

ANTI-CD30L ANTIBODIES AND USES THEREOF**CROSS-REFERENCE**

[0001] This application claims the benefit of U.S. Provisional Patent Application Serial No. 63/150,373 filed February 17, 2021, which is incorporated by reference herein in its entirety.

SEQUENCE LISTING

[0002] The instant application contains a Sequence Listing which has been submitted electronically in ASCII format and is hereby incorporated by reference in its entirety. Said ASCII copy, created on February 14, 2022, is named 56884-786_601_SL.txt and is 256,626 bytes in size.

1. BACKGROUND

[0003] Autoimmune disease occurs when the immune system attacks self-molecules as a result of a breakdown of immunologic tolerance to autoreactive immune cells. Many autoimmune disorders have been strongly associated with genetic, infectious, and/or environmental predisposing factors yielding multiple disorders and symptoms ranging from organ-specific dysfunction to systemic dysfunction. Inflammatory bowel disease (IBD) refers to a collection of intestinal disorders causing inflammatory conditions in the gastrointestinal tract. The primary types of IBD are ulcerative colitis (UC) and Crohn's Disease (CD). These diseases are prevalent, with about 1.86 million people diagnosed globally with UC, and about 1.3 million people diagnosed globally with CD. Severe forms of IBD may result in or be characterized by intestinal fibrosis, which is the accumulation of scar tissue in the intestinal wall. The pathogenesis of IBD is thought to involve an uncontrolled immune response that may be triggered by certain environmental factors in a genetically susceptible host. The heterogeneity of disease pathogenesis and clinical course, combined with the variable response to treatment and its associated side effects, suggests a targeted therapeutic approach to treating these diseases is a desirable treatment strategy. Yet there are very few targeted therapies available to IBD patients, especially those patients who may be non-responsive or lose response to existing IBD therapies.

2. SUMMARY

[0004] Provided herein are antibodies that bind CD30 ligand (also referred to as CD30L, CD153, TNFSF8) and are useful in the treatment of autoimmune disorders such as IBD.

Generally, in an aspect, the antibodies described herein effectively inhibit an interaction between CD30L and CD30 in order to effectively reduce, inhibit, or prevent immune activation (for example, an inflammatory response). Furthermore, the anti-CD30L antibodies described herein also comprise properties useful for therapeutic application, including, for example, reduced and/or low immunogenicity. The antibodies described herein also inhibit expression/secretion of certain inflammatory cytokines (e.g., interleukin-6 and interleukin-8) that play a key role in inflammatory and autoimmune diseases such as inflammatory bowel disease, Crohn's disease, and ulcerative colitis.

[0005] Accordingly, in one aspect, provided herein is an antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765.

[0006] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109, 628, 635, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149, 642, 649, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189, 656, 663, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309, 670, 677, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349, 684, 691, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-389, 698, 705, and 760-765.

[0007] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one

of SEQ ID NOs: 145-149, 642, 649, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, and 760-765.

[0008] In one aspect, provided herein is an antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof binds to an epitope comprising one or more amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0009] In some embodiments, the antibody or antigen binding fragment thereof binds to an epitope comprising: (i) any one amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; (ii) any two amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; (iii) any three amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; (iv) any four amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; (v) any five amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; or (vi) K16, S21, R30, K48, R63, and Y64 in CD30L; wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0010] In some embodiments, the antibody or antigen binding fragment thereof binds to an epitope comprising K16 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34. In some embodiments, the epitope further comprises S21 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34. In some embodiments, the epitope further comprises R30 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34. In some embodiments, the epitope further comprises K48 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34. In some embodiments, the epitope further comprises R63 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34. In some embodiments, the epitope further comprises Y64 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0011] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119, 629, 636, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159, 643, 650, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199, 657, 664, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319, 671, 678, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359, 685, 692, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399, 699, 706, and 760-765.

[0012] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119, 629, 636, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159, 643, 650, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199, 657, 664, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319, 671, 678, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359, 685, 692, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399, 699, 706, and 760-765.

[0013] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409, and 760-765.

[0014] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409, and 760-765.

[0015] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419, and 760-765.

[0016] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414.

[0017] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 215-219, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419, and 760-765.

[0018] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 220-224, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 235-239, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 250-254, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 420-424, and 744-751; (e) a CDR-L2 comprising

the amino acid sequence set forth in any one of SEQ ID NOs: 435-439, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 450-454, and 760-765.

[0019] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain (VH) comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 17; and/or (b) the immunoglobulin variable region light chain (VL) comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 18.

[0020] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 225-229, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 240-244, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 255-259, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 425-429, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 440-444, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 455-459, and 760-765.

[0021] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) VH comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 19; and/or (b) VL comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 20.

[0022] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 230-234, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 245-249, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 260-264, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 430-434, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 445-449, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 460-464, and 760-765.

[0023] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) VH comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 21; and/or (b) VL comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 22.

[0024] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 465-469, 631, 638, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 490-494, 645, 652, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 528-532, 659, 666, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 553-557, 673, 680, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 578-582, 687, 694, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 603-607, 701, 708, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 470-474, 632, 639, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 495-499, 646, 653, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 533-537, 660, 667, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 558-562, 674, 681, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 583-587, 688, 695, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 608-612, 702, 709, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 475-479, 633, 640, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 513-517, 647, 654, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 538-542, 661, 668, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 563-567, 675, 682, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 588-592, 689, 696, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 613-617, 703, 710, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set

forth in any one of SEQ ID NOs: 480-484, 630, 637, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 518-522, 644, 651, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 543-547, 658, 665, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 568-572, 672, 679, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 593-597, 686, 693, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 618-622, 700, 707, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 485-489, 634, 641, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 523-527, 648, 655, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 548-552, 662, 669, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 573-577, 676, 683, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 598-602, 690, 697, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 623-627, 704, 711, and 760-765.

[0025] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712, 714, 716, 718, 720, and 722; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724, 726, 728, 730, 732, and 734; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736, 738, 740, and 742; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744, 746, 748, and 750; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752, 754, 756, and 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760, 762, and 764. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the

amino acid sequence set forth in any one of SEQ ID NOs: 713, 715, 717, 719, 721, and 723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 725, 727, 729, 731, 733, and 735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 737, 739, 741, and 743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 745, 747, 749, and 751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 753, 755, 757, and 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 761, 763, and 765. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 760. In some embodiments, the antibody or antigen binding fragment thereof comprises: (v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 761. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 724; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 760. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 725; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 761. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 714; (b) a CDR-H2

comprising the amino acid sequence set forth in SEQ ID NO: 726; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 760. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 715; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 727; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 761. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 716; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 728; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 760. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 717; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 729; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 761. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 718; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 738; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 746; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 754; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 762. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 719; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 739; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 747; (e) a CDR-L2 comprising the amino acid sequence

set forth SEQ ID NO: 755; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 763. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 720; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 732; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 740; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 748; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 756; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 721; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 733; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 741; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 749; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 757; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 722; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 734; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 742; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 750; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 764. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 723; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 735; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 743; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 751; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 765.

[0026] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 635; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 649; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 663; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 677; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 691; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 705. In some embodiments, the antibody or antigen binding fragment thereof

comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 107; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 147; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 187; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 307; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 347; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 387. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 105; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 145; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 185; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 305; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 345; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 385. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 106; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 146; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 186; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 306; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 346; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 386. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 108; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 148; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 188; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 308; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 348; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 388. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 109; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 149; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 189; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 309; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 389. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 628; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 642; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 656; (d) a CDR-L1

comprising the amino acid sequence set forth in SEQ ID NO: 670; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 684; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 698.

[0027] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 636; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 650; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 664; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 678; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 692; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 706. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 117; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 157; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 197; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 317; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 357; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 397. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 115; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 155; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 195; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 315; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 355; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 395. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 116; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 156; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 196; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 316; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 356; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 396. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 118; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 158; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 198; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 318; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 358; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO:

398. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 119; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 159; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 199; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 319; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 399. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 629; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 643; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 657; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 671; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 685; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 699.

[0028] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 637; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 651; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 665; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 679; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 693; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 707. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 482; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 520; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 545; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 570; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 595; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 620. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 480; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 518; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 543; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 568; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 593; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 618. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 481; (b) a CDR-H2 comprising the amino acid sequence

set forth in SEQ ID NO: 519; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 544; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 569; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 594; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 619. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 483; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 521; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 546; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 571; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 596; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 621. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 484; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 522; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 547; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 572; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 597; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 622. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 630; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 644; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 658; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 672; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 686; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 700.

[0029] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 638; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 652; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 666; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 680; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 694; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 708. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 467; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 492; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 530; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 555; (e) a CDR-L2 comprising

the amino acid sequence set forth SEQ ID NO: 580; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 605. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 465; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 490; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 528; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 553; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 578; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 603. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 466; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 491; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 529; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 554; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 579; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 604. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 468; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 493; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 531; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 556; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 581; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 606. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 469; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 494; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 532; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 557; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 582; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 607. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 631; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 645; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 659; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 673; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 687; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 701.

[0030] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 639; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 653; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 667; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 681; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 695; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 709. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 472; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 497; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 535; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 560; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 585; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 610. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 470; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 495; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 533; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 558; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 583; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 608. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 471; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 496; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 534; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 559; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 584; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 609. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 473; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 498; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 536; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 561; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 586; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 611. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 474; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 499; (c) a CDR-H3 comprising

the amino acid sequence set forth in SEQ ID NO: 537; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 562; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 587; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 612. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 632; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 646; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 660; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 674; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 688; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 702.

[0031] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 640; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 654; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 668; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 682; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 696; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 710. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 477; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 515; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 540; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 565; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 590; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 615. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 475; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 513; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 538; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 563; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 588; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 613. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 476; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 514; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 539; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 564; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 589; and/or (f)

a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 614. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 478; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 516; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 541; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 566; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 591; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 616. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 479; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 517; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 542; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 567; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 592; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 617. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 633; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 647; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 661; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 675; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 689; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 703.

[0032] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 641; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 655; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 669; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 683; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 697; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 711. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 487; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 525; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 550; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 575; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 600; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 625. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set

forth in SEQ ID NO: 485; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 523; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 548; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 573; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 598; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 623. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 486; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 524; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 549; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 574; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 599; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 624. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 488; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 526; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 551; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 576; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 601; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 626. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 489; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 527; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 552; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 577; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 602; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 627. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 634; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 648; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 662; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 676; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 690; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 704.

[0033] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin variable region heavy chain (VH) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) an immunoglobulin variable

region light chain (VL) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 3. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 4. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 7. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 8. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 11. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 12. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 15. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 16. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH

comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 24. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 26. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 28. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 30. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 32.

[0034] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) a VL comprising an amino acid sequence set forth in any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 3. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 4. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 7. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 8. In some embodiments, the antibody or antigen binding fragment thereof comprises:

(a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 11. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 12. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 15. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 16. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 24. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 26. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 28. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 30. In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 32.

[0035] In some embodiments, the antibody or antigen binding fragment thereof further comprises an IgG constant region. In some embodiments, the antibody or antigen binding fragment thereof further comprises an IgG constant region having reduced antibody-dependent cell-mediated cytotoxicity (ADCC) function as compared to human IgG and/or reduced complement-dependent cytotoxicity (CDC) as compared to human IgG. In some embodiments, the constant region comprises an amino acid sequence having 80, 85, 90, 95, 97, 98, 99, or 100 % sequence identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In some embodiments, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NOs: 500-512.

[0036] In some embodiments, the antibody or antigen binding fragment thereof further comprises a constant region having an amino acid sequence variant corresponding to (a) 297A,

297Q, 297G, or 297D, (b) 279F, 279K, or 279L, (c) 228P, (d) 235A, 235E, 235G, 235Q, 235R, or 235S, (e) 237A, 237E, 237K, 237N, or 237R, (f) 234A, 234V, or 234F, (g) 233P, (h) 328A, (i) 327Q or 327T, (j) 329A, 329G, 329Y, or 329R, (k) 331S, (l) 236F or 236R, (m) 238A, 238E, 238G, 238H, 238I, 238V, 238W, or 238Y, (n) 248A, (o) 254D, 254E, 254G, 254H, 254I, 254N, 254P, 254Q, 254T, or 254V, (p) 255N, (q) 256H, 256K, 256R, or 256V, (r) 264S, (s) 265H, 265K, 265S, 265Y, or 265A, (t) 267G, 267H, 267I, or 267K, (u) 268K, (v) 269N or 269Q, (w) 270A, 270G, 270M, or 270N, (x) 271T, (y) 272N, (z) 292E, 292F, 292G, or 292I, (aa) 293S, (bb) 301W, (cc) 304E, (dd) 311E, 311G, or 311S, (ee) 316F, (ff) 328V, (gg) 330R, (hh) 339E or 339L, (ii) 343I or 343V, (jj) 373A, 373G, or 373S, (kk) 376E, 376W, or 376Y, (ll) 380D, (mm) 382D or 382P, (nn) 385P, (oo) 424H, 424M, or 424V, (pp) 434I, (qq) 438G, (rr) 439E, 439H, or 439Q, (ss) 440A, 440D, 440E, 440F, 440M, 440T, or 440V, (tt) E233P, (uu) L235E, (vv) L234A and L235A, (ww) L234A, L235A, and G237A, (xx) L234A, L235A, and P329G, (yy) L234F, L235E, and P331S, (zz) L234A, L235E, and G237A, (aaa) L234A, L235E, G237A, and P331S, (bbb) L234A, L235A, G237A, P238S, H268A, A330S, and P331S, (ccc) L234A, L235A, and P329A, (ddd) G236R and L328R, (eee) G237A, (fff) F241A, (ggg) V264A, (hhh) D265A, (iii) D265A and N297A, (jjj) D265A and N297G, (kkk) D270A, (lll) A330L, (mmm) P331A or P331S, or (nnn) any combination of (a) – (mmm), per EU numbering.

[0037] In some embodiments, the antibody or antigen binding fragment thereof is an IgG antibody. In some embodiments, the IgG antibody is IgG1, IgG2, IgG3, or IgG4.

[0038] In some embodiments, the antibody or antigen binding fragment thereof is human, chimeric, or humanized.

[0039] In some embodiments, the antigen binding fragment thereof is a Fab, F(ab')₂, a single-domain antibody, or a single chain variable fragment (scFv).

[0040] In some embodiments, the antibody or antigen binding fragment thereof binds one or more amino acids residues of CD30L that interact with CD30.

[0041] In some embodiments, the antibody or antigen binding fragment thereof inhibits a binding interaction between CD30L and CD30. In some embodiments, the antibody or antigen binding fragment thereof blocks a binding interaction between CD30L and CD30. In some embodiments, the inhibition or blocking is determined in an ELISA assay, a cell binding assay with CD30L expressing cells, or a surface plasmon resonance (SPR) assay.

[0042] In some embodiments, the antibody or antigen binding fragment thereof specifically binds to CD30L.

[0043] In some embodiments, the antibody or antigen binding fragment thereof (i) inhibits interleukin-8 secretion in a cell-based assay, (ii) inhibits interleukin-6 secretion in a cell-based assay, or (iii) both (i) and (ii). In some embodiments, the antibody or antigen binding fragment thereof (i) blocks interleukin-8 secretion in a cell-based assay, (ii) blocks interleukin-6 secretion in a cell-based assay, or (iii) both (i) and (ii). In some embodiments, the cell-based assay is a dual cell assay with a cell expressing CD30 and a cell expressing CD30L.

[0044] In some embodiments, the antibody or antigen binding fragment thereof binds to (i) human CD30L, (ii) cynomolgus CD30L, or (iii) both human CD30L and cynomolgus CD30L.

[0045] In some embodiments, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation equilibrium constant (K_D) of no more than 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, or 1000 pM. In some embodiments, the antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of at least 0.1×10^6 , 0.2×10^6 , 0.3×10^6 , 0.4×10^6 , 0.5×10^6 , 0.6×10^6 , 0.7×10^6 , 0.8×10^6 , 0.9×10^6 , 1.0×10^6 , 1.1×10^6 , 1.2×10^6 , 1.3×10^6 , 1.4×10^6 , 1.5×10^6 , or $1.55 \times 10^6 \text{ M}^{-1}\text{S}^{-1}$. In some embodiments, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation rate constant (k_{off}) of no more than 1.4×10^{-4} , 1.41×10^{-4} , 1.5×10^{-4} , 1.6×10^{-4} , 1.7×10^{-4} , 1.8×10^{-4} , 1.9×10^{-4} , 2.0×10^{-4} , 2.1×10^{-4} , 2.2×10^{-4} , 2.3×10^{-4} , 2.4×10^{-4} , 2.5×10^{-4} , 2.6×10^{-4} , 2.7×10^{-4} , 2.8×10^{-4} , 2.9×10^{-4} , 3.0×10^{-4} , 3.1×10^{-4} , 3.2×10^{-4} , 3.3×10^{-4} , 3.4×10^{-4} , or $3.5 \times 10^{-4} \text{ S}^{-1}$.

[0046] In some embodiments, the antibody or antigen binding fragment thereof is recombinant antibody or antigen binding fragment thereof.

[0047] In some embodiments, the antibody or antigen binding fragment thereof is isolated antibody or antigen binding fragment thereof.

[0048] In one aspect, provided herein are recombinant antibodies and/or antigen binding fragments thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139 or 220-234; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179 or 235-249; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219 or 250-264; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339 or 420-434; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379 or 435-449; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3)

comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419 or 450-464.

[0049] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-389.

[0050] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-104; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-144; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-184; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-304; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-344; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-384.

[0051] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 145-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs:

305-309; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389.

[0052] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1 and 2; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3 and 4.

[0053] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359; and/or (e) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399.

[0054] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-114; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-154; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-194; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-314; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-354; and/or (e) an immunoglobulin light

chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-394.

[0055] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399.

[0056] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 5 and 6; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 7 and 8.

[0057] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409.

[0058] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-124; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-164; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-204; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-324; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-364; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-404.

[0059] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409.

[0060] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 9 and 10; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 11 and 12.

[0061] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid

sequence set forth in any one of SEQ ID NOs: 130-139; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419.

[0062] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414.

[0063] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 215-219; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419.

[0064] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 13 and 14; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 15 and 16.

[0065] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 220-224; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 235-239; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 250-254; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 420-424; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 435-439; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 450-454.

[0066] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 17; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 18.

[0067] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 225-229; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 240-244; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 255-259; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs:

425-429; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 440-444; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 455-459.

[0068] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 19; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 20.

[0069] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 230-234; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 245-249; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 260-264; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 430-434; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 445-449; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 460-464.

[0070] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 21; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 22.

[0071] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising a constant region (e.g. a fragment crystallizable (Fc) region) having reduced antibody-dependent cell-mediated cytotoxicity (ADCC) function as compared to human IgG1 and/or reduced complement-dependent

cytotoxicity (CDC) as compared to human IgG1. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the Constant region comprises an amino acid sequence having 80, 85, 90, 95, 97, 98, 99, or 100 % sequence identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the Constant region comprises the amino acid sequence set forth by any one of SEQ ID NOs: 500-512.

[0072] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising a constant region having an amino acid sequence variant corresponding to (a) 297A, 297Q, 297G, or 297D, (b) 279F, 279K, or 279L, (c) 228P, (d) 235A, 235E, 235G, 235Q, 235R, or 235S, (e) 237A, 237E, 237K, 237N, or 237R, (f) 234A, 234V, or 234F, (g) 233P, (h) 328A, (i) 327Q or 327T, (j) 329A, 329G, 329Y, or 329R (k) 331S, (l) 236F or 236R, (m) 238A, 238E, 238G, 238H, 238I, 238V, 238W, or 238Y, (n) 248A, (o) 254D, 254E, 254G, 254H, 254I, 254N, 254P, 254Q, 254T, or 254V, (p) 255N, (q) 256H, 256K, 256R, or 256V, (r) 264S, (s) 265H, 265K, 265S, 265Y, or 265A, (t) 267G, 267H, 267I, or 267K, (u) 268K, (v) 269N or 269Q, (w) 270A, 270G, 270M, or 270N, (x) 271T, (y) 272N, (z) 292E, 292F, 292G, or 292I, (aa) 293S, (bb) 301W, (cc) 304E, (dd) 311E, 311G, or 311S, (ee) 316F, (ff) 328V, (gg) 330R, (hh) 339E or 339L, (ii) 343I or 343V, (jj) 373A, 373G, or 373S, (kk) 376E, 376W, or 376Y, (ll) 380D, (mm) 382D or 382P, (nn) 385P, (oo) 424H, 424M, or 424V, (pp) 434I, (qq) 438G, (rr) 439E, 439H, or 439Q, (ss) 440A, 440D, 440E, 440F, 440M, 440T, or 440V, (tt) E233P, (uu) L235E, (vv) L234A and L235A, (ww) L234A, L235A, and G237A, (xx) L234A, L235A, and P329G, (yy) L234F, L235E, and P331S, (zz) L234A, L235E, and G237A, (aaa), L234A, L235E, G237A, and P331S (bbb) L234A, L235A, G237A, P238S, H268A, A330S, and P331S, (ccc) L234A, L235A, and P329A, (ddd) G236R and L328R, (eee) G237A, (fff) F241A, (ggg) V264A, (hhh) D265A, (iii) D265A and N297A, (jjj) D265A and N297G, (kkk) D270A, (lll) A330L, (mmm) P331A or P331S, or (nnn) any combination of (a) – (mmm), per EU numbering.

[0073] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is an IgG antibody. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the IgG antibody is IgG1, IgG2, IgG3, or IgG4. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is human, chimeric, or humanized.

[0074] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is a Fab, F(ab)[']₂, a single-domain antibody, or a single chain variable fragment (scFv). In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is a bispecific or multispecific antibody.

[0075] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof inhibits a binding interaction between CD30L and CD30.

[0076] In an aspect, further provided are nucleic acids encoding the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments. Also provided are cells comprising the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments. In some embodiments, the cell is a eukaryotic cell. In some embodiments, the cell is a prokaryotic cell.

[0077] In an aspect, provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting binding of CD30L to CD30. Further provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting activation of CD30 signaling in a cell. Also provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting activation, expression, and/or secretion of a pro-inflammatory cytokine protein.

[0078] In an aspect, provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in treating an autoimmune disease in an individual in need thereof. In some embodiments, the autoimmune disease is irritable bowel disease. In some embodiments, the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

[0079] In an aspect, provided are methods of treating or ameliorating an autoimmune disease in an individual in need thereof, the method comprising administering to the individual the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments, thereby treating or ameliorating the autoimmune disease. Also provided are methods for inhibiting and/or reducing binding of CD30L to CD30 in an individual with an inflammatory or autoimmune disorder, the method comprising administering to an individual afflicted with the inflammatory or autoimmune disorder the recombinant antibody or antigen binding fragment thereof of the preceding embodiments, thereby inhibiting and/or reducing

the binding of CD30L to CD30. Further provided are methods of reducing and/or inhibiting inflammation in an individual, the method comprising administering to the individual the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments, thereby reducing and/or inhibiting inflammation.

[0080] In some embodiments, the provided are methods of any of the preceding embodiments, wherein the individual has an autoimmune disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the autoimmune disease is irritable bowel disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

[0081] In some embodiments, the provided are methods of any of the preceding embodiments, wherein reducing and/or inhibiting inflammation comprises reducing an amount of pro-inflammatory cytokine expression or secretion in the individual or a tissue of the individual. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the pro-inflammatory cytokine comprises interleukin 8 and/or interleukin 6. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the individual has an autoimmune disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the autoimmune disease is irritable bowel disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

3. BRIEF DESCRIPTION OF THE DRAWINGS

[0082] FIGS. 1A-1E depict dose dependent curve of various anti-CD30L antibodies in B16-huCD30L cell binding assay (1st left column), inhibition/blocking of IL-8 release in a dual cell assay (B16-huCD30L cells and K299 cells) (2nd column from the left), ELISA assay of binding to rhCD30L (3rd column from the left), and ELISA assay of antibody-mediated blocking of CD30-Fc binding to huCD30L (4th column from the left). Units for ELISA are OD 450nm; and units for cell binding assays are mean fluorescence intensity (MFI). **FIG. 1A:** results for clones 2_germlined, 62, 63, 64 and 65; **FIG. 1B:** results for clones 66, 67, 68, 69, 70 and 71; **FIG. 1C:** results for clones 72, 73, 74, 75, 76 and 77; **FIG. 1D:** results for clones 78, 79 80 and 8; **FIG. 1E:** results for clones 82, 83,84 and 85.

[0083] **FIG. 2** depicts the overlap mapping of the peptides generated from trypsin, chymotrypsin, ASP-N, elastase, and/or thermolysin proteolysis, demonstrating that the peptide signature covers 94.76% of the CD30L ECD sequence.

[0084] **FIG. 3** depicts the epitope determined from cross-linking and mass spectrometry studies in the context of parts of the CD30L ECD sequence (SEQ ID NO: 34).

[0085] **FIGS. 4A-4J** depict the 3 dimensional structure of the epitope on CD30L as identified. CD30L PDB structure was colored in blue on the epitope site. CD30L amino acids colored in dark gray are corresponding to 16-30 (KGGNCSEDLLCILKR) and 48-64 (KTKLSWNKDGILHGVRY) of SEQ ID NO: 34. **FIGS 4A-4E**: ribbon/surface representation of front view (**4A**); back view (**4B**), side view 1 (**4C**), side view 2 (**4D**) and top view (**4E**). **FIGS 4F-4J**: ribbon representation of front view (**4F**); back view (**4G**), side view 1 (**4H**), side view 2 (**4I**) and top view (**4J**).

[0086] **FIG. 5A** depicts the cell binding assays for determining anti-CD30L binding to CD30L expressing cells and for determining the blocking/inhibition of CD30 binding to CD30L expressing cells by anti-CD30L. **FIG. 5B** and **FIG. 5C** depict representative binding curves for germlined clone 2 from cell binding assay shown in **FIG. 5A**, with **5B** showing binding to human CD30L expressing B16 cells and **5C** showing binding to cynoCD30L expressing HEK293 cells. **FIG. 5D** and **FIG. 5E** depict representative blocking curves for germlined clone 2 from cell binding assay shown in **FIG. 5A**, with **5D** showing blocking curves against humanCD30L expressing B16 cells and **5E** showing blocking curves against cynoCD30L expressing HEK293 cells. **FIG. 5F** depicts the ELISA configuration for determining anti-CD30L binding to purified CD30L and **FIG. 5G** depicts the ELISA configuration for determining the blocking/inhibition of CD30L to CD30 by anti-CD30L. **FIG. 5H** depicts representative binding curve for germlined clone 2 with ELISA assay shown in **FIG. 5F** and **FIG. 5I** depicts representative blocking curve for germlined clone 2 with ELISA assay shown in **FIG. 5G**. **FIG. 5J** depicts the dual cell IL-8 release assay in which CD30 expressing cells release IL-8 upon signaling by ligation with CD30L expressing cells via the CD30-CD30L interaction. **FIG. 5K** and **FIG. 5L** depict representative IL-8 release curves for germlined clone 2 from dual cell assay shown in **FIG. 5J**, with **5K** showing IL-8 release curves with humanCD30L expressing B16 cells and **5L** showing IL-8 release curves with cynoCD30L expressing HEK293 cells.

[0087] **FIGS. 6A-6D** depict the effect of anti-CD30L in cynomolgus T cell-dependent antibody responses *in vivo*. **FIG. 6A** depicts the time course of the KLH-specific IgM levels in the serum of various treated animals as indicated. **FIG. 6B** depicts the overall anti-KLH IgM

levels (area under the curve) after various treatment based on the curve of **FIG. 6A**. **FIG. 6C** depicts the time course of the KLH-specific IgG levels in the serum of various treated animals as indicated. **FIG. 6D** depicts the overall anti-KLH IgG levels (area under the curve) after various treatment based on the curve of **FIG. 6C**.

4. DETAILED DESCRIPTION

[0088] There are a limited number of therapies available for autoimmune disorders such as IBD, and the development of new therapeutics presents a challenge in the treatment autoimmune diseases, disorders, and symptoms associated therewith. A notable number anti-inflammatory therapies either do not result in an effective therapeutic response to or fail to provide a lasting response. Furthermore, for the time that a patient is treated with an ineffective anti-inflammatory therapy, the disease worsens. For such non-responding patients, the only treatment is surgery, generally in the form of strictureplasty (reshaping of the intestine) or resection (removal of the intestine). Surgical treatments for IBD are invasive, causing post-operative risks for an estimated one-third of patients undergoing surgery, such as anastomotic leak, infection, and bleeding. Accordingly, the heterogeneity of disease pathogenesis and clinical course, combined with the variable and/or inconsistent response to treatment, suggests a targeted therapeutic approach to treating autoimmune disorders such as IBD is a desirable treatment strategy. Yet very few targeted therapies have been identified and effective in IBD patients, especially those patients who may be non-responsive to existing IBD anti-inflammatory therapies. Thus, there is a need for novel therapeutics to treat autoimmune diseases such as IBD that specifically target IBD pathogenesis.

[0089] Described herein are antibodies that target and bind CD30 ligand (CD30L) and, in certain instances, provide an effective targeted therapy approach for the treatment of autoimmune disorders such as IBD. Generally, in an aspect, the antibodies described herein effectively inhibit an interaction between CD30L and CD30 in order to effectively reduce, inhibit, or prevent immune activation (for example, an inflammatory response). The CD30 ligand (also referred to as CD30L, CD153 or TNFSF8) is a member of the tumor necrosis factor (TNF) family. CD30L is a transmembrane protein expressed on immune cells, including activated T and B cells. Generally, after interaction with its receptor CD30, CD30L may induce signal transduction through modulation of TNF receptor-associated factor 1 (TRAF1), TRAF2, 3 and 5. Interaction between CD30-CD30L results in the triggering of immune cell (for example, T cell) activation (for example, stimulating immune cell

proliferation, release of cytokines, etc.) and the activation of an inflammatory response. Accordingly, the antibodies described here that target CD30L are useful in preventing, inhibiting, or reducing CD30-CD30L-mediated immune cell activation and/or activation of an inflammatory response in an individual. In certain instances, preventing, inhibiting, or reducing CD30-CD30L-mediated immune cell activation and/or activation of an inflammatory response in an individual is useful for the treatment of autoimmune disorders such as IBD.

4.1 anti-CD30L Antibodies

[0090] Described herein are recombinant antibodies or antigen binding fragments thereof that bind CD30 ligand (CD30L). CD30 ligand or CD30L or human CD30L (also known and referred to as Tumor necrosis factor ligand superfamily member 8, CD153; CD30L; CD30LG; TNLG3A) as used herein refers to any protein that comprises the expressed and processed forms of the human (*Homo sapiens*) CD30L gene which, in certain embodiments, is designated as UniProtKB/Swiss-Prot P32971 (NCBI Reference Sequence: NM_001244.4 → NP_001235.1 or NM_001252290.1 → NP_001239219.1) The term “CD30L” as used herein includes the wild type protein and all naturally occurring variants and/or isoforms thereof, and all transcriptional variants, post-translationally-modified variants (for example, as described as part of the record in UniProtKB/Swiss-Prot P32971). The antibodies further block an interaction between CD30L and CD30 and inhibit pro-inflammatory cytokine release.

[0091] The term “and/or” as used in a phrase with a list of members is intended to include all members individually and all combination of full or partial list of members. For example, a phrase such as “A and/or B” herein is intended to include both A and B; A or B; A (alone); and B (alone). Likewise, the term “and/or” as used in a phrase such as “A, B, and/or C” is intended to encompass each of the following embodiments: A, B, and C; A, B, or C; A or C; A or B; B or C; A and C; A and B; B and C; A (alone); B (alone); and C (alone).

[0092] The disclosure provides that wherever embodiments are provided herein with the term “comprising,” the analogous embodiments described in terms of “consisting of” and/or “consisting essentially of” are also provided, if such analogous embodiments are not explicitly provided. The disclosure further provides that wherever embodiments are described herein with the phrase “consisting essentially of,” the analogous embodiments described in terms of “consisting of” are also provided. The disclosure also provides that wherever embodiments

are described herein with the phrase “consisting of,” the analogous embodiments described in terms of “consisting essentially of” are also provided.

[0093] All applications, publications, patents and other references, GenBank citations and ATCC citations cited herein are incorporated by reference in their entirety. In case of conflict, the specification, including definitions, will control.

[0094] As used herein, numerical values are often presented in a range format throughout this document. The use of a range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention unless the context clearly indicates otherwise. Accordingly, the use of a range expressly includes all possible subranges, all individual numerical values within that range, and all numerical values or numerical ranges including integers within such ranges and fractions of the values or the integers within ranges unless the context clearly indicates otherwise. This construction applies regardless of the breadth of the range and in all contexts throughout this patent document. Thus, for example, reference to a range of 90-100% includes 91-99%, 92-98%, 93-95%, 91-98%, 91-97%, 91-96%, 91-95%, 91-94%, 91-93%, and so forth. Reference to a range of 90-100% also includes 91%, 92%, 93%, 94%, 95%, 95%, 97%, *etc.*, as well as 91.1%, 91.2%, 91.3%, 91.4%, 91.5%, *etc.*, 92.1%, 92.2%, 92.3%, 92.4%, 92.5%, *etc.*, and so forth.

[0095] In addition, reference to a range of 1-3, 3-5, 5-10, 10-20, 20-30, 30-40, 40-50, 50-60, 60-70, 70-80, 80-90, 90-100, 100-110, 110-120, 120-130, 130-140, 140-150, 150-160, 160-170, 170-180, 180-190, 190-200, 200-225, 225-250 includes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, *etc.* In a further example, reference to a range of 25-250, 250-500, 500-1,000, 1,000-2,500, 2,500-5,000, 5,000-25,000, 25,000-50,000 includes any numerical value or range within or encompassing such values, *e.g.*, 25, 26, 27, 28, 29...250, 251, 252, 253, 254...500, 501, 502, 503, 504..., *etc.*

[0096] As also used herein a series of ranges are disclosed throughout this document. The use of a series of ranges includes combinations of the upper and lower ranges to provide another range. This construction applies regardless of the breadth of the range and in all contexts throughout this patent document. Thus, for example, reference to a series of ranges such as 5-10, 10-20, 20-30, 30-40, 40-50, 50-75, 75-100, 100-150, includes ranges such as 5-20, 5-30, 5-40, 5-50, 5-75, 5-100, 5-150, and 10-30, 10-40, 10-50, 10-75, 10-100, 10-150, and 20-40, 20-50, 20-75, 20-100, 20-150, and so forth.

[0097] In some embodiments, the term “about” means mean within 10%, within 9%, within 8%, within 7%, within 6%, within 5%, within 4%, within 3%, within 2%, within 1%, or less of a given value, amount, or range. For instance, an antibody variable region comprising

about 90% identity to a reference variable region may comprise 82% to 98% identity to the reference variable region.

[0098] The terms “specifically bind to,” “specific binding,” and analogous terms when used in the context of one molecule binding to the other, means that one molecule binds to the other molecule with significantly higher affinity than to any cross-reactive antigen or off-target antigen (together as non-target antigen) as determined using experimental techniques, such as Surface Plasmon Resonance (SPR), fluorescence activated cell sorting (FACS) analysis, Kinetic Exclusion Assay (KinExA), isothermal titration calorimetry (ITC), radioimmunoassays (RIA) and enzyme linked immunosorbent assays (ELISAs). Typically, a specific or selective reaction will be at least twice non-target signal or noise of non-target binding and may be more than 10 times non-target binding. See, *e.g.*, Fundamental Immunology 332-36 (Paul ed., 2d ed. 1989) for a discussion regarding antibody specificity. An antibody or antigen binding fragment which binds a target of interest (*e.g.*, a target CD30L) is one that binds the target with sufficient affinity such that the antibody or antigen binding fragment is useful as a therapeutic agent in targeting a cell or tissue expressing the target, and does not significantly cross-react with other proteins. In such embodiments, the extent of binding of the antibody or antigen binding fragment to a **“non-target” protein** will be less than about 10% of the binding of the antibody or antigen binding fragment to its particular target protein, for example, as determined by FACS analysis, SPR, KinExA, ITC, ELISA, or RIA. Specific binding can be measured, for example, by determining binding of a molecule compared to binding of a control molecule, which generally is a molecule of similar structure that does not have binding activity. For example, specific binding can be determined by competition with a control molecule that is similar to the target, for example, an excess of non-labeled target. In this case, specific binding is indicated if the binding of the labeled target to a probe is competitively inhibited by excess unlabeled target. As such, the term **“specific binding,” “specifically binds to,” “specifically inhibits,” “specifically blocks” or “is specific for” a particular target as used herein refers to binding, blocking, or inhibition where a molecule binds to, blocks, or inhibits a particular target without substantially binding to or inhibiting a non-target.** In certain embodiments, the antiCD30L antibody or antigen binding fragment provided herein specifically binds to CD30L. In some embodiments, an antiCD30L antibody or antigen binding fragment that specifically binds to CD30L indicates that the antibody reacts or associates more frequently, more rapidly, with greater duration, with greater affinity, or with some combination of the above to the CD30L than with alternative substances, including unrelated proteins.

[0099] As used herein, the term “inhibit,” “inhibiting,” or “inhibition” when used in reference to CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions, is intended to mean decreasing, attenuating, lowering, reducing, or completely abolishing the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions (such as CD30L-mediated IL-8 release in CD30 expressing cells). For example, such inhibition of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions can be a reduction of 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%, or 99% of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions. In other examples, such inhibition of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions can be complete elimination of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions. In one embodiment, the anti-CD30L antibody or antigen binding fragment provided herein inhibited the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions by at least 30%, at least 35%, at least 40%, at least 45%, at least 50%, at least 55%, at least 60%, at least 65%, at least 70%, at least 75%, at least 80%, at least 85%, at least 90%, at least 95%, or at least 99%. In another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein inhibited the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions by about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, or about 99%. In yet another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein completely abolished the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions.

[0100] As used herein, the term “block,” or “blocking,” when used in reference to CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions, is intended to mean decreasing, attenuating, lowering, reducing, or completely abolishing the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions (such as CD30L-mediated IL-8 release in CD30 expressing cells), to such a degree that the remaining the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions are no longer biologically significant. For example, such

blocking of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions can be a reduction of 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, or 99% of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions. In other examples, such blocking of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions can be complete elimination of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions. In one embodiment, the anti-CD30L antibody or antigen binding fragment provided herein blocks the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions by decreasing at least 60%, at least 65%, at least 70%, at least 75%, at least 80%, at least 85%, at least 90%, at least 95%, or at least 99% of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions, such that the remaining CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions are no longer biologically significant. In another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein blocks the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions by about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, or about 99% of the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions, such that the remaining CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions are no longer biologically significant. In yet another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein completely blocks, e.g. completely abolishes the CD30-CD30L binding or interaction, CD30L-mediated CD30 signaling, or other CD30L biochemical or biological functions.

[0101] “Antibody-dependent cell-mediated cytotoxicity” or “ADCC” refers to a form of cytotoxicity in which secreted immunoglobulin bound onto Fc receptors (FcRs) present on certain cytotoxic cells (*e.g.*, Natural Killer (NK) cells, neutrophils, and macrophages) enable these cytotoxic effector cells to bind specifically to an antigen-bearing target cell and subsequently kill the target cell with cytotoxins. The antibodies “arm” the cytotoxic cells and are absolutely required for such killing. NK cells, the primary cells for mediating ADCC, express FcγRIII only, whereas monocytes express FcγRI, FcγRII, and FcγRIII. FcR expression on hematopoietic cells is known (*see, e.g.*, Ravetch and Kinet, 1991, *Annu. Rev. Immunol.*

9:457-92). To assess ADCC activity of a molecule of interest, an *in vitro* ADCC assay (*see, e.g.*, US Pat. Nos. 5,500,362 and 5,821,337) can be performed. Useful effector cells for such assays include peripheral blood mononuclear cells (PBMC) and Natural Killer (NK) cells. Alternatively, or additionally, ADCC activity of the molecule of interest may be assessed *in vivo*, for example, in an animal model (*see, e.g.*, Clynes *et al.*, 1998, Proc. Natl. Acad. Sci. USA 95:652-56). Antibodies with little or no ADCC activity can be selected for use.

[0102] “Antibody-dependent cellular phagocytosis” or “ADCP” refers to the destruction of target cells via monocyte or macrophage-mediated phagocytosis when immunoglobulin bound onto Fc receptors (FcRs) present on certain phagocytotic cells (*e.g.*, neutrophils, monocytes, and macrophages) enable these phagocytotic cells to bind specifically to an antigen-bearing target cell and subsequently kill the target cell. To assess ADCP activity of a molecule of interest, an *in vitro* ADCP assay (*see, e.g.*, Bracher *et al.*, 2007, J. Immunol. Methods 323:160-71) can be performed. Useful phagocytotic cells for such assays include peripheral blood mononuclear cells (PBMC), purified monocytes from PBMC, or U937 cells differentiated to the mononuclear type. Alternatively, or additionally, ADCP activity of the molecule of interest may be assessed *in vivo*, for example, in an animal model (*see, e.g.*, Wallace *et al.*, 2001, J. Immunol. Methods 248:167-82). Antibodies with little or no ADCP activity can be selected for use.

[0103] “Complement dependent cytotoxicity” or “CDC” refers to the lysis of a target cell in the presence of complement. Activation of the classical complement pathway is initiated by the binding of the first component of the complement system (C1q) to antibodies (of the appropriate subclass) which are bound to their cognate antigen. To assess complement activation, a CDC assay (*see, e.g.*, Gazzano-Santoro *et al.*, 1996, J. Immunol. Methods 202:163) may be performed. Polypeptide variants with altered Fc region amino acid sequences (polypeptides with a variant Fc region) and increased or decreased C1q binding capability have been described (*see, e.g.*, US Pat. No. 6,194,551; WO 1999/51642; Idusogie *et al.*, 2000, J. Immunol. 164: 4178-84). Antibodies with little or no CDC activity can be selected for use.

[0104] As provided herein, the term “antibody” is used in the broadest sense and includes polyclonal and monoclonal antibodies, including intact antibodies and functional (antigen-binding) antibody fragments thereof, including fragment antigen binding (Fab) fragments, F(ab')₂ fragments, Fab' fragments, Fv fragments, recombinant IgG (rIgG) fragments, single chain antibody fragments, including single chain variable fragments (sFv or scFv), and single domain antibodies (for example, sdAb, sdFv, nanobody) fragments. The term encompasses genetically engineered and/or otherwise modified forms of immunoglobulins, such as

intrabodies, peptibodies, chimeric antibodies, fully human antibodies, humanized antibodies, and heteroconjugate antibodies, multispecific, for example, bispecific, antibodies, diabodies, triabodies, and tetrabodies, tandem di-scFv, tandem tri-scFv. Unless otherwise stated, the term “antibody” should be understood to encompass functional antibody fragments thereof. The term also encompasses intact or full-length antibodies, including antibodies of any class or sub-class, including IgG and sub-classes thereof, IgM, IgE, IgA, and IgD. The antibody can comprise a human IgG1 constant region. The antibody can comprise a human IgG4 constant region.

[0105] The provided antibodies are useful as monoclonal antibodies, in polyclonal antibody compositions, as multispecific antibodies (for example, bispecific antibodies and polyreactive antibodies), and as antibody fragments (for example, scFv formats). The antibodies provided herein also include antibody-conjugates and molecules comprising the antibodies, such as chimeric molecules. Thus, an antibody includes, but is not limited to, full-length and native antibodies, as well as fragments and portions thereof retaining the binding specificities thereof, such as any specific binding portion thereof including those having any number of, immunoglobulin classes and/or isotypes (for example, IgG1, IgG2, IgG3, IgG4, IgA, IgD, IgE and IgM); and biologically relevant (antigen-binding) fragments or specific binding portions thereof, including but not limited to Fab, F(ab')₂, Fv, and scFv (single chain or related entity). A monoclonal antibody is generally one within a composition of substantially homogeneous antibodies; thus, any individual antibodies comprised within the monoclonal antibody composition are identical except for possible naturally occurring mutations that may be present in minor amounts. A polyclonal antibody is a preparation that includes different antibodies of varying sequences that generally are directed against two or more different determinants (epitopes). The monoclonal antibody can comprise a human IgG1 constant region. The monoclonal antibody can comprise a human IgG4 constant region.

[0106] The terms “complementarity determining region,” and “CDR,” which are synonymous with “hypervariable region” or “HVR,” are known in the art to refer to non-contiguous sequences of amino acids within antibody variable regions, which confer antigen specificity and/or binding affinity. In general, there are three CDRs in each heavy chain variable region (CDR-H1, CDR-H2, CDR-H3) and three CDRs in each light chain variable region (CDR-L1, CDR-L2, CDR-L3). “Framework regions” and “FR” are known in the art to refer to the non-CDR portions of the variable regions of the heavy and light chains. In general, there are four FRs in each full-length heavy chain variable region (FR-H1, FR-H2, FR-H3, and FR-H4), and four FRs in each full-length light chain variable region (FR-L1, FR-

L2, FR-L3, and FR-L4). The precise amino acid sequence boundaries of a given CDR or FR can be readily determined using any of a number of well-known schemes, including those described by Kabat et al. (1991), "Sequences of Proteins of Immunological Interest," 5th Ed. Public Health Service, National Institutes of Health, Bethesda, MD ("Kabat" numbering scheme); Al-Lazikani et al., (1997) JMB 273,927-948 ("Chothia" numbering scheme); MacCallum et al., J. Mol. Biol. 262:732-745 (1996), "Antibody-antigen interactions: Contact analysis and binding site topography," J. Mol. Biol. 262, 732-745. ("Contact" numbering scheme); Lefranc MP et al., "IMGT unique numbering for immunoglobulin and T cell receptor variable domains and Ig superfamily V-like domains," Dev Comp Immunol, 2003 Jan;27(1):55-77 ("IMGT" numbering scheme); Honegger A and Plückthun A, "Yet another numbering scheme for immunoglobulin variable domains: an automatic modeling and analysis tool," J Mol Biol, 2001 Jun 8;309(3):657-70, ("Aho" numbering scheme); and Whitelegg NR and Rees AR, "WAM: an improved algorithm for modelling antibodies on the WEB," Protein Eng. 2000 Dec;13(12):819-24 ("AbM" numbering scheme). The CDRs of the antibodies described herein may be defined by the Kabat, IMGT, Chothia, AbM, Aho, contact numbering scheme, or any combination thereof.

[0107] The boundaries of a given CDR or FR may vary depending on the scheme used for identification. For example, the Kabat scheme is based on structural alignments, while the Chothia scheme is based on structural information. Numbering for both the Kabat and Chothia schemes is based upon the most common antibody region sequence lengths, with insertions accommodated by insertion letters, for example, "30a," and deletions appearing in some antibodies. The two schemes place certain insertions and deletions ("indels") at different positions, resulting in differential numbering. The Contact scheme is based on analysis of complex crystal structures and is similar in many respects to the Chothia numbering scheme. The various numbering schemes and the CDR boundaries according to each numbering schemes are summarized below in Table 26.

Table 26: CDR boundaries according to various numbering schemes

	<u>IMGT</u>	<u>Kabat</u>	<u>AbM</u>	<u>Chothia</u>	<u>Contact</u>	<u>Aho</u>
CDR-H1 (VH CDR1)	27-38	31-35	26-35	26-32	30-35	25-40
CDR-H2 (VH CDR2)	56-65	50-65	50-58	52-56	47-58	58-77
CDR-H3 (VH CDR3)	105-117	95-102	95-102	96-101	93-101	109-137

CDR-L1 (VL CDR1)	27-38	24-34	24-34	26-32	30-36	25-40
CDR-L2 (VL CDR2)	56-65	50-56	50-56	50-52	46-55	58-77
CDR-L3 (VL CDR3)	105-117	89-97	89-97	91-96	89-96	109-137

[0108] Accordingly, the term “variable region residue numbering as in Kabat” or “amino acid position numbering as in Kabat”, and variations thereof, refer to the numbering system used for heavy chain variable regions or light chain variable regions of the compilation of antibodies in Kabat *et al.*, *supra*. Using this numbering system, the actual linear amino acid sequence may contain fewer or additional amino acids corresponding to a shortening of, or insertion into, an FR or CDR of the variable domain. For example, a heavy chain variable domain may include a single amino acid insert (residue 52a according to Kabat) after residue 52 and three inserted residues (*e.g.*, residues 82a, 82b, and 82c, *etc.* according to Kabat) after residue 82. The Kabat numbering of residues may be determined for a given antibody by alignment at regions of homology of the sequence of the antibody with a “standard” Kabat numbered sequence. The Kabat numbering system is generally used when referring to a residue in the variable domain (approximately residues 1-107 of the light chain and residues 1-113 of the heavy chain) (*e.g.*, Kabat *et al.*, *supra*). The “EU numbering system” or “EU index” is generally used when referring to a residue in an immunoglobulin heavy chain constant region (*e.g.*, the EU index reported in Kabat *et al.*, *supra*). The “EU index as in Kabat” refers to the residue numbering of the human IgG 1 EU antibody. Other numbering systems have been described, for example, by AbM, Chothia, Contact, IMGT, and AHo.

[0109] The term “variable region” or “variable domain” refers to the domain of an antibody heavy or light chain that is involved in binding the antibody to antigen. The variable domains of the heavy chain and light chain (VH and VL, respectively) of a native antibody generally have similar structures, with each domain comprising four conserved framework regions (FRs) and three CDRs (See for example, Kindt et al. Kuby Immunology, 6th ed., W.H. Freeman and Co., page 91(2007)). A single VH or VL domain may be sufficient to confer antigen-binding specificity. Furthermore, antibodies that bind a particular antigen may be isolated using a VH or VL domain from an antibody that binds the antigen to screen a library of complementary VL or VH domains, respectively (See for example, Portolano et al., J. Immunol. 150:880-887 (1993); Clarkson et al., Nature 352:624-628 (1991)).

[0110] The term “heavy chain” when used in reference to an antibody refers to a polypeptide chain of about 50-70 kDa, wherein the amino-terminal portion includes a variable region of about 120 to 130 or more amino acids, and a carboxy-terminal portion includes a constant region. The constant region can be one of five distinct types, (*e.g.*, isotypes) referred to as **alpha (α), delta (δ), epsilon (ϵ), gamma (γ), and mu (μ)**, based on the amino acid sequence of the heavy chain constant region. The distinct heavy chains differ in size: **α , δ , and γ contain approximately 450 amino acids, while μ and ϵ contain approximately 550 amino acids.** When combined with a light chain, these distinct types of heavy chains give rise to five well known classes (*e.g.*, isotypes) of antibodies, IgA, IgD, IgE, IgG, and IgM, respectively, including four subclasses of IgG, namely IgG1, IgG2, IgG3, and IgG4. A heavy chain can be a human heavy chain.

[0111] The term “light chain” when used in reference to an antibody refers to a polypeptide chain of about 25 kDa, wherein the amino-terminal portion includes a variable region of about 100 to about 110 or more amino acids, and a carboxy-terminal portion includes a constant region. The approximate length of a light chain is 211 to 217 amino acids. There are two distinct types, referred to as **kappa (κ) or lambda (λ)** based on the amino acid sequence of the constant domains. Light chain amino acid sequences are well known in the art. A light chain can be a human light chain.

[0112] Among the provided antibodies are antibody fragments. An “antibody fragment,” “antigen-binding fragment,” “antigen-binding domain,” “antigen-binding region,” “antigen binding fragment,” “antigen binding domain,” “antigen binding region,” and similar terms refer to a molecule other than an intact antibody that comprises a portion of an intact antibody that binds the antigen to which the intact antibody binds. Examples of antibody fragments include, but are not limited to, Fv, Fab, Fab', Fab'-SH, F(ab')₂; diabodies; linear antibodies; single-chain antibody molecules (for example, scFv or sFv); and multispecific antibodies formed from antibody fragments. In particular embodiments, the antibodies are single-chain antibody fragments comprising a variable heavy chain region and/or a variable light chain region, such as scFvs. Generally, an antibody fragment or antigen-binding fragment will comprise one or more CDRs from a parental antibody that are sufficient to confer binding specificity.

[0113] As used herein the term “contact” or “contacts” in reference to an antibody binding or being bound to a specific target refers to an amino acid residue of variable region or a CDR coming within 5, 4, 3 or fewer angstroms of the recited contacted residue. Contact includes hydrogen bonding, Van der Waal's interactions and salt bridge formation between an amino acid residue of the variable region or CDR of the antibody and the recited residue.

[0114] Antibody fragments can be made by various techniques, including but not limited to proteolytic digestion of an intact antibody as well as production by recombinant host cells. In some embodiments, the antibodies are recombinantly-produced fragments, such as fragments comprising arrangements that do not occur naturally, such as those with two or more antibody regions or chains joined by synthetic linkers, for example, polypeptide linkers, and/or those that are not produced by enzyme digestion of a naturally-occurring intact antibody. In some aspects, the antibody fragments are scFvs.

[0115] Generally, a humanized antibody is an antibody in which all or substantially all CDR amino acid residues are derived from non-human CDRs and all or substantially all FR amino acid residues are derived from human FRs. A humanized antibody optionally may include at least a portion of an antibody constant region derived from a human antibody. A “humanized form” of a non-human antibody refers to a variant of the non-human antibody that has undergone humanization, typically to reduce immunogenicity to humans, while retaining the specificity and affinity of the parental non-human antibody. In some embodiments, some FR residues in a humanized antibody are substituted with corresponding residues from a non-human antibody (for example, the antibody from which the CDR residues are derived), for example, to restore or improve antibody specificity or affinity. In some embodiments, a humanized antibody refers to forms of non-human (for example, murine) or not fully humanized antibodies having specific immunoglobulin chains, chimeric immunoglobulins, or fragments thereof that contain minimal non-human (for example, murine) sequences. In a non-limiting example, a humanized antibody comprises less than about 40% non-human sequence in the variable region. In some embodiments, a humanized antibody comprises less than about 20% non-human sequence in a full-length antibody sequence. In a further non-limiting example, a humanized antibody comprises less than about 20% non-human sequence in the framework region of each of the heavy chain and light chain variable regions. For instance, the humanized antibody comprises less than about 20%, 19%, 18%, 17%, 16%, 15%, 14%, 13%, 12%, 11%, 10%, 9%, 8%, 7%, 6%, 5%, 4%, 3%, 2%, or 1% non-human sequence in the framework region of each of the heavy chain and light chain variable regions. As another example, the humanized antibody comprises about or less than about 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, or 1 non-human sequences in the framework region of each of the heavy chain and light chain variable regions. In some embodiments, humanized antibodies are human immunoglobulins in which residues from the complementarity determining region (CDR) are replaced by residues from the CDR of a non-human species (for example, mouse, rat, rabbit, hamster) that have the desired specificity, affinity, and

capability. These humanized antibodies may contain one or more non-human species mutations, for example, the heavy chain comprises about 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 non-human species mutations in the framework region, and the light chain comprises about 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 non-human species mutations in the framework region. The humanized heavy chain variable domain may comprise a IGHV3-9, IGHV4-59, or IGHV3-33 framework with no or fewer than about 10, 9, 8, 7, 6, 5, 4, 3, 2, or 1 amino acid mutations. In some embodiments, the heavy chain variable domain comprises a IGHV3-9 framework. In some embodiments, the heavy chain variable domain comprises a IGHV4-59 framework. In some embodiments, the heavy chain variable domain comprises a IGHV3-33 framework. The humanized light chain variable domain may comprise IGKV1-16, IGKV1-6, or IGKV2-28 framework with no or fewer than about 10, 9, 8, 7, 6, 5, 4, 3, 2, or 1 amino acid mutations.

[0116] Among the provided antibodies are human antibodies. A “human antibody” is an antibody with an amino acid sequence corresponding to that of an antibody produced by a human or a human cell, or non-human source that utilizes human antibody repertoires or other human antibody-encoding sequences, including human antibody libraries. The term excludes humanized forms of non-human antibodies comprising non-human antigen-binding regions, such as those in which all or substantially all CDRs are non-human.

[0117] Human antibodies may be prepared by administering an immunogen to a transgenic animal that has been modified to produce intact human antibodies or intact antibodies with human variable regions in response to antigenic challenge. Such animals typically contain all or a portion of the human immunoglobulin loci, which replace the endogenous immunoglobulin loci, or which are present extrachromosomally or integrated randomly into the animal's chromosomes. In such transgenic animals, the endogenous immunoglobulin loci have generally been inactivated. Human antibodies also may be derived or selected from human antibody libraries, including phage display and cell-free libraries, containing antibody-encoding sequences derived from a human repertoire. In certain embodiments, a human antibody can have sequence liabilities removed or its affinity increased by successive rounds of selection by a method such as phage display.

[0118] The terms “polypeptide” and “protein” are used interchangeably to refer to a polymer of amino acid residues and are not limited to a minimum length. Polypeptides, including the provided antibodies and antibody chains and other peptides, for example, linkers and binding peptides, may include amino acid residues including natural and/or non-natural amino acid residues. The terms also include post-expression modifications of the polypeptide, for

example, glycosylation, sialylation, acetylation, phosphorylation, and the like. In some aspects, the polypeptides may contain modifications with respect to a native or natural sequence, as long as the protein maintains the desired activity. These modifications may be deliberate, as through site-directed mutagenesis, or may be accidental, such as through mutations of hosts which produce the proteins or errors due to PCR amplification.

[0119] Percent (%) sequence identity with respect to a reference polypeptide sequence is the percentage of amino acid residues in a candidate sequence that are identical with the amino acid residues in the reference polypeptide sequence, after aligning the sequences and introducing gaps, if necessary, to achieve the maximum percent sequence identity, and not considering any conservative substitutions as part of the sequence identity. Alignment for purposes of determining percent amino acid sequence identity can be achieved in various ways that are known for instance, using publicly available computer software such as BLAST, BLAST-2, ALIGN or Megalign (DNASTAR) software. Appropriate parameters for aligning sequences are able to be determined, including algorithms needed to achieve maximal alignment over the full length of the sequences being compared. For purposes herein, however, % amino acid sequence identity values are generated using the sequence comparison computer program ALIGN-2. The ALIGN-2 sequence comparison computer program was authored by Genentech, Inc., and the source code has been filed with user documentation in the U.S. Copyright Office, Washington D.C., 20559, where it is registered under U.S. Copyright Registration No. TXU510087. The ALIGN-2 program is publicly available from Genentech, Inc., South San Francisco, Calif., or may be compiled from the source code. The ALIGN-2 program should be compiled for use on a UNIX operating system, including digital UNIX V4.0D. All sequence comparison parameters are set by the ALIGN-2 program and do not vary.

[0120] In situations where ALIGN-2 is employed for amino acid sequence comparisons, the % amino acid sequence identity of a given amino acid sequence A to, with, or against a given amino acid sequence B (which can alternatively be phrased as a given amino acid sequence A that has or comprises a certain % amino acid sequence identity to, with, or against a given amino acid sequence B) is calculated as follows: 100 times the fraction X/Y , where X is the number of amino acid residues scored as identical matches by the sequence alignment program ALIGN-2 in that program's alignment of A and B, and where Y is the total number of amino acid residues in B. It will be appreciated that where the length of amino acid sequence A is not equal to the length of amino acid sequence B, the % amino acid sequence identity of A to B will not equal the % amino acid sequence identity of B to A. Unless

specifically stated otherwise, all % amino acid sequence identity values used herein are obtained as described in the immediately preceding paragraph using the ALIGN-2 computer program.

[0121] In some embodiments, amino acid sequence variants of the antibodies provided herein are contemplated. A variant typically differs from a polypeptide specifically disclosed herein in one or more substitutions, deletions, additions and/or insertions. Such variants can be naturally occurring or can be synthetically generated, for example, by modifying one or more of the above polypeptide sequences of the invention and evaluating one or more biological activities of the polypeptide as described herein and/or using any of a number of known techniques. For example, it may be desirable to improve the binding affinity and/or other biological properties of the antibody. Amino acid sequence variants of an antibody may be prepared by introducing appropriate modifications into the nucleotide sequence encoding the antibody, or by peptide synthesis. Such modifications include, for example, deletions from, and/or insertions into and/or substitutions of residues within the amino acid sequences of the antibody. Any combination of deletion, insertion, and substitution can be made to arrive at the final construct, provided that the final construct possesses the desired characteristics, for example, antigen-binding.

[0122] In some embodiments, antibody variants having one or more amino acid substitutions are provided. Sites of interest for mutagenesis by substitution include the CDRs and FRs. Amino acid substitutions may be introduced into an antibody of interest and the products screened for a desired activity, for example, retained/improved antigen binding, decreased immunogenicity such as reduced ADCC or CDC. In some embodiments, substitutions, insertions, or deletions may occur within one or more CDRs, wherein the substitutions, insertions, or deletions do not substantially reduce antibody binding to antigen. For example, conservative substitutions that do not substantially reduce binding affinity may be made in CDRs. Such alterations may be outside of CDR “hotspots.” In some embodiments of the variant VH and VL sequences, each CDR is unaltered.

[0123] Alterations (for example, substitutions) may be made in CDRs, for example, to improve antibody affinity. Such alterations may be made in CDR encoding codons with a high mutation rate during somatic maturation (See for example, Chowdhury, Methods Mol. Biol. 207:179-196 (2008)), and the resulting variant can be tested for binding affinity. Affinity maturation (for example, using error-prone PCR, chain shuffling, randomization of CDRs, or oligonucleotide-directed mutagenesis) can be used to improve antibody affinity (See for example, Hoogenboom et al. in Methods in Molecular Biology 178:1-37 (2001)).

CDR residues involved in antigen binding may be specifically identified, for example, using alanine scanning mutagenesis or modeling (See for example, Cunningham and Wells Science, 244:1081-1085 (1989)). CDR-H3 and CDR-L3 in particular are often targeted. Alternatively, or additionally, a crystal structure of an antigen-antibody complex to identify contact points between the antibody and antigen. Such contact residues and neighboring residues may be targeted or eliminated as candidates for substitution. Variants may be screened to determine whether they contain the desired properties.

[0124] Amino acid sequence insertions and deletions include amino- and/or carboxyl-terminal fusions ranging in length from one residue to polypeptides containing a hundred or more residues, as well as intrasequence insertions and deletions of single or multiple amino acid residues. Examples of terminal insertions include an antibody with an N-terminal methionyl residue. Other insertional variants of the antibody molecule include the fusion to the N- or C-terminus of the antibody to an enzyme (for example, for ADEPT) or a polypeptide which increases the serum half-life of the antibody. Examples of intrasequence insertion variants of the antibody molecules include an insertion of 3 amino acids in the light chain. Examples of terminal deletions include an antibody with a deletion of 7 or less amino acids at an end of the light chain.

[0125] In some embodiments, the antibodies are altered to increase or decrease their glycosylation (for example, by altering the amino acid sequence such that one or more glycosylation sites are created or removed). A carbohydrate attached to an Fc region of an antibody may be altered. Native antibodies from mammalian cells typically comprise a branched, biantennary oligosaccharide attached by an N-linkage to Asn297 of the CH2 domain of the Fc region (See for example, Wright et al. TIBTECH 15:26-32 (1997)). The oligosaccharide can be various carbohydrates, for example, mannose, N-acetyl glucosamine (GlcNAc), galactose, sialic acid, fucose attached to a GlcNAc in the stem of the biantennary oligosaccharide structure. Modifications of the oligosaccharide in an antibody can be made, for example, to create antibody variants with certain improved properties. Antibody glycosylation variants can alter ADCC and/or CDC function. Cell lines, for example, knockout cell lines and methods of their use can be used to produce defucosylated antibodies, for example, Lec13 CHO cells deficient in protein fucosylation and alpha-1,6-fucosyltransferase gene (FUT8) knockout CHO cells (See for example, Ripka et al. Arch. Biochem. Biophys. 249:533-545 (1986); Yamane-Ohnuki et al. Biotech. Bioeng. 87: 614 (2004); Kanda, Y. et al., Biotechnol. Bioeng., 94(4):680-688 (2006)). Other antibody glycosylation variants are also included (See for example, U.S. Pat. No. 6,602,684).

[0126] In some embodiments, one or more amino acid modifications may be introduced into the Fc region of an antibody provided herein, thereby generating an Fc region variant. An Fc region herein is a C-terminal region of an immunoglobulin heavy chain that contains at least a portion of the constant region. An Fc region includes native sequence Fc regions and variant Fc regions. The Fc region variant may comprise a human Fc region sequence (for example, a human IgG1, IgG2, IgG3 or IgG4 Fc region) comprising an amino acid modification (for example, a substitution) at one or more amino acid positions.

[0127] In some embodiments, the antibodies of this disclosure are variants that possess some but not all effector functions, which make it a desirable candidate for applications in which the half-life of the antibody in vivo is important yet certain effector functions (such as complement and ADCC) are unnecessary or deleterious. In vitro and/or in vivo cytotoxicity assays can be conducted to confirm the reduction/depletion of CDC and/or ADCC activities. For example, Fc receptor (FcR) binding assays can be conducted to ensure that the antibody **lacks FcγR binding (hence likely lacking ADCC activity)**. Non-limiting examples of in vitro assays to assess ADCC activity of a molecule of interest is described in U.S. Pat. No. 5,500,362 and 5,821,337. Alternatively, non-radioactive assays methods may be employed (for example, **ACTITM** and **CytoTox 96®** non-radioactive cytotoxicity assays). Useful effector cells for such assays include peripheral blood mononuclear cells (PBMC), monocytes, macrophages, and Natural Killer (NK) cells.

[0128] Antibodies can have increased half-lives and improved binding to the neonatal Fc receptor (FcRn) (See for example, US 2005/0014934). Such antibodies can comprise an Fc region with one or more substitutions therein which improve binding of the Fc region to FcRn, and include those with substitutions at one or more of Fc region residues: 238, 256, 265, 272, 286, 303, 305, 307, 311, 312, 317, 340, 356, 360, 362, 376, 378, 380, 382, 413, 424 or 434 according to the EU numbering system (See for example, U.S. Pat. No. 7,371,826). Other examples of Fc region variants are also contemplated (See for example, Duncan & Winter, Nature 322:738-40 (1988); U.S. Pat. Nos. 5,648,260 and 5,624,821; and WO94/29351).

[0129] Reactive groups can be positioned at sites for conjugation to other moieties, such as drug moieties or linker drug moieties, to create an immunoconjugate. In certain embodiments, the recombinant anti-CD30L antibody provided herein may be further modified to contain additional nonproteinaceous moieties that are known and available. The moieties suitable for derivatization of the antibody include but are not limited to water soluble polymers. Non-limiting examples of water soluble polymers include, but are not

limited to, polyethylene glycol (PEG), copolymers of ethylene glycol/propylene glycol, carboxymethylcellulose, dextran, polyvinyl alcohol, polyvinyl pyrrolidone, poly-1,3-dioxolane, poly-1,3,6-trioxane, ethylene/maleic anhydride copolymer, polyaminoacids (either homopolymers or random copolymers), and dextran or poly(n vinyl pyrrolidone)polyethylene glycol, polypropylene glycol homopolymers, polypropylene oxide/ethylene oxide copolymers, polyoxyethylated polyols (for example, glycerol), polyvinyl alcohol, and mixtures thereof. Polyethylene glycol propionaldehyde may have advantages in manufacturing due to its stability in water. The polymer may be of any molecular weight, and may be branched or unbranched. The number of polymers attached to the antibody may vary, and if two or more polymers are attached, they can be the same or different molecules.

[0130] The antibodies described herein can be encoded by a nucleic acid. A nucleic acid is a type of polynucleotide comprising two or more nucleotide bases. In certain embodiments, the nucleic acid is a component of a vector that can be used to transfer the polypeptide encoding polynucleotide into a cell. **As used herein, the term “vector” refers to a nucleic acid molecule capable of transporting another nucleic acid to which it has been linked.** One type of vector is **a genomic integrated vector, or “integrated vector,” which can become integrated into the chromosomal DNA of the host cell.** Another type of vector is an **“episomal” vector**, for example, a nucleic acid capable of extra-chromosomal replication. Vectors capable of directing the expression of genes to which they are operatively linked are referred to herein as **“expression vectors.”** Suitable vectors comprise plasmids, bacterial artificial chromosomes, yeast artificial chromosomes, viral vectors and the like. In the expression vectors regulatory elements such as promoters, enhancers, polyadenylation signals for use in controlling transcription can be derived from mammalian, microbial, viral or insect genes. The ability to replicate in a host, usually conferred by an origin of replication, and a selection gene to facilitate recognition of transformants may additionally be incorporated. Vectors derived from viruses, such as lentiviruses, retroviruses, adenoviruses, adeno-associated viruses, and the like, may be employed. Plasmid vectors can be linearized for integration into a chromosomal location. Vectors can comprise sequences that direct site-specific integration into a defined location or restricted set of sites in the genome (for example, AttP-AttB recombination). Additionally, vectors can comprise sequences derived from transposable elements.

[0131] As used herein, the terms **“homologous,” “homology,” or “percent homology”** when used herein to describe to an amino acid sequence or a nucleic acid sequence, relative to a reference sequence, can be determined using the formula described by Karlin and Altschul

(Proc. Natl. Acad. Sci. USA 87: 2264-2268, 1990, modified as in Proc. Natl. Acad. Sci. USA 90:5873-5877, 1993). Such a formula is incorporated into the basic local alignment search tool (BLAST) programs of Altschul et al. (J. Mol. Biol. 215: 403-410, 1990). Percent homology of sequences can be determined using the most recent version of BLAST, as of the filing date of this application.

[0132] The nucleic acids encoding the antibodies described herein can be used to infect, transfect, transform, or otherwise render a suitable cell transgenic for the nucleic acid, thus enabling the production of antibodies for commercial or therapeutic uses. Standard cell lines and methods for the production of antibodies from a large-scale cell culture are known in the art. See for example, Li et al., “Cell culture processes for monoclonal antibody production.” *Mabs*. 2010 Sep-Oct; 2(5): 466–477. In certain embodiments, the cell is a Eukaryotic cell. In certain embodiments, the Eukaryotic cell is a mammalian cell. In certain embodiments, the mammalian cell is a Chines Hamster Ovary cell (CHO) cell, an NS0 murine myeloma cell, a HEK293 (Human Embryonic Kidney 293) cell or a PER.C6® cell. In certain embodiments, the nucleic acid encoding the antibody is integrated into a genomic locus of a cell useful for producing antibodies. In certain embodiments, described herein is a method of making an antibody comprising culturing a cell comprising a nucleic acid encoding an antibody under conditions in vitro sufficient to allow production and secretion of said antibody.

[0133] In certain embodiments, described herein, is a master cell bank comprising: (a) a mammalian cell line comprising one or more nucleic acids encoding an antibody described herein integrated at a genomic location; and (b) a cryoprotectant. In certain embodiments, the cryoprotectant comprises glycerol, DMSO, or a combination thereof. In certain embodiments, the master cell bank comprises: (a) a CHO cell line comprising a nucleic acid encoding an antibody with (i) a heavy chain variable region amino acid sequence at least 90% identical to that set forth by SEQ ID NO: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, or 31; and (ii) a light chain amino acid sequence at least 90% identical to that set forth by SEQ ID NO: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, 30, or 32, integrated at a genomic location; and (b) a cryoprotectant. In certain embodiments, the cryoprotectant comprises glycerol, DMSO, or a combination thereof. In certain embodiments, the master cell bank is contained in a suitable vial or container able to withstand freezing by liquid nitrogen.

[0134] Also described herein are methods of making an antibody described herein. Such methods comprise incubating a cell or cell-line comprising a nucleic acid encoding the antibody in a cell culture medium under conditions sufficient to allow for expression and secretion of the antibody, and further harvesting the antibody from the cell culture medium.

The harvesting can further comprise one or more purification steps to remove live cells, cellular debris, non-antibody proteins or polypeptides, undesired salts, buffers, and medium components. In certain embodiments, the additional purification step(s) include centrifugation, ultracentrifugation, dialysis, desalting, protein A, protein G, protein A/G, or protein L purification, and/or ion exchange chromatography.

[0135] The recombinant antibodies or antibody fragments thereof disclosed herein, specifically bind CD30L and are marked by a high affinity for CD30L. Accordingly, the antibodies disclosed herein are useful for targeting (i.e. binding) CD30L. In some embodiments, the anti-CD30L antibodies provided comprise a heavy chain comprising four heavy chain framework regions (HCFR) and three heavy chain complementarity -determining regions (HCDR): HCFR1, HCDR1, HCFR2, HCDR2, HCFR3, HCDR3, and HCFR4; and a light chain comprising four light chain framework regions (LCFR) and three light chain complementarity -determining regions (LCDR): LCFR1, LCDR1, LCFR2, LCDR2, LCFR3, LCDR3, and LCFR4.

[0136] In one aspect, provided herein is an antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin heavy chain CDR1 (CDR-H1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723; (b) an immunoglobulin heavy chain CDR2 (CDR-H2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743; (d) an immunoglobulin light chain CDR1 (CDR-L1) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751; (e) an immunoglobulin light chain CDR2 (CDR-L2) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759; and/or (f) an immunoglobulin light chain CDR3 (CDR-L3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765.

[0137] Consistent with the above aspect, in one embodiment, the Antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723. In some embodiments, the Antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735. In certain embodiments, the Antibody or

antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743. In other embodiments, the Antibody or antigen binding fragment thereof comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In another embodiment, the antibody or antigen binding fragment thereof comprises or consists of a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In one embodiment, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723 and a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723 and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In further embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735 and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-

669, and 736-743. In one embodiment, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In one embodiment, the antibody or antigen binding fragment thereof comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In another embodiment, the antibody or antigen binding fragment thereof comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In another embodiment, the antibody or antigen binding fragment thereof comprises or

consists of a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In further embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising

the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219,

250-264, 528-552, 656-669, and 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-

751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751. In further embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the

antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID

NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In yet other embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In further embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In further embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-

697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising

the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In certain embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of a CDR-H1 comprising the amino

acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of any one of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of any two of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765, in any combination or permutation. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of any three of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ

Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765, in any combination or permutation. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of any four of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765, in any combination or permutation. In some embodiments, the antibody or antigen binding fragment thereof comprises or consists of any five of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765, in any combination or permutation. In some embodiments, the Antibody or antigen binding fragment thereof comprises or consists of all six of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ Id NOs: 180-219, 250-264, 528-552, 656-669, and 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751, a CDR-L2 comprising the amino acid

sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765.

[0138] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109, 628, 635, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149, 642, 649, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189, 656, 663, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309, 670, 677, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349, 684, 691, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 380-389, 698, 705, and 760-765.

[0139] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109, 628, 635, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149, 642, 649, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189, 656, 663, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309, 670, 677, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349, 684, 691, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 380-389, 698, 705, and 760-765.

[0140] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, and 752-759; and/or (f)

a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, and 760-765.

[0141] In one aspect, provided herein is an antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof binds to an epitope comprising one or more amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0142] The anti-CD30L antibody provided herein can binds to epitope of various combinations of amino acids on CD30L as described herein. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising any one amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising any two amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising any three amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising any four amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising any five amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to an epitope comprising K16, S21, R30, K48, R63, and Y64. The position of the amino acids in this paragraph are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0143] Furthermore, the anti-CD30L antibody provided herein including in Section 2 and this Section (Section 4.1) can bind to certain specific epitope of specific combinations of amino acids on CD30L as described herein and such epitopes are further provided in this paragraph. Accordingly, in one embodiment, the epitope for the anti-CD30L provided herein comprises or consists of K16. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K48. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R63. In another embodiment, the epitope for the anti-CD30L provided herein comprises or consists of Y64. In one embodiment, the epitope for the anti-CD30L provided herein comprises or consists of K16 and S21. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16 and R30. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16 and K48. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16 and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16 and Y64. In further embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21 and R30. In one embodiment, the epitope for the anti-CD30L provided herein comprises or consists of S21 and K48. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21 and R63. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21 and Y64. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30 and K48. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30 and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30 and Y64. In one embodiment, the epitope for the anti-CD30L provided herein comprises or consists of K48 and R63. In another embodiment, the epitope for the anti-CD30L provided herein comprises or consists of K48 and Y64. In another embodiment, the epitope for the anti-CD30L provided herein comprises or consists of R63 and Y64. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, and R30. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21 and K48. In further embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, and Y64. In some embodiments,

the epitope for the anti-CD30L provided herein comprises or consists of K16, R30 and K48. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, and Y64. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, K48 and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, K48 and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R63 and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30 and K48. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, and Y64. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, K48 and R63. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, K48 and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R63 and Y64. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30, K48 and R63. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30, K48 and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30, R63 and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K48, R63 and Y64. In other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, and K48. In further embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, K48, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, K48, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R63, and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, K48, and R63. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, K48, and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, R63, and Y64. In yet other embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, K48, R63, and Y64. In further

embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, K48, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, K48, and Y64. In further embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, K48, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of R30, K48, R63, and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, K48, and R63. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, K48, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, R63, and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, K48, R63, and Y64. In certain embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, R30, K48, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of S21, R30, K48, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of K16, S21, R30, K48, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of any one of K16, S21, R30, K48, R63, and Y64. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of any two of K16, S21, R30, K48, R63, and Y64, in any combination or permutation. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of any three of K16, S21, R30, K48, R63, and Y64, in any combination or permutation. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of any four of K16, S21, R30, K48, R63, and Y64, in any combination or permutation. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of any five of K16, S21, R30, K48, R63, and Y64, in any combination or permutation. In some embodiments, the epitope for the anti-CD30L provided herein comprises or consists of all six of K16, S21, R30, K48, R63, and Y64. The position of the amino acids in this paragraph are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

[0144] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119, 629, 636, and 712-723; (b) a CDR-H2 comprising

the amino acid sequence set forth in any one of SEQ ID NOs: 150-159, 643, 650, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199, 657, 664, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319, 671, 678, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359, 685, 692, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399, 699, 706, and 760-765.

[0145] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-114, 629, 636, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-154, 643, 650, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-194, 657, 664, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-314, 671, 678, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-354, 685, 692, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-394, 699, 706, and 760-765.

[0146] In other embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119, 629, 636, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159, 643, 650, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199, 657, 664, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319, 671, 678, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359, 685, 692, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399, 699, 706, and 760-765.

[0147] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169, and 724-735; (c) a CDR-H3

comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409, and 760-765.

[0148] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-124, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-164, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-204, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-324, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-364, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-404, and 760-765.

[0149] In other embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409, and 760-765.

[0150] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one

of SEQ ID NOs: 370-379, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419, and 760-765.

[0151] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414, and 760-765.

[0152] In other embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 215-219, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419, and 760-765.

[0153] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 220-224, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 235-239, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 250-254, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 420-424, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 435-439, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 450-454, and 760-765.

[0154] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen

binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 225-229, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 240-244, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 255-259, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 425-429, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 440-444, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 455-459, and 760-765.

[0155] In other embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 230-234, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 245-249, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 260-264, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 430-434, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 445-449, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 460-464, and 760-765.

[0156] In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 465-469, 631, 638, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 490-494, 645, 652, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 528-532, 659, 666, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 553-557, 673, 680, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 578-582, 687, 694, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 603-607, 701, 708, and 760-765;

[0157] In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 470-474, 632, 639, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 495-499, 646, 653, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 533-537, 660, 667, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 558-562, 674, 681, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 583-587, 688, 695, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 608-612, 702, 709, and 760-765;

[0158] In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 475-479, 633, 640, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 513-517, 647, 654, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 538-542, 661, 668, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 563-567, 675, 682, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 588-592, 689, 696, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 613-617, 703, 710, and 760-765;

[0159] In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 480-484, 630, 637, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 518-522, 644, 651, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 543-547, 658, 665, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 568-572, 672, 679, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 593-597, 686, 693, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 618-622, 700, 707, and 760-765; or

[0160] In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 485-489, 634, 641, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 523-527, 648, 655, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 548-552, 662,

669, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 573-577, 676, 683, and 744-751; € a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 598-602, 690, 697, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 623-627, 704, 711, and 760-765.

[0161] The disclosure further provides that the sequence and structural features in the CDR sequences common to the antibodies that confer the anti-CD30L antibody the binding affinity, specificity, and the capacity to functionally block both the CD30-CD30L interaction and the CD30L-mediated CD30 signaling and IL-8 releasing. Accordingly, also provided herein are anti-CD30L antibodies with consensus CDR sequences that confer the anti-CD30L antibody the binding affinity, specificity, and the capacity to functionally block both the CD30-CD30L interaction and the CD30L-mediated CD30 signaling and IL-8 releasing. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712, 714, 716, 718, 720, and 722; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724, 726, 728, 730, 732, and 734; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736, 738, 740, and 742; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744, 746, 748, and 750; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752, 754, 756, and 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760, 762, and 764. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 713, 715, 717, 719, 721, and 723; (b) a

CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 725, 727, 729, 731, 733, and 735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 737, 739, 741, and 743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 745, 747, 749, and 751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 753, 755, 757, and 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 761, 763, and 765. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 724; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 725; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1

comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 714; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 726; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 715; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 727; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 716; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 728; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 717; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 729; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section

2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 718; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 738; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 746; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 754; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 762. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 719; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 739; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 747; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 755; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 763. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 720; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 732; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 740; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 748; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 756; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 760. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 721; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 733; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 741; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 749; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 757; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 761. In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 722; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 734; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 742; (d) a CDR-L1

comprising the amino acid sequence set forth in SEQ ID NO: 750; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 764. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 723; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 735; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 743; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 751; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 765. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, 115-119, 629, 636, 480-484, 630, 637, 465-469, 631, 638, 470-474, 632, 639, 475-479, 633, 640, 485-489, 634, and 641. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, 155-159, 643, 650, 518-522, 644, 651, 490-494, 645, 652, 495-499, 646, 653, 513-517, 647, 654, 523-527, 648, and 655. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, 195-199, 657, 664, 543-547, 658, 665, 528-532, 659, 666, 533-537, 660, 667, 538-542, 661, 668, 548-552, 662, and 669. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, 315-319, 671, 678, 568-572, 672, 679, 553-557, 673, 680, 558-562, 674, 681, 563-567, 675, 682, 573-577, 676, and 683. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, 355-359, 685, 692, 593-597, 686, 693, 578-582, 687, 694, 583-587, 688, 695, 588-592, 689, 696, 598-602, 690, and 697. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, 395-399, 699, 706, 618-622, 700, 707, 603-607, 701, 708, 608-612, 702, 709, 613-617, 703, 710, 623-627, 704, and 711. In certain embodiments of the anti-CD30L provided herein

including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, 115-119, 629, 636, 480-484, 630, and 637. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, 155-159, 643, 650, 518-522, 644, and 651. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, 195-199, 657, 664, 543-547, 658, and 665. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, 315-319, 671, 678, 568-572, 672, and 679. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, 355-359, 685, 692, 593-597, 686, and 693. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, 395-399, 699, 706, 618-622, 700, and 707.

[0162] Further to the anti-CD30L antibody provided herein including in Section 2 and this Section 4.1 (such as those of the preceding paragraph), in one embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In one embodiment, the anti-CD30L

antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723 and a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723 and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In further embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735 and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743. In one embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided

herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In one embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In another embodiment, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, and a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In further embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided

herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743 and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments,

the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759 and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759 and a CDR-L3 comprising the amino acid sequence set forth in

any one of SEQ ID NOs: 760-765. In other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751. In further embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the

amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In yet other embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In further embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In further embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743,

a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723,

a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In certain embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of any one of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of any two of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2

comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765, in any combination or permutation. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of any three of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765, in any combination or permutation. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of any four of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765, in any combination or permutation. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of any five of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765, in any combination or permutation. In some embodiments, the anti-CD30L antibody or antigen binding fragment provided herein comprises or consists of all six of a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723, a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735, a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743, a CDR-L1 comprising the

amino acid sequence set forth in any one of SEQ ID NOs: 744-751, a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759, and a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, 115-119, 629, 636, 480-484, 630, 637, 465-469, 631, 638, 470-474, 632, 639, 475-479, 633, 640, 485-489, 634, and 641. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, 155-159, 643, 650, 518-522, 644, 651, 490-494, 645, 652, 495-499, 646, 653, 513-517, 647, 654, 523-527, 648, and 655. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, 195-199, 657, 664, 543-547, 658, 665, 528-532, 659, 666, 533-537, 660, 667, 538-542, 661, 668, 548-552, 662, and 669. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, 315-319, 671, 678, 568-572, 672, 679, 553-557, 673, 680, 558-562, 674, 681, 563-567, 675, 682, 573-577, 676, and 683. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, 355-359, 685, 692, 593-597, 686, 693, 578-582, 687, 694, 583-587, 688, 695, 588-592, 689, 696, 598-602, 690, and 697. In some embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, 395-399, 699, 706, 618-622, 700, 707, 603-607, 701, 708, 608-612, 702, 709, 613-617, 703, 710, 623-627, 704, and 711. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, 115-119, 629, 636, 480-484, 630, and 637. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-H2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, 155-159, 643, 650, 518-522, 644, and 651. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this

paragraph), the CDR-H3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, 195-199, 657, 664, 543-547, 658, and 665. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L1 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, 315-319, 671, 678, 568-572, 672, and 679. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L2 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, 355-359, 685, 692, 593-597, 686, and 693. In certain embodiments of the anti-CD30L provided herein including in Section 2 and this Section 4.1 (such as those of this paragraph), the CDR-L3 comprises the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, 395-399, 699, 706, 618-622, 700, and 707.

[0163] Additionally, the anti-CD30L antibody provided herein, including in Section 2 and this Section (Section 4.1), can comprise specific combinations of CDRs of each anti-CD30L clone as listed in Tables 10-16. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 635; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 649; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 663; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 677; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 691; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 705. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 107; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 147; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 187; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 307; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 347; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 387. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 105; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 145; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 185; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ

ID NO: 305; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 345; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 385. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 106; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 146; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 186; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 306; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 346; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 386. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 108; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 148; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 188; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 308; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 348; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 388. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 109; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 149; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 189; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 309; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 389. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 628; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 642; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 656; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 670; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 684; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 698.

[0164] Similarly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen

binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 636; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 650; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 664; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 678; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 692; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 706. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 117; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 157; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 197; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 317; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 357; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 397. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 115; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 155; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 195; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 315; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 355; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 395. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 116; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 156; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 196; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 316; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 356; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 396. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 118; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 158; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 198; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ

ID NO: 318; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 358; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 398. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 119; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 159; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 199; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 319; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 399. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 629; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 643; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 657; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 671; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 685; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 699.

[0165] Likewise, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 637; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 651; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 665; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 679; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 693; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 707. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 482; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 520; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 545; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 570; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 595; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 620. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody

or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 480; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 518; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 543; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 568; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 593; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 618. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 481; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 519; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 544; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 569; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 594; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 619. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 483; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 521; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 546; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 571; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 596; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 621. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 484; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 522; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 547; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 572; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 597; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 622. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 630; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 644; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 658; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ

ID NO: 672; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 686; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 700.

[0166] Additionally, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 638; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 652; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 666; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 680; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 694; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 708. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 467; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 492; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 530; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 555; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 580; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 605. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 465; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 490; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 528; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 553; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 578; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 603. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 466; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 491; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 529; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 554; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 579; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 604. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and

this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 468; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 493; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 531; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 556; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 581; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 606. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 469; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 494; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 532; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 557; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 582; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 607. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 631; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 645; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 659; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 673; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 687; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 701.

[0167] Similarly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 639; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 653; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 667; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 681; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 695; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 709. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 472; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 497; (c) a CDR-H3 comprising

the amino acid sequence set forth in SEQ ID NO: 535; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 560; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 585; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 610. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 470; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 495; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 533; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 558; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 583; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 608. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 471; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 496; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 534; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 559; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 584; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 609. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 473; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 498; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 536; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 561; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 586; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 611. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 474; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 499; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 537; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 562; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 587; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 612. In one embodiment of the anti-CD30L antibody or

antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 632; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 646; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 660; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 674; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 688; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 702.

[0168] Likewise, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 640; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 654; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 668; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 682; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 696; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 710. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 477; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 515; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 540; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 565; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 590; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 615. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 475; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 513; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 538; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 563; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 588; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 613. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 476; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 514; (c) a CDR-H3

comprising the amino acid sequence set forth in SEQ ID NO: 539; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 564; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 589; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 614. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 478; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 516; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 541; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 566; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 591; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 616. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 479; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 517; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 542; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 567; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 592; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 617. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 633; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 647; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 661; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 675; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 689; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 703.

[0169] Additionally, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 641; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 655; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 669; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 683; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 697; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 711. In another

embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 487; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 525; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 550; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 575; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 600; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 625. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 485; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 523; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 548; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 573; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 598; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 623. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 486; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 524; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 549; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 574; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 599; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 624. In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 488; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 526; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 551; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 576; (e) a CDR-L2 comprising the amino acid sequence set forth in SEQ ID NO: 601; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in SEQ ID NO: 626. In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 489; (b) a CDR-H2 comprising the amino acid sequence set

forth in SEQ ID NO: 527; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 552; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 577; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 602; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 627. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 634; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 648; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 662; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 676; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 690; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 704.

[0170] The anti-CD30L antibodies can have various CDR sequences as listed in **Tables 10-16**. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 10; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 10; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 10; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 10; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 10; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 10.

[0171] In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 11; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 11; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 11; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 11; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 11; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 11.

[0172] In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 12; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 12; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 12; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 12; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 12; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 12.

[0173] In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 13; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 13; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 13; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 13; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 13; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 13.

[0174] In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 14; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 14; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 14; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 14; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 14; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 14.

[0175] In another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 15; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 15; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 15; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 15; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 15; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 15.

[0176] In a further embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Table 16; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Table 16; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Table 16; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Table 16; (e) a CDR-L2 comprising any CDR-L2 sequence listed in Table 16; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Table 16.

[0177] In yet another embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising any CDR-H1 sequence listed in Tables 10-16; (b) a CDR-H2 comprising any CDR-H2 sequence listed in Tables 10-16; (c) a CDR-H3 comprising any CDR-H3 sequence listed in Tables 10-16; (d) a CDR-L1 comprising any CDR-L1 sequence listed in Tables 10-16; (e) a CDR-L2 comprising any CDR-L2 sequence

listed in Tables 10-16; and/or (f) a CDR-L3 comprising any CDR-L3 sequence listed in Tables 10-16.

[0178] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Tables 10-16 and 25. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 10. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 11. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 12. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 13. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 14. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-

CD30L of the same clone number listed in Table 15. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 16. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 of any anti-CD30L of the same clone number listed in Table 25.

[0179] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number in Tables 10-16 and 25. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 10. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 11. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 12. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 13. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 14. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any

anti-CD30L of the same clone number listed in Table 15. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 16. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises the VH and VL of the corresponding VH and VL of any anti-CD30L of the same clone number listed in Table 25.

[0180] The disclosure also provides that the anti-CD30L antibodies provided herein can comprise various combinations of immunoglobulin heavy chain variable region (VH) and immunoglobulin light chain variable region (VL). In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin variable region heavy chain (VH) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) an immunoglobulin variable region light chain (VL) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 3. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 4. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 7. In one embodiment of the anti-

CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 8. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 11. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 12. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 15. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 16. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 24. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID

NO: 25; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 26. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 28. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 32.

[0181] Additionally, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) an immunoglobulin variable region heavy chain (VH) comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) an immunoglobulin variable region light chain (VL) comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 3. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding

fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 4. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 7. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 8. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 11. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 12. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81,

82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99% sequence identity to SEQ ID NO: 15. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 16. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 24. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 26. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 28. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen

binding fragment thereof comprises: (a) a VH comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence having at least about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to SEQ ID NO: 32.

[0182] Furthermore, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) a VL comprising an amino acid sequence set forth in any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 3. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 4. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 7. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 8. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 11. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 12. In one

embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 15. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 16. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 24. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 26. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 28. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 32.

[0183] The CDRs of the anti-CD30L antibody or antigen binding fragment provided herein are also provided by the CDR definitions as described herein (Kabat, Chothia, AbM, Contact, IMGT, and Aho) for the provided VH and VL sequences. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3

of the VH sequence set forth in SEQ ID NO: 1; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 3, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 2; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 4, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 5; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 7, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 6; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 8, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 9; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 11, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 10; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2,

and CDR-L3 of the VL sequence set forth in SEQ ID NO: 12, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 13; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 15, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 14; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 16, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 23; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 24, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 25; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 26, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 27; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 28, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or

Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 29; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 30, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof comprises: (a) the CDR-H1, CDR-H2, and CDR-H3 of the corresponding CDR-H1, CDR-H2, and CDR-H3 of the VH sequence set forth in SEQ ID NO: 31; and/or (a) the CDR-L1, CDR-L2, and CDR-L3 of the corresponding CDR-L1, CDR-L2, and CDR-L3 of the VL sequence set forth in SEQ ID NO: 32, wherein the CDRs are determined by Kabat, Chothia, AbM, Contact, IMGT, or Aho numbering scheme.

[0184] As is clear from the descriptions above and below, the anti-CD30L antibodies provided herein can further comprise constant regions. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof further comprises an immunoglobulin heavy chain constant region. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof further comprises an immunoglobulin light chain constant region. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof further comprises an immunoglobulin heavy chain constant region and an immunoglobulin light chain constant region. In one embodiment, the heavy chain constant region is an IgG heavy chain constant region. In one embodiment, the light chain constant region is an IgG light chain constant region. In one embodiment, the light chain constant region is a kappa (κ) chain constant region. In one embodiment, the light chain constant region is a lambda (λ) chain constant region. In one embodiment, the heavy chain constant region is a IgG1 heavy chain constant region. In one embodiment, the heavy chain constant region is a IgG2 heavy chain constant region. In one embodiment, the heavy chain constant region is a IgG3 heavy chain constant region. In one embodiment, the heavy chain constant region is a IgG4 heavy chain constant region. In one embodiment, the constant region comprises an amino acid sequence having about 80, 85, 90, 95, 97, 98, 99, or 100 % sequence

identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In one embodiment, the constant region comprises an amino acid sequence having about 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 % sequence identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 500. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 501. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 502. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 503. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 504. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 505. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 506. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 507. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 508. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 509. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 510. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 511. In one embodiment, the constant region comprises the amino acid sequence set forth by any one of SEQ ID NO: 512.

[0185] The antibody or antigen binding fragment thereof provided herein can have various functional properties as described herein, e.g., in Section 5 (EXAMPLES). Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof blocks a binding interaction between CD30L and CD30. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof inhibits a binding interaction between CD30L and CD30. In one embodiment, the interaction between CD30L and CD30 for assessing the blocking or inhibition is determined in an ELISA assay, a cell binding assay with CD30L expressing cells, a KinExA assay, or a surface plasmon resonance (SPR) assay. In one embodiment, the interaction between CD30L and CD30 for assessing the blocking or inhibition is determined in an ELISA assay. In one embodiment, the interaction

between CD30L and CD30 for assessing the blocking or inhibition is determined in a cell binding assay with CD30L expressing cells. In one embodiment, the interaction between CD30L and CD30 for assessing the blocking or inhibition is determined in a KinExA assay. In one embodiment, the interaction between CD30L and CD30 for assessing the blocking or inhibition is determined in an SPR assay.

[0186] As shown in Example 8, the anti-CD30L or antigen binding fragment provided herein have high binding specificity for CD30L, binding specifically to CD30L among 6,232 targets tested. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof specifically binds to CD30L. In some embodiments, the ELISA, SPR, KinExA, and/or cell binding assay with CD30L expressing cells are as described and demonstrated in Section 5 (EXAMPLES) (e.g. **FIGS. 5A, 5F, and 5G**).

[0187] As further demonstrated herein, e.g. in Section 5 (EXAMPLES), the anti-CD30L antibody provided herein can block or inhibit CD30L-mediated CD30 signaling in cell-based assays. Such cell assays include cytokine release (e.g. IL-8) release dual cell assays. Briefly and using IL-8 release as an example of cytokine release, when co-cultured with CD30L expressing cells (e.g. B16 cells expressing human CD30L or HEK293 expressing cyno CD30L), K299 CD30+ cells release IL-8 upon ligation with and stimulation by the co-cultured CD30L expressing cells (**FIG. 5J**). Blocking of the CD30L-CD30 interaction can proportionally reduce the release of IL-8 and thus the amount of IL-8 released can be used as a readout for the effectiveness of antibody mediated blocking of CD30L-CD30 interactions between the co-cultured cells.

[0188] Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof inhibits interleukin-8 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof inhibits interleukin-6 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof inhibits both interleukin-8 and interleukin-6 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof blocks interleukin-8 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen

binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof blocks interleukin-6 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof blocks both interleukin-8 and interleukin-6 secretion in a cell-based assay. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the cell-based assay is a dual cell assay with a cell expressing CD30 and a cell expressing CD30L.

[0189] The disclosure demonstrated in Section 5 (EXAMPLES) that the anti-CD30L antibody or antigen binding fragment bind to CD30L with strong binding affinity and blocked CD30L with high effectiveness. Accordingly, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation equilibrium constant (K_D) of no more than 60, no more than 65, no more than 70, no more than 75, no more than 80, no more than 85, no more than 90, no more than 95, no more than 100, no more than 105, no more than 110, no more than 115, no more than 120, no more than 125, no more than 130, no more than 135, no more than 140, no more than 145, no more than 150, no more than 155, no more than 160, no more than 165, no more than 170, no more than 175, no more than 180, no more than 185, no more than 190, no more than 195, no more than 200, no more than 250, no more than 300, no more than 350, no more than 400, no more than 450, no more than 500, no more than 550, no more than 600, no more than 650, no more than 700, no more than 750, no more than 800, no more than 850, no more than 900, no more than 950, or no more than 1000 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation equilibrium constant (K_D) of about 60, about 65, about 70, about 75, about 80, about 85, about 90, about 95, about 100, about 105, about 110, about 115, about 120, about 125, about 130, about 135, about 140, about 145, about 150, about 155, about 160, about 165, about 170, about 175, about 180, about 185, about 190, about 195, about 200, about 250, about 300, about 350, about 400, about 450, about 500, about 550, about 600, about 650, about 700, about 750, about 800, about 850, about 900, about 950, or about 1000 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 90.5

pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 125 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 65.4 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 122 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 51.3 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of no more than 244 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 90.5 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 125 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 64.5 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 122 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 51.3 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 244 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein,

including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 65 to about 125 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 50 to about 140 pM, about 55 to about 135 pM, about 60 to about 130 pM, about 65 to about 125 pM, about 70 to about 120 pM, about 75 to about 115 pM, about 80 to about 110 pM, about 85 to about 105 pM, about 90 to about 100 pM, or about 95 to about 100 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 51 to about 244 pM. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a K_D of about 50 to about 250 pM, about 51 to about 244 pM, about 55 to about 240 pM, about 60 to about 235 pM, about 65 to about 230 pM, about 70 to about 225 pM, about 75 to about 220 pM, about 80 to about 215 pM, about 80 to about 210 pM, about 85 to about 205 pM, about 90 to about 200 pM, about 95 to about 195 pM, about 100 to about 190 pM, about 105 to about 185 pM, about 110 to about 180 pM, about 115 to about 175 pM, about 120 to about 170 pM, about 125 to about 165 pM, about 130 to about 160 pM, about 135 to about 155 pM, or about 140 to about 150 pM.

[0190] Additionally, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of at least 0.1×10^6 , at least 0.2×10^6 , at least 0.3×10^6 , at least 0.4×10^6 , at least 0.5×10^6 , at least 0.6×10^6 , at least 0.7×10^6 , at least 0.8×10^6 , at least 0.9×10^6 , at least 1.0×10^6 , at least 1.1×10^6 , at least 1.2×10^6 , at least 1.3×10^6 , at least 1.4×10^6 , at least 1.5×10^6 , at least 1.55×10^6 , at least 1.56×10^6 , at least 1.57×10^6 , at least 1.58×10^6 , at least 1.59×10^6 , at least 1.60×10^6 , at least 1.61×10^6 , at least 1.62×10^6 , at least 1.63×10^6 , at least 1.64×10^6 , at least 1.65×10^6 , at least 1.66×10^6 , at least 1.67×10^6 , at least 1.68×10^6 , at least 1.69×10^6 , at least 1.7×10^6 , at least 1.8×10^6 , at least 1.9×10^6 , at least 2.0×10^6 , at least 2.1×10^6 , at least 2.2×10^6 , at least 2.3×10^6 , at least 2.4×10^6 , at least 2.5×10^6 , at least 2.6×10^6 , at least 2.7×10^6 , at least 2.8×10^6 , at least 2.9×10^6 , at least 3.0×10^6 , or at least $3.1 \times 10^6 \text{ M}^{-1}\text{S}^{-1}$. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the

antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of about 0.1×10^6 , about 0.2×10^6 , about 0.3×10^6 , about 0.4×10^6 , about 0.5×10^6 , about 0.6×10^6 , about 0.7×10^6 , about 0.8×10^6 , about 0.9×10^6 , about 1.0×10^6 , about 1.1×10^6 , about 1.2×10^6 , about 1.3×10^6 , about 1.4×10^6 , about 1.5×10^6 , about 1.55×10^6 , about 1.56×10^6 , about 1.57×10^6 , about 1.58×10^6 , about 1.59×10^6 , about 1.60×10^6 , about 1.61×10^6 $M^{-1}S^{-1}$, about 1.62×10^6 , about 1.63×10^6 , about 1.64×10^6 , about 1.65×10^6 , about 1.66×10^6 , about 1.67×10^6 , about 1.68×10^6 , about 1.69×10^6 , about 1.7×10^6 , about 1.8×10^6 , about 1.9×10^6 , about 2.0×10^6 , about 2.1×10^6 , about 2.2×10^6 , about 2.3×10^6 , about 2.4×10^6 , about 2.5×10^6 , about 2.6×10^6 , about 2.7×10^6 , about 2.8×10^6 , about 2.9×10^6 , about 3.0×10^6 , or about 3.1×10^6 . In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of about 1.54×10^6 to about 1.55×10^6 , about 1.53×10^6 to about 1.56×10^6 , about 1.52×10^6 to about 1.57×10^6 , about 1.53×10^6 to about 1.58×10^6 , about 1.52×10^6 to about 1.59×10^6 , about 1.51×10^6 to about 1.60×10^6 , or about 1.5×10^6 to about 1.61×10^6 $M^{-1}S^{-1}$. In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of about 2.5×10^6 to about 3.8×10^6 , about 2.4×10^6 to about 3.9×10^6 , about 2.45×10^6 to about 3.89×10^6 , about 2.6×10^6 to about 3.7×10^6 , about 2.7×10^6 to about 3.6×10^6 , about 2.8×10^6 to about 3.5×10^6 , about 2.9×10^6 to about 3.4×10^6 , about 3.0×10^6 to about 3.3×10^6 , or about 3.1×10^6 to about 3.2×10^6 , $M^{-1}S^{-1}$.

[0191] Furthermore, in one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation rate constant (k_{off}) of no more than 1.4×10^{-4} , no more than 1.41×10^{-4} , no more than 1.5×10^{-4} , no more than 1.6×10^{-4} , no more than 1.7×10^{-4} , no more than 1.8×10^{-4} , no more than 1.9×10^{-4} , no more than 2.0×10^{-4} , no more than 2.1×10^{-4} , no more than 2.2×10^{-4} , no more than 2.3×10^{-4} , no more than 2.4×10^{-4} , no more than 2.5×10^{-4} , no more than 2.6×10^{-4} , no more than 2.7×10^{-4} , no more than 2.8×10^{-4} , no more than 2.9×10^{-4} , no more than 3.0×10^{-4} , no more than 3.1×10^{-4} , no more than 3.2×10^{-4} , no more than 3.3×10^{-4} , no more than 3.4×10^{-4} , no more than 3.5×10^{-4} , no more than 3.6×10^{-4} , no more than 3.7×10^{-4} , no more than 3.78×10^{-4} , or no more than 3.8×10^{-4} S^{-1} . In one embodiment of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1) such as those of this

paragraph, the antibody or antigen binding fragment thereof binds to CD30L with a dissociation rate constant (k_{off}) of about 1.4×10^{-4} , about 1.41×10^{-4} , about 1.5×10^{-4} , about 1.6×10^{-4} , about 1.7×10^{-4} , about 1.8×10^{-4} , about 1.9×10^{-4} , about 2.0×10^{-4} , about 2.1×10^{-4} , about 2.2×10^{-4} , about 2.3×10^{-4} , about 2.4×10^{-4} , about 2.5×10^{-4} , about 2.6×10^{-4} , about 2.7×10^{-4} , about 2.8×10^{-4} , about 2.9×10^{-4} , about 3.0×10^{-4} , about 3.1×10^{-4} , about 3.2×10^{-4} , about 3.3×10^{-4} , about 3.4×10^{-4} , about $3.5 \times 10^{-4} \text{ S}^{-1}$, about 3.6×10^{-4} , about 3.7×10^{-4} , about 3.78×10^{-4} , or about 3.8×10^{-4} .

[0192] The disclosure demonstrates that the anti-CD30L antibody provided herein binds to human CD30L, cyno CD30L, or both human and cyno CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to human CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to cyno CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof binds to both human and cyno CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof specifically binds to human CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof specifically binds to cyno CD30L. In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof specifically binds to both human and cyno CD30L.

[0193] In some embodiments, the antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419.

[0194] In some embodiments, the antibody or antigen binding fragment thereof comprises:
(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-389.

[0195] In certain embodiments, the antibody or antigen binding fragment thereof comprises:
(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-104; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-144; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-184; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-304; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-344; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-384.

[0196] In certain embodiments, the antibody or antigen binding fragment thereof comprises:
(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 145-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 305-309; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389.

[0197] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 1 and 2; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 3 and 4.

[0198] In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 100% sequence identity to any one of SEQ ID NOs: 1 and 2. In certain

embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 1 and 2. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 1 and 2. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 95% sequence identity to any one of SEQ ID NOs: 1 and 2, about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 97% sequence identity to any one of SEQ ID NOs: 1 and 2, about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 98% sequence identity to any one of SEQ ID NOs: 1 and 2, about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 99% sequence identity to any one of SEQ ID NOs: 1 and 2, about 90% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 100% sequence identity to any one of SEQ ID NOs: 1 and 2, about 95% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 97% sequence identity to any one of SEQ ID NOs: 1 and 2, about 95% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 98% sequence identity to any one of SEQ ID NOs: 1 and 2, about 95% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 99% sequence identity to any one of SEQ ID NOs: 1 and 2, about 95% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 100% sequence identity to any one of SEQ ID NOs: 1 and 2, about 97% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 98% sequence identity to any one of SEQ ID NOs: 1 and 2, about 97% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 99% sequence identity to any one of SEQ ID NOs: 1 and 2, about 97% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 100% sequence identity to any one of SEQ ID NOs: 1 and 2, or about 99% sequence identity to any one of SEQ ID NOs: 1 and 2 to about 100% sequence identity to any one of SEQ ID NOs: 1 and 2. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 1 and 2, about 95% sequence identity to any one of SEQ ID NOs: 1 and 2, about 97% sequence identity to any one of SEQ ID NOs: 1 and 2, about 98% sequence identity to any one of SEQ ID NOs: 1 and 2, about 99% sequence identity to any one of SEQ ID NOs: 1 and 2, or about 100% sequence identity to any one of SEQ ID NOs: 1 and 2.

[0199] In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 3 and 4. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 3 and 4. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 95% sequence identity to any one of SEQ ID NOs: 3 and 4, about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 97% sequence identity to any one of SEQ ID NOs: 3 and 4, about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 98% sequence identity to any one of SEQ ID NOs: 3 and 4, about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 99% sequence identity to any one of SEQ ID NOs: 3 and 4, about 90% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4, about 95% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 97% sequence identity to any one of SEQ ID NOs: 3 and 4, about 95% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 98% sequence identity to any one of SEQ ID NOs: 3 and 4, about 95% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 99% sequence identity to any one of SEQ ID NOs: 3 and 4, about 95% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4, about 97% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 98% sequence identity to any one of SEQ ID NOs: 3 and 4, about 97% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 99% sequence identity to any one of SEQ ID NOs: 3 and 4, about 97% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4, about 98% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 99% sequence identity to any one of SEQ ID NOs: 3 and 4, about 98% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4, or about 99% sequence identity to any one of SEQ ID NOs: 3 and 4 to about 100% sequence identity to any one of SEQ ID NOs: 3 and 4. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 3 and 4, about 95% sequence identity to any one of SEQ ID NOs: 3 and 4, about 97% sequence identity to any one of SEQ

ID NOs: 3 and 4, about 98% sequence identity to any one of SEQ ID NOs: 3 and 4, about 99% sequence identity to any one of SEQ ID NOs: 3 and 4, or about 100% sequence identity to any one of SEQ ID NOs: 3 and 4.

[0200] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399.

[0201] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-114; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-154; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-194; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-314; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-354; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-394.

[0202] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399.

[0203] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 5 and 6; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 7 and 8.

[0204] In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 5 and 6. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 5 and 6. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 95% sequence identity to any one of SEQ ID NOs: 5 and 6, about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 97% sequence identity to any one of SEQ ID NOs: 5 and 6, about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 98% sequence identity to any one of SEQ ID NOs: 5 and 6, about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 99% sequence identity to any one of SEQ ID NOs: 5 and 6, about 90% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6, about 95% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 97% sequence identity to any one of SEQ ID NOs: 5 and 6, about 95% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 98% sequence identity to any one of SEQ ID NOs: 5 and 6, about 95% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 99% sequence identity to any one of SEQ ID NOs: 5 and 6, about 95% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6, about 97% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 98% sequence identity to any one of SEQ ID NOs: 5 and 6, about 97% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 99% sequence identity to any one of SEQ ID NOs: 5 and 6, about 97% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6, about 98% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 99% sequence identity to any one of SEQ ID NOs: 5 and 6, about 98% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6, or about 99% sequence identity to any one of SEQ ID NOs: 5 and 6 to about 100% sequence identity to any one of SEQ ID NOs: 5 and 6. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 5 and 6, about 95% sequence identity to any one of SEQ ID NOs: 5 and 6, about 97% sequence identity to any one of SEQ

ID NOs: 5 and 6, about 98% sequence identity to any one of SEQ ID NOs: 5 and 6, about 99% sequence identity to any one of SEQ ID NOs: 5 and 6, or about 100% sequence identity to any one of SEQ ID NOs: 5 and 6.

[0205] In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 7 and 8. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 7 and 8. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 95% sequence identity to any one of SEQ ID NOs: 7 and 8, about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 97% sequence identity to any one of SEQ ID NOs: 7 and 8, about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 98% sequence identity to any one of SEQ ID NOs: 7 and 8, about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 99% sequence identity to any one of SEQ ID NOs: 7 and 8, about 90% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8, about 95% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 97% sequence identity to any one of SEQ ID NOs: 7 and 8, about 95% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 98% sequence identity to any one of SEQ ID NOs: 7 and 8, about 95% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 99% sequence identity to any one of SEQ ID NOs: 7 and 8, about 95% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8, about 97% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 98% sequence identity to any one of SEQ ID NOs: 7 and 8, about 97% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 99% sequence identity to any one of SEQ ID NOs: 7 and 8, about 97% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8, about 98% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 99% sequence identity to any one of SEQ ID NOs: 7 and 8, about 98% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8, or about 99% sequence identity to any one of SEQ ID NOs: 7 and 8 to about 100% sequence identity to any one of SEQ ID NOs: 7 and 8. In certain embodiments,

the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 7 and 8, about 95% sequence identity to any one of SEQ ID NOs: 7 and 8, about 97% sequence identity to any one of SEQ ID NOs: 7 and 8, about 98% sequence identity to any one of SEQ ID NOs: 7 and 8, about 99% sequence identity to any one of SEQ ID NOs: 7 and 8, or about 100% sequence identity to any one of SEQ ID NOs: 7 and 8.

[0206] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409.

[0207] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-124; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-164; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-204; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-324; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-364; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-404.

[0208] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409.

[0209] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of

SEQ ID NOs: 9 and 10; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 11 and 12.

[0210] In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 9 and 10. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 9 and 10. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 95% sequence identity to any one of SEQ ID NOs: 9 and 10, about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 97% sequence identity to any one of SEQ ID NOs: 9 and 10, about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 98% sequence identity to any one of SEQ ID NOs: 9 and 10, about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 99% sequence identity to any one of SEQ ID NOs: 9 and 10, about 90% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10, about 95% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 97% sequence identity to any one of SEQ ID NOs: 9 and 10, about 95% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 98% sequence identity to any one of SEQ ID NOs: 9 and 10, about 95% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 99% sequence identity to any one of SEQ ID NOs: 9 and 10, about 95% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10, about 97% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 98% sequence identity to any one of SEQ ID NOs: 9 and 10, about 97% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 99% sequence identity to any one of SEQ ID NOs: 9 and 10, about 97% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10, about 98% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 99% sequence identity to any one of SEQ ID NOs: 9 and 10, about 98% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10, or about 99% sequence identity to any one of SEQ ID NOs: 9 and 10 to about 100% sequence identity to any one of SEQ ID NOs: 9 and 10. In

certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 9 and 10, about 95% sequence identity to any one of SEQ ID NOs: 9 and 10, about 97% sequence identity to any one of SEQ ID NOs: 9 and 10, about 98% sequence identity to any one of SEQ ID NOs: 9 and 10, about 99% sequence identity to any one of SEQ ID NOs: 9 and 10, or about 100% sequence identity to any one of SEQ ID NOs: 9 and 10.

[0211] In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 11 and 12. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 11 and 12. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 95% sequence identity to any one of SEQ ID NOs: 11 and 12, about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 97% sequence identity to any one of SEQ ID NOs: 11 and 12, about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 98% sequence identity to any one of SEQ ID NOs: 11 and 12, about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 99% sequence identity to any one of SEQ ID NOs: 11 and 12, about 90% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12, about 95% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 97% sequence identity to any one of SEQ ID NOs: 11 and 12, about 95% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 98% sequence identity to any one of SEQ ID NOs: 11 and 12, about 95% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 99% sequence identity to any one of SEQ ID NOs: 11 and 12, about 95% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12, about 97% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 98% sequence identity to any one of SEQ ID NOs: 11 and 12, about 97% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 99% sequence identity to any one of SEQ ID NOs: 11 and 12, about 97% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12, about 98% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 99% sequence identity to any one of SEQ ID NOs: 11 and 12, about 98%

sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12, or about 99% sequence identity to any one of SEQ ID NOs: 11 and 12 to about 100% sequence identity to any one of SEQ ID NOs: 11 and 12. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 11 and 12, about 95% sequence identity to any one of SEQ ID NOs: 11 and 12, about 97% sequence identity to any one of SEQ ID NOs: 11 and 12, about 98% sequence identity to any one of SEQ ID NOs: 11 and 12, about 99% sequence identity to any one of SEQ ID NOs: 11 and 12, or about 100% sequence identity to any one of SEQ ID NOs: 11 and 12.

[0212] In some embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419.

[0213] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414.

[0214] In certain embodiments, the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 215-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419.

[0215] In some embodiments, the antibody or antigen binding fragment thereof comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 13 and 14; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 15 and 16.

[0216] In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 13 and 14. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 13 and 14. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 95% sequence identity to any one of SEQ ID NOs: 13 and 14, about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 97% sequence identity to any one of SEQ ID NOs: 13 and 14, about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 98% sequence identity to any one of SEQ ID NOs: 13 and 14, about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 99% sequence identity to any one of SEQ ID NOs: 13 and 14, about 90% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14, about 95% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 97% sequence identity to any one of SEQ ID NOs: 13 and 14, about 95% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 98% sequence identity to any one of SEQ ID NOs: 13 and 14, about 95% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 99% sequence identity to any one of SEQ ID NOs: 13 and 14, about 95% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14, about 97% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 98% sequence identity to any one of SEQ ID NOs: 13 and 14, about 97% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 99% sequence identity to any one of SEQ ID NOs: 13 and 14, about 97% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14, about 98% sequence identity to any

one of SEQ ID NOs: 13 and 14 to about 99% sequence identity to any one of SEQ ID NOs: 13 and 14, about 98% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14, or about 99% sequence identity to any one of SEQ ID NOs: 13 and 14 to about 100% sequence identity to any one of SEQ ID NOs: 13 and 14. In certain embodiments, the immunoglobulin variable region heavy chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 13 and 14, about 95% sequence identity to any one of SEQ ID NOs: 13 and 14, about 97% sequence identity to any one of SEQ ID NOs: 13 and 14, about 98% sequence identity to any one of SEQ ID NOs: 13 and 14, about 99% sequence identity to any one of SEQ ID NOs: 13 and 14, or about 100% sequence identity to any one of SEQ ID NOs: 13 and 14.

[0217] In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90% sequence identity to any one of SEQ ID NOs: 15 and 16. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having at most about 100% sequence identity to any one of SEQ ID NOs: 15 and 16. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 95% sequence identity to any one of SEQ ID NOs: 15 and 16, about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 97% sequence identity to any one of SEQ ID NOs: 15 and 16, about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 98% sequence identity to any one of SEQ ID NOs: 15 and 16, about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 99% sequence identity to any one of SEQ ID NOs: 15 and 16, about 90% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16, about 95% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 97% sequence identity to any one of SEQ ID NOs: 15 and 16, about 95% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 98% sequence identity to any one of SEQ ID NOs: 15 and 16, about 95% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 99% sequence identity to any one of SEQ ID NOs: 15 and 16, about 95% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16, about 97% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 98% sequence identity to any one of SEQ ID NOs: 15 and 16, about 97% sequence identity to any one of SEQ ID NOs:

15 and 16 to about 99% sequence identity to any one of SEQ ID NOs: 15 and 16, about 97% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16, about 98% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 99% sequence identity to any one of SEQ ID NOs: 15 and 16, about 98% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16, or about 99% sequence identity to any one of SEQ ID NOs: 15 and 16 to about 100% sequence identity to any one of SEQ ID NOs: 15 and 16. In certain embodiments, the immunoglobulin variable region light chain comprises an amino acid sequence having about 90% sequence identity to any one of SEQ ID NOs: 15 and 16, about 95% sequence identity to any one of SEQ ID NOs: 15 and 16, about 97% sequence identity to any one of SEQ ID NOs: 15 and 16, about 98% sequence identity to any one of SEQ ID NOs: 15 and 16, about 99% sequence identity to any one of SEQ ID NOs: 15 and 16, or about 100% sequence identity to any one of SEQ ID NOs: 15 and 16.

[0218] In some embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof is recombinant antibody or antigen binding fragment thereof.

[0219] In certain embodiments of the anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1), the antibody or antigen binding fragment thereof is isolated antibody or antigen binding fragment thereof.

[0220] In one additional aspect, provided herein is an antibody or antigen-binding fragment thereof that binds to an epitope of human CD30L recognized by an anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1 such as the preceding paragraphs).

[0221] In another aspect, provided herein is an antibody or antigen-binding fragment thereof that competes for the binding to human CD30L with an anti-CD30L antibody or antigen binding fragment provided herein, including in Section 2 and this Section (Section 4.1 such as the preceding paragraphs).

4.2 Germline Reversions

[0222] In some instances, germline reversions (for example, mutations of an antibody sequence back to the germline sequence) are useful for improving the safety, pharmacodynamic and/or pharmacokinetic properties of the anti-CD30L antibodies. For example, in certain instances, germline reversion mutations reduce immunogenicity of an

anti-CD30L antibody while maintaining the ability to bind CD30L with high affinity and specificity.

[0223] Generally, a germline antibody gene or germline antibody gene segment refers to a sequence encoding an immunoglobulin present in the genome of an organism, wherein the genome is not or has not been subjected to mutational processes such as somatic hypermutation (for example, has not experienced a maturation process that leads to genetic rearrangements and mutations that express specific immunoglobulins). Thus, in some instances, the heavy chain germline gene refers to a germline antibody gene or gene fragment encoding an immunoglobulin heavy chain, which includes a V gene (variable), a D gene (diversity), and a J gene (joining), and in certain instances, the C gene (constant). Similarly, in some instances, the light chain germline gene refers to a germline antibody gene or gene fragment encoding an immunoglobulin light chain, which includes a V gene (variable), a J gene (joining), and in some instances, the C gene (constant). In some instances, the amino acid sequence encoded by the germline antibody gene or the germline antibody gene fragment is also referred to as a germline sequence. In certain instances, an amino acid sequence mutation back to a germline amino acid sequence refers to or identifies an amino acid mutation (for example, in a matured antibody amino acid sequence) to the amino acid of the germline amino acid (for example, in the germline antibody sequence). In certain instances, identifying a germline antibody gene or germline antibody gene fragments and their corresponding germline sequences can be obtained or queried from a professional database (for example, IMGT, UNSWIG, NCBI or VBASE2).

[0224] Accordingly, in some embodiments, the anti-CD30L comprises one or more amino acid sequence mutations back to a germline amino acid sequence. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising about 1 mutation back to a germline sequence to about 20 mutations back to a germline sequence. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising at least about 1 mutation back to a germline sequence. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising at most about 20 mutations back to a germline sequence. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising about 1 mutation back to a germline sequence to about 2 mutations back to a germline sequence,

about 1 mutation back to a germline sequence to about 3 mutations back to a germline sequence, about 1 mutation back to a germline sequence to about 4 mutations back to a germline sequence, about 1 mutation back to a germline sequence to about 5 mutations back to a germline sequence, about 1 mutation back to a germline sequence to about 10 mutations back to a germline sequence, about 1 mutation back to a germline sequence to about 15 mutations back to a germline sequence, about 1 mutation back to a germline sequence to about 20 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 3 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 4 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 5 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 10 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 15 mutations back to a germline sequence, about 2 mutations back to a germline sequence to about 20 mutations back to a germline sequence, about 3 mutations back to a germline sequence to about 4 mutations back to a germline sequence, about 3 mutations back to a germline sequence to about 5 mutations back to a germline sequence, about 3 mutations back to a germline sequence to about 10 mutations back to a germline sequence, about 3 mutations back to a germline sequence to about 15 mutations back to a germline sequence, about 3 mutations back to a germline sequence to about 20 mutations back to a germline sequence, about 4 mutations back to a germline sequence to about 5 mutations back to a germline sequence, about 4 mutations back to a germline sequence to about 10 mutations back to a germline sequence, about 4 mutations back to a germline sequence to about 15 mutations back to a germline sequence, about 4 mutations back to a germline sequence to about 20 mutations back to a germline sequence, about 5 mutations back to a germline sequence to about 10 mutations back to a germline sequence, about 5 mutations back to a germline sequence to about 15 mutations back to a germline sequence, about 5 mutations back to a germline sequence to about 20 mutations back to a germline sequence, about 10 mutations back to a germline sequence to about 15 mutations back to a germline sequence, about 10 mutations back to a germline sequence to about 20 mutations back to a germline sequence, or about 15 mutations back to a germline sequence to about 20 mutations back to a germline sequence. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising about 1 mutation back to a germline sequence, about 2 mutations back to a germline sequence, about 3 mutations back to a germline sequence, about 4 mutations back to a germline sequence, about 5 mutations back to

a germline sequence, about 10 mutations back to a germline sequence, about 15 mutations back to a germline sequence, or about 20 mutations back to a germline sequence.

[0225] In some embodiments, a recombinant antibody or antigen binding fragment thereof comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain as set forth in SEQ ID NOs: 1 and 3 comprises one or more amino acid sequence mutations back to a germline amino acid sequence, thereby yielding a germline reverted or germlined anti-CD30L antibody. In certain embodiments, the germline reverted or germlined anti-CD30L antibody comprises the amino acid sequence as set forth in SEQ ID NOs: 2 and 4, or an amino acid sequence at least 90, 95, 95, 96, 97, 98, or 99 percent identical to the amino acid sequence as set forth in SEQ ID NOs: 2 and 4.

[0226] In some embodiments, a recombinant antibody or antigen binding fragment thereof comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain as set forth in SEQ ID NOs: 5 and 7 comprises one or more amino acid sequence mutations back to a germline amino acid sequence, thereby yielding a germline reverted or germlined anti-CD30L antibody. In certain embodiments, the germline reverted or germlined anti-CD30L antibody comprises the amino acid sequence as set forth in SEQ ID NOs: 6 and 8, or an amino acid sequence at least 90, 95, 95, 96, 97, 98, or 99 percent identical to the amino acid sequence as set forth in SEQ ID NOs: 6 and 8.

[0227] In some embodiments, a recombinant antibody or antigen binding fragment thereof comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain as set forth in SEQ ID NOs: 9 and 11 comprises one or more amino acid sequence mutations back to a germline amino acid sequence, thereby yielding a germline reverted or germlined anti-CD30L antibody. In certain embodiments, the germline reverted or germlined anti-CD30L antibody comprises the amino acid sequence as set forth in SEQ ID NOs: 10 and 12, or an amino acid sequence at least 90, 95, 95, 96, 97, 98, or 99 percent identical to the amino acid sequence as set forth in SEQ ID NOs: 10 and 12.

[0228] In some embodiments, a recombinant antibody or antigen binding fragment thereof comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain as set forth in SEQ ID NOs: 13 and 15 comprises one or more amino acid sequence mutations back to a germline amino acid sequence, thereby yielding a germline reverted or germlined anti-CD30L antibody. In certain embodiments, the germline reverted or germlined anti-CD30L antibody comprises the amino acid sequence as set forth in SEQ ID NOs: 14 and 16, or an amino acid sequence at least 90, 95, 95, 96, 97, 98, or 99 percent identical to the amino acid sequence as set forth in SEQ ID NOs: 14 and 16.

4.3 Cysteine Engineering

[0229] In some instances, exposed (for example, solvent exposed) thiol moieties (for example, the thiol moiety of a cysteine amino acid residue) contribute to protein aggregation. For example, disulfide linkages between one or more proteins can be formed as a result of thiol oxidation. In certain instances, mutation of solvent exposed cysteine residues (for example, mutation of one or more solvent exposed cysteine residues) are advantageous in reducing protein aggregation, thereby increasing protein solubility.

[0230] Generally, solubility references the ability of a protein to remain dispersed within an aqueous solution (for example, the amount of a monomeric protein species in a solution). In certain instances, the solubility of a protein in an aqueous formulation depends upon the proper distribution of amino acid residues and therefore, solubility can, in certain instances, correlate with the production of correctly folded proteins or the production of proteins retaining. Specific function (for example, an antibody binding an antigen). Methods of detecting an increase or decrease in solubility of a protein (for example, an antibody) are known in the art (for example, using routine HPLC techniques, dynamic light scattering techniques, etc.).

[0231] Accordingly, in some embodiments, one or more cysteine amino acid residues of the anti-CD30L antibodies are mutated to a non-cysteine amino acid residue (for example, serine). In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising 1 cysteine residue that is mutated to a non-cysteine residue to 5 cysteine residues that is mutated to a non-cysteine residue. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising at least 1 cysteine residue that is mutated to a non-cysteine residue. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising at most 5 cysteine residues that is mutated to a non-cysteine residue. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising 1 cysteine residue that is mutated to a non-cysteine residue to 2 cysteine residues that is mutated to a non-cysteine residue, 1 cysteine residue that is mutated to a non-cysteine residue to 3 cysteine residues that is mutated to a non-cysteine residue, 1 cysteine residue that is mutated to a non-cysteine residue to 4 cysteine residues that is mutated to a non-cysteine residue, 1 cysteine residue that

is mutated to a non-cysteine residue to 5 cysteine residues that is mutated to a non-cysteine residue, 2 cysteine residues that is mutated to a non-cysteine residue to 3 cysteine residues that is mutated to a non-cysteine residue, 2 cysteine residues that is mutated to a non-cysteine residue to 4 cysteine residues that is mutated to a non-cysteine residue, 2 cysteine residues that is mutated to a non-cysteine residue to 5 cysteine residues that is mutated to a non-cysteine residue, 3 cysteine residues that is mutated to a non-cysteine residue to 4 cysteine residues that is mutated to a non-cysteine residue, 3 cysteine residues that is mutated to a non-cysteine residue to 5 cysteine residues that is mutated to a non-cysteine residue, or 4 cysteine residues that is mutated to a non-cysteine residue to 5 cysteine residues that is mutated to a non-cysteine residue. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a heavy chain variable region and/or light chain variable region comprising 1 cysteine residue that is mutated to a non-cysteine residue, 2 cysteine residues that is mutated to a non-cysteine residue, 3 cysteine residues that is mutated to a non-cysteine residue, 4 cysteine residues that is mutated to a non-cysteine residue, or 5 cysteine residues that is mutated to a non-cysteine residue. In some embodiments, one or more cysteine amino acid residues of the anti-CD30L antibody as set forth in SEQ ID NOs: 1-16 are mutated to a non-cysteine amino acid residue.

4.4 Fc Constant Regions

[0232] Generally, the fragment crystallizable (Fc) region or domain of an antibody (for example, an anti-CD30L antibody) mediates downstream effector functions via its interaction with Fc-receptors on immune cells (for example, innate immune cells) or with complement protein C1q, the recognition molecule of the complement system. Furthermore, the interaction with Fc-receptors can lead to killing of targeted cells through a variety of immune effector mechanisms, including antibody-dependent cell-mediated cytotoxicity (ADCC) and antibody-dependent cellular phagocytosis (ADCP), and antibody-mediated complement activation may lead to complement-dependent cytotoxicity (CDC). In addition, both Fc-receptor interactions and complement activation can exert a broad range of immunomodulatory functions.

[0233] Accordingly, in certain instances, mutations within the Fc region that reduce, inhibit, ablate, and/or abrogate Fc-mediated function (for example, ADCC, ADCP, CDC, etc.) of an anti-CD30L antibodies are advantageous for reducing immune activation resulting from the binding of an anti-CD30L antibody to CD30L. In some embodiments, one or more amino acid modifications may be introduced into the Fc region of an anti-CD30L antibody, thereby

generating an Fc region variant. An Fc region may comprise a C-terminal region of an immunoglobulin heavy chain that comprises a hinge region, CH2 domain, CH3 domain, or any combination thereof. As used herein, an Fc region includes native sequence Fc regions and variant Fc regions. The Fc region variant may comprise a human Fc region sequence (e.g., a human IgG1, IgG2, IgG3 or IgG4 Fc region) comprising an amino acid modification (e.g., a substitution, addition, or deletion) at one or more amino acid positions.

[0234] In some embodiments, the anti-CD30L antibodies of this disclosure are variants that possess some but not all effector functions, which make it a desirable candidate for applications in which the half-life of the antibody *in vivo* is important yet certain effector functions (such as complement and ADCC) are unnecessary or deleterious. *In vitro* and/or *in vivo* cytotoxicity assays can be conducted to confirm the reduction/depletion of CDC and/or ADCC activities. For example, Fc receptor (FcR) binding assays can be conducted to ensure **that the antibody lacks FcγR binding** (hence likely lacking ADCC activity) but retains FcRn binding ability. **In some embodiments, antibodies are tested for binding to Fcγ receptors and complement C1q** by an ELISA based assay, flow cytometry, SPR, or other methods known to interrogate protein-protein interactions and affinity. In some embodiments, antibodies can be tested for reduced effector functions their ability to activate appropriate cell lines or primary human immune cells *in vitro*, for example, by assessing their ability to induce expression of activation markers, cytokine/chemokine secretion, proliferation, or cell-killing (e.g. using labeled target cells).

[0235] In some embodiments, the anti-CD30L antibodies of this disclosure have a reduced effector function as compared to a human IgG. In general, effector function refers to a biological event resulting from the interaction of an antibody Fc region with an Fc receptor or ligand. In certain instances, non-limiting effector functions include C1q binding, complement dependent cytotoxicity (CDC), Fc receptor binding, antibody-dependent cell-mediated cytotoxicity (ADCC), antibody-dependent cellular phagocytosis (ADCP), cytokine secretion, immune complex-mediated antigen uptake by antigen presenting cells, down regulation of cell surface receptors (for example, B cell receptor), and B cell activation. In some embodiments, antibody-dependent cell-mediated cytotoxicity (ADCC) refers to a cell-mediated reaction in which nonspecific cytotoxic cells expressing Fc receptors (e.g., natural killer cells, neutrophils, macrophages) recognize bound antibody on a target cell, subsequently causing lysis of the target cell. In some embodiments, complement dependent cytotoxicity (CDC) refers to lysing of a target cells in the presence of complement, where the

complement action pathway is initiated by the binding of C1q to antibody bound with the target.

[0236] Some Fc regions have a natural lack of effector function, and some Fc regions can comprise mutations that reduce effector functions. For instance, IgG4 has low ADCC and CDC activities and IgG2 has low ADCC activity.

[0237] In some embodiments, the anti-CD30L antibodies comprise Fc regions characterized by ADCC that is reduced by at least about 30%, at least about 40%, at least about 50%, at least about 60%, at least about 70% or more as compared to an antibody comprising a non-variant Fc region, such as, an antibody with the same sequence identity but for the substitution(s) that decrease ADCC. The disclosure provides antibodies comprising Fc regions characterized by exhibiting CDC that is reduced by at least about 30%, at least about 40%, at least about 50%, at least about 60%, at least about 70% or more as compared to an antibody comprising a non-variant Fc region, i.e., an antibody with the same sequence identity but for the substitution(s) that decrease CDC. In certain embodiments, the antibodies of this disclosure have reduced effector function as compared with human IgG1.

[0238] Non-limiting examples of Fc mutations in IgG1 that may reduce ADCC and/or CDC include substitutions at one or more of positions: 231, 232, 234, 235, 236, 237, 238, 239, 264, 265, 267, 269, 270, 297, 299, 318, 320, 322, 325, 327, 328, 329, 330, and 331 in IgG1, where the numbering system of the constant region is that of the EU index as set forth by Kabat. In certain embodiments, the antibodies of this disclosure have reduced effector function as compared with human IgG1.

[0239] In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an N297A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an N297Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an N297D substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an D265A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an S228P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an L235A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an L237A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an L234A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an E233P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an L234V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an C236 deletion, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising a P238A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an A327Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising a P329A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising a P329G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an L235E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an P331S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an L234F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising a 235G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 235Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 235R substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 235S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 236F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 236R substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 237E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 237K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 237N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 237R substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238W substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 238Y substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 248A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254D substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 254H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254T substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 254V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 255N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 256H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 256K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 256R substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 256V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 264S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 265H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 265K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 265S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 265Y substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 267G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 267H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 267I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 267K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 268K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 269N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 269Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 270A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 270G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 270M substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 270N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 271 T substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 272N substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 279F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 279K substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 279L substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 292E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 292F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 292G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 292I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 293S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 301W substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 304E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 311E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 311G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 311S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 316F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 327T substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 328V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 329Y substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 330R substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 339E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 339L substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 343I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 343V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 373A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 373G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 373S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 376E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 376W substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 376Y substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 380D substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 382D substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 382P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 385P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 424H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 424M substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 424V substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 434I substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 438G substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 439E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region

comprising an 439H substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 439Q substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440D substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440E substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440F substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440M substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440T Fc region substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising an 440V substitution, according to the EU numbering system.

[0240] In certain embodiments, the recombinant anti-CD30L antibody comprises a Fc region selected from the representative sequences disclosed in **Table 1**.

[0241] **Table 1.** Mutations Abrogating Effector Function

Mutation(s)	Effect
E233P	Decreases binding to FcγRI, II, III
S228P, L235E SPLE in IgG4	Decreases binding to FcγRI
L235E	Decreases binding to FcγRs
L234A, L235A	Decreases binding to FcγRI, II, III
L234A, L235A, G237A	Decreases binding to FcγRI, II, III, C1q
L234A, L235A, P329G	Decreases binding to FcγRI, II, III, C1q
L234F, L235E, P331S	Decreases binding to FcγRI, II, III, C1q
L234A, L235E, G237A	Decreases binding to FcγRI, II, III, C1q
L234A, L235E, G237A, P331S	Decreases binding to FcγRI, II, III, C1q
L234A, L235A, G237A, P238S, H268A, A330S, P331S (IgG1σ)	Decreases binding to FcγRI, IIa, IIb, IIc
L234A, L235A, P329A	Decreases binding to FcγRI, II, III, C1q
G236R, L328R	Decreases binding to FcγRI, II, III
G237A	Decreases binding to FcγRII
F241A	Decreases binding to C1q
V264A	Decreases binding to C1q
D265A	Decreases binding to FcγRI, II, III
D265A, N297A	Decreases binding to FcγRI, II, III, C1q
D265A, N297G	Decreases binding to FcγRI, II, III, C1q
D270A	Decreases binding to C1q
N297A, G, D, Q	Elimination of N-linked glycosylation

	Decreases binding to FcγRI, II, III, C1q
P329A, G, R	Decreases binding to C1q
A330L	Decreases binding to C1q
P331A, S	Diminished C1q binding
IgG2	Decreases binding to FcγRs
IgG4	Decreases binding to FcγRs; Does not activate complement system
S228P	Prevent IgG4 Fab arm exchange
S228P, F234A, L235A (IgG4)	Decreases binding to FcγRI, IIa, IIb
IgG2-IgG4 cross-subclass (IgG2/G4)	Decreases binding to FcγRI, II, III, C1q
IgG2-IgG3 cross-subclass	Decreases binding to FcγRs; Decreases binding to C1q
H268Q, V309L, A330S, P331S (IgG2m4)	Decreases binding to FcγRI, II, III, C1q
V234A, G237A, P238S, H268A, V309L, A330S, P331S (IgG2σ)	Decreases binding to FcγRI, IIa, IIb, IIc, C1q
High mannose glycosylation	Decreases binding to C1q

[0242] In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising E233P, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region comprising S228P and L235E. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L235E, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A and L235A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235A, and G237A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235A, P329G, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234F, L235E, and P331S, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235E, and G237A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235E, G237A, and P331S, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235A, G237A, P238S, H268A, A330S, and P331S (IgG1), according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising L234A, L235A, and P329A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising G236R and L328R, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody

comprises an IgG1 Fc region comprising G237A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising F241A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising V264A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising D265A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising D265A and N297A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising D265A and N297G, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising D270A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising N297A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising N297G, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising N297D, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising N297Q, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising P329A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising P329G, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising P329R, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising A330L, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising P331A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG1 Fc region comprising P331S, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region comprising S228P, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region

comprising S228P, F234A, and L235A, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2-IgG4 cross-subclass (IgG2/G4) Fc region. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2-IgG3 cross-subclass Fc region. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising H268Q, V309L, A330S, and P331S, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising V234A, G237A, P238S, H268A, V309L, A330S, and P331S, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises a Fc region comprising high mannose glycosylation.

[0243] In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region comprising a S228P substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region comprising an A330S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG4 Fc region comprising a P331S substitution, according to the EU numbering system.

[0244] In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising an A330S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising a P331S substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising a 234A substitution, according to the EU numbering system. In certain embodiments, the recombinant anti-CD30L antibody comprises an IgG2 Fc region comprising a 237A substitution, according to the EU numbering system.

[0245] In some embodiments, assessment of ADCC activity of an anti-CD30L antibody comprises adding the antibody to target cells in combination with immune effector cells, which may be activated by the antigen-antibody complexes resulting in cytolysis of the target cell. Cytolysis may be detected by the release of label (for example, radioactive substrates, fluorescent dyes or natural intracellular proteins) from the lysed cells. Useful effector cells for such assays include peripheral blood mononuclear cells (PBMC) and Natural Killer (NK) cells. Specific examples of in vitro ADCC assays are described in Wisecarver et al., 1985 79:277-282; Bruggemann et al., 1987, J Exp Med 166:1351-1361; Wilkinson et al., 2001, J Immunol Methods 258:183-191; Patel et al., 1995 J Immunol Methods 184:29-38. Alternatively, or additionally, ADCC activity of the antibody of interest may be assessed in

vivo, e.g., in an animal model such as that disclosed in Clynes et al., 1998, PNAS USA 95:652-656.

[0246] In some embodiments, antibodies comprising a Fc region herein exhibit decreased ADCC activities as compared to an unmodified antibody (e.g., an antibody with human IgG1). In some embodiments, the antibodies herein exhibit ADCC activities that are at least 2-fold, or at least 3-fold, or at least 5-fold or at least 10-fold or at least 50-fold or at least 100-fold less than that of an unmodified antibody. In some embodiments, antibodies herein exhibit ADCC activities that are reduced by at least 10%, or at least 20%, or by at least 30%, or by at least 40%, or by at least 50%, or by at least 60%, or by at least 70%, or by at least 80%, or by at least 90%, or by at least 100%, or by at least 200%, or by at least 300%, or by at least 400%, or by at least 500% relative to an unmodified antibody. In certain embodiments, antibodies herein have no detectable ADCC activity. In certain embodiments, the reduction and/or abatement of ADCC activity may be attributed to the reduced affinity antibodies of the invention exhibit for Fc ligands and/or receptors.

[0247] In some embodiments, an assessment of complement activation, a CDC assay, may be performed as described in Gazzano-Santoro et al., 1996, J. Immunol. Methods, 202:163. In some embodiments, antibodies comprising Fc regions described herein exhibit decreased affinities to C1q relative to an unmodified antibody (e.g., human IgG1). In some embodiments, antibodies herein exhibit affinities for C1q receptor that are at least 2 fold, or at least 3 fold, or at least 5 fold, or at least 7 fold, or at least 10 fold, or at least 20 fold, or at least 30 fold, or at least 40 fold, or at least 50 fold, or at least 60 fold, or at least 70 fold, or at least 80 fold, or at least 90 fold, or at least 100 fold, or at least 200 fold less than an unmodified antibody. In some embodiments, antibodies herein exhibit affinities for C1q that are at least 90%, at least 80%, at least 70%, at least 60%, at least 50%, at least 40%, at least 30%, at least 20%, at least 10%, or at least 5% less than an unmodified antibody.

[0248] In some embodiments, antibodies comprising Fc regions described herein exhibit decreased CDC activities as compared to an unmodified antibody (e.g., human IgG1). In some embodiments, antibodies herein exhibit CDC activities that are at least 2-fold, or at least 3-fold, or at least 5-fold or at least 10-fold or at least 50-fold or at least 100-fold less than that of an unmodified antibody. In some embodiments, antibodies herein exhibit CDC activities that are reduced by at least 10%, or at least 20%, or by at least 30%, or by at least 40%, or by at least 50%, or by at least 60%, or by at least 70%, or by at least 80%, or by at least 90%, or by at least 100%, or by at least 200%, or by at least 300%, or by at least 400%, or by at least 500% relative to an unmodified antibody. In certain embodiments, antibodies

herein exhibit no detectable CDC activities. In some embodiments, the reduction and/or abatement of CDC activity may be attributed to the reduced affinity antibodies of the invention exhibit for Fc ligands and/or receptors.

[0249] Accordingly, further provided and described herein are anti-CD30L antibodies comprising a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 500 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 501. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 501 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 501. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 502 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 502. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 503 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 503. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 504 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 504. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 505 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 505. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 506 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 506. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 507 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 507. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 508 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 508. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 509 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 509. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 510 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%,

98%, or 99% identical to SEQ ID NO: 510. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 511 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 511. In some embodiments, an anti-CD30L antibody described herein comprises a Fc region comprising SEQ ID NO: 512 or a sequence at least about 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 512.

[0250] In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-389. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 1 and 2; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 3 and 4. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising the amino acid sequence as set forth in any one of SEQ ID NOs: 500-512 or a sequence at least about 90, 91, 92, 93, 94, 95, 96, 97, 98, or 99% identical to SEQ ID NOs: 500-512. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising one or more of the mutations as set forth in **Table 1**.

[0251] In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises (a) a CDR-H1 comprising the amino acid

sequence set forth in any one of SEQ ID NOs: 110-119; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 5 and 6; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 7 and 8. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising the amino acid sequence as set forth in any one of SEQ ID NOs: 500-512 or a sequence at least about 90, 91, 92, 93, 94, 95, 96, 97, 98, or 99% identical to SEQ ID NOs: 500-512. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising one or more of the mutations as set forth in **Table 1**.

[0252] In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises an immunoglobulin

variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 9 and 10; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 11 and 12. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising the amino acid sequence as set forth in any one of SEQ ID NOs: 500-512 or a sequence at least about 90, 91, 92, 93, 94, 95, 96, 97, 98, or 99% identical to SEQ ID NOs: 500-512. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising one or more of the mutations as set forth in **Table 1**.

[0253] In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419. In certain embodiments, the recombinant antibody or antigen binding fragment thereof comprises a variant Fc region (for example, harboring mutations) that reduce the cytotoxic response (for example, ADCC or CDC) elicited by an anti-CD30L antibody and wherein the anti-CD30L antibody comprises an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein: (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 13 and 14; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100% sequence identity to any one of SEQ ID NOs: 15 and 16. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising the amino acid sequence as set forth in any one of SEQ ID NOs: 500-512 or a sequence at least about 90, 91, 92, 93, 94, 95, 96, 97, 98, or 99% identical to SEQ ID NOs: 500-512. In certain embodiments, the anti-CD30L antibody comprises a Fc region comprising one or more of the mutations as set forth in **Table 1**.

4.5 Pharmaceutical Compositions

[0254] Compositions comprising the anti-CD30L recombinant antibodies or antigen binding fragments thereof of the current disclosure are included in a pharmaceutical composition comprising one or more pharmaceutically acceptable excipients, carriers, and diluents. As used herein, the term “pharmaceutically acceptable carrier” includes any and all solvents, dispersion media, coatings, surfactants, antioxidants, preservatives (e.g., antibacterial agents, antifungal agents), isotonic agents, absorption delaying agents, salts, preservatives, drug stabilizers, binders, excipients, disintegration agents, lubricants, sweetening agents, flavoring agents, dyes, and the like and combinations thereof, as would be known to those skilled in the art (see, for example, Remington's Pharmaceutical Sciences, 18th Ed. Mack Printing Company, 1990, pp. 1289-1329). Except insofar as any conventional carrier is incompatible with the active ingredient, its use in the therapeutic or pharmaceutical compositions is contemplated. In certain embodiments, the antibodies of the current disclosure are administered suspended in a sterile solution. In certain embodiments, the solution comprises about 0.9% NaCl. In certain embodiments, the solution comprises about 5.0% dextrose. In certain embodiments, the solution further comprises one or more of: buffers, for example, acetate, citrate, histidine, succinate, phosphate, bicarbonate and hydroxymethylaminomethane (Tris); surfactants, for example, polysorbate 80 (Tween 80), polysorbate 20 (Tween 20), and poloxamer 188; polyol/disaccharide/polysaccharides, for example, glucose, dextrose, mannose, mannitol, sorbitol, sucrose, trehalose, and dextran 40; amino acids, for example, glycine or arginine; antioxidants, for example, ascorbic acid, methionine; or chelating agents, for example, EDTA or EGTA.

[0255] In certain embodiments, the anti-CD30L antibodies of the current disclosure are shipped/stored lyophilized and reconstituted before administration. In certain embodiments, lyophilized antibody formulations comprise a bulking agent such as, mannitol, sorbitol, sucrose, trehalose, dextran 40, or combinations thereof. The lyophilized formulation can be contained in a vial comprised of glass or other suitable non-reactive material. The antibodies when formulated, whether reconstituted or not, can be buffered at a certain pH, generally less than 8.0. In certain embodiments, the pH can be between 4.5 and 7.5, 4.5 and 6.0, 4.5 and 5.5, 7.5 and 5.0, or 5.0 and 8.0.

[0256] Also described herein are kits comprising one or more of the anti-CD30L antibodies described herein in a suitable container and one or more additional components selected from: instructions for use; a diluent, an excipient, a carrier, and a device for administration.

4.6 Methods of Treatment

[0257] The recombinant anti-CD30L antibodies or antigen binding fragments thereof described herein are useful in various embodiments for treating or ameliorating an autoimmune disorder in an individual. For example, in some embodiments, the recombinant anti-CD30L antibodies or antigen binding fragments thereof are useful in methods of treating an autoimmune disorder in an individual, wherein the method comprises administering the recombinant anti-CD30L antibodies or antigen binding fragments thereof to the individual. Accordingly, provided methods of treating an autoimmune disorder in an individual, wherein the method comprises administering the recombinant anti-CD30L antibodies or antigen binding fragments thereof to the individual, thereby treating or ameliorating the immune disorder. In certain embodiments, the autoimmune disorder is inflammatory bowel disease (IBD). In certain embodiments, the inflammatory bowel disease (IBD) is Crohn's disease (CD), ulcerative colitis (UC), and/or fibrosis. In certain instances, Inflammatory bowel disease (IBD) refers to a chronic disorder characterized by inflammation of the gastrointestinal tract. IBD encompasses and/or includes ulcerative colitis, which affects the large intestine and/or rectum, and Crohn's disease, which can affect the entire gastrointestinal system or be localized to the small intestine (ileum) and regions of the large intestine.

[0258] The terms “patient” “individual” or “subject” are used interchangeably and refer to any animal, including, but not limited to, humans, non-human primates, rodents, and domestic and game animals, which is to be the recipient of a particular treatment. Primates include chimpanzees, cynomolgus monkeys, spider monkeys, and macaques, e.g., Rhesus. Rodents include mice, rats, woodchucks, ferrets, rabbits and hamsters. Domestic and game animals include cows, horses, pigs, deer, bison, buffalo, feline species, e.g., domestic cat, canine species, e.g., dog, fox, wolf, avian species, e.g., chicken, emu, ostrich, and fish, e.g., trout, catfish and salmon. In various embodiments, a subject can be one who has been previously diagnosed with or identified as suffering from or having a condition in need of treatment. In certain embodiments, the subject is a human. In various other embodiments, the subject previously diagnosed with or identified as suffering from or having a condition may or may not have undergone treatment for a condition. In yet other embodiments, a subject can also be one who has not been previously diagnosed as having a condition (i.e., a subject who exhibits one or more risk factors for a condition). An “individual in need” of treatment for a particular condition can be a subject having that condition, diagnosed as having that

condition, or at risk of developing that condition. In some embodiments, the individual is a **“patient,” that has been diagnosed with a disease or condition described herein.**

[0259] In certain embodiments, administering the recombinant anti-CD30L antibodies or antigen binding fragments thereof comprises administering a therapeutically effective amount of the recombinant anti-CD30L antibodies or antigen binding fragments thereof. In certain instances, **the term “therapeutically effective amount” refers to an amount of an antibody, polypeptide, polynucleotide, small organic molecule, or other drug effective to “treat” a disease or disorder in a subject or mammal.** In certain instances, therapeutically effective amount of the drug reduces the severity of symptoms of the disease or disorder. In some embodiments, **the disease or disorder comprises inflammatory bowel disease (IBD), Crohn’s disease (CD), or ulcerative colitis (UC).** In certain embodiments, the IBD, CD, and/or UC are severe or medically refractory forms of the IBD, CD, and/or UC. Non-limiting examples of symptoms of IBD, CD, and/or UC include, but are not limited to, diarrhea, fever, fatigue, abdominal pain, abdominal cramping, inflammation, ulceration, nausea, vomiting, bleeding, blood in stool, reduced appetite, and weight loss.

[0260] In certain instances, **the terms, “treat” or “treating” as used herein refer to both** therapeutic treatment and prophylactic or preventative measures (e.g., disease progression), wherein the object is to prevent or slow down (lessen) the targeted pathologic condition. In some embodiments provided herein, individuals in need of treatment include those already with a disease or condition, as well as those susceptible to develop the disease or condition. In additional embodiments, the disease or condition comprises an inflammatory disease or autoimmune condition.

[0261] The recombinant anti-CD30L antibodies or antigen binding fragments thereof described herein are further useful in various embodiments for inhibiting, reducing, and/or preventing an inflammatory immune response or immune activation in an individual, wherein the method comprises administering the recombinant anti-CD30L antibodies or antigen binding fragments thereof. In certain instances, the inflammatory immune response or immune activation comprises the expression, release, and/or activation of cytokine molecules and signaling pathways. In certain instances, cytokines is a generic term for proteins released by one cell population which act on another cell as intercellular mediators. Examples of such cytokines are lymphokines, monokines, and traditional polypeptide hormones. Included among the cytokines are transforming growth factors (TGFs) such as TGF- α and TGF- β ; insulin-like growth factor-I and -II; erythropoietin (EPO); osteoinductive factors; interferons such as interferon- α , - β , and - γ ; **colony stimulating factors (CSFs)** such as macrophage-CSF

(M-CSF); granulocyte-macrophage-CSF (GM-CSF); and granulocyte-CSF (G-CSF); interleukins (ILs) such as IL-1, IL-1 α , IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, IL-17, IL-21, IL-22, IL-26; a tumor necrosis factor such as TNF- α or TNF- β ; and other polypeptide factors including LIF and kit ligand (KL). The anti-CD30L antibodies are useful for reducing the expression/secretion of pro-inflammatory cytokines such as, for example, IL-1, IL-1 α , IL-2, IL-6, IL-7, IL-8, IL-12, IL-23, interferon- α , - β , and - γ , and GM-CSF. Without being bound by theory, pro-inflammatory cytokines are released by inflammatory T cell subsets such as T_h1 or T_h17 cells, which play a role in many immune mediated pathologies including inflammatory bowel disease, ulcerative colitis, and Crohn's disease. Thus, effective reduction or blockade of these pro-inflammatory cytokines or interleukins addresses a key etiology of many autoimmune and inflammatory disorders. In another instance, the inflammatory immune response or immune activation comprises apoptosis of cells affected by an autoimmune disorder. In another instance, the inflammatory immune response or immune activation comprises the presence or activation of immune cells (e.g. macrophages, T cells, T helper cells, natural killer cells, etc.) in a tissue affected by an autoimmune disorder. In certain embodiments, immune cells encompass any cell derived from a hematopoietic stem cell that plays a role in the immune response. Immune cells include, without limitation, lymphocytes, such as T cells and B cells, antigen-presenting cells (APC), dendritic cells, monocytes, macrophages, natural killer (NK) cells, mast cells, basophils, eosinophils, or neutrophils, as well as any progenitors of such cells. In certain embodiments, the immune cell is a T cell. In certain embodiments, T cells include all cells within the T cell lineage, including thymocytes, immature T cells, mature T cells and the like. Thus, T cells include CD4⁺ T cells, CD8⁺ T cells, T helper (T_h) cells (for example, T_h1, T_h2 and T_h17 cells) and T regulatory (T_{reg}) cells.

[0262] Accordingly, provided herein are methods if inhibiting, reducing, and/or preventing an inflammatory immune response or immune activation in an individual. In some embodiments, the inflammatory immune response or immune activation is characterized by the presence or activation of cytokine signaling molecules, the presence or activation of cellular apoptosis, and/or the presence or activation of immune cells. In certain embodiments, the presence or activation of cytokine signaling molecules, the presence or activation of cellular apoptosis, and/or the presence or activation of immune cells is the result of an autoimmune disorder. In certain embodiments, the presence or activation of cytokine signaling molecules, the presence or activation of cellular apoptosis, and/or the presence or activation of immune cells is localized to a specific tissue affected by the autoimmune

disorder. In certain embodiments, the autoimmune disease or disorder comprises **inflammatory bowel disease (IBD), Crohn's disease (CD), or ulcerative colitis (UC)**. In certain embodiments, the IBD, CD, and/or UC are severe or medically refractory forms of the IBD, CD, and/or UC.

[0263] Furthermore, the recombinant anti-CD30L antibodies or antigen binding fragments thereof described herein are useful for inhibiting and/or reducing binding of a CD30L molecule to a CD30 molecule. In some embodiments, the recombinant anti-CD30L antibodies or antigen binding fragments thereof described herein are useful for preventing an interaction inhibiting and/or reducing binding of a CD30L molecule to a CD30 molecule in an individual. In some embodiments, inhibiting and/or reducing binding of a CD30L molecule to a CD30 molecule prevents, reduces, or inhibits an inflammatory immune response and/or the activation of immune cells, as described herein. Accordingly, provided are method of inhibiting and/or reducing binding of a CD30L molecule to a CD30 molecule, wherein the method comprises administering the recombinant anti-CD30L antibodies or antigen binding fragments thereof described herein to the individual. In certain embodiments, the individual comprises an autoimmune disorder. In certain embodiments, the autoimmune disorder comprises **inflammatory bowel disease (IBD), Crohn's disease (CD), or ulcerative colitis (UC)**. In certain embodiments, the IBD, CD, and/or UC are severe or medically refractory forms of the IBD, CD, and/or UC.

4.7 Exemplary Embodiments

[0264] As described herein, provided are recombinant antibodies and/or antigen binding fragments thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139 or 220-234; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179 or 235-249; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219 or 250-264; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339 or 420-434; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379 or 435-449; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419 or 450-464.

[0265] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof

comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-389.

[0266] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-104; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-144; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-184; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-304; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-344; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-384.

[0267] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises: (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 145-149; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 305-309; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389.

[0268] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1 and 2; and/or (b) the

immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3 and 4.

[0269] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359; and/or (e) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399.

[0270] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-114; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-154; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-194; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-314; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-354; and/or (e) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-394.

[0271] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399.

[0272] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy

chain and an immunoglobulin variable region light chain, wherein (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 5 and 6; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 7 and 8.

[0273] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409.

[0274] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-124; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-164; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-204; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-324; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-364; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-404.

[0275] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369;

and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409.

[0276] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 9 and 10; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 11 and 12.

[0277] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419.

[0278] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414.

[0279] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the

amino acid sequence set forth in any one of SEQ ID NOs: 215-219; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419.

[0280] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 13 and 14; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 15 and 16.

[0281] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 220-224; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 235-239; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 250-254; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 420-424; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 435-439; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 450-454.

[0282] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 17; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 18.

[0283] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 225-229; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 240-244; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the

amino acid sequence set forth in any one of SEQ ID NOs: 255-259; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 425-429; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 440-444; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 455-459.

[0284] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 19; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 20.

[0285] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the antibody or antigen binding fragment thereof comprises : (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 230-234; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 245-249; (c) an immunoglobulin heavy chain CDR3 (CDR-H3) comprising the amino acid sequence set forth in any one of SEQ ID NOs: 260-264; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 430-434; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 445-449; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 460-464.

[0286] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein : (a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 21; and/or (b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NO: 15 and 22.

[0287] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising a constant region (e.g. a fragment crystallizable (Fc) region) having reduced antibody-dependent cell-mediated cytotoxicity (ADCC) function as compared to human IgG1 and/or reduced complement-dependent cytotoxicity (CDC) as compared to human IgG1. In some embodiments, provided is an

antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the Constant region comprises an amino acid sequence having 80, 85, 90, 95, 97, 98, 99, or 100 % sequence identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the Constant region comprises the amino acid sequence set forth by any one of SEQ ID NOs: 500-512.

[0288] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, comprising a constant region having an amino acid sequence variant corresponding to (a) 297A, 297Q, 297G, or 297D, (b) 279F, 279K, or 279L, (c) 228P, (d) 235A, 235E, 235G, 235Q, 235R, or 235S, (e) 237A, 237E, 237K, 237N, or 237R, (f) 234A, 234V, or 234F, (g) 233P, (h) 328A, (i) 327Q or 327T, (j) 329A, 329G, 329Y, or 329R (k) 331S, (l) 236F or 236R, (m) 238A, 238E, 238G, 238H, 238I, 238V, 238W, or 238Y, (n) 248A, (o) 254D, 254E, 254G, 254H, 254I, 254N, 254P, 254Q, 254T, or 254V, (p) 255N, (q) 256H, 256K, 256R, or 256V, (r) 264S, (s) 265H, 265K, 265S, 265Y, or 265A, (t) 267G, 267H, 267I, or 267K, (u) 268K, (v) 269N or 269Q, (w) 270A, 270G, 270M, or 270N, (x) 271T, (y) 272N, (z) 292E, 292F, 292G, or 292I, (aa) 293S, (bb) 301W, (cc) 304E, (dd) 311E, 311G, or 311S, (ee) 316F, (ff) 328V, (gg) 330R, (hh) 339E or 339L, (ii) 343I or 343V, (jj) 373A, 373G, or 373S, (kk) 376E, 376W, or 376Y, (ll) 380D, (mm) 382D or 382P, (nn) 385P, (oo) 424H, 424M, or 424V, (pp) 434I, (qq) 438G, (rr) 439E, 439H, or 439Q, (ss) 440A, 440D, 440E, 440F, 440M, 440T, or 440V, (tt) E233P, (uu) L235E, (vv) L234A and L235A, (ww) L234A, L235A, and G237A, (xx) L234A, L235A, and P329G, (yy) L234F, L235E, and P331S, (zz) L234A, L235E, and G237A, (aaa), L234A, L235E, G237A, and P331S (bbb) L234A, L235A, G237A, P238S, H268A, A330S, and P331S, (ccc) L234A, L235A, and P329A, (ddd) G236R and L328R, (eee) G237A, (fff) F241A, (ggg) V264A, (hhh) D265A, (iii) D265A and N297A, (jjj) D265A and N297G, (kkk) D270A, (lll) A330L, (mmm) P331A or P331S, or (nnn) any combination of (a) – (mmm), per EU numbering.

[0289] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is an IgG antibody. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the IgG antibody is IgG1, IgG2, IgG3, or IgG4. In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is human, chimeric, or humanized.

[0290] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is a Fab, F(ab)[']₂, a single-domain antibody, or a single chain variable fragment (scFv). In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof is a bispecific or multispecific antibody.

[0291] In some embodiments, provided is an antibody or antigen binding fragment thereof of any of the preceding embodiments, wherein the recombinant antibody or antigen binding fragment thereof inhibits a binding interaction between CD30L and CD30.

[0292] In an aspect, further provided are nucleic acids encoding the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments. Also provided are cells comprising the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments. In some embodiments, the cell is a eukaryotic cell. In some embodiments, the cell is a prokaryotic cell.

[0293] In an aspect, provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting binding of CD30L to CD30. Further provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting activation of CD30 signaling in a cell. Also provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in a method of inhibiting activation, expression, and/or secretion of a pro-inflammatory cytokine protein.

[0294] In an aspect, provided are recombinant antibodies or antigen binding fragments thereof of any the preceding embodiments for use in treating an autoimmune disease in an individual in need thereof. In some embodiments, the autoimmune disease is irritable bowel disease. In some embodiments, the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

[0295] In an aspect, provided are methods of treating or ameliorating an autoimmune disease in an individual in need thereof, the method comprising administering to the individual the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments, thereby treating or ameliorating the autoimmune disease. Also provided are methods for inhibiting and/or reducing binding of CD30L to CD30 in an individual with an inflammatory or autoimmune disorder, the method comprising administering to an individual afflicted with the inflammatory or autoimmune disorder the recombinant antibody or antigen binding fragment thereof of the preceding embodiments, thereby inhibiting and/or reducing

the binding of CD30L to CD30. Further provided are methods of reducing and/or inhibiting inflammation in an individual, the method comprising administering to the individual the recombinant antibody or antigen binding fragment thereof of any of the preceding embodiments, thereby reducing and/or inhibiting inflammation.

[0296] In some embodiments, the provided are methods of any of the preceding embodiments, wherein the individual has an autoimmune disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the autoimmune disease is irritable bowel disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

[0297] In some embodiments, the provided are methods of any of the preceding embodiments, wherein reducing and/or inhibiting inflammation comprises reducing an amount of pro-inflammatory cytokine expression or secretion in the individual or a tissue of the individual. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the pro-inflammatory cytokine comprises interleukin 8 and/or interleukin 6. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the individual has an autoimmune disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the autoimmune disease is irritable bowel disease. In some embodiments, the provided are methods of any of the preceding embodiments, wherein the irritable bowel disease comprises ulcerative colitis (UC) or Crohn's Disease (CD).

5. EXAMPLES

[0298] The following examples are illustrative of the embodiments described herein and are not to be interpreted as limiting the scope of this disclosure. To the extent that specific materials are mentioned, it is merely for purposes of illustration and is not intended to be limiting. One skilled in the art may develop equivalent means or reactants without the exercise of inventive capacity and without departing from the scope of this disclosure.

Example 1: Generation and identification of anti-CD30L antibodies

[0299] Mice with humanized immunoglobulin locus were used for antibody generation. Mice were inoculated with human CD30L expressing cells (B16 cell line transfected to express human CD30L), DNA encoding human CD30L, and recombinant human CD30L protein. At

certain time points following the start of the immunizations, the serum of the mice was screened for reactivity to human CD30L and cynomolgus CD30L and plasma cells from mice with high titers were fused to generate hybridomas.

[0300] The hybridomas were then expanded, screened and selected based on their flow cytometry binding to cells expressing human and cyno CD30L, CD30:CD30L blocking activity when CD30L is expressed on cells by flow cytometry, ELISA binding to recombinant human CD30L protein, ELISA binding to recombinant cynomolgus CD30L protein, and CD30:CD30L blocking ability in an ELISA binding assay. **Table 2**, **Table 3**, and **Table 4** show data from hybridoma screening assays. The anti-CD30L antibodies shown in **Table 2** and **Table 3** effectively bind recombinant CD30L, cells expressing CD30L, and inhibit binding of CD30L to CD30. Clone 1 comprises the CDRs as set forth in SEQ ID NOs: 100-104, 140-144, 180-184, 300-304, 340-344, and 380-384; Clone 2 comprises the CDRs as set forth in SEQ ID NOs: 110-114, 150-154, 190-194, 310-314, 350-354, and 390-394; Clone 3 comprises the CDRs as set forth in SEQ ID NOs: 120-124, 160-164, 200-204, 320-324, 360-364, and 400-404; and Clone 4 comprises the CDRs as set forth in SEQ ID NOs: 130-134, 170-174, 210-214, 330-334, 370-374, and 410-414; Clone 59 comprises the CDRs as set forth in SEQ ID NOs: 220-224, 235-239, 250-254, 420-424, 435-439, and 450-454; Clone 60 comprises the CDRs as set forth in SEQ ID NOs: 225-229, 240-244, 255-259, 425-429, 440-444, and 455-459; and Clone 61 comprises the CDRs as set forth in SEQ ID NOs: 230-234, 245-249, 260-264, 430-434, 445-449, and 460-464.

Table 2: Cell binding and ELISA screening against CD30L					
Clone ID	Cell Binding (MFI)		Elisa Binding (OD)		
	huCD30L (1/50 dil)	cyCD30L (1/50 dil)	huCD30L (1/50 dil)	huCD30L (1/500 dil)	huCD30L (1/5000 dil)
1	208	77.3	3.586	3.025	1.283
2	280	57.6	2.147	1.712	0.565
3	153	72.4	3.495	2.54	0.662
4	151	67.8	3.075	2.652	0.68
5	205	79.6	3.166	2.849	1.111
6	200	61.9	2.374	1.377	0.503
7	234	77.6	2.17	1.404	0.395
8	186	69.9	2.255	1.074	0.255
9	234	62.8	1.829	1.202	0.358
10	192	74.6	2.14	1.233	0.313
11	176	68.4	2.294	1.274	0.324
12	186	76.7	3.067	2.679	0.822
13	168	69.6	3.244	2.797	0.825
14	168	70.3	2.045	1.129	0.27
15	176	67.1	2.951	2.6	0.754

16	176	76	2.014	1.133	0.284
17	166	68.3	3.184	2.448	0.719
18	171	70.1	3.183	2.571	0.774
19	137	57.5	1.87	0.93	0.221
20	197	79.8	2.085	1.345	0.3
21	160	66.2	2.302	1.239	0.295
22	156	74.6	3.128	2.673	0.82
23	170	64.2	3.482	2.494	0.701
24	170	68.7	3.176	2.618	0.697
25	155	64.2	3.104	2.411	0.621
26	167	66	2.919	2.48	0.658
27	149	68.8	3.206	2.395	0.605
28	144	68	3.046	2.342	0.569
29	139	65.9	3.158	2.306	0.588
30	154	62.9	3.137	2.389	0.645
31	141	68.2	3.043	2.316	0.589
32	149	68.2	3.012	2.397	0.608
33	132	68.5	3.059	2.224	0.536
34	115	57	1.923	0.784	0.177
35	148	57.4	3.18	2.429	0.572
36	146	57.7	3.288	2.308	0.582
37	127	57.2	1.826	0.834	0.193
38	146	63.1	2.864	2.31	0.628
39	135	52.4	2.004	0.846	0.178
40	123	50.4	1.198	0.791	0.191
41	120	51.9	0.502	0.349	0.081
42	104	53.1	3.109	1.928	0.408
43	104	51.7	1.772	0.643	0.142
44	76.2	46.4	1.545	0.52	0.114
45	0.54	0.54	0.314	0.085	0.047
46	0.74	0.77	0.454	0.111	0.054
47	0.59	0.76	0.61	0.138	0.053
48	0.86	0.63	0.418	0.108	0.043
49	2.83	2.86	0.143	0.054	0.043
50	0.23	0.16	0.047	0.046	0.047
51	0.23	0.16	0.052	0.048	0.042
52	0.61	0.77	0.499	0.137	0.053
53	18.8	11.4	0.887	0.18	0.059
54	0.58	0.75	0.471	0.128	0.05
55	0.47	0.57	0.331	0.086	0.047
56	0.25	0.17	0.043	0.042	0.043
57	0.26	0.18	0.041	0.041	0.04
58	0.53	0.23	0.033	0.043	0.039

Table 3: Cell binding and ELISA screening against CD30L		
Clone ID	Cell Binding HuCD30L Flow (MFI)	ELISA Binding HuCD30L ELISA (OD)
59	9785.31	0.06
60	1090.51	0.23
61	361.75	1.42

Table 4: ELISA screening against CD30L and CD30:CD30L blocking data							
Clone ID	Elisa Binding (OD)			Elisa CD30 Neutralization (% inhibition)			
	cyCD30 L (1/50 dil)	cyCD30L (1/500 dil)	cyCD30L (1/5000 dil)	huCD30 L (undil)	huCD30L (1/10 dil)	huCD30L (1/100 dil)	huCD30L (1/1000 dil)
1	2.833	2.866	1.155	98%	98%	34%	0%
2	3.762	3.177	1.226	98%	98%	45%	1%
3	3.199	2.348	0.552	98%	95%	17%	3%
4	2.575	2.378	0.583	98%	96%	10%	0%
5	2.899	2.774	0.974	98%	98%	36%	7%
6	3.482	2.574	0.793	98%	98%	25%	0%
7	3.665	2.742	0.837	98%	98%	21%	0%
8	3.443	2.266	0.616	98%	98%	25%	0%
9	3.432	2.539	0.794	98%	98%	29%	0%
10	3.356	2.254	0.655	98%	98%	28%	0%
11	2.99	2.507	0.675	98%	97%	28%	0%
12	2.442	2.636	0.69	98%	97%	16%	0%
13	2.787	2.522	0.699	98%	97%	17%	3%
14	3.228	2.08	0.557	98%	97%	17%	0%
15	2.644	2.48	0.656	98%	97%	22%	7%
16	3.227	2.006	0.582	98%	97%	23%	6%
17	2.689	2.636	0.69	98%	97%	17%	0%
18	2.567	2.559	0.637	98%	96%	20%	4%
19	3.328	1.905	0.453	98%	96%	8%	0%
20	3.349	2.583	0.679	98%	98%	24%	6%
21	3.372	2.008	0.511	98%	96%	16%	1%
22	2.752	2.441	0.631	98%	96%	24%	10%
23	2.845	2.474	0.625	98%	96%	17%	3%
24	2.583	2.416	0.617	98%	96%	17%	6%
25	2.537	2.283	0.534	98%	95%	9%	0%
26	2.303	2.267	0.574	98%	95%	18%	5%
27	2.693	2.293	0.503	98%	94%	16%	4%
28	2.589	2.244	0.516	98%	96%	15%	2%
29	2.85	2.287	0.522	98%	92%	18%	8%
30	2.694	2.314	0.578	98%	96%	12%	0%
31	2.473	2.269	0.493	98%	88%	9%	1%
32	2.461	2.37	0.507	98%	89%	16%	1%
33	2.727	2.154	0.473	98%	91%	9%	4%
34	3.249	1.683	0.366	98%	93%	12%	2%
35	2.703	2.218	0.484	98%	92%	19%	5%
36	2.428	2.288	0.525	98%	94%	10%	0%
37	3.065	1.631	0.353	99%	86%	10%	4%
38	2.694	2.352	0.568	98%	92%	16%	5%
39	3.336	1.72	0.358	98%	93%	13%	1%
40	1.192	0.682	0.198	0%	0%	0%	0%
41	2.063	1.382	0.409	64%	52%	13%	18%
42	2.633	1.893	0.36	98%	76%	11%	6%
43	3.064	1.385	0.278	98%	76%	8%	0%
44	2.911	1.185	0.223	98%	66%	5%	0%
45	1.138	0.248	0.067	1%	0%	0%	0%
46	1.388	0.338	0.079	67%	57%	26%	5%
47	1.785	0.447	0.094	0%	0%	28%	0%
48	1.163	0.279	0.071	9%	5%	0%	0%
49	0.064	0.058	0.045	0%	0%	0%	2%

50	0.046	0.048	0.063	3%	4%	2%	0%
51	0.052	0.049	0.043	1%	0%	4%	1%
52	1.713	0.463	0.092	5%	0%	0%	0%
53	1.84	0.397	0.089	83%	7%	0%	3%
54	1.716	0.426	0.102	0%	22%	0%	0%
55	1.253	0.262	0.069	7%	3%	9%	14%
56	0.057	0.045	0.049	0%	0%	0%	0%
57	0.046	0.043	0.046	0%	0%	0%	1%
58	0.052	0.043	0.043	0%	0%	0%	0%

Example 2: Functional activity of CD30L antibodies

[0301] When engaged by CD30L, expressed at the cell surface or in a recombinant soluble form, CD30+ Karpas 299 (K299) (cells from Dr Abraham Karpas at the University of Cambridge) cells release IL-8 in the supernatant. Interleukin 8 is a chemokine produced by macrophages and other cell types such as epithelial cells, and functions in activating an inflammatory and/or immune response. A monoclonal antibody binding to CD30L in such a way to neutralize CD30-CD30L interaction can therefore be identified using this functional assay by detecting inhibition of IL-8 release. A dual cell, IL-8 release assay was developed with the K299 cells expressing human CD30 and B16-huCD30L or HEK-cyCD30L. Clones 1-2 effectively reduced, inhibited, and/or prevented IL-8 release. In this assay, the anti-CD30L antibody test articles showed marked improvements (e.g. lower IC₅₀) over the control test article anti-CD30L Reference 1 antibody (Ref1, comprising heavy chain of SEQ ID NO: 768 and light chain of SEQ ID NO: 769), an antibody that binds CD30L and blocks its interaction with CD30. **Table 5** shows the results of the assay.

Table 5: IL-8 release, dual cell assay				
	Inhibition of IL-8 release in a dual cell assay (B16-huCD30L cells + K299 cells) IC ₅₀ (nM)		Inhibition of IL-8 release in a dual cell assay (HEK293-cyCD30L cells + K299 cells) IC ₅₀ (nM)	
Clone	Mouse IgG	Human IgG1	Mouse IgG	Human IgG1
Ref1		1.74		0.68
1	1.99	1.1	0.55	0.22
2	1.20	0.6	0.46	0.24

Example 3: Anti-CD30L antibody binding to cell-expressed CD30L

[0302] Anti-CD30L antibody binding to a CD30L target was determined by flow cytometry, using B16 cells transfected to express human CD30L (compared to non-transfected B16), and using HEK293 cells transfected to express cynomolgus CD30L (compared to non-transfected HEK293). In brief, the cell lines were detached with a non-enzymatic EDTA-based reagent,

incubated on ice with increasing concentrations of anti-CD30L antibodies (from 0.002nM to 33.5 nM) in flow cytometry buffer, and washed to remove unbound molecules. Cell surface bound antibodies were detected using a fluorescently labeled anti-human-IgG or anti-mouse IgG, depending on the Fc portion of the antibodies. After incubation with the secondary antibody, the cells were washed, fixed in a paraformaldehyde solution, and analyzed by flow cytometry to detect antibody binding. The results from this assay are shown in **Table 6**.

Table 6: Summary of cell-based binding and blocking assays				
	Binding of antibodies to B16-huCD30L cells EC ₅₀ (nM)		Antibody mediated blocking of huCD30 binding to B16-huCD30L cells IC ₅₀ (nM)	
Clone	Mouse IgG	Human IgG1	Mouse IgG	Human IgG1
Ref1		1.74		2.77
1	1.95	1.41	3.06	1.35
2	1.21	0.81	1.84	0.86

[0303] To assess the potency of the disclosed anti-CD30L antibodies to inhibit binding between CD30 and CD30L, a flow cytometry-based assay was developed using cells expressing human CD30L (B16-huCD30L) and cells expressing cyno CD30L (HEK-cyCD30L). In this assay, the binding of soluble fluorescently-labeled CD30-Fc to CD30 was detected at the surface of the cells by flow cytometry. The pre-incubation of these cells with increasing concentrations of blocking anti-CD30L antibodies inhibited the binding of fluorescent CD30-Fc to the cell surface in a dose dependent manner. The results from this assay are shown in **Table 6**. In both assays (binding and blocking), the anti-CD30L antibody test articles show improvements (e.g. lower EC₅₀ and lower IC₅₀ values) over the control test article anti-CD30L Reference 1 antibody (Ref1, comprising heavy chain of SEQ ID NO: 768 and light chain of SEQ ID NO: 769), an antibody that binds CD30L and blocks its interaction with CD30.

Example 4: Anti-CD30L antibody binding to human primary cells

[0304] Peripheral blood mononuclear cells (PBMCs) were isolated from freshly collected whole blood from **Ulcerative Colitis (UC) and Crohn's Disease (CD) patients**, by conventional density gradient centrifugation. To induce CD30L expression on primary lymphocytes, the isolated cells were stimulated overnight with Phorbol 12-myristate 13-acetate (PMA) and ionomycin. The next day, the stimulated cells, along with non-stimulated cells kept as control, were collected, washed and incubated on ice with increasing

concentrations of fluorescently labeled anti-CD30L antibodies or isotype control (from 0.001 nM to 60 nM). After washing to remove unbound antibodies, the cells were fixed in a paraformaldehyde solution and analyzed by flow cytometry to quantify cell surface antibody binding. Typical results from this assay are shown in **Table 7**.

Table 7: Binding to primary lymphocytes from UC and CD patients stimulated with PMA/ionomycin.				
Antibody Clone	Patient 1 (CD, #04-021) Binding EC ₅₀ (nM)	Patient 2 (UC, #03-041) Binding EC ₅₀ (nM)	Patient 3 (UC, #02-180) Binding EC ₅₀ (nM)	Patient 4 (CD, #01-051) Binding EC ₅₀ (nM)
Ref1 (HC of SEQ ID NO: 768 & LC of SEQ ID NO: 769)	3.63	3.12	3.07	2.82
1	7.45	5.43	5.57	4.53
2	2.40	1.55	1.71	1.72

Example 5: Generation and Identification of Additional anti-CD30L antibodies

[0305] To identify additional antibody sequences, including additional CDR sequences, that can specifically bind to CD30L, block CD30-CD30L interaction, and block CD30L-mediated CD30 signaling, multiple additional antibody campaigns were independently performed. Three different and independently constructed and humanized mouse strains (#1, #2, or #3) were used for antibody generation. Two of the mouse strains (#2 or #3) were designed to maximize antibody diversity. All mice were inoculated with human CD30L expressing cells (B16 cell line transfected to express human CD30L), DNA encoding human CD30L, and recombinant human CD30L protein. At certain time points following the start of the immunizations, the serum of the mice was screened for reactivity to human CD30L, cynomolgus CD30L and mouse CD30L. B cells from mice with strong titers were imported to a BEACON instrument for single B cell screening. The BEACON screening aimed to identify CD30L blocking antibodies that exhibited human and cynomolgus species cross reactivity and on-cell target binding.

[0306] B cells from the BEACON screening were exported to multi-well plates for VH and VL sequencing and production of recombinant antibodies. Purified recombinant antibodies were tested for binding to recombinant human CD30L, cynomolgus CD30L and mouse CD30L and to cells expressing human and cynomolgus CD30L (Table 8). In addition, the ability of

each antibody to block CD30L binding to CD30 was tested. Briefly, individual anti-human biosensors were loaded with purified IgG (normalized to 10 µg/mL) and a baseline was measured for each biosensor. Biosensors were saturated with biotin and with polyclonal huIgG and a baseline was measured. Loaded biosensors were then allowed to bind CD30L and the association rate was measured for the binding. Biosensors were moved to buffer wells to measure the dissociation rate. Biosensors were reloaded with CD30L and moved to wells with CD30. Association of CD30 results in an increase in relative units over background (0.15) and is indicative of a non-blocking antibody clone.

Table 8. Purified recombinant antibodies bind CD30L and compete with CD30

Clone ID	Mouse Strain	rhCD30 L (+) ELISA	rcyCD30 L (+) ELISA	rmCD30 L (+) ELISA	hCD30L B16 (+) FLOW	Parental (-) FLOW	rhCD30 L : rhCD30 Blocking
62	#1	0.555	0.332	0.047	4826784	11596	0.0557
86	#1	1.435	0.748	0.045	4493586	11572	0.0631
87	#1	0.051	0.057	0.045	10958	10992	No binding
88	#1	0.283	0.109	0.045	1052602	10999	0.0547
89	#1	0.449	0.146	0.058	1984901	11095	0.0532
90	#1	1.641	0.798	0.046	5997151	11468	0.068
63	#1	1.871	0.724	0.046	6070933	11113	0.0592
91	#1	0.268	0.104	0.044	1051940	10786	0.0547
92	#1	0.251	0.057	0.045	47034	10869	0.0642
93	#1	0.144	0.066	0.045	234134	11002	No binding
94	#1	0.982	0.245	0.059	4535943	11254	0.0551
95	#1	0.866	0.262	0.045	1503954	11012	0.053
96	#1	0.048	0.057	0.046	12183	11785	No binding
97	#1	0.05	0.055	0.055	13077	11219	No binding
64	#1	2.041	0.951	0.049	5667300	11683	0.0633
98	#1	0.049	0.056	0.048	35192	11365	No binding
99	#1	0.048	0.055	0.049	11119	11472	No binding
65	#1	1.966	1.378	0.047	6913949	11367	0.0522
100	#1	0.049	0.055	0.048	10750	11549	No binding
66	#1	2.047	0.056	0.045	19034	11297	0.2575
101	#1	0.052	0.055	0.046	10757	11622	No binding

67	#1	2.352	0.089	0.046	197523	11267	0.2053
68	#2 or #3	1.707	0.867	0.044	5578433	10925	0.055
102	#2 or #3	0.412	0.231	0.045	2417049	11384	0.0697
69	#2 or #3	0.353	0.138	0.047	4929180	11328	0.2273
103	#2 or #3	0.05	0.058	0.049	11442	10952	No binding
70	#2 or #3	1.514	0.709	0.046	6946359	12003	0.0687
104	#2 or #3	0.238	0.065	0.047	774533	11524	0.0394
71	#2 or #3	1.733	0.855	0.046	5382299	11676	0.0529
72	#2 or #3	0.813	0.262	0.046	5242171	11521	0.0696
73	#2 or #3	0.634	0.169	0.045	4377595	11469	0.0646
74	#2 or #3	1.561	0.634	0.047	6843276	12458	0.0807
105	#2 or #3	0.048	0.058	0.048	10970	11632	No binding
106	#2 or #3	0.051	0.056	0.046	11924	11608	No binding
107	#2 or #3	0.049	0.057	0.05	10499	11162	No binding
108	#2 or #3	0.048	0.081	0.051	13882	15347	No binding
75	#2 or #3	1.177	0.349	0.044	5907158	11251	0.0739
76	#1	1.665	0.494	0.045	5656499	11271	0.0684
77	#1	1.74	0.96	0.05	5186725	11680	0.0926
78	#1	1.545	0.972	0.049	6565681	11228	0.0959
79	#1	1.464	0.538	0.05	6388847	11415	0.0718
109	#1	1.762	0.703	0.055	6506456	10919	0.0749
80	#1	0.941	0.475	0.048	8301813	12058	0.0635
110	#1	1.952	0.999	0.051	6507107	11209	0.1115
81	#1	1.596	1.412	0.052	7156876	11429	0.2136
82	#1	1.408	0.982	0.048	8422953	11194	0.071
83	#1	1.855	1.214	0.049	6828103	11641	0.0855
84	#1	1.643	0.732	0.052	6810066	12542	0.0638
85	#1	1.03	0.283	0.067	5284859	12331	0.08

[0307] A subset of antibody clones (clones 62-85) with robust CD30L binding and CD30 blocking activity were selected for larger scale production based on the binding and blocking data, as well as VH and VL sequence considerations. Affinities to human CD30L were determined using a Carterra instrument (**Table 9**). Recombinant blocking activity of the clones were also evaluated in an ELISA format, in which CD30L was added to the plate, followed by CD30 and a dose response of the antibody clones. The IC₅₀ of the clones determined in such

ELISA assay was shown in **Table 9**. Clones were also tested in a functional assay. Briefly, when engaged by CD30L, expressed at the cell surface or in a recombinant soluble form, CD30+ Karpas 299 (K299) cells release IL-8 in the supernatant. Interleukin 8 is a chemokine produced by macrophages and other cell types such as epithelial cells, and functions in activating an inflammatory and/or immune response. A monoclonal antibody binding to CD30L in such a way to neutralize CD30-CD30L interaction can therefore be identified using this functional assay by detecting inhibition of IL-8 release. A dual cell, IL-8 release assay was developed with the K299 cells endogenously expressing human CD30 and B16-huCD30L (“dual cell assay”). The ability of each tested clone to inhibit or block CD30L-mediated CD30 signaling was shown in **Table 9**, in which “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay, and “–” indicates no inhibition of IL-8 release in the dual cell assay despite of inhibiting or blocking recombinant CD30-CD30L binding. **FIG. 1A-1E** shows a dose response of CD30L antibodies in dual cell IL-8 release assay, huCD30L B16 flow assay and binding/blocking ELISA which were the basis for **Table 9**.

Table 9. Characterization of select anti-CD30L antibodies

Clone ID	KD (Carterra)	Recombinant blocking ELISA (IC ₅₀ nM)	Dual cell assay
62	8.77E-09	5.936	–
63	1.85E-09	3.178	+
64	1.57E-09	3.174	+
65	1.52E-09	3.66	+
66	4.23E-10	12.25	–
67	1.15E-09	12.02	–
68	1.59E-08	3.658	–
69	4.83E-09	3.195	NA
70	2.83E-10	4.192	–
71	2.07E-08	3.576	–
72	4.72E-09	4.045	–
73	7.41E-09	4.791	–
74	3.58E-10	3.712	–
75	3.19E-09	3.394	–
76	5.57E-10	1.669	–
77	4.16E-10	2.716	–
78	3.13E-10	11.76	–
79	8.57E-10	2.023	NA
80	3.54E-09	2.739	++

81	1.37E-07	2.763	NA
82	5.59E-10	3.508	+
83	1.94E-10	3.742	—
84	3.23E-10	4.604	—
85	1.22E-08	6.375	—

[0308] Taking the above Examples (Examples 1-5) together, at least three different humanized mouse strains have been immunized, multiple independent antibody campaigns have been conducted at different time points, and at least 110 antibodies have been generated and tested. Of the 110 anti-CD30L antibody clones tested, the vast majority of the 110 clones bound to CD30L and the vast majority of the 110 clones blocked CD30-CD30L recombinant protein binding (see **Tables 2-9**). Among the 110 clones, seven clones (clones 1, 2, 63-65, 80 and 82) blocked or inhibited CD30L-mediated CD30 signaling, *e.g.* CD30L-mediated IL-8 release (see **Tables 5, 6, and 9**).

Example 6: Structural determinants of binding to CD30L and blocking/inhibiting CD30L-mediated CD30 signaling

[0309] As shown above, 110 clones across multiple antibody campaigns with at least three different mouse strains were generated, with the vast majority of which demonstrating robust binding to recombinant CD30L and cell surface CD30L and blocking/inhibiting recombinant CD30-CD30L binding. Despite such large number of clones from diverse campaigns and background, 7 anti-CD30L (clones 1, 2, 63-65, 80 and 82) blocked/inhibited both CD30-CD30L recombination protein interaction and functionally blocked/inhibited CD30L-mediated CD30 signaling in a dual cell assay. Therefore, the structural (including the primary structure, *e.g.* amino acid sequence) features of the 7 clones that confer them the binding and functional blocking capability were determined. The clones were sequenced and the CDR sequences of the 7 clones were identified according to Kabat, Chothia, AbM, Contact, IMGT, and Aho numbering scheme. Each of the 6 CDRs (CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3) was aligned to determine the sequence and sequence features common to all of them, which can be the determinants of their common capacity to both block/inhibit CD30-CD30L recombination protein interaction and functionally block/inhibit CD30L-mediated CD30 signaling in a dual cell assay. As shown in **Tables 10-16**, despite coming from different mice and different antibody campaign, the corresponding CDR sequences of the 7 clones aligned well with identical residues at certain positions and conserved variations at others, suggesting that these conserved sequence features confer their common capacity to both

block/inhibit CD30-CD30L recombination protein interaction and functionally block/inhibit CD30L-mediated CD30 signaling in a dual cell assay.

Accordingly, consensus sequences for each of the 6 CDRs (CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3) was established based on the clones as shown in **Tables 10-16** to capture the common sequence features, which can be the determinants of their common capacity to both block/inhibit CD30-CD30L recombination protein interaction and functionally block/inhibit CD30L-mediated CD30 signaling in a dual cell assay. In each of **Tables 10-16**, the consensus_1 sequence shows the common sequence features of clones 1, 2, and 80, which completely blocked both CD30-CD30L recombination protein interaction and CD30L-mediated CD30 signaling in a dual cell assay; the consensus_2 sequence shows the common sequence features of clones 1, 2, 63-65, 80 and 82, which both block/inhibit CD30-CD30L recombination protein interaction and functionally block/inhibit CD30L-mediated CD30 signaling in a dual cell assay.

Table 10 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on Kabat numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	GYWMS (SEQ ID NO: 107)	YI F YSGYTKYNPSLKS (SEQ ID NO: 147)	DR W D F DY (SEQ ID NO: 187)	RASQGIRNNIG (SEQ ID NO: 307)	AESSIQS (SEQ ID NO: 347)	LQDFNYPYT (SEQ ID NO: 387)	++
2 (germlined)	DYAMH (SEQ ID NO: 117)	GI S WRSQNI GYADSVKG (SEQ ID NO: 157)	DRGIGFNNYEGF DY (SEQ ID NO: 197)	RASQGISNHIA (SEQ ID NO: 317)	AASSIQS (SEQ ID NO: 357)	QQYVYPLT (SEQ ID NO: 397)	++
80	SYDMH (SEQ ID NO: 482)	SI G I GGDYYPGVS VKG (SEQ ID NO: 520)	GEWDLWY FMDV (SEQ ID NO: 545)	RASQGISSWIA (SEQ ID NO: 570)	AASSIQS (SEQ ID NO: 595)	QQANSFPLT (SEQ ID NO: 620)	++
63	SYSMN (SEQ ID NO: 467)	YI S SSSSTIYDADSVKG (SEQ ID NO: 492)	EAYPGYYN YMDV (SEQ ID NO: 530)	RASQSISSRIA (SEQ ID NO: 555)	KASNLES (SEQ ID NO: 580)	QQYNSYSRT (SEQ ID NO: 605)	+
64	NYAMT (SEQ ID NO: 472)	AI S GFGGSTYYADSVKG (SEQ ID NO: 497)	D HDYYA F DY (SEQ ID NO: 535)	RASQSISSYIN (SEQ ID NO: 560)	AVSSIQS (SEQ ID NO: 585)	QQSYSTPYT (SEQ ID NO: 610)	+
65	NYAMT (SEQ ID NO: 477)	AI S GYGGSTYYAASVKG (SEQ ID NO: 515)	D HDYYA F DY (SEQ ID NO: 540)	RASQSINSYIN (SEQ ID NO: 565)	SASSIQS (SEQ ID NO: 590)	QQSYSTPYT (SEQ ID NO: 615)	+
82	NAWMS (SEQ ID NO: 487)	RIKSKTYGGT DYAAPVKG (SEQ ID NO: 525)	DPWYVNNY FMDV (SEQ ID NO: 550)	RASQDIRNYIA (SEQ ID NO: 575)	AASTIQS (SEQ ID NO: 600)	QNYFSVPLT (SEQ ID NO: 625)	+
Consensus_1 based on Kabat	X1-Y-X2-X3-X4, wherein X1 is G, D, or S; X2 is Y, A, or D; X3 is W or M; and X4 is S or H (SEQ ID NO: 712)	X1-I-X2-X3-X4-X5-G-X6-X7- X8-Y-X9-X10-S-X11-K-X12, wherein X1 is Y, G, or S; X2 is S, G, or none; X3 is F, W, or I; X4 is Y, R, or none; X5 is G or S; X6 is Y, N, or D; X7 is T or I; X8 is K, G, or Y; X9 is N, A, or P; and X10 is P, D, or G; X11 is L or V; and X12 is S or G (SEQ ID NO: 724)	X1-X2-X3-X4-X5-X6-X7- W-X8-X9-X10-X11-F- X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none;	R-A-S-Q-G-I-X1-X2-X3-L- X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W, and X4 is G or A (SEQ ID NO: 744)	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	X1-Q-X2-X3-X4-X5-P- X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	

			X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)		R-A-S-Q-X1-I-X2-X3-X4-L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	X1-X2-S-X3-L-X4-S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	X1-Q-X2-X3-X4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)		
Consensus_2 based on Kabat	X1-X2-X3-X4-X5, wherein X1 is G, D, N, or S; X2 is Y or A; X3 is Y, A, S, W, or D; X4 is W or M; and X5 is N, T, S or H (SEQ ID NO: 713)	X1-I-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-K-X15, wherein X1 is Y, G, S, A or R; X2 is S, G, or none; X3 is F, W, I, S, G or T; X4 is Y, R, S, F, or none; X5 is G or S; X6 is G or S; X7 is Y, N, D, T or S; X8 is T or I; X9 is K, G, Y, or D; X10 is Y or D; X11 is N, A, or P; and X12 is P, D, G, or A; X13 is S or P; X14 is L or V; and X15 is S or G (SEQ ID NO: 725)	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)						

Table 11 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on Chothia numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	GGISGY (SEQ ID NO: 105)	FYSGY (SEQ ID NO: 145)	DR W D F DY (SEQ ID NO: 185)	RASQGI RNILG (SEQ ID NO: 305)	AESSLQS (SEQ ID NO: 345)	LQDFNYPYT (SEQ ID NO: 385)	++
2 (germlined)	GFNFDDY (SEQ ID NO: 115)	S WRSGN (SEQ ID NO: 155)	DKGIGFNWYEGF DY (SEQ ID NO: 195)	RASQGI SNHLA (SEQ ID NO: 315)	AASSLQS (SEQ ID NO: 355)	QQYVTYPLT (SEQ ID NO: 395)	++
80	GFTFSSY (SEQ ID NO: 480)	G I GGD (SEQ ID NO: 518)	GEWDLWY FMDV (SEQ ID NO: 543)	RASQGISSWLA (SEQ ID NO: 568)	AASSLQS (SEQ ID NO: 593)	QQANSFPLT (SEQ ID NO: 618)	++
63	GFMFSSY (SEQ ID NO: 465)	S SSSST (SEQ ID NO: 490)	EAYPGYYN YMDV (SEQ ID NO: 528)	RASQSISSRLA (SEQ ID NO: 553)	KASNLES (SEQ ID NO: 578)	QQYNSYSRT (SEQ ID NO: 603)	+
64	GFTFSNY (SEQ ID NO: 470)	S GFSGS (SEQ ID NO: 495)	D HDYYA F DY (SEQ ID NO: 533)	RASQSISSYLN (SEQ ID NO: 558)	AVSSLQS (SEQ ID NO: 583)	QQSYSTPYT (SEQ ID NO: 608)	+
65	GFTFSNY (SEQ ID NO: 475)	S GYSGS (SEQ ID NO: 513)	D HDYYA F DY (SEQ ID NO: 538)	RASQSISSYLN (SEQ ID NO: 563)	SASSLQS (SEQ ID NO: 588)	QQSYSTPYT (SEQ ID NO: 613)	+
82	GITFSNA (SEQ ID NO: 485)	KSKTYGGT (SEQ ID NO: 523)	DPWYVNVNY FMDV (SEQ ID NO: 548)	RASQDIRNYLA (SEQ ID NO: 573)	AASSTLQS (SEQ ID NO: 598)	QNYFSVPLT (SEQ ID NO: 623)	+
Consensus_1 based on Chothia	G-X1-X2-X3-X4- X5-Y, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; and X5 is G, D, or S (SEQ ID NO: 714)	X1-X2-X3-X4-G-X5, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is S or G; and X5 is Y, N, or D (SEQ ID NO: 726)	X1-X2-X3-X4-X5-X6-X7- W-X8-X9-X10-X11-F-X12- D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and	R-A-S-Q-G-I-X1-X2-X3-L- X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	A-X1-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	X1-Q-X2-X3-X4-X5-P- X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	

Consensus_2 based on Chothia	G-X1-X2-X3-X4- X5-X6, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; and X6 is Y or A (SEQ ID NO: 715)	X1-X2-X3-X4-X5- X6, wherein X1 is S, G, or none; X2 is F, W, G, S, I, or T; X3 is Y, R, S, F, or none; X4 is S or G; X5 is G or S; and X6 is Y, N, D, T, or S (SEQ ID NO: 727)	X1-X2-X3-X4-X5- X6-X7-X8-X9-X10- X11-X12-X13- X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)	R-A-S-Q-X1-I-X2-X3-X4- L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	X1-X2-S-X3-L-X4- S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	X1-Q-X2-X3-X4-X5- X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)		
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Table 12 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on AbM numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	GGISGGYWS (SEQ ID NO: 106)	YI FYSGYTK (SEQ ID NO: 146)	DR W D F DY (SEQ ID NO: 186)	RASQGRNHLG (SEQ ID NO: 306)	AESSLOS (SEQ ID NO: 346)	LQDENYPYT (SEQ ID NO: 386)	++
2 (germlined)	GFNFDDYAMH (SEQ ID NO: 116)	GI S WRSNIG (SEQ ID NO: 156)	DKIGFNWYEGF DY (SEQ ID NO: 196)	RASQGISNHLA (SEQ ID NO: 316)	AASSLOS (SEQ ID NO: 356)	QQYVTYPLT (SEQ ID NO: 396)	++
80	GFTFSSYDMH (SEQ ID NO: 481)	SI G I GGDY (SEQ ID NO: 519)	GEWDLWY FMDV (SEQ ID NO: 544)	RASQGISWLA (SEQ ID NO: 569)	AASSLOS (SEQ ID NO: 594)	QQANSFPLT (SEQ ID NO: 619)	++
63	GFMFSSYSMN (SEQ ID NO: 466)	YI S SSSSTIY (SEQ ID NO: 491)	EAYPGYYN YMDV (SEQ ID NO: 529)	RASQISSRLA (SEQ ID NO: 554)	KASNLES (SEQ ID NO: 579)	QQYNSYSRT (SEQ ID NO: 604)	+
64	GFTFSNYAMT (SEQ ID NO: 471)	AI S GFGGSTY (SEQ ID NO: 496)	D HDYYA F DY (SEQ ID NO: 534)	RASQISSYLN (SEQ ID NO: 559)	AVSSLOS (SEQ ID NO: 584)	QQSYSTPYT (SEQ ID NO: 609)	+
65	GFTFSNYAMT (SEQ ID NO: 476)	AI S GYGGSTY (SEQ ID NO: 514)	D HDYYA F DY (SEQ ID NO: 539)	RASQINSYLN (SEQ ID NO: 564)	SASSLOS (SEQ ID NO: 589)	QQSYSTPYT (SEQ ID NO: 614)	+
82	GITFSNAWMS (SEQ ID NO: 486)	RIKSKTYGGTTD (SEQ ID NO: 524)	DPWYVNYN FMDV (SEQ ID NO: 549)	RASQIRNYLA (SEQ ID NO: 574)	AASTLOS (SEQ ID NO: 599)	QNYFSVPLT (SEQ ID NO: 624)	+
Consensus_1 based on AbM	G-X1-X2-X3-X4-X5-Y- X6-X7-X8, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; X5 is G, D, or S; X6 is Y, A, or D; X7 is W or M; and X8 is S or H (SEQ ID NO: 716)	X1-I-X2-X3-X4-X5-G- X6-X7-X8, wherein X1 is Y, G, or S; X2 is S, G, or none; X3 is F, W, or I; X4 is Y, R, or none; X5 is G or S; X6 is Y, N, or D; X7 is T or I; X8 is K, G, or Y (SEQ ID NO: 728)	X1-X2-X3-X4-X5-X6-X7-W- X8-X9-X10-X11-F-X12-D- X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none;	R-A-S-Q-G-I-X1-X2-X3-L- X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	X1-Q-X2-X3-X4-X5-P- X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	

Consensus_2 based on AbM	G-X1-X2-X3-X4-X5-X6- X7-X8-X9, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; X6 is Y or A; X7 is Y, A, D, S or W; X8 is W or M; and X9 is S, H, N, or T (SEQ ID NO: 717)	X1-I-X2-X3-X4-X5-X6- X7-X8-X9, wherein X1 is Y, G, S, A or R; X2 is S, G, or none; X3 is F, W, I, S, G or T; X4 is Y, R, S, F, or none; X5 is G or S; X6 is G or S; X7 is Y, N, D, T or S; X8 is T or I; X9 is K, G, Y, or D (SEQ ID NO: 729)	X1-X2-X3-X4-X5-X6-X7- X8- X9-X10-X11-X12-X13-X14- D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)	R-A-S-Q-X1-I-X2-X3-X4- L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	X1-X2-S-X3-L-X4- S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	X1-Q-X2-X3-X4-X5- X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)		
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Table 13 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on Contact numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	SGYWS (SEQ ID NO: 108)	WIGYI FYSGYTK (SEQ ID NO: 148)	ARDR W D F D (SEQ ID NO: 188)	RNNLWY (SEQ ID NO: 308)	LLIYAESSLQ (SEQ ID NO: 348)	LQDFNYPY (SEQ ID NO: 388)	++
2 (germlined)	DDYAMH (SEQ ID NO: 118)	WVSGI S WPSGNIG (SEQ ID NO: 158)	AKDKGIGFNWYEGF D (SEQ ID NO: 198)	SNHLAWF (SEQ ID NO: 318)	SLIYAASSLQ (SEQ ID NO: 358)	QQYVTYPL (SEQ ID NO: 398)	++
80	SSYDMH (SEQ ID NO: 483)	WVSSI G I GGDY (SEQ ID NO: 521)	AR GEWDLLWY FMD (SEQ ID NO: 546)	SSWLAWY (SEQ ID NO: 571)	LLIYAASSLQ (SEQ ID NO: 596)	QQANSFPL (SEQ ID NO: 621)	++
63	SSYSMN (SEQ ID NO: 468)	WVSYI S SSSSTIY (SEQ ID NO: 493)	TR EAYPGYYN YMD (SEQ ID NO: 531)	SSRLAWY (SEQ ID NO: 556)	LLIYKASNLE (SEQ ID NO: 581)	QQXNSYSR (SEQ ID NO: 606)	+
64	SNYAMT (SEQ ID NO: 473)	WVSAI S GFGGSTY (SEQ ID NO: 498)	AKD HDYYA F D (SEQ ID NO: 536)	SSYLWY (SEQ ID NO: 561)	LLIYAVSSLQ (SEQ ID NO: 586)	QQSYSTPY (SEQ ID NO: 611)	+
65	SNYAMT (SEQ ID NO: 478)	WVSAI S GYGGSTY (SEQ ID NO: 516)	AKD HDYYA F D (SEQ ID NO: 541)	NSYLWY (SEQ ID NO: 566)	LLIYASSSLQ (SEQ ID NO: 591)	QQSYSTPY (SEQ ID NO: 616)	+
82	SNAMWS (SEQ ID NO: 488)	WVGRIKSKTYGGTTD (SEQ ID NO: 526)	TTDPWNYVNNY FMD (SEQ ID NO: 551)	RNYLAWY (SEQ ID NO: 576)	LLIYAASSLQ (SEQ ID NO: 601)	QNYFSVPL (SEQ ID NO: 626)	+
Consensus_1 based on Contact	X1-X2-Y-X3-X4- X5, wherein X1 is S or D; X2 is G, D, or S; X3 is Y, A, or D; X4 is W or M; and X5 is S or H (SEQ ID NO: 718)	W-X1-X2-X3-I-X4-X5- X6-X7-G-X8-X9-X10, wherein X1 is I or V; X2 is G or S; X3 is Y, G, or S; X4 is S, G, or none; X5 is F, W, or I; X6 is Y, R, or none; X7 is G or S; X8 is Y, N, or D; X9 is T or I; X 10 is K, G, or Y (SEQ ID NO: 730)	A-X1-X2-X3-X4-X5-X6-X7- X8-W-X9-X10-X11-X12-F- X13-D, wherein X1 is K or R; X2 is D or none; X3 is R, K, or G; X4 is G, E, or none; X5 is I, W, or none; X6 is G, D, or none; X7 is F, L, or none; X8 is N, L, or none; X9 is N, Y, or none; X10 is Y, or none; X11 is D, E, or none; X12 is G or none; and X13 is M or none (SEQ ID NO: 738)	X1-X2-X3-L-X4-W- X5, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; X4 is G or A; and X5 is Y or F (SEQ ID NO: 746)	X1-L-I-Y-A-X2-S-L-Q, wherein X1 is L or S; and X2 is A or E (SEQ ID NO: 754)	X1-Q-X2-X3-X4-X5- P-X6, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 762)	

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Consensus_2 based on Contact	X1-X2-X3-X4- X5-X6, wherein X1 is S or D; X2 is G, D, N, or S; X3 is Y or A; X4 is Y, A, S, W, or D; X5 is W or M; and X6 is N, T, S or H (SEQ ID NO: 719)	W-X1-X2-X3-I-X4-X5- X6-X7-X8-X9-X10-X11, wherein X1 is I or V; X2 is G or S; X3 is Y, G, S, A or R; X4 is S, G, or none; X5 is F, W, I, S, G or T; X6 is Y, R, S, F, or none; X7 is G or S; X8 is G or S; X9 is Y, N, D, T or S; X10 is T or I; X 10 is K, G, Y, or D (SEQ ID NO: 731)	X1-X2-X3-X4-X5-X6-X7-X8- X9-X10-X11-X12-X13-X14- X15-X16-D, wherein X1 is A or T; X2 is K, R, or T; X3 is D or none; X4 is R, K, G, P, or none; X5 is G, E, W, or none; X6 is I, W, A, N, or none; X7 is G, D, Y, or none; X8 is F, L, P, H, V, or none; X9 is N, L, G, D, or none; X10 is W or Y; X11 is N, Y, or none; X12 is Y, A, or none; X13 is D, E, N, or none; X14 is G or none; X15 is F or Y; and X16 is M or none (SEQ ID NO: 739)	X1-X2-X3-L-X4-W- X5, wherein X1 is R, S, or N; X2 is N or S; X3 is N, H, W, R, or Y; X4 is G, A, or N; and X5 Y or F (SEQ ID NO: 747)	X1-L-X2-Y-X3-X4-S-X5- L-X6, wherein X1 is L or S; X2 is I or V; X3 is A, K, or S; X4 is A, E, or V; X5 is S, N, or T; and X6 is Q or E (SEQ ID NO: 755)	X1-Q-X2-X3-X4-X5- X6-X7, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 763)	
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Table 14 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on IMGT numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	GGISGGY (SEQ ID NO: 109)	I FYSGYT (SEQ ID NO: 149)	ARDR W D F DY (SEQ ID NO: 189)	QGIRNN (SEQ ID NO: 309)	AE (SEQ ID NO: 349)	LQDFNYPYT (SEQ ID NO: 389)	++
2 (germlined)	GFNFDDYA (SEQ ID NO: 119)	I S WRSNGI (SEQ ID NO: 159)	AKDKGIGFNWYEGF DY (SEQ ID NO: 199)	QGISNH (SEQ ID NO: 319)	AA (SEQ ID NO: 359)	QQYVYPLT (SEQ ID NO: 399)	++
80	GFTFSSYD (SEQ ID NO: 484)	I G I GGDY (SEQ ID NO: 522)	AR GEWDLWY FMDV (SEQ ID NO: 547)	QGISW (SEQ ID NO: 572)	AA (SEQ ID NO: 597)	QQANSFPLT (SEQ ID NO: 622)	++
63	GFMFSSYS (SEQ ID NO: 469)	I S SSSSTI (SEQ ID NO: 494)	TR EAYPGYYN YMDV (SEQ ID NO: 532)	QSISR (SEQ ID NO: 557)	KA (SEQ ID NO: 582)	QQYNSYSRT (SEQ ID NO: 607)	+
64	GFTFSNYA (SEQ ID NO: 474)	I S GFGGST (SEQ ID NO: 499)	AKD HDYYA F DY (SEQ ID NO: 537)	QSISSY (SEQ ID NO: 562)	AV (SEQ ID NO: 587)	QQSYSTPYT (SEQ ID NO: 612)	+
65	GFTFSNYA (SEQ ID NO: 479)	I S GYGGST (SEQ ID NO: 517)	AKD HDYYA F DY (SEQ ID NO: 542)	QSINSY (SEQ ID NO: 567)	SA (SEQ ID NO: 592)	QQSYSTPYT (SEQ ID NO: 617)	+
82	GTFFSNAW (SEQ ID NO: 489)	IKSKTYGGTT (SEQ ID NO: 527)	TTDPMNYVNY FMDV (SEQ ID NO: 552)	QDIRNY (SEQ ID NO: 577)	AA (SEQ ID NO: 602)	QNYFSVPLT (SEQ ID NO: 627)	+
Consensus_1 based on IMGT	G-X1-X2-X3-X4-X5- Y-X6, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; X5 is G, D, or S; and X6 is Y, A, or D (SEQ ID NO: 720)	I-X1-X2-X3-X4-G-X5- X6, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is G or S; X5 is Y, N, or D; and X6 is T or I (SEQ ID NO: 732)	A-X1-X2-X3-X4-X5-X6-X7- X8-W-X9-X10-X11-X12-F- X13-D-X14, wherein X1 is K or R; X2 is D or none; X3 is R, K, or G; X4 is G, E, or none; X5 is I, W, or none; X6 is G, D, or none; X7 is F, L, or none; X8 is N, L, or none; X9 is N, Y, or none; X10 is Y, or none; X11 is D, E, or none; X12 is G or none; X13 is M or none;	Q-G-I-X1-X2-X3, wherein X1 is R or S; X2 is N or S; and X3 is N, H or W (SEQ ID NO: 748)	A-X1, wherein X1 is A or E (SEQ ID NO: 756)	X1-Q-X2-X3-X4-X5-P- X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	

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Consensus_2 based on IMGT	G-X1-X2-X3-X4-X5- X6-X7, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; X6 is Y or A; and X7 is Y, A, D, S, or W (SEQ ID NO: 721)	I-X1-X2-X3-X4-X5-X6- X7, wherein X1 is S, G, or none; X2 is F, W, I, S, G or T; X3 is Y, R, S, F, or none; X4 is G or S; X5 is G or S; X6 is Y, N, D, T or S; and X7 is T or I (SEQ ID NO: 733)	X1-X2-X3-X4-X5-X6-X7-X8- X9-X10-X11-X12-X13-X14- X15-X16-D-X17, wherein X1 is A or T; X2 is K, R, or T; X3 is D or none; X4 is R, K, G, P, or none; X5 is G, E, W, or none; X6 is I, W, A, N, or none; X7 is G, D, Y, or none; X8 is F, L, P, H, V, or none; X9 is N, L, G, D, or none; X10 is W or Y; X11 is N, Y, or none; X12 is Y, A, or none; X13 is D, E, N, or none; X14 is G or none; X15 is F or Y; X16 is M or none; and X17 is Y or V (SEQ ID NO: 741)	Q-X1-I-X2-X3-X4, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N, or S; and X4 is N, H, W, R, or Y (SEQ ID NO: 749)	X1-X2, wherein X1 is A, K, or S; and X2 is A, E, or V (SEQ ID NO: 757)	X1-Q-X2-X3-X4-X5- X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)		
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Table 15 Alignment and Consensus Sequences of Clones 1, 2, 63-65, 80 and 82 based on Aho numbering (where applicable, space was inserted into the CDR sequences to demonstrate the alignment; in the table “++” indicates complete blocking of IL-8 release in the dual cell assay, “+” indicates inhibition of IL-8 release in the dual cell assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	VSGGTSIGYY (SEQ ID NO: 628)	I F YSGYTKYNPSLKSR (SEQ ID NO: 642)	DR W D F D (SEQ ID NO: 656)	ASQGIRNN (SEQ ID NO: 670)	AESSIQSGVPSR (SEQ ID NO: 684)	DFNYPY (SEQ ID NO: 698)	++
2 (germlined)	ASGFNFDDYA (SEQ ID NO: 629)	I S WRSNIGYADSVKGR (SEQ ID NO: 643)	DKGIGFNWNYEGF D (SEQ ID NO: 657)	ASQGISNH (SEQ ID NO: 671)	AASSIQSGVPSR (SEQ ID NO: 685)	YVTYPL (SEQ ID NO: 699)	++
80	VSGFTFSSYD (SEQ ID NO: 630)	I G I GDTYYPGSVKGR (SEQ ID NO: 644)	GEWDLLWY FMD (SEQ ID NO: 658)	ASQGISSW (SEQ ID NO: 672)	AASSIQSGVPSR (SEQ ID NO: 686)	ANSFPL (SEQ ID NO: 700)	++
63	ASGFMFSSYS (SEQ ID NO: 631)	I S SSSSTIYDADSVKGR (SEQ ID NO: 645)	EAYPGYYN YMD (SEQ ID NO: 659)	ASQSISSR (SEQ ID NO: 673)	KASNLESQVPSR (SEQ ID NO: 687)	YNSYSR (SEQ ID NO: 701)	+
64	ASGFTFSNYA (SEQ ID NO: 632)	I S GFGGTTYADSVKGR (SEQ ID NO: 646)	D HDYYA F D (SEQ ID NO: 660)	ASQSISSY (SEQ ID NO: 674)	AVSSIQSGVPSR (SEQ ID NO: 688)	SYSTPY (SEQ ID NO: 702)	+
65	ASGFTFSNYA (SEQ ID NO: 633)	I S GYGSTYYAASVKGR (SEQ ID NO: 647)	D HDYYA F D (SEQ ID NO: 661)	ASQSISSY (SEQ ID NO: 675)	SASSIQSGVPSR (SEQ ID NO: 689)	SYSTPY (SEQ ID NO: 703)	+
82	VSGITFSNAW (SEQ ID NO: 634)	IKSKTYGGTDTYAAPVKGR (SEQ ID NO: 648)	DPWNYNNY FMD (SEQ ID NO: 662)	ASQDIRNY (SEQ ID NO: 676)	AASTIQSGVPSR (SEQ ID NO: 690)	YFSVPL (SEQ ID NO: 704)	+
Consensus_1 based on Aho	X1-S-G-X2-X3-X4-X5- X6-Y-X7, wherein X1 is V or A; X2 is G or F; X3 is S, N, or T; X4 is I or F; X5 is S or D; X6 is G, D, or S; and X7 is Y, A, or D (SEQ ID NO: 722)	I-X1-X2-X3-X4-G-X5-X6-X7- Y-X8-X9-S-X10-K-X11-R, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is G or S; X5 is Y, N, or D; X6 is T or I; X7 is K, G, or Y; X8 is N, A, or P; X9 is P, D or G; X10 is L or V; and X11 is G or S (SEQ ID NO: 734)	X1-X2-X3-X4-X5-X6-X7- W-X8-X9-X10-X11-F- X12-D, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, Y, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11	A-S-Q-G-I-X1-X2-X3, wherein X1 is R or S; X2 is N or S; and X3 is N, H or W (SEQ ID NO: 750)	A-X1-S-S-L-Q-S-G-V-P-S- R, wherein X1 is A or E (SEQ ID NO: 758)	X1-X2-X3-X4-P- X5, wherein X1 is D, Y, or A; X2 is F, V, or N; X3 is N, T, or S; X4 is Y or F; X5 is Y or L (SEQ ID NO: 764)	

Consensus_2 based on Aho	X1-S-G-X2-X3-X4-X5- X6-X7-X8, wherein X1 is V or A; X2 is G, F or I; X3 is S, N, T, or M; X4 is I or F; X5 is S or D; X6 is G, D, S, or N; X7 is Y or A; and X8 is Y, A, D, S or W (SEQ ID NO: 723)	I-X1-X2-X3-X4-X5-X6-X7-X8- X9-X10-X11-X12-X13-K-X14- R, wherein X1 is S, G, or none; X2 is F, W, I, S, G or T; X3 is Y, R, S, F, or none; X4 is G or S; X5 is G or S; X6 is Y, N, D, T or S; X7 is T or I; X8 is K, G, Y, or D; X9 is Y or D; X10 is N, A, or P; X11 is P, D, G, or A; X12 is S or P; X13 is L or V; and X14 is G or S (SEQ ID NO: 735)	X1-X2-X3-X4-X5-X6-X7- X8-X9-X10-X11-X12- X13-X14-D, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; and X14 is M or none (SEQ ID NO: 743)	A-S-Q-X1-I-X2-X3- X4, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; and X4 is N, H, W, R, or Y (SEQ ID NO: 751)	X1-X2-S-X3-L-X4-S-G-V- P-S-R, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 759)	X1-X2-X3-X4-X5- X6, wherein X1 is D, Y, A, or S; X2 is F, V, N, or Y; X3 is N, T, or S; X4 is Y, F, T, or V; X5 is P or S; X6 is Y, L or R (SEQ ID NO: 765)		
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assay as shown in FIG. 1)

Clone ID/ Consensus	CDR-H1	CDR-H2	CDR-H3	CDR-L1	CDR-L2	CDR-L3	Functional blocking
1 (germlined)	GYWS (SEQ ID NO: 635)	WIGYI FYSGYTK (SEQ ID NO: 649)	DR W D F DY (SEQ ID NO: 663)	RASQGI RNNLG (SEQ ID NO: 677)	AESSLQS (SEQ ID NO: 691)	LQDFNYPYT (SEQ ID NO: 705)	++
2 (germlined)	DYAMH (SEQ ID NO: 636)	WVSGI S WPSGNIG (SEQ ID NO: 650)	DKIGIFWNZEGF DY (SEQ ID NO: 664)	RASQGISNHLA (SEQ ID NO: 678)	AASSLQS (SEQ ID NO: 692)	QQYTYPLT (SEQ ID NO: 706)	++
80	SYDMH (SEQ ID NO: 637)	WVSSI G I GGDY (SEQ ID NO: 651)	GEWDLILWY FMDV (SEQ ID NO: 665)	RASQGISSWLA (SEQ ID NO: 679)	AASSLQS (SEQ ID NO: 693)	QQANSFPILT (SEQ ID NO: 707)	++
63	SYSMN (SEQ ID NO: 638)	WVSYI S SSSSTIY (SEQ ID NO: 652)	EAYPGYYYN YMDV (SEQ ID NO: 666)	RASQGISRRLA (SEQ ID NO: 680)	KASNLES (SEQ ID NO: 694)	QQYNSYSRT (SEQ ID NO: 708)	+
64	NYAMT (SEQ ID NO: 639)	WVSAI S GFGGSTY (SEQ ID NO: 653)	D HDYYA F DY (SEQ ID NO: 667)	RASQGISSYLN (SEQ ID NO: 681)	AVSSLQS (SEQ ID NO: 695)	QQSYSTPYT (SEQ ID NO: 709)	+
65	NYAMT (SEQ ID NO: 640)	WVSAI S GYGGSTY (SEQ ID NO: 654)	D HDYYA F DY (SEQ ID NO: 668)	RASQGISNYLN (SEQ ID NO: 682)	SASSLQS (SEQ ID NO: 696)	QQSYSTPYT (SEQ ID NO: 710)	+
82	NAWMS (SEQ ID NO: 641)	WVGRIKSKTYGGTTD (SEQ ID NO: 655)	DPWNYVNYN FMDV (SEQ ID NO: 669)	RASQDIRNYLA (SEQ ID NO: 683)	AASTLQS (SEQ ID NO: 697)	QNYFSVPILT (SEQ ID NO: 711)	+
Consensus_1 based on Cross-linking	X1-Y-X2-X3-X4, wherein X1 is G, D, or S; X2 is Y, A, or D; X3 is W or M; and X4 is S or H (SEQ ID NO: 712)	W-X1-X2-X3-I-X4-X5- X6-X7-G-X8-X9-X10, wherein X1 is I or V; X2 is G or S; X3 is Y, G, or S; X4 is S, G, or none; X5 is F, W, or I; X6 is Y, R, or none; X7 is G or S; X8 is Y, N, or D; X9 is T or I; X 10 is K, G, or Y (SEQ ID NO: 730)	X1-X2-X3-X4-X5-X6-X7- W-X8-X9-X10-X11-F- X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is K, G, or Y (SEQ ID NO: 730)	R-A-S-Q-G-I-X1-X2-X3-L- X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	X1-Q-X2-X3-X4-X5-P- X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	

Attorney Docket No. 56884-786.601

Consensus_2 based on Cross-linking	X1-X2-X3-X4-X5, wherein X1 is G, D, N, or S; X2 is Y or A; X3 is Y, A, S, W, or D; X4 is W or M; and X5 is N, T, S or H (SEQ ID NO: 713)	W-X1-X2-X3-l-X4-X5-X6- X7-X8-X9-X10-X11, wherein X1 is l or V; X2 is G or S; X3 is Y, G, S, A or R; X4 is S, G, or none; X5 is F, W, l, S, G or T; X6 is Y, R, S, F, or none; X7 is G or S; X8 is G or S; X9 is Y, N, D, T or S; X10 is T or l; X10 is K, G, Y, or D (SEQ ID NO: 731)	none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)	R-A-S-Q-X1-l-X2-X3-X4- L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	X1-X2-S-X3-L-X4- S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	X1-Q-X2-X3-X4-X5- X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)		
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Example 7: Mapping Binding Epitope on CD30L of the Anti-CD30L Antibodies and the Sequence and Structural Determinants for Such Binding Epitope

[0310] To map the binding epitope on CD30L of the clones that both block/inhibit CD30-CD30L recombination protein interaction and functionally block/inhibit CD30L-mediated CD30 signaling in a dual cell assay, cross-linking, enzyme digestion and peptide mass spectrometry studies on the antibody-CD30L complex were performed. Since the 7 clones demonstrated sequence similarity and common primary structure (sequence) features, a representative clone, germlined clone 2 comprising VH set forth in SEQ ID NO: 6, VL set forth in SEQ ID NO:8 and IgG1 constant region set forth in SEQ ID NO: 504 was used in the study. The CD30L extracellular domain ("ECD") comprising SEQ ID NO: 34 was used. Before starting the epitope mapping, a high-mass MALDI analysis has been performed to verify the integrity and aggregation level for each sample, including germlined clone 2 and the CD30L extracellular domain comprising SEQ ID NO: 34 used for the complex formation (data not shown).

[0311] The germlined clone 2 anti-CD30L antibody and the ECD were mixed and incubated to allow the complex formation, and then cross-linked to convert the non-covalent interactions into covalent bond for detection. The cross-linking study thus allows the direct analysis of non-covalent interaction by High-Mass MALDI mass spectrometry. By mixing a protein sample containing non-covalent interactions with a specially developed cross-linking mixture (Bich, C et al. Anal. Chem., 2010, 82 (1), pp 172–179), non-covalent complex can be specifically detected with high-sensitivity. The covalent binding generated allows the interacting species to survive the sample preparation process and the MALDI ionization. A special High-Mass detection system allows characterizing the interaction in the High-Mass range.

[0312] Each mixture prepared for the control (antibody alone or CD30L ECD alone) and for the antibody-CD30L complex (germlined clone 2 and CD30L ECD complex) was submitted to cross-linking using DSS MALDI MS analysis kit. The protein solutions (9 µl) were mixed with 1 µl of DSS Stabilizer reagent (2 mg/ml) and incubated at room temperature. After the incubation time (180 minutes) the samples were prepared for MALDI analysis for all the samples. The samples were analysed by High-Mass MALDI MS immediately after crystallization with sinapinic acid matrix (10 mg/ml) in acetonitrile/water (1:1, v/v), TFA 0.1% (DSS MALDI Kit). In control samples, MALDI TOF peaks corresponding to theoretically calculated values for antibody only or CD30L ECD only were detected (data not shown). After cross-linking, MALDI TOF peaks corresponding to the antibody-CD30L complex (germlined

clone 2 and CD30L ECD complex) were detected, demonstrating the proper formation of the antibody-CD30L complex (data not shown).

[0313] Before the epitope mapping studies, peptide mass fingerprint of CD30L ECD was determined. To characterize CD30L ECD, the sample was subjected to trypsin, chymotrypsin, Asp-N, elastase and thermolysin proteolysis followed by nLC-Q-Exactive MS/MS analysis. Briefly, two tubes of 10 μ L of CD30L ECD (15.34 μ M) were prepared. One of the two was mixed with 1 μ L of DSS d0/d12 (2mg/mL; DMF) before 180 minutes incubation time at room temperature. The other tube was not mixed with the cross-linking reagent (control). Both tubes were kept 180 minutes at room temperature. After incubation, the cross-linking reaction was stopped by adding 1 μ L of Ammonium Bicarbonate (20 mM final concentration) before additional 60 minutes incubation at room temperature. Then, both tubes were dried using speedvac before 8M urea resuspension (10 μ L). After mixing, DTT (1 μ L, 500 mM) was added to both tubes. The mixture was then incubated 60 minutes at 37°C. After incubation, iodoacetamide (1 μ L, 1M) was added to each tube before additional 60 minutes incubation at room temperature, in a dark room. After incubation, 100 μ L of the proteolytic buffer were added to both tubes. Trypsin buffer contains 50mM Ambic pH 8.5, 5% acetonitrile; chymotrypsin buffer contains Tris HCl 100mM, CaCl₂ 10mM pH 7.8; the ASP-N buffer contains Phosphate buffer 50mM pH 7.8; elastase buffer contains Tris HCl 50mM pH 8.0 and thermolysin buffer contains Tris HCl 50mM, CaCl₂ 0.5mM pH 9.0. For trypsin proteolysis, 100 μ L of the reduced/alkylated CD30L ECD were mixed with 1 μ L of trypsin (Promega) with the ratio 1/100. The proteolytic mixture was incubated overnight at 37°C. For chymotrypsin proteolysis, 100 μ L of the reduced/alkylated CD30L ECD were mixed with 0.5 μ L of chymotrypsin (Promega) with the ratio 1/200. The proteolytic mixture was incubated overnight at 25°C. For ASP-N proteolysis, 100 μ L of the reduced/alkylated CD30L ECD were mixed with 0.5 μ L of ASP-N (Promega) with the ratio 1/200. The proteolytic mixture was incubated overnight at 37°C. For elastase proteolysis, 100 μ L of the reduced/alkylated CD30L ECD were mixed with 1 μ L of elastase (Promega) with the ratio 1/100. The proteolytic mixture was incubated overnight at 37°C. For thermolysin proteolysis, 100 μ L of the reduced/alkylated TNFSF8 were mixed with 2 μ L of thermolysin (Promega) with a ratio 1/50. The proteolytic mixture was incubated overnight at 70°C. After digestion formic acid 1% final was added to the solution.

[0314] After proteolysis, 1 μ L of the peptide solution generated by proteolysis was loaded onto a nano-liquid chromatography system (Ultimate 3000-RSLC) and the Q-Exactive MS analysis was then performed. Based on the results obtained from such MS analyses, overlap mapping of the peptides generated from trypsin, chymotrypsin, ASP-N, elastase, and/or thermolysin

proteolysis as determined and shown in FIG. 2. Combining the peptides of Trypsin, Chymotrypsin, ASP-N, Elastase and Thermolysin proteolysis, 94.76% of the CD30L ECD sequence (SEQ ID NO: 34) is covered.

[0315] To determine the epitope on CD30L by anti-CD30L binding with high resolution, the protein complexes of CD30L ECD (SEQ ID NO: 34) and anti-CD30L (clone 2 germlined) were incubated with deuterated cross-linkers and subjected to multi-enzymatic cleavage with the enzymes and procedures as described above for determining peptide mass fingerprint of CD30L ECD. After enrichment of the cross-linked peptides, the samples were analyzed by high resolution mass spectrometry (nLC-Q-ExactiveMS) and the data generated were analyzed using XQuest 2.0 and Stavrox 3.6 software.

[0316] After trypsin, chymotrypsin, ASP-N, elastase, and thermolysin proteolysis of the complex between CD30L ECD and anti-CD30L with deuterated d0d12, the nLC-orbitrap MS/MS analysis detected nine cross-linked peptides between CD30L ECD (SEQ ID NO: 34) and anti-CD30L (clone 2 germlined). The sequences and positions of cross-links are presented in the **Table 17**.

Table 17: Cross-linked peptides detected between CD30L ECD (SEQ ID NO: 34) and anti-CD30L (clone 2 germlined)

Sequence	Enzyme	Sequence on anti-CD30L	Sequence on CD30L ECD (SEQ ID NO: 34)	XL Type	Cross-linking position on anti-CD30L	Cross-linking position on CD30L ECD (SEQ ID NO: 34)	Identified on StavroX
ATYYCQQYVTP- QRTDSIPNSPDNVPLKGGNCSEDL-a10-b16	Thermolysin	84-95 (SEQ ID NO: 8)	1-24	inter-protein xl	93 (SEQ ID NO: 8)	16	Yes
GLEWVSGISWR-GGNCSEDLCLLK-a6-b5	Trypsin	44-54 (SEQ ID NO: 6)	17-29	inter-protein xl	49 (SEQ ID NO: 6)	21	Yes
SLIYAASSLQSGVPSR-GGNCSEDLCLLK-a7-b5	Trypsin	46-61 (SEQ ID NO: 8)	17-29	inter-protein xl	52 (SEQ ID NO: 8)	21	Yes
IGFNWNYEG-LKGGNCSEDLCLC-a7-b7	Thermolysin	102-110 (SEQ ID NO: 6)	15-26	inter-protein xl	108 (SEQ ID NO: 6)	21	Yes
SLRLSCAASGFNFDDYAMHWVR-RAPFK-a19-b1	Trypsin	17-38 (SEQ ID NO: 6)	30-34	inter-protein xl	35 (SEQ ID NO: 6)	30	Yes
FDYWG-KHLNKTLS-a3-b5	Elastase	111-115 (SEQ ID NO: 6)	44-52	inter-protein xl	113 (SEQ ID NO: 6)	48	Yes
LQSGVPSR-AKHLNKT-a3-b6	Thermolysin	54-61 (SEQ ID NO: 8)	43-50	inter-protein xl	56 (SEQ ID NO: 8)	48	Yes
ISWRSNIGYADS-VRYQDGNLV-a5-b2	Thermolysin	51-63 (SEQ ID NO: 6)	62-70	inter-protein xl	55 (SEQ ID NO: 6)	63	Yes
ISWRSNIGYADS-VRYQDGNLV-a5-b3	Thermolysin	51-63 (SEQ ID NO: 6)	62-70	inter-protein xl	55 (SEQ ID NO: 6)	64	Yes

[0317] Therefore, the studies with chemical cross-linking, high-mass MALDI mass spectrometry and nLC-Orbitrap mass spectrometry characterized the molecular interface between CD30L and a representative anti-CD30L that blocked/inhibited both CD30-CD30L recombination protein interaction and functionally blocked/inhibited CD30L-mediated CD30 signaling in a dual cell assay. The analyses demonstrate that the epitope on CD30L for such representative anti-CD30L (clone 2 germlined) include the amino acids the amino acids K16, S21, R30, K48, R63, and/or Y64 of SEQ ID NO: 34, as shown in **Table 17** above and **Table 18** below.

Table 18: Epitope on CD30L and the corresponding contact residues in CDR of the representative anti-CD30L

VH H35 (CDRH1)	R30 (R92)
VH S49 (FR-CDRH2)	S21 (S83)
VH S55 (CDRH2)	R63, Y64 (R125, Y126)
VH Y108 (CDRH3)	S21 (S83)
VH Y113 (CDRH3)	K48 (K110)
VL S52 (CDRL2)	S21 (S83)
VL S56 (CDRL2)	K48 (K110)
VL T93 (CDRL3)	K16 (K78)

[0318] Having established the epitope on CD30L for a representative anti-CD30L (germlined clone 2) that blocked/inhibited both CD30-CD30L recombination protein interaction and functionally blocked/inhibited CD30L-mediated CD30 signaling in a dual cell assay, the corresponding structural and sequence features conferring the functional property for such representative anti-CD30L were analyzed. As shown in **Table 17** and **Table 18**, eight amino acid residues from 5 of the 6 CDRs of the germlined clone 2 came into significant stable contact with the epitope on CD30L, as demonstrated by the crosslinking of the residues in close proximity in the complex between CD30 and anti-CD30L. The corresponding epitope-interacting residues and the corresponding interactions were mapped by identifying the crosslinked peptides in Table 17 and the interaction pairs were listed in each row of Table 18. **FIG. 3** further summarized the cross-linked epitope in the context of the CD30L ECD sequence

(SEQ ID NO: 34). **FIG. 4A-4J** provided the 3 dimensional structure of the epitope on CD30L as identified.

[0319] Based on the detected CD30L-interacting residues from the anti-CD30L CDR sequences, the CDRs from the representative anti-CD30L (germlined clone 2) that conferring the CD30L binding and blocking functionality were further determined by combining CDRs from Kabat numbering scheme and the Contact numbering scheme, as shown in **Table 16** (referred to as based on cross-linking studies or cross-linking based). Such cross-linking based CDRs encompasses all the CD30L-interacting residues detected in the cross-linking studies. The cross-linking based CDRs, the identified CD30L-interacting residues, and the consensus CDR sequences provided herein (*e.g.* **Table 16**), when combined with the fact that the CDRs demonstrated robust alignment and significant similarity across the 7 out of the 110 clones from multiple independent antibody campaigns, provides the sequence and structural features for antibodies binding to the epitope and/or for antibodies having the CD30L binding and blocking functionality provided herein.

Example 8: Specificity of the Anti-CD30L Antibodies.

[0320] Before the binding of the anti-CD30L antibodies to targets other than CD30L (off-target binding) can be assessed, an assay system was established and validated to investigate such off-target binding. Briefly, 4 representative antibodies were tested, including anti-CD30L antibody clone 1, clone 1 germlined, clone 2, and clone 2 germlined, all of which further comprising IgG1 constant regions (SEQ ID NO: 502). All 4 antibodies showed low to medium levels of background binding to untransfected HEK293 cells when tested at 2, 5 and 20 $\mu\text{g/mL}$, whilst germlined clone 2 showed low levels of background binding to untransfected HEK293 cells when tested at 2, 5 and 20 $\mu\text{g/mL}$. Binding to over-expressed TNFSF8 (CD30L), the primary target, was observed with equal intensity at all 3 concentrations (2, 5 and 20 $\mu\text{g/mL}$) tested. Based upon these data, further off-target binding was assessed at the concentration of 5 $\mu\text{g/mL}$ to minimize the background.

[0321] Having established and validated the assay, all 4 antibodies (clone 1, clone 1 germlined, clone 2, and clone 2 germlined) at 5 $\mu\text{g/mL}$ were screened for binding against fixed human HEK293 cells, individually expressing 5,861 full-length human plasma membrane proteins and cell surface-tethered human secreted proteins plus a further 371 human heterodimers. For the off-target screening, 5,861 expression vectors, encoding both ZsGreen1 and a full-length human plasma membrane protein or a cell surface-tethered human secreted protein, were individually arrayed in duplicate across 18 microarray slides ('slide-sets'). In addition, vectors encoding a further 371 human heterodimers were co-arrayed across a further microarray slide.

This study with a library of 6,232 (5,861+371) targets other than CD30L revealed no specific binding to 6,213 library targets, and only 19 preliminary library hits altogether for further investigation, among which is CD30L (hit #3 of the 19 hits).

[0322] To confirm the preliminary findings, each library hit was re-expressed, along with 2 control receptors, and re-tested with 5 µg/mL of each test antibody individually or control treatments. Briefly, vectors encoding each of the 19 hits identified in the library screen, plus vectors encoding CD20 and EGFR, were arrayed and expressed in HEK293 cells on new slides. This conformation study was performed both on fixed and live cells. The procedure and analyses were carried out as for described for the initial screen except that identical slides were treated, either after cell fixation or in the absence of cell fixation, with 5 µg/mL of each test antibody individually, 1 µg/mL Rituximab biosimilar (positive control), or no test molecule (AF647 anti-hIgG Fc secondary only) (n=2 slides per treatment for fixed cell screen and n=1 slide per treatment for live cell screen). Binding to target-expressing cells and untransfected cells was again assessed by fluorescence imaging.

[0323] In the confirmation screen, all 19 library hits (one of which is CD30L) and 2 control receptors (CD20 and EGFR) were over-expressed in HEK293 cells. As expected, the Rituximab biosimilar showed a med/strong intensity interaction with over-expressed CD20, validating the incubation conditions and detection system.

[0324] The binding of each of the tested anti-CD30L antibodies to CDH13 (hit # 16 of the 19 hits) was very weak (very low confidence) in the library screen. Lack of reproducibility into the confirmation screen indicates that this was not a real interaction.

[0325] Twelve of the 19 library hits (#4 to #15 of the 19 hits, which are IGHG3, SLC22A23, CXCL12, IGF2, EDN2, IGF1, PAPP, IGHG4, IGHG1, IGHG2, FCGR3A+FCER1G and FCGR3A+CD247, respectively) were bound by at least 1 of the control treatments (Rituximab biosimilar and/or no primary test molecule). These are therefore classed as non-specific, and included Fc gamma receptors (hit #s 14 and 15, FCGR3A+FCER1G and FCGR3A+CD247 respectively) which are presumably Fc-domain mediated and IGHG3 (hit # 4) which is known to be bound directly by the secondary detection antibody. Hit #3 is TNFSF8 (CD30L), the primary target of the antibodies tested.

[0326] The signal intensities for the further 5 of the 19 library hits (hit #s 1, 2, 19, 20 and 21, which are FCGR1A, SLC38A4, GPR87, EPHA7, CACNA2D4) in the confirmation screen were classed as very weak (with the exception that clone 1 and clone 1 germlined binding to EPHA7 in live 293 cells was classified as weak) and, in 1 instance, only observed on 1 of the 2 replicate slides. For such hits, signals are so close to background levels that there is little to

no confidence that they are real and/or specific. Thus no significance were attributed to such hits.

[0327] In contrast, the 4 representative anti-CD30L antibodies tested in this Example, including anti-CD30L antibody clone 1, clone 1 germlined, clone 2, and clone 2 germlined, all showed specific, strong intensity, interactions with TNFSF8 (CD30L), their primary target, on both fixed and live cell microarrays.

[0328] These data demonstrate high specificity of the 4 representative anti-CD30L antibodies tested in this Example, including anti-CD30L antibody clone 1, clone 1 germlined, clone 2, and clone 2 germlined for their primary target, TNFSF8 (CD30L).

Example 9: Additional Binding Studies and Comparison with Reference Anti-CD30L Antibodies.

[0329] Representative anti-CD30L clone antibodies (clone 1, clone 1 germlined, clone 2, and clone 2 germlined) were also characterized for binding affinity to cynomolgus and human CD30L and for their ability to neutralize the interaction of CD30L to CD30. Binding of the representative anti-CD30L clones to recombinant cynomolgus (cyno) and human CD30L has been demonstrated by ELISA binding assays with purified human or cyno CD30L and by binding to CD30L expressing B16 or HEK293 cells in flow cytometry, with human or cyno CD30L expressed on HEK293 or B16 cells. In the B16 or HEK293 cell binding assays (cell binding assays as shown in **FIG. 5A**), the representative anti-CD30L clones were all shown to bind strongly to CD30L with nanomolar or sub-nanomolar affinity (**Table 19**). The representative binding and blocking curves for germlined clone 2 from such cell binding assays were shown in **FIGS. 5B to 5E**. In the ELISA binding assays with purified human or cyno CD30L (ELISA configuration shown in **FIGS. 5F and 5G**), the representative anti-CD30L clones were all shown to bind strongly to CD30L with picomolar affinity for recombinant human CD30L and nanomolar affinity for cyno CD30L (**Table 20**). The representative binding and blocking curves from the ELISA for germlined clone 2 were shown in **FIGS. 5H and 5I**. When directly compared with the reference 1 (ref1) anti-CD30L (comprising HC of SEQ ID NO: 768 and LC of SEQ ID NO: 769), all 4 representative anti-CD clones had better IC₅₀, up to 2.74 fold better IC₅₀ (clone 2 germlined) against human CD30L and up to 2.13 fold better IC₅₀ (clone 2 germlined) against cyno CD30L, at which the representative anti-CD30L clones blocked the binding of recombinant CD30-Fc to human or cyno CD30L expressed on HEK293 or B16 cells, (**Table 19**). In addition, these 4 representative anti-CD30L clones were tested in an IL-8 release dual cell assay, for cyno CD30L involving the K299 CD30+ cell line co-cultured with HEK293-cyno CD30L and for human CD30L involving K299 CD30+ cell line co-cultured

with B16-humanCD30L cells. In such IL-8 release dual cell assay, K299 CD30+ release IL-8 upon ligation with and stimulation by the co-cultured CD30L expressing cells (**FIG. 5J**). Blocking of the CD30L-CD30 interaction can proportionally reduce the release of IL-8 and thus the amount of IL-8 released can be used as a readout for the effectiveness of antibody mediated blocking of CD30L-CD30 interactions between the co-cultured cells (**FIG. 5J**). All 4 representative anti-CD30L clones potently and effectively neutralized the cell-cell interaction mediated by CD30 and CD30L ligation and blocked IL-8 release, with IC_{50} in the sub-nanomolar (clone 2 and clone 2 germlined) or nanomolar (clone 1 and clone 1 germlined) range (**Table 21**). The representative IL-8 release curves from the dual cell assay for germlined clone 2 were shown in **FIGS. 5K** and **5L**. When directly compared with the reference 1 (ref1) anti-CD30L (comprising HC of SEQ ID NO: 768 and LC of SEQ ID NO: 769), all 4 representative anti-CD30L clones had better IC_{50} , up to 2.0 fold better IC_{50} (clone 2) against humanCD30L and up to 2.6 fold better IC_{50} (clone 2) against cyno CD30L, at which the representative anti-CD30L clones functionally blocked IL-8 release in the dual cell assay (**Table 21**).

Table 19. Summary of (1) the binding EC_{50} of the representative anti-CD30L clones to human or cyno CD30L expressed on HEK293 or B16 cells as indicated and (2) the IC_{50} at which the representative anti-CD30L clones blocked the binding of recombinant CD30-Fc to human or cyno CD30L expressed on HEK293 or B16 cells as indicated.

Clones	Human CD30L		Cyno CD30L	
	Binding to B16-rhCD30L EC_{50} (nM)	Ab-mediated blocking of CD30-Fc to B16-huCD30L cells IC_{50} (nM)	Binding to HEK293-cyCD30L EC_{50} (nM)	Ab-mediated blocking of CD30-Fc to HEK293-cyCD30L cells IC_{50} (nM)
Ref1	1.12	1.84	0.56	0.73
CLONE_1	1.11	1.06	0.67	0.51
CLONE_1_germlined	1.12	1.05	0.58	0.54
CLONE_2	0.74	0.79	0.30	0.34
CLONE_2_germlined	0.64	0.67	0.33	0.34

Table 20. Summary of (1) the binding EC_{50} of the representative anti-CD30L clones to purified human or cyno CD30L in an ELISA assay and (2) the IC_{50} at which the representative anti-CD30L clones blocked the binding of recombinant CD30-Fc to purified human or cyno CD30L in an ELISA assay.

Clones	Human CD30L		Cyno CD30L	
	Binding to rhCD30L EC_{50} (nM)	Ab-mediated blocking of CD30-Fc to huCD30L IC_{50} (nM)	Binding to rcyCD30L EC_{50} (nM)	Ab-mediated blocking of CD30-Fc to rcyCD30L IC_{50} (nM)
CLONE_1	0.05	2.14	0.07	1.58
CLONE_1_germlined	0.05	1.85	0.07	1.71
CLONE_2	0.04	1.35	0.05	1.28
CLONE_2_germlined	0.03	1.92	0.05	1.53

Table 21. Summary of the IC_{50} at which the representative anti-CD30L clones blocked the IL-8 release in a dual cell assay.

Clones	Inhibition of IL-8 release in a dual cell assay (B16-huCD30L cells + K299 cells) IC_{50} (nM)	Inhibition of IL-8 release in a dual cell assay (HEK293-cyCD30L cells + K299 cells) IC_{50} (nM)
Ref1	1.61	0.79
CLONE_1	1.43	0.39
CLONE_1_germlined	1.29	0.43
CLONE_2	0.81	0.31
CLONE_2_germlined	0.89	0.41

[0330] To more precisely define and compare the binding affinities (dissociation equilibrium constant, K_D), the association rate constant (on rate, k_{on}), and the dissociation rate constant (off rate, k_{off}), the kinetic exclusion assay (KinExA) was performed. KinExA measures the equilibrium binding affinity and kinetics between unmodified binding molecules in solution. For affinity analysis, the equilibrium dissociation constant, K_D , is experimentally determined and reflects the strength of the binding interaction. The rate of association, k_{on} , is also experimentally determined, while the rate of dissociation, k_{off} , is calculated based on the equation: $k_{off} = K_D \times k_{on}$.

[0331] A K_D analysis requires immobilization of one interaction partner to a solid phase which is then used as a probe to capture the other interaction partner, the constant binding partner (Fab). For each experiment, CD30L antigen is titrated in a background of the Fab and allowed to reach equilibrium. The solutions are then briefly exposed to the solid phase and a portion of

free Fab is captured. The captured Fab is then labeled with a fluorescent secondary molecule. The short contact time with the solid phase is less than the time needed for dissociation of the pre-formed complex in solution, thus competition between the solution and the solid phase titrated binding partner is kinetically excluded.

[0332] The signals generated from the captured Fab, which are directly proportional to the concentration of free Fab in the equilibrated samples, are used to determine the K_D value. The KinExA Pro software performs a least squares analysis on the measured data to fit optimal solution for the K_D and the activity of the Fab to a curve representative of a 1:1 reversible bi-molecular interaction.

[0333] Using a KinExA 3200 instrument, the affinity and kinetics were measured for the Fab of a representative anti-CD30L, clone 2 germlined, to human CD30L. The K_D , k_{on} , and k_{off} were shown in **Table 22**.

Table 22: Binding of Fab of clone 2 germlined to human CD30L.

K_D	90.5 pM
95% Confidence Interval	65.4 to 125 pM
On Rate (k_{on}) ($M^{-1}s^{-1}$)	1.55×10^6
95% Confidence Interval ($M^{-1}s^{-1}$)	1.50×10^6 to 1.61×10^6
Off Rate (k_{off}) (s^{-1})	1.41×10^{-4}

[0334] Using a KinExA 3200 instrument, the affinity and kinetics were measured for the Fab of a representative anti-CD30L, clone 2 germlined, to cyno CD30L. The K_D , k_{on} , and k_{off} were shown in **Table 23**.

Table 23: Binding of the Fab of clone 2 germlined to cyno CD30L.

K_D	122 pM
95% Confidence Interval	51.3 to 244 pM
On Rate (k_{on}) ($M^{-1}s^{-1}$)	3.1×10^6
95% Confidence Interval ($M^{-1}s^{-1}$)	2.45×10^6 to 3.89×10^6
Off Rate (k_{off}) (s^{-1})	3.78×10^{-4}

[0335] As a direct comparison, using a KinExA 3200 instrument, the affinity and kinetics were measured for the Fab of the reference 1 (ref1) anti-CD30L (comprising VH of SEQ ID NO:766 and VL of SEQ ID NO: 767), to human CD30L. The K_D , k_{on} , and k_{off} for this reference 1 anti-CD30L were shown in **Table 24**.

Table 24: Binding of Fab of the reference 1 anti-CD30L to human CD30L.

K_D	377 pM
95% Confidence Interval	289 to 489 pM
On Rate (k_{on}) ($M^{-1}s^{-1}$)	9.37×10^5
95% Confidence Interval ($M^{-1}s^{-1}$)	7.56×10^5 to 1.09×10^6
Off Rate (k_{off}) (s^{-1})	3.53×10^{-4}

[0336] Therefore, the representative anti-CD30L provided herein, clone 2 germlined, has picomolar affinity for both human and cyno CD30L and has 4.2 fold higher K_D than the reference 1 anti-CD30L in a head-to-head comparison with the reference 1 anti-CD30L.

Example 10. Study of the Effect of Anti-CD30L in cynomolgus T cell-dependent antibody responses *in vivo*

[0337] This disclosure provides studies on the effect of anti-CD30L in T cell-dependent antibody responses in a non-human primate model of humoral immunity.

[0338] Briefly, keyhole limpet hemocyanin (KLH) is a model antigen that is commonly used in mechanistic studies of cellular and humoral immunity. The robust availability of well-characterized tools and reagents to study murine and non-human primate KLH-specific antibody responses makes it a key model in preclinical drug characterization, target validation, and immune mechanism of action studies. 18 naïve male cynomolgus monkeys (*Macaca fascicularis*) between 3-6 years old and between 3.5-6.0 kg body weight were allocated to treatment groups according to **Table 24**. Monkeys were immunized intramuscularly (I.M.) with 10mg of KLH in PBS in 1 mL, with half the volume injected into each quadriceps on day 0. Group 2 tested the CTLA4-Ig treatment, a published positive control for preventing T cell dependent antibody responses (TDAR) compared to vehicle (PBS) treated animals in Group 1. Groups 3 and 4 tested the effect of CD30L blockade during the primary anti-KLH response with 0.3 and 3 mg/kg a representative anti-CD30L, clone 2 germlined comprising VH of SEQ ID NO: 6, VL of SEQ ID NO: 8, and IgG1 constant region set forth in SEQ ID NO: 504.

Table 24: Study design for the Effect of Anti-CD30L in cynomolgus T cell-dependent antibody responses *in vivo*

Group	KLH injection	Test article	N	Route	Conc. mg/ml	Dosage		Regimen
						mg/kg	mL/kg	
1	Y	Vehicle	3	I.V. slow bolus	N/A	N/A	2	-2 days before primary immunization q.w. starting day 7 for 3 weeks (4 total doses, D-2, D7, D14, D21)

2	Y	CTLA4-Ig	3	S.C.	5	10	2	-2 days before primary immunization 2x per week 3 weeks (8 total doses, D-2, D1, D4, D7, D11, D14, D18, D21)
3	Y	Clone 2 germlined (anti-CD30L)	3	I.V. slow bolus	1.5	3	2	-2 days before primary immunization q.w. starting day 7 for 3 weeks (4 total doses, D-2, D7, D14, D21)
4	Y	Clone 2 germlined (anti-CD30L)	3	I.V. slow bolus	0.15	0.3	2	-2 days before primary immunization q.w. starting day 7 for 3 weeks (4 total doses, D-2, D7, D14, D21)

[0339] Serum samples were isolated from blood collected from the cephalic or femoral vein on days -7, 4, 9, 14, and 28. Blood was kept at room temperature for 30 minutes and centrifuged to isolate serum prior to storage at -80°C until use. Serum was analyzed for KLH-specific IgM and IgG.

[0340] KLH-specific IgM levels in the serum of Vehicle treated animals peaked at day 9 and then quickly diminished through day 28 post-immunization (**FIG. 6A**). CTLA4-Ig treatment delayed the peak of anti-KLH IgM, but had a variable effect on the magnitude of the peak, with a trend toward decreasing overall anti-KLH IgM levels (measured by the area under the curve (AUC), **FIG. 6B**). CD30L blockade by anti-CD30L germlined clone 2 did not alter the timing of the peak anti-KLH IgM levels, but reduced the magnitude of the peak in 3/3 0.3 mg/kg treated animals and to a greater degree in 2/3 3 mg/kg treated animals (**FIG. 6B**). The overall anti-KLH IgM levels measured by AUC showed a comparable trend toward reduction in anti-CD30L treated monkey when compared to CTLA4-Ig treated monkey, which as described above is a published positive control for preventing T cell dependent antibody responses (TDAR) (**FIG. 6B**).

[0341] KLH-specific IgG levels in the serum of Vehicle treated animals peaked at day 14 and were maintained through day 28 post-immunization (**FIG. 6C**). Similar to its effect on anti-KLH IgM, CTLA4-Ig treatment delayed the peak of anti-KLH IgG, and reduced the magnitude of the peak, resulting in a reduction of overall anti-KLH IgG levels measured by AUC (**FIG. 6D**). CD30L blockade by anti-CD30L germlined clone 2 had some effect on the timing of primary anti-KLH IgG response at 0.3 mg/kg or 3 mg/kg, and appeared to reduce both the peak and the overall (AUC) anti-KLH IgG levels in 2 of the 3 animals treated with 3 mg/kg (**FIG. 6C and 6D**).

[0342] While preferred embodiments of the present invention have been shown and described herein, it will be obvious to those skilled in the art that such embodiments are

provided by way of example only. Numerous variations, changes, and substitutions will now occur to those skilled in the art without departing from the invention. It should be understood that various alternatives to the embodiments of the invention described herein may be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that methods and structures within the scope of these claims and their equivalents be covered thereby.

6. SEQUENCE LISTING

Table 25: Sequence Listing

SEQ ID	SEQUENCE	Description 1	Description 2	Description 3
1	<i>QVQLQESGPGLVKPSSETLSLTCTVS GGGISGYYSWIRQPPVKGLEWIGY IFYSGYTKYNPSLKSRVTISVDTSK NQFSLKLSSVTAADTAVYYCARDRW DFDYWGQ GALVTVSS</i>	CLONE_1_VH _parental		
2	<i>QVQLQESGPGLVKPSSETLSLTCTVS GGGISGYYSWIRQPPVKGLEWIGY IFYSGYTKYNPSLKSRVTISVDTSK NQFSLKLSSVTAADTAVYYCARDRW DFDYWGQ GLVTVSS</i>	CLONE_1_VH _germlined		
3	<i>AIQMTQSPSYLSASVGDRVITICRA SQGIRNNLGWYQQKPGKAPKLLIYA ESSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCLQDFNYPYTFGQ GTKLEIK</i>	CLONE_1_VL _parental		
4	<i>AIQMTQSPSYLSASVGDRVITICRA SQGIRNNLGWYQQKPGKAPKLLIYA ESSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCLQDFNYPYTFGQ GTKLEIK</i>	CLONE_1_VL _germlined		
5	<i>EVQLVESGGGLVQPGRSRLSCAAS GFNFDYAMHWVRQAPGKLEWVSG ISWRSGNIGYAGSVKGRFTISRDN KNSLYLQMNSLRPEDSALYYCAKDK GIGFNWNYEGFDYWGQGLVTVSS</i>	CLONE_2_VH _parental		
6	<i>EVQLVESGGGLVQPGRSRLSCAAS GFNFDYAMHWVRQAPGKLEWVSG ISWRSGNIGYADSVKGRFTISRDN KNSLYLQMNSLRRAEDTALYYCAKDK GIGFNWNYEGFDYWGQGLVTVSS</i>	CLONE_2_VH _germlined		
7	<i>DIQMTQSPSYLSASVGDRVITICRA SQGISNHLAWFQQKPGKAPKSLIYA ASSLQSGVPSKFSGSGSGTDFTLTI SSLQPEDFATYYCQQYVITYPLTFGG GTKVEIK</i>	CLONE_2_VL _parental		

8	DIQMTQSPSSLSASVGDRTITCRA SQGISNHLAWFQQKPGKAPKSLIYA ASSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCQQYVITYPLTFGG GTKVEIK	CLONE_2_VL _germlined		
9	<i>QVQLQESGPGLVKPSSETLSLTCTVS GGGISGYWSWIRQPPVKGLEWIGY IFYSGYTKYNPSLKSRVTISVDTSK NQFSLKLSSVTAADTAVYYCARDRW DFDYWGQALVTVSS</i>	CLONE_3_VH _parental		
10	<i>QVQLQESGPGLVKPSSETLSLTCTVS GGGISGYWSWIRQPPVKGLEWIGY IFYSGYTKYNPSLKSRVTISVDTSK NQFSLKLSSVTAADTAVYYCARDRW DFDYWGQGLVTVSS</i>	CLONE_3_VH _germlined		
11	DIVMTQSPLSLPVTSGEPASFSRCS SQSLLHSNGYNYLDWYLQKPGQSPQ LLIYLGSRASGVPRFSGSGSGTD FTLKI SRVEAADVGVYYCMQALQTP RTFGQGTKVEIK	CLONE_3_VL _parental		
12	DIVMTQSPLSLPVTSGEPASFSRCS SQSLLHSNGYNYLDWYLQKPGQSPQ LLIYLGSRASGVPRFSGSGSGTD FTLKI SRVEAADVGVYYCMQALQTP RTFGQGTKVEIK	CLONE_3_VL _germlined		
13	<i>QVQLVESGGGVVQPGRSRLSCAAS GFPFSYGMHWVRQAPGKLEWVTF IWFDGNNKDYADSVKGRFVSVDNS KNTLYLQMNSLRADDTAVYYCARNG VYYGSGAYVDYWGQGLVTVSS</i>	CLONE_4_VH _parental		
14	<i>QVQLVESGGGVVQPGRSRLSCAAS GFPFSYGMHWVRQAPGKLEWVTF IWFDGNNKDYADSVKGRFTISRDN KNTLYLQMNSLRADDTAVYYCARNG VYYGSGAYVDYWGQGLVTVSS</i>	CLONE_4_VH _germlined		
15	DIVMTQSPLSLPVTSGEPASFSRCS SQSLLHSNGYNYLDWYLQKPGQSPQ LLIYLGSRASGVPRFSGSGSGTD FTLKI SRVEAADVGVYYCMQALQTP RTFGQGTKVEIK	CLONE_4_VL _parental		
16	DIVMTQSPLSLPVTSGEPASFSRCS SQSLLHSNGYNYLDWYLQKPGQSPQ LLIYLGSRASGVPRFSGSGSGTD FTLKI SRVEAADVGVYYCMQALQTP RTFGQGTKVEIK	CLONE_4_VL _germlined		
17	<i>QVQLVESGGGVVQPGRSRLSCAAS GFTFSIYGMHWVRQAPGKLEWVAV IWDGNSNKEYVDSVKGRFTISRDN KNSLYLQMNSLRADDTAVYYCAREG NLFYWGQGLVTVSS</i>	CLONE_59_V H		

18	DIQMTQSPSTLSASVGDRVITTCRA SQSISSWLAWYQQKPGKAPKLLIYK ASSLESGVPSRFSGSGSGTEFTLTI SSLKPDDFATYYCQQYKSYTTFGQ TKLEIK	CLONE_59_V L		
19	QVHLVESGGGVVQPGSLRLSCAAS GFAFNIIYGMHWVRQAPGKGLEWVAV ISYDGSNKVYADSVKGRFSISRDN KNTLYLQMNSLRAEDTAVYYCAKSG GITMVRGVFDYWGQGLTVTVSS	CLONE_60_V H		
20	DIQMTQSPSLPASVGDRVITTCRA SQGIRNDLGWYQQKPGKAPKRLIHA ASSLHSGVPSRFSGSGSGTEFTLTI SSLQPEDFATYYCLQHNRYPIITFGQ GTRLEIK	CLONE_60_V L		
21	QITLKESGPTLVKPTQTTLTCTFS GFSLSSTSGVGVGWIRQPPGKALEWL ALIYWNDKRYSPSLKSRLTITKDT SKNQVVLMTNMDPVDATYYCAHR RTTTVTIYYYYMDVWGKTTTVTVSS	CLONE_61_V H		
22	EIVMTQSPATLSVSPGERATLSCRA SQSVSNLAWYQQKPGQAPRLIIYG ASTRATGIPARFSGSGSGTEFTLTI SSLQSEDFAVYYCQQYNNWPFITFGP GTKVDIK	CLONE_61_V L		
23	EVQLVESGGGLVQPGGSLRLSCAAS GFMFSYSMNWVRQAPGKGLEWVS ISSSSSTIYDADSVKGRFTISRDDA KNSLYLQMNSLRDEDTAVYYCTREA YPGYYNYMDVWGKTTTVTVSS	CLONE_63_V H		
24	DIQMTQSPSLASVGDRVITTCRA SQSISRLAWYQQKPGKAPNLLIYK ASNLESGVPSRFSGSGSGTEFTLTI SSLQPDDEFATYYCQQYNSYSRTFGQ GTKVEIK	CLONE_63_V L		
25	EVQLVESGGGLVQPGGSLRLSCAAS GFTFSNYAMTWVRQAPGKGLEWVSA ISGFGGSTYYADSVKGRFTISRDN KNTLYLQMNSLRAEDTAVYYCAKDH DYAFDYWGQGLTVTVSS	CLONE_64_V H		
26	DIQMTQSPSLASVGDRVITTCRA SQSISSYLNWYQQKPGKAPKLLIYA VSSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCQQSYSTPYTFGQ GTKLEIK	CLONE_64_V L		
27	EVQLVESGGGLVQPGGSLRLSCAAS GFTFSNYAMTWVRQAPGKGLEWVSA ISGYGGSTYYAASVKGRFTISRDN KNTLFLQMNSLRAEDTAVYYCAKDH DYAFDYWGQGLTVTVSS	CLONE_65_V H		

28	DIQMTQSPSLSASVGDRTITCRA SQSINSYLNWYQQKPGKAPKLLIYS ASSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCQQSYSTPYTFGQ GTKLEIK	CLONE_65_V L		
29	EVQLVESGGGLVQPGGSLRLSCEVS GFTFSYDMHWVRQVTGTGLEWVSS IGIGGDTYYPGSVKGRFTISRENAK NSLYLQMNSLRGGDTGVYYCARGEW DLLWYFMDVWGKGTITVTVSS	CLONE_80_V H		
30	DIQMTQSPSLSASVGDRTITCRA SQGISSWLAWYQQKPGKAPKLLIYA ASSLQSGVPSRFSGSGSGTDFTLTI SSLQPEDFATYYCQQANSFPLTFGG GTKVEIK	CLONE_80_V L		
31	EVQLVESGGGLVQPGGSLRLSCAVS GITFSNAWMWVRQAPGKGLEWVGR IKSKTYGGTTDYAAPVKGRFIISRD DSKDTLYLQMNSLKTEDTAIYYCTT DPWNYVNYNYFMDVWGKGTITVTVSS	CLONE_82_V H		
32	DIQMTQSPSLSASVGDRTITCRA SQDIRNYLAWYQQKPGKITHLLVYA ASTLQSGVPSRFSGSGSGTDFTLTI NSLQPEDVATYYCQNYFSVPLTFGG GTKVEIK	CLONE_82_V L		
33	MDPGLQQALNGMAPPGDTAMHVPAG SVASHLGTTSRSYFYLTATLALCL VFTVATIMVLVVQRTDSIPNSPDNV PLKGGNCSEDLILKRAPFKKSWA YLQVAKHLNKTCLSWNKDGLHGV YQDGNLVIQFPGLYFIICQLQFLVQ CPNNSVDLKLELLINKHKKQALVT VCESGMQTKHVVQNLSQFLLDYLQV NTTISVNVDTFQYIDTSTFPLENVL SIFLYSNSD	CD30L full length sequence		
34	QRTDSIPNSPDNVPLKGGNCSEDL CILKRAPFKKSWAYLQVAKHLNKT LSWKNKGILHGVRYQDGNLVIQFPG LYFIICQLQFLVQCPNNSVDLKLEL LINKHKKQALVTVCESGMQTKHVV QNLSQFLLDYLQVNTTISVNVDTFQ YIDTSTFPLENVL SIFLYSNSD	CD30L extracellular domain sequence		
766	QVQLQESGPGLVKPSSETLSLTCTVS GGSSISYIWSWIRQPAKGLEWIGR IYASGNTNYPNSLKSRVTISVDTSK NQFSLKLSSMTAADTAVYYCARDYR VAGTYYYYYGLDVWGQGTITVTVSS	Reference- 1(Ref1)_VH		
767	QSALTQPASVSGSPGQSITISCTGT SSDVGVDYVSWYQQHPGKAPKLMI YEVSNRPSGVSNRFGSKSGNTASL TISGLQTEDEADYICSSYTSRSTWV FGGGTKLTVL	Reference- 1(Ref1)_VL		

768	QVQLQESGPGLVKPSSETLSLTCTVS GGSISSYIWSWIRQPAGKGLEWIGR IYASGNTNYPNPSLKSRVTISVDTSK NQFSLKLSSMTAADTAVYYCARDYR VAGTYYYYYGLDVWGQGTITVTVSSA STKGPSVFPLAPSKSTSGGTAAALG CLVKDYFPEPVTVSWNSGALTSGVH TFPAVLQSSGLYSLSSVVTVPSSSL GTQTYICNVNHKPSNTKVDKKVEPK SCDKTHTCPPCPAPEAAAGAPSVFLF PPKPKDTLMISRTPEVTCVVDVSH EDPEVKFNWYVDGVEVHNAKTKPRE EQYNSTYRVVSVLTVLHQDWLNGKE YKCKVSNKALPAPIEKTISKAKGQP REPQVYTLPPSRDELTKNQVSLTCL VKGFYPSDIAVEWESNGQPENNYKT TPPVLDSDGSFFLYSKLTVDKSRWQ QGNVFCSCVMHEALHNYTQKSLSL SPGK	Reference- 1(Ref1)_He avy Chain (HC)		
769	QSALTQPASVSGSPGQSITISCTGT SSDVGVDYVSWYQQHPGKAPKLMI YEVSNRPSGVSNRFSGSKSGNTASL TISGLQTEDEADYICSSYTSRSTWV FGGGTKLTVLGQPKAAPSVTLFPPS SEELQANKATLVCLISDFYPGAVTV AWKADSSPVKAGVETTTPSKQSNNK YAASSYLSLTPEQWKSHKSYSCQVT HEGSTVEKTVAPTECS	Reference- 1(Ref1)_Li ght Chain (LC)		
100	GGISIGY	CLONE_1	Chothia	CDR-H1
101	GGISIGYYWS		AbM	
102	GYYSWS		Kabat	
103	SGYYWS		Contact	
104	GGISIGYY		IMGT	
105	GGISIGY	CLONE_1_g ermlined	Chothia	CDR-H1
106	GGISIGYYWS		AbM	
107	GYYSWS		Kabat	
108	SGYYWS		Contact	
109	GGISIGYY		IMGT	
110	GFNFDDY	CLONE_2	Chothia	CDR-H1
111	GFNFDDYAMH		AbM	
112	DYAMH		Kabat	
113	DDYAMH		Contact	
114	GFNFDDYA		IMGT	
115	GFNFDDY	CLONE_2_ge rmlined	Chothia	CDR-H1
116	GFNFDDYAMH		AbM	
117	DYAMH		Kabat	

118	DDYAMH		Contact	
119	GFNFDDYA		IMGT	
120	GGSISGY	CLONE_3	Chothia	CDR-H1
121	GGSISGYYWS		AbM	
122	GYYSWS		Kabat	
123	SGYYWS		Contact	
124	GGSISGYY		IMGT	
125	GGSISGY	CLONE_3_ge rmlined	Chothia	CDR-H1
126	GGSISGYYWS		AbM	
127	GYYSWS		Kabat	
128	SGYYWS		Contact	
129	GGSISGYY		IMGT	
130	GFPFSSY	CLONE_4	Chothia	CDR-H1
131	GFPFSSYGMH		AbM	
132	SYGMH		Kabat	
133	SSYGMH		Contact	
134	GFPFSSYG		IMGT	
135	GFPFSSY	CLONE_4_ge rmlined	Chothia	CDR-H1
136	GFPFSSYGMH		AbM	
137	SYGMH		Kabat	
138	SSYGMH		Contact	
139	GFPFSSYG		IMGT	
140	FYSGY	CLONE_1	Chothia	CDR-H2
141	YIFYSGYTK		AbM	
142	YIFYSGYTKYNPSLKS		Kabat	
143	WIGYIFYSGYTK		Contact	
144	IFYSGYT		IMGT	
145	FYSGY	CLONE_1_g ermlined	Chothia	CDR-H2
146	YIFYSGYTK		AbM	
147	YIFYSGYTKYNPSLKS		Kabat	
148	WIGYIFYSGYTK		Contact	
149	IFYSGYT		IMGT	
150	SWRSGN	CLONE_2	Chothia	CDR-H2
151	GISWRSGNIG		AbM	
152	GISWRSGNIGYAGSVKG		Kabat	
153	WVSGISWRSGNIG		Contact	
154	ISWRSGNI		IMGT	

155	SWRSGN	CLONE_2_ge rmlined	Chothia	CDR-H2
156	GISWRSGNIG		AbM	
157	GISWRSGNIGYADSVKG		Kabat	
158	WVSGISWRSGNIG		Contact	
159	ISWRSGNI		IMGT	
160	FYSGY	CLONE_3	Chothia	CDR-H2
161	YIFYSGYTK		AbM	
162	YIFYSGYTKYNPSLKS		Kabat	
163	WIGYIFYSGYTK		Contact	
164	IFYSGYT		IMGT	
165	FYSGY	CLONE_3_ge rmlined	Chothia	CDR-H2
166	YIFYSGYTK		AbM	
167	YIFYSGYTKYNPSLKS		Kabat	
168	WIGYIFYSGYTK		Contact	
169	IFYSGYT		IMGT	
170	WFDGNN	CLONE_4	Chothia	CDR-H2
171	FIWFDGNNKD		AbM	
172	FIWFDGNNKDYADSVKG		Kabat	
173	WVTFIWFDGNNKD		Contact	
174	IWFDGNNK		IMGT	
175	WFDGNN	CLONE_4_ge rmlined	Chothia	CDR-H2
176	FIWFDGNNKD		AbM	
177	FIWFDGNNKDYADSVKG		Kabat	
178	WVTFIWFDGNNKD		Contact	
179	IWFDGNNK		IMGT	
180	DRWDFDY	CLONE_1	Chothia	CDR-H3
181	DRWDFDY		AbM	
182	DRWDFDY		Kabat	
183	ARDRWDFD		Contact	
184	ARDRWDFDY		IMGT	
185	DRWDFDY	CLONE_1_g ermlined	Chothia	CDR-H3
186	DRWDFDY		AbM	
187	DRWDFDY		Kabat	
188	ARDRWDFD		Contact	
189	ARDRWDFDY		IMGT	
190	DKGIGFNWNYEGFDY	CLONE_2	Chothia	CDR-H3
191	DKGIGFNWNYEGFDY		AbM	

192	DKGIGFNWNYEGFDY		Kabat	
193	AKDKGIGFNWNYEGFD		Contact	
194	AKDKGIGFNWNYEGFDY		IMGT	
195	DKGIGFNWNYEGFDY	CLONE_2_ge rmlined	Chothia	CDR-H3
196	DKGIGFNWNYEGFDY		AbM	
197	DKGIGFNWNYEGFDY		Kabat	
198	AKDKGIGFNWNYEGFD		Contact	
199	AKDKGIGFNWNYEGFDY		IMGT	
200	DRWDFDY	CLONE_3	Chothia	CDR-H3
201	DRWDFDY		AbM	
202	DRWDFDY		Kabat	
203	ARDRWDFD		Contact	
204	ARDRWDFDY		IMGT	
205	DRWDFDY	CLONE_3_ge rmlined	Chothia	CDR-H3
206	DRWDFDY		AbM	
207	DRWDFDY		Kabat	
208	ARDRWDFD		Contact	
209	ARDRWDFDY		IMGT	
210	NGVYYGSGAYVDY	CLONE_4	Chothia	CDR-H3
211	NGVYYGSGAYVDY		AbM	
212	NGVYYGSGAYVDY		Kabat	
213	ARNGVYYGSGAYVD		Contact	
214	ARNGVYYGSGAYVDY		IMGT	
215	NGVYYGSGAYVDY	CLONE_4_ge rmlined	Chothia	CDR-H3
216	NGVYYGSGAYVDY		AbM	
217	NGVYYGSGAYVDY		Kabat	
218	ARNGVYYGSGAYVD		Contact	
219	ARNGVYYGSGAYVDY		IMGT	
220	GFTFSIY	CLONE_59	Chothia	CDR-H1
221	GFTFSIYGMH		AbM	
222	IYGMH		Kabat	
223	SIYGMH		Contact	
224	GFTFSIYG		IMGT	
225	GFAFNIIY	CLONE_60	Chothia	CDR-H1
226	GFAFNIIYGMH		AbM	
227	IYGMH		Kabat	
228	NIIYGMH		Contact	
229	GFAFNIIYG		IMGT	

230	GFSLSTSGV	CLONE_61	Chothia	CDR-H1
231	GFSLSTSGVGVG		AbM	
232	TSGVGVG		Kabat	
233	STSGVGVG		Contact	
234	GFSLSTSGVG		IMGT	
235	WYDGSN	CLONE_59	Chothia	CDR-H2
236	VIWYDGSNKY		AbM	
237	VIWYDGSNKYYVDSVKG		Kabat	
238	WVAVIWIWYDGSNKY		Contact	
239	IWYDGSNK		IMGT	
240	SYDGSN	CLONE_60	Chothia	CDR-H2
241	VISYDGSNKV		AbM	
242	VISYDGSNKKVYADSVKG		Kabat	
243	WVAVISYDGSNKV		Contact	
244	ISYDGSNK		IMGT	
245	YWNDD	CLONE_61	Chothia	CDR-H2
246	LIYWNNDDKR		AbM	
247	LIYWNNDDKRYSPSLKS		Kabat	
248	WLALIYWNNDDKR		Contact	
249	IYWNNDDK		IMGT	
250	EGNLFYD	CLONE_59	Chothia	CDR-H3
251	EGNLFYD		AbM	
252	EGNLFYD		Kabat	
253	AREGNLFD		Contact	
254	AREGNLFYD		IMGT	
255	SGGITMVRGVFDY	CLONE_60	Chothia	CDR-H3
256	SGGITMVRGVFDY		AbM	
257	SGGITMVRGVFDY		Kabat	
258	AKSGGITMVRGVFD		Contact	
259	AKSGGITMVRGVFDY		IMGT	
260	RRTTTVTIYYYYMDV	CLONE_61	Chothia	CDR-H3
261	RRTTTVTIYYYYMDV		AbM	
262	RRTTTVTIYYYYMDV		Kabat	
263	AHRRTTTVTIYYYYMD		Contact	
264	AHRRTTTVTIYYYYMDV		IMGT	
300	RASQGIRNNLG	CLONE_1	Chothia	CDR-L1
301	RASQGIRNNLG		AbM	
302	RASQGIRNNLG		Kabat	
303	RNNLGWY		Contact	

304	QGIRNN		IMGT	
305	RASQGIRNNLG	CLONE_1_g ermlined	Chothia	CDR-L1
306	RASQGIRNNLG		AbM	
307	RASQGIRNNLG		Kabat	
308	RNNLGWY		Contact	
309	QGIRNN		IMGT	
310	RASQGISNHIA	CLONE 2	Chothia	CDR-L1
311	RASQGISNHIA		AbM	
312	RASQGISNHIA		Kabat	
313	SNHLAWF		Contact	
314	QGISNH		IMGT	
315	RASQGISNHIA	CLONE_2_ge rmlined	Chothia	CDR-L1
316	RASQGISNHIA		AbM	
317	RASQGISNHIA		Kabat	
318	SNHLAWF		Contact	
319	QGISNH		IMGT	
320	RSSQSLHSHNGYNYLD	CLONE 3	Chothia	CDR-L1
321	RSSQSLHSHNGYNYLD		AbM	
322	RSSQSLHSHNGYNYLD		Kabat	
323	LHSHNGYNYLDWY		Contact	
324	QSLHSHNGYNY		IMGT	
325	RSSQSLHSHNGYNYLD	CLONE_3_ge rmlined	Chothia	CDR-L1
326	RSSQSLHSHNGYNYLD		AbM	
327	RSSQSLHSHNGYNYLD		Kabat	
328	LHSHNGYNYLDWY		Contact	
329	QSLHSHNGYNY		IMGT	
330	RSSQSLHSHNGYNYLD	CLONE 4	Chothia	CDR-L1
331	RSSQSLHSHNGYNYLD		AbM	
332	RSSQSLHSHNGYNYLD		Kabat	
333	LHSHNGYNYLDWY		Contact	
334	QSLHSHNGYNY		IMGT	
335	RSSQSLHSHNGYNYLD	CLONE_4_ge rmlined	Chothia	CDR-L1
336	RSSQSLHSHNGYNYLD		AbM	
337	RSSQSLHSHNGYNYLD		Kabat	
338	LHSHNGYNYLDWY		Contact	
339	QSLHSHNGYNY		IMGT	
340	AESSLQS	CLONE_1	Chothia	CDR-L2

341	AESSLQS		AbM	
342	AESSLQS		Kabat	
343	LLIYAESSLQ		Contact	
344	AE		IMGT	
345	AESSLQS	CLONE_1_g ermlined	Chothia	CDR-L2
346	AESSLQS		AbM	
347	AESSLQS		Kabat	
348	LLIYAESSLQ		Contact	
349	AE		IMGT	
350	AASSLQS	CLONE 2	Chothia	CDR-L2
351	AASSLQS		AbM	
352	AASSLQS		Kabat	
353	SLIYAASSLQ		Contact	
354	AA		IMGT	
355	AASSLQS	CLONE_2_ge rmlined	Chothia	CDR-L2
356	AASSLQS		AbM	
357	AASSLQS		Kabat	
358	SLIYAASSLQ		Contact	
359	AA		IMGT	
360	LGSNRAS	CLONE 3	Chothia	CDR-L2
361	LGSNRAS		AbM	
362	LGSNRAS		Kabat	
363	LLIYLGSNRA		Contact	
364	LG		IMGT	
365	LGSNRAS	CLONE_3_ge rmlined	Chothia	CDR-L2
366	LGSNRAS		AbM	
367	LGSNRAS		Kabat	
368	LLIYLGSNRA		Contact	
369	LG		IMGT	
370	LGSNRAS	CLONE 4	Chothia	CDR-L2
371	LGSNRAS		AbM	
372	LGSNRAS		Kabat	
373	LLIYLGSNRA		Contact	
374	LG		IMGT	
375	LGSNRAS	CLONE_4_ge rmlined	Chothia	CDR-L2
376	LGSNRAS		AbM	
377	LGSNRAS		Kabat	

378	LLIYLGSNRA		Contact	
379	LG		IMGT	
380	LQDFNYPYT	CLONE_1	Chothia	CDR-L3
381	LQDFNYPYT		AbM	
382	LQDFNYPYT		Kabat	
383	LQDFNYPY		Contact	
384	LQDFNYPYT		IMGT	
385	LQDFNYPYT	CLONE_1_g ermlined	Chothia	CDR-L3
386	LQDFNYPYT		AbM	
387	LQDFNYPYT		Kabat	
388	LQDFNYPY		Contact	
389	LQDFNYPYT		IMGT	
390	QQYVTYPLT	CLONE_2	Chothia	CDR-L3
391	QQYVTYPLT		AbM	
392	QQYVTYPLT		Kabat	
393	QQYVTYPL		Contact	
394	QQYVTYPLT		IMGT	
395	QQYVTYPLT	CLONE_2_ge rmlined	Chothia	CDR-L3
396	QQYVTYPLT		AbM	
397	QQYVTYPLT		Kabat	
398	QQYVTYPL		Contact	
399	QQYVTYPLT		IMGT	
400	MQALQTPRT	CLONE_3	Chothia	CDR-L3
401	MQALQTPRT		AbM	
402	MQALQTPRT		Kabat	
403	MQALQTPR		Contact	
404	MQALQTPRT		IMGT	
405	MQALQTPRT	CLONE_3_ge rmlined	Chothia	CDR-L3
406	MQALQTPRT		AbM	
407	MQALQTPRT		Kabat	
408	MQALQTPR		Contact	
409	MQALQTPRT		IMGT	
410	MQALQTPRT	CLONE_4	Chothia	CDR-L3
411	MQALQTPRT		AbM	
412	MQALQTPRT		Kabat	
413	MQALQTPR		Contact	
414	MQALQTPRT		IMGT	

415	MQALQTPRT	CLONE_4_ge rmlined	Chothia	CDR-L3
416	MQALQTPRT		AbM	
417	MQALQTPRT		Kabat	
418	MQALQTPR		Contact	
419	MQALQTPRT		IMGT	
420	RASQSISSWLA	CLONE_59	Chothia	CDR-L1
421	RASQSISSWLA		AbM	
422	RASQSISSWLA		Kabat	
423	SSWLAWY		Contact	
424	QSISSW		IMGT	
425	RASQGIRNDLG	CLONE_60	Chothia	CDR-L1
426	RASQGIRNDLG		AbM	
427	RASQGIRNDLG		Kabat	
428	RNDLGWY		Contact	
429	QGIRND		IMGT	
430	RASQSVSSNLA	CLONE_61	Chothia	CDR-L1
431	RASQSVSSNLA		AbM	
432	RASQSVSSNLA		Kabat	
433	SSNLAWY		Contact	
434	QSVSSN		IMGT	
435	KASSLES	CLONE_59	Chothia	CDR-L2
436	KASSLES		AbM	
437	KASSLES		Kabat	
438	LLIYKASSLE		Contact	
439	KA		IMGT	
440	AASSLHS	CLONE_60	Chothia	CDR-L2
441	AASSLHS		AbM	
442	AASSLHS		Kabat	
443	PLIHAASSLH		Contact	
444	AA		IMGT	
445	GASTRAT	CLONE_61	Chothia	CDR-L2
446	GASTRAT		AbM	
447	GASTRAT		Kabat	
448	LLIYGASTRA		Contact	
449	GA		IMGT	
450	QQYKSYYT	CLONE_59	Chothia	CDR-L3
451	QQYKSYYT		AbM	
452	QQYKSYYT		Kabat	
453	QQYKSY		Contact	

454	QQYKSYTT		IMGT	
455	LQHNRYPTT	CLONE_60	Chothia	CDR-L3
456	LQHNRYPTT		AbM	
457	LQHNRYPTT		Kabat	
458	LQHNRYPTI		Contact	
459	LQHNRYPTT		IMGT	
460	QQYNNWPFT	CLONE_61	Chothia	CDR-L3
461	QQYNNWPFT		AbM	
462	QQYNNWPFT		Kabat	
463	QQYNNWPF		Contact	
464	QQYNNWPFT		IMGT	
465	GFMFSSSY	CLONE_63	Chothia	CDR-H1
466	GFMFSSSYSMN		AbM	
467	SYSMN		Kabat	
468	SSYSMN		Contact	
469	GFMFSSSYS		IMGT	
470	GFTFSNY	CLONE_64	Chothia	CDR-H1
471	GFTFSNYAMT		AbM	
472	NYAMT		Kabat	
473	SNYAMT		Contact	
474	GFTFSNYA		IMGT	
475	GFTFSNY	CLONE_65	Chothia	CDR-H1
476	GFTFSNYAMT		AbM	
477	NYAMT		Kabat	
478	SNYAMT		Contact	
479	GFTFSNYA		IMGT	
480	GFTFSSSY	CLONE_80	Chothia	CDR-H1
481	GFTFSSSYDMH		AbM	
482	SYDMH		Kabat	
483	SSYDMH		Contact	
484	GFTFSSSYD		IMGT	
485	GITFSNA	CLONE_82	Chothia	CDR-H1
486	GITFSNAWMS		AbM	
487	NAWMS		Kabat	
488	SNAWMS		Contact	
489	GITFSNAW		IMGT	
490	SSSSST	CLONE_63	Chothia	CDR-H2
491	YISSSSSTIY		AbM	
492	YISSSSSTIYDADSVKG		Kabat	

493	WVSYISSSSSTIY		Contact	
494	ISSSSSTI		IMGT	
495	SGFGGS	CLONE 64	Chothia	CDR-H2
496	AI SGFGGSTY		AbM	
497	AI SGFGGSTYYADSVKG		Kabat	
498	WVSAI SGFGGSTY		Contact	
499	ISGFGGST		IMGT	
513	SGYGGG	CLONE 65	Chothia	CDR-H2
514	AI SGYGGGSTY		AbM	
515	AI SGYGGGSTYYAASVKG		Kabat	
516	WVSAI SGYGGGSTY		Contact	
517	ISGYGGST		IMGT	
518	GIGGD	CLONE 80	Chothia	CDR-H2
519	SIGIGGDTY		AbM	
520	SIGIGGDTYYPGSVKG		Kabat	
521	WVSSIGIGGDTY		Contact	
522	IGIGGDT		IMGT	
523	KSKTYGGT	CLONE 82	Chothia	CDR-H2
524	RIKSKTYGGTTD		AbM	
525	RIKSKTYGGTTDYAAPVKG		Kabat	
526	WVGRIKSKTYGGTTD		Contact	
527	IKSKTYGGTT		IMGT	
528	EAYPGYYNYMDV	CLONE 63	Chothia	CDR-H3
529	EAYPGYYNYMDV		AbM	
530	EAYPGYYNYMDV		Kabat	
531	TREAYPGYYNYMD		Contact	
532	TREAYPGYYNYMDV		IMGT	
533	DHDYYAFDY	CLONE 64	Chothia	CDR-H3
534	DHDYYAFDY		AbM	
535	DHDYYAFDY		Kabat	
536	AKDHDYYAFD		Contact	
537	AKDHDYYAFDY		IMGT	
538	DHDYYAFDY	CLONE 65	Chothia	CDR-H3
539	DHDYYAFDY		AbM	
540	DHDYYAFDY		Kabat	
541	AKDHDYYAFD		Contact	
542	AKDHDYYAFDY		IMGT	
543	GEWDL LWYFMDV	CLONE 80	Chothia	CDR-H3
544	GEWDL LWYFMDV		AbM	

545	GEWDLWLWYFMDV		Kabat	
546	ARGEWDLLWYFMD		Contact	
547	ARGEWDLLWYFMDV		IMGT	
548	DPWNYVNINYFMDV	CLONE 82	Chothia	CDR-H3
549	DPWNYVNINYFMDV		AbM	
550	DPWNYVNINYFMDV		Kabat	
551	TTDPWNYVNINYFMD		Contact	
552	TTDPWNYVNINYFMDV		IMGT	
553	RASQSISSRLA	CLONE 63	Chothia	CDR-L1
554	RASQSISSRLA		AbM	
555	RASQSISSRLA		Kabat	
556	SSRLAWY		Contact	
557	QSISSR		IMGT	
558	RASQSISSYLN	CLONE 64	Chothia	CDR-L1
559	RASQSISSYLN		AbM	
560	RASQSISSYLN		Kabat	
561	SSYLNWY		Contact	
562	QSISSY		IMGT	
563	RASQSIINSYLN	CLONE 65	Chothia	CDR-L1
564	RASQSIINSYLN		AbM	
565	RASQSIINSYLN		Kabat	
566	NSYLNWY		Contact	
567	QSINSY		IMGT	
568	RASQGISSWLA	CLONE 80	Chothia	CDR-L1
569	RASQGISSWLA		AbM	
570	RASQGISSWLA		Kabat	
571	SSWLAWY		Contact	
572	QGISSW		IMGT	
573	RASQDIRNYLA	CLONE 82	Chothia	CDR-L1
574	RASQDIRNYLA		AbM	
575	RASQDIRNYLA		Kabat	
576	RNYLAWY		Contact	
577	QDIRNY		IMGT	
578	KASNLES	CLONE 63	Chothia	CDR-L2
579	KASNLES		AbM	
580	KASNLES		Kabat	
581	LLIYKASNLE		Contact	
582	KA		IMGT	
583	AVSSLQS	CLONE 64	Chothia	CDR-L2

584	AVSSLQS		AbM	
585	AVSSLQS		Kabat	
586	LLIYAVSSLQ		Contact	
587	AV		IMGT	
588	SASSLQS	CLONE 65	Chothia	CDR-L2
589	SASSLQS		AbM	
590	SASSLQS		Kabat	
591	LLIYSASSLQ		Contact	
592	SA		IMGT	
593	AASSLQS	CLONE 80	Chothia	CDR-L2
594	AASSLQS		AbM	
595	AASSLQS		Kabat	
596	LLIYAASSLQ		Contact	
597	AA		IMGT	
598	AASTLQS	CLONE 82	Chothia	CDR-L2
599	AASTLQS		AbM	
600	AASTLQS		Kabat	
601	LLVYAASTLQ		Contact	
602	AA		IMGT	
603	QQYNSYSRT	CLONE 63	Chothia	CDR-L3
604	QQYNSYSRT		AbM	
605	QQYNSYSRT		Kabat	
606	QQYNSYSR		Contact	
607	QQYNSYSRT		IMGT	
608	QQSYSTPYT	CLONE 64	Chothia	CDR-L3
609	QQSYSTPYT		AbM	
610	QQSYSTPYT		Kabat	
611	QQSYSTPY		Contact	
612	QQSYSTPYT		IMGT	
613	QQSYSTPYT	CLONE 65	Chothia	CDR-L3
614	QQSYSTPYT		AbM	
615	QQSYSTPYT		Kabat	
616	QQSYSTPY		Contact	
617	QQSYSTPYT		IMGT	
618	QQANSFPLT	CLONE 80	Chothia	CDR-L3
619	QQANSFPLT		AbM	
620	QQANSFPLT		Kabat	
621	QQANSFPL		Contact	
622	QQANSFPLT		IMGT	

623	QNYFSVPLT	CLONE_82	Chothia	CDR-L3
624	QNYFSVPLT		AbM	
625	QNYFSVPLT		Kabat	
626	QNYFSVPL		Contact	
627	QNYFSVPLT		IMGT	
628	VSGGSI SGYY	CLONE_1_ge mlined	Aho	CDR-H1
629	ASGFNFDDYA	CLONE_2_ge mlined	Aho	CDR-H1
630	VSGFTFSSYD	CLONE_80	Aho	CDR-H1
631	ASGFMFSSYS	CLONE_63	Aho	CDR-H1
632	ASGFTFSNYA	CLONE_64	Aho	CDR-H1
633	ASGFTFSNYA	CLONE_65	Aho	CDR-H1
634	VSGITFSNAW	CLONE_82	Aho	CDR-H1
635	GYAWS (SEQ ID NO: 107)	CLONE_1_ge mlined	Cross- linking	CDR-H1
636	DYAMH (SEQ ID NO: 117)	CLONE_2_ge mlined	Cross- linking	CDR-H1
637	SYDMH (SEQ ID NO: 482)	CLONE_80	Cross- linking	CDR-H1
638	YSMN (SEQ ID NO: 467)	CLONE_63	Cross- linking	CDR-H1
639	NYAMT (SEQ ID NO: 472)	CLONE_64	Cross- linking	CDR-H1
640	NYAMT (SEQ ID NO: 477)	CLONE_65	Cross- linking	CDR-H1
641	NAWMS (SEQ ID NO: 487)	CLONE_82	Cross- linking	CDR-H1
642	IFYSGYTKYNPSLKSR	CLONE_1_ge mlined	Aho	CDR-H2
643	ISWRSGNIGYADSVKGR	CLONE_2_ge mlined	Aho	CDR-H2
644	IGIGGDTYYPGSVKGR	CLONE_80	Aho	CDR-H2
645	ISSSSSTIYDADSVKGR	CLONE_63	Aho	CDR-H2
646	ISGFGGSTIYADSVKGR	CLONE_64	Aho	CDR-H2

647	ISGYGGSTYYAASVKGR	CLONE__65	Aho	CDR-H2
648	IKSKTYGGTTDYAAPVKGR	CLONE__82	Aho	CDR-H2
649	WIGYIFYSGYTK (SEQ ID NO: 148)	CLONE_1_ge rmlined	Cross- linking	CDR-H2
650	WVSGISWRSNIG (SEQ ID NO: 158)	CLONE_2_ge rmlined	Cross- linking	CDR-H2
651	WVSSIGIGGDTY (SEQ ID NO: 521)	CLONE__80	Cross- linking	CDR-H2
652	WVSYISSSSSTIY (SEQ ID NO: 493)	CLONE__63	Cross- linking	CDR-H2
653	WVSAISGFGGSTY (SEQ ID NO: 498)	CLONE__64	Cross- linking	CDR-H2
654	WVSAISGYGGSTY (SEQ ID NO: 516)	CLONE__65	Cross- linking	CDR-H2
655	WVGRIKSKTYGGTTD (SEQ ID NO: 526)	CLONE__82	Cross- linking	CDR-H2
656	DRWDFD	CLONE_1_ge rmlined	Aho	CDR-H3
657	DKGIGFNWNYEGFD	CLONE_2_ge rmlined	Aho	CDR-H3
658	GEWDLWLWYFMD	CLONE__80	Aho	CDR-H3
659	EAYPGYNYNYMD	CLONE__63	Aho	CDR-H3
660	DHDYYAFD	CLONE__64	Aho	CDR-H3
661	DHDYYAFD	CLONE__65	Aho	CDR-H3
662	DPWNYVNYNYFMD	CLONE__82	Aho	CDR-H3
663	DRWDFDY (SEQ ID NO: 187)	CLONE_1_ge rmlined	Cross- linking	CDR-H3
664	DKGIGFNWNYEGFDY (SEQ ID NO: 197)	CLONE_2_ge rmlined	Cross- linking	CDR-H3
665	GEWDLWLWYFMDV (SEQ ID NO: 545)	CLONE__80	Cross- linking	CDR-H3
666	EAYPGYNYNYMDV (SEQ ID NO: 530)	CLONE__63	Cross- linking	CDR-H3
667	DHDYYAFDY (SEQ ID NO: 535)	CLONE__64	Cross- linking	CDR-H3

668	DHDYYAFDY (SEQ ID NO: 540)	CLONE__65	Cross-linking	CDR-H3
669	DPWNYVNYNFMDV (SEQ ID NO: 550)	CLONE__82	Cross-linking	CDR-H3
670	ASQGIRNN	CLONE__1_ge rmlined	Aho	CDR-L1
671	ASQGISNH	CLONE__2_ge rmlined	Aho	CDR-L1
672	ASQGISSW	CLONE__80	Aho	CDR-L1
673	ASQSISSR	CLONE__63	Aho	CDR-L1
674	ASQSISSY	CLONE__64	Aho	CDR-L1
675	ASQSINSY	CLONE__65	Aho	CDR-L1
676	ASQDIRNY	CLONE__82	Aho	CDR-L1
677	RASQGIRNNLG (SEQ ID NO: 307)	CLONE__1_ge rmlined	Cross-linking	CDR-L1
678	RASQGISNHIA (SEQ ID NO: 317)	CLONE__2_ge rmlined	Cross-linking	CDR-L1
679	RASQGISSWLA (SEQ ID NO: 570)	CLONE__80	Cross-linking	CDR-L1
680	RASQSISSRLA (SEQ ID NO: 555)	CLONE__63	Cross-linking	CDR-L1
681	RASQSISSYLN (SEQ ID NO: 560)	CLONE__64	Cross-linking	CDR-L1
682	RASQSINSYLN (SEQ ID NO: 565)	CLONE__65	Cross-linking	CDR-L1
683	RASQDIRNYLA (SEQ ID NO: 575)	CLONE__82	Cross-linking	CDR-L1
684	AESSLQSGVPSR	CLONE__1_ge rmlined	Aho	CDR-L2
685	AASSLQSGVPSR	CLONE__2_ge rmlined	Aho	CDR-L2
686	AASSLQSGVPSR	CLONE__80	Aho	CDR-L2
687	KASNLESGVPSR	CLONE__63	Aho	CDR-L2
688	AVSSLQSGVPSR	CLONE__64	Aho	CDR-L2

689	SASSLQSGVPSR	CLONE__65	Aho	CDR-L2
690	AASTLQSGVPSR	CLONE__82	Aho	CDR-L2
691	AESSLQS (SEQ ID NO: 347)	CLONE_1_ge rmlined	Cross- linking	CDR-L2
692	AASSLQS (SEQ ID NO: 357)	CLONE_2_ge rmlined	Cross- linking	CDR-L2
693	AASSLQS (SEQ ID NO: 595)	CLONE__80	Cross- linking	CDR-L2
694	KASNLES (SEQ ID NO: 580)	CLONE__63	Cross- linking	CDR-L2
695	AVSSLQS (SEQ ID NO: 585)	CLONE__64	Cross- linking	CDR-L2
696	SASSLQS (SEQ ID NO: 590)	CLONE__65	Cross- linking	CDR-L2
697	AASTLQS (SEQ ID NO: 600)	CLONE__82	Cross- linking	CDR-L2
698	DFNYPY	CLONE_1_ge rmlined	Aho	CDR-L3
699	YVTYPL	CLONE_2_ge rmlined	Aho	CDR-L3
700	ANSFPL	CLONE__80	Aho	CDR-L3
701	YNSYSR	CLONE__63	Aho	CDR-L3
702	SYSTPY	CLONE__64	Aho	CDR-L3
703	SYSTPY	CLONE__65	Aho	CDR-L3
704	YFSVPL	CLONE__82	Aho	CDR-L3
705	LQDFNYPYT (SEQ ID NO: 387)	CLONE_1_ge rmlined	Cross- linking	CDR-L3
706	QQYVTYPLT (SEQ ID NO: 397)	CLONE_2_ge rmlined	Cross- linking	CDR-L3
707	QQANSFPLT (SEQ ID NO: 620)	CLONE__80	Cross- linking	CDR-L3
708	QQYNSYSRT (SEQ ID NO: 605)	CLONE__63	Cross- linking	CDR-L3
709	QQSYSTPYT (SEQ ID NO: 610)	CLONE__64	Cross- linking	CDR-L3

710	QQSYSTPYT (SEQ ID NO: 615)	CLONE__65	Cross-linking	CDR-L3
711	QNYFSVPLT (SEQ ID NO: 625)	CLONE__82	Cross-linking	CDR-L3
712	X1-Y-X2-X3-X4, wherein X1 is G, D, or S; X2 is Y, A, or D; X3 is W or M; and X4 is S or H (SEQ ID NO: 712)	Consensus__1	based on Kabat	CDR-H1
713	X1-X2-X3-X4-X5, wherein X1 is G, D, N, or S; X2 is Y or A; X3 is Y, A, S, W, or D; X4 is W or M; and X5 is N, T, S or H (SEQ ID NO: 713)	Consensus__2	based on Kabat	CDR-H1
714	G-X1-X2-X3-X4-X5-Y, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; and X5 is G, D, or S (SEQ ID NO: 714)	Consensus__1	based on Chothia	CDR-H1
715	G-X1-X2-X3-X4-X5-X6, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; and X6 is Y or A (SEQ ID NO: 715)	Consensus__2	based on Chothia	CDR-H1
716	G-X1-X2-X3-X4-X5-Y-X6-X7-X8, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; X5 is G, D, or S; X6 is Y, A, or D; X7 is W or M; and X8 is S or H (SEQ ID NO: 716)	Consensus__1	based on AbM	CDR-H1
717	G-X1-X2-X3-X4-X5-X6-X7-X8-X9, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; X6 is Y or A; X7 is Y, A, D, S or W; X8 is W or M; and X9 is S, H, N, or T (SEQ ID NO: 717)	Consensus__2	based on AbM	CDR-H1
718	X1-X2-Y-X3-X4-X5, wherein X1 is S or D; X2 is G, D, or S; X3 is Y, A, or D; X4 is W or M; and X5 is S or H (SEQ ID NO: 718)	Consensus__1	based on Contact	CDR-H1
719	X1-X2-X3-X4-X5-X6, wherein X1 is S or D; X2 is G, D, N, or S; X3 is Y or A; X4 is Y, A, S, W,	Consensus__2	based on Contact	CDR-H1

	or D; X5 is W or M; and X6 is N, T, S or H (SEQ ID NO: 719)			
720	G-X1-X2-X3-X4-X5-Y-X6, wherein X1 is G or F; X2 is S, N, or T; X3 is I or F; X4 is S or D; X5 is G, D, or S; and X6 is Y, A, or D (SEQ ID NO: 720)	Consensus__ 1	based on IMGT	CDR-H1
721	G-X1-X2-X3-X4-X5-X6-X7, wherein X1 is G, F or I; X2 is S, N, T, or M; X3 is I or F; X4 is S or D; X5 is G, D, S, or N; X6 is Y or A; and X7 is Y, A, D, S, or W (SEQ ID NO: 721)	Consensus__ 2	based on IMGT	CDR-H1
722	X1-S-G-X2-X3-X4-X5-X6-Y-X7, wherein X1 is V or A; X2 is G or F; X3 is S, N, or T; X4 is I or F; X5 is S or D; X6 is G, D, or S; and X7 is Y, A, or D (SEQ ID NO: 722)	Consensus__ 1	based on Aho	CDR-H1
723	X1-S-G-X2-X3-X4-X5-X6-X7-X8, wherein X1 is V or A; X2 is G, F or I; X3 is S, N, T, or M; X4 is I or F; X5 is S or D; X6 is G, D, S, or N; X7 is Y or A; and X8 is Y, A, D, S or W (SEQ ID NO: 723)	Consensus__ 2	based on Aho	CDR-H1
712	X1-Y-X2-X3-X4, wherein X1 is G, D, or S; X2 is Y, A, or D; X3 is W or M; and X4 is S or H (SEQ ID NO: 712)	Consensus__ 1	based on Cross- linking	CDR-H1
713	X1-X2-X3-X4-X5, wherein X1 is G, D, N, or S; X2 is Y or A; X3 is Y, A, S, W, or D; X4 is W or M; and X5 is N, T, S or H (SEQ ID NO: 713)	Consensus__ 2	based on Cross- linking	CDR-H1
724	X1-I-X2-X3-X4-X5-G-X6-X7-X8-Y-X9-X10-S-X11-K-X12, wherein X1 is Y, G, or S; X2 is S, G, or none; X3 is F, W, or I; X4 is Y, R, or none; X5 is G or S; X6 is Y, N, or D; X7 is T or I; X8 is K, G, or Y; X9 is N, A, or P; and X10 is P, D, or G;	Consensus__ 1	based on Kabat	CDR-H2

	X11 is L or V; and X12 is S or G (SEQ ID NO: 724)			
725	X1-I-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-K-X15, wherein X1 is Y, G, S, A or R; X2 is S, G, or none; X3 is F, W, I, S, G or T; X4 is Y, R, S, F, or none; X5 is G or S; X6 is G or S; X7 is Y, N, D, T or S; X8 is T or I; X9 is K, G, Y, or D; X10 is Y or D; X11 is N, A, or P; and X12 is P, D, G, or A; X13 is S or P; X14 is L or V; and X15 is S or G (SEQ ID NO: 725)	Consensus__ 2	based on Kabat	CDR-H2
726	X1-X2-X3-X4-G-X5, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is S or G; and X5 is Y, N, or D (SEQ ID NO: 726)	Consensus__ 1	based on Chothia	CDR-H2
727	X1-X2-X3-X4-X5-X6, wherein X1 is S, G, or none; X2 is F, W, G, S, I, or T; X3 is Y, R, S, F, or none; X4 is S or G; X5 is G or S; and X6 is Y, N, D, T, or S (SEQ ID NO: 727)	Consensus__ 2	based on Chothia	CDR-H2
728	X1-I-X2-X3-X4-X5-G-X6-X7-X8, wherein X1 is Y, G, or S; X2 is S, G, or none; X3 is F, W, or I; X4 is Y, R, or none; X5 is G or S; X6 is Y, N, or D; X7 is T or I; X8 is K, G, or Y (SEQ ID NO: 728)	Consensus__ 1	based on AbM	CDR-H2
729	X1-I-X2-X3-X4-X5-X6-X7-X8-X9, wherein X1 is Y, G, S, A or R; X2 is S, G, or none; X3 is F, W, I, S, G or T; X4 is Y, R, S, F, or none; X5 is G or S; X6 is G or S; X7 is Y, N, D, T or S; X8 is T or I; X9 is K, G, Y, or D (SEQ ID NO: 729)	Consensus__ 2	based on AbM	CDR-H2

730	W-X1-X2-X3-I-X4-X5-X6-X7-G-X8-X9-X10, wherein X1 is I or V; X2 is G or S; X3 is Y, G, or S; X4 is S, G, or none; X5 is F, W, or I; X6 is Y, R, or none; X7 is G or S; X8 is Y, N, or D; X9 is T or I; X10 is K, G, or Y (SEQ ID NO: 730)	Consensus___ 1	based on Contact	CDR-H2
731	W-X1-X2-X3-I-X4-X5-X6-X7-X8-X9-X10-X11, wherein X1 is I or V; X2 is G or S; X3 is Y, G, S, A or R; X4 is S, G, or none; X5 is F, W, I, S, G or T; X6 is Y, R, S, F, or none; X7 is G or S; X8 is G or S; X9 is Y, N, D, T or S; X10 is T or I; X11 is K, G, Y, or D (SEQ ID NO: 731)	Consensus___ 2	based on Contact	CDR-H2
732	I-X1-X2-X3-X4-G-X5-X6, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is G or S; X5 is Y, N, or D; and X6 is T or I (SEQ ID NO: 732)	Consensus___ 1	based on IMGT	CDR-H2
733	I-X1-X2-X3-X4-X5-X6-X7, wherein X1 is S, G, or none; X2 is F, W, I, S, G or T; X3 is Y, R, S, F, or none; X4 is G or S; X5 is G or S; X6 is Y, N, D, T or S; and X7 is T or I (SEQ ID NO: 733)	Consensus___ 2	based on IMGT	CDR-H2
734	I-X1-X2-X3-X4-G-X5-X6-X7-Y-X8-X9-S-X10-K-X11-R, wherein X1 is S, G, or none; X2 is F, W, or I; X3 is Y, R, or none; X4 is G or S; X5 is Y, N, or D; X6 is T or I; X7 is K, G, or Y; X8 is N, A, or P; X9 is P, D or G; X10 is L or V; and X11 is G or S (SEQ ID NO: 734)	Consensus___ 1	based on Aho	CDR-H2

735	I-X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-K-X14-R, wherein X1 is S, G, or none; X2 is F, W, I, S, G or T; X3 is Y, R, S, F, or none; X4 is G or S; X5 is G or S; X6 is Y, N, D, T or S; X7 is T or I; X8 is K, G, Y, or D; X9 is Y or D; X10 is N, A, or P; X11 is P, D, G, or A; X12 is S or P; X13 is L or V; and X14 is G or S (SEQ ID NO: 735)	Consensus__ 2	based on Aho	CDR-H2
730	W-X1-X2-X3-I-X4-X5-X6-X7-G-X8-X9-X10, wherein X1 is I or V; X2 is G or S; X3 is Y, G, or S; X4 is S, G, or none; X5 is F, W, or I; X6 is Y, R, or none; X7 is G or S; X8 is Y, N, or D; X9 is T or I; X 10 is K, G, or Y (SEQ ID NO: 730)	Consensus__ 1	based on Cross- linking	CDR-H2
731	W-X1-X2-X3-I-X4-X5-X6-X7-X8-X9-X10-X11, wherein X1 is I or V; X2 is G or S; X3 is Y, G, S, A or R; X4 is S, G, or none; X5 is F, W, I, S, G or T; X6 is Y, R, S, F, or none; X7 is G or S; X8 is G or S; X9 is Y, N, D, T or S; X10 is T or I; X 10 is K, G, Y, or D (SEQ ID NO: 731)	Consensus__ 2	based on Cross- linking	CDR-H2
736	X1-X2-X3-X4-X5-X6-X7-W-X8-X9-X10-X11-F-X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)	Consensus__ 1	based on Kabat	CDR-H3

737	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)	Consensus_ 2	based on Kabat	CDR-H3
736	X1-X2-X3-X4-X5-X6-X7-W-X8-X9-X10-X11-F-X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)	Consensus_ 1	based on Chothia	CDR-H3
737	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)	Consensus_ 2	based on Chothia	CDR-H3

736	X1-X2-X3-X4-X5-X6-X7-W-X8-X9-X10-X11-F-X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)	Consensus__ 1	based on AbM	CDR-H3
737	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)	Consensus__ 2	based on AbM	CDR-H3
738	A-X1-X2-X3-X4-X5-X6-X7-X8-W-X9-X10-X11-X12-F-X13-D, wherein X1 is K or R; X2 is D or none; X3 is R, K, or G; X4 is G, E, or none; X5 is I, W, or none; X6 is G, D, or none; X7 is F, L, or none; X8 is N, L, or none; X9 is N, Y, or none; X10 is Y, or none; X11 is D, E, or none; X12 is G or none; and X13 is M or none (SEQ ID NO: 738)	Consensus__ 1	based on Contact	CDR-H3

739	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-X15-X16-D, wherein X1 is A or T; X2 is K, R, or T; X3 is D or none; X4 is R, K, G, P, or none; X5 is G, E, W, or none; X6 is I, W, A, N, or none; X7 is G, D, Y, or none; X8 is F, L, P, H, V, or none; X9 is N, L, G, D, or none; X10 is W or Y; X11 is N, Y, or none; X12 is Y, A, or none; X13 is D, E, N, or none; X14 is G or none; X15 is F or Y; and X16 is M or none (SEQ ID NO: 739)	Consensus____ 2	based on Contact	CDR-H3
740	A-X1-X2-X3-X4-X5-X6-X7-X8-W-X9-X10-X11-X12-F-X13-D-X14, wherein X1 is K or R; X2 is D or none; X3 is R, K, or G; X4 is G, E, or none; X5 is I, W, or none; X6 is G, D, or none; X7 is F, L, or none; X8 is N, L, or none; X9 is N, Y, or none; X10 is Y, or none; X11 is D, E, or none; X12 is G or none; X13 is M or none; and X14 is Y or V (SEQ ID NO: 740)	Consensus____ 1	based on IMGT	CDR-H3
741	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-X15-X16-D-X17, wherein X1 is A or T; X2 is K, R, or T; X3 is D or none; X4 is R, K, G, P, or none; X5 is G, E, W, or none; X6 is I, W, A, N, or none; X7 is G, D, Y, or none; X8 is F, L, P, H, V, or none; X9 is N, L, G, D, or none; X10 is W or Y; X11 is N, Y, or none; X12 is Y, A, or none; X13 is D, E, N, or none; X14 is G or none; X15 is F or Y; X16 is M or none; and X17 is Y or V (SEQ ID NO: 741)	Consensus____ 2	based on IMGT	CDR-H3

742	X1-X2-X3-X4-X5-X6-X7-W-X8-X9-X10-X11-F-X12-D, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; and X12 is M or none (SEQ ID NO: 742)	Consensus__ 1	based on Aho	CDR-H3
743	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8 is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; and X14 is M or none (SEQ ID NO: 743)	Consensus__ 2	based on Aho	CDR-H3
736	X1-X2-X3-X4-X5-X6-X7-W-X8-X9-X10-X11-F-X12-D-X13, wherein X1 is D or none; X2 is R, K, or G; X3 is G, E, or none; X4 is I, W, or none; X5 is G, D, or none; X6 is F, L, or none; X7 is N, L, or none; X8 is N, Y, or none; X9 is Y, or none; X10 is D, E, or none; X11 is G or none; X12 is M or none; and X13 is Y or V (SEQ ID NO: 736)	Consensus__ 1	based on Cross- linking	CDR-H3
737	X1-X2-X3-X4-X5-X6-X7-X8-X9-X10-X11-X12-X13-X14-D-X15, wherein X1 is D or none; X2 is R, K, G, P, or none; X3 is G, E, W, or none; X4 is I, W, A, N, or none; X5 is G, D, Y, or none; X6 is F, L, P, H, V, or none; X7 is N, L, G, D, or none; X8	Consensus__ 2	based on Cross- linking	CDR-H3

	is W or Y; X9 is N, Y, or none; X10 is Y, A, or none; X11 is D, E, N, or none; X12 is G or none; X13 is F or Y; X14 is M or none; and X15 is Y or V (SEQ ID NO: 737)			
744	R-A-S-Q-G-I-X1-X2-X3-L-X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	Consensus__ 1	based on Kabat	CDR-L1
745	R-A-S-Q-X1-I-X2-X3-X4-L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	Consensus__ 2	based on Kabat	CDR-L1
744	R-A-S-Q-G-I-X1-X2-X3-L-X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	Consensus__ 1	based on Chothia	CDR-L1
745	R-A-S-Q-X1-I-X2-X3-X4-L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	Consensus__ 2	based on Chothia	CDR-L1
744	R-A-S-Q-G-I-X1-X2-X3-L-X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	Consensus__ 1	based on AbM	CDR-L1
745	R-A-S-Q-X1-I-X2-X3-X4-L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	Consensus__ 2	based on AbM	CDR-L1
746	X1-X2-X3-L-X4-W-X5, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; X4 is G or A; and X5 is Y or F (SEQ ID NO: 746)	Consensus__ 1	based on Contact	CDR-L1
747	X1-X2-X3-L-X4-W-X5, wherein X1 is R, S, or N; X2 is N or S; X3 is N, H, W, R, or Y; X4 is G, A, or N; and X5 Y or F (SEQ ID NO: 747)	Consensus__ 2	based on Contact	CDR-L1

748	Q-G-I-X1-X2-X3, wherein X1 is R or S; X2 is N or S; and X3 is N, H or W (SEQ ID NO: 748)	Consensus__ 1	based on IMGT	CDR-L1
749	Q-K1-I-X2-X3-X4, wherein K1 is G, S, or D; X2 is R, S, or N; X3 is N or S; and X4 is N, H, W, R, or Y (SEQ ID NO: 749)	Consensus__ 2	based on IMGT	CDR-L1
750	A-S-Q-G-I-X1-X2-X3, wherein X1 is R or S; X2 is N or S; and X3 is N, H or W (SEQ ID NO: 750)	Consensus__ 1	based on Aho	CDR-L1
751	A-S-Q-K1-I-X2-X3-X4, wherein K1 is G, S, or D; X2 is R, S, or N; X3 is N or S; and X4 is N, H, W, R, or Y (SEQ ID NO: 751)	Consensus__ 2	based on Aho	CDR-L1
744	R-A-S-Q-G-I-X1-X2-X3-L-X4, wherein X1 is R or S; X2 is N or S; X3 is N, H or W; and X4 is G or A (SEQ ID NO: 744)	Consensus__ 1	based on Cross- linking	CDR-L1
745	R-A-S-Q-K1-I-X2-X3-X4-L-X5, wherein X1 is G, S, or D; X2 is R, S, or N; X3 is N or S; X4 is N, H, W, R, or Y; and X5 is G, A, or N (SEQ ID NO: 745)	Consensus__ 2	based on Cross- linking	CDR-L1
752	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	Consensus__ 1	based on Kabat	CDR-L2
753	X1-X2-S-X3-L-X4-S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	Consensus__ 2	based on Kabat	CDR-L2
752	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	Consensus__ 1	based on Chothia	CDR-L2
753	X1-X2-S-X3-L-X4-S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	Consensus__ 2	based on Chothia	CDR-L2
752	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	Consensus__ 1	based on AbM	CDR-L2
753	X1-X2-S-X3-L-X4-S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	Consensus__ 2	based on AbM	CDR-L2

754	X1-L-I-Y-A-X2-S-S-L-Q, wherein X1 is L or S; and X2 is A or E (SEQ ID NO: 754)	Consensus__ 1	based on Contact	CDR-L2
755	X1-L-X2-Y-X3-K4-S-X5-L- K6, wherein X1 is L or S; X2 is I or V; X3 is A, K, or S; X4 is A, E, or V; X5 is S, N, or T; and X6 is Q or E (SEQ ID NO: 755)	Consensus__ 2	based on Contact	CDR-L2
756	A-X1, wherein X1 is A or E (SEQ ID NO: 756)	Consensus__ 1	based on IMGT	CDR-L2
757	X1-X2, wherein X1 is A, K, or S; and X2 is A, E, or V (SEQ ID NO: 757)	Consensus__ 2	based on IMGT	CDR-L2
758	A-X1-S-S-L-Q-S-G-V-P-S-R, wherein X1 is A or E (SEQ ID NO: 758)	Consensus__ 1	based on Aho	CDR-L2
759	X1-X2-S-X3-L-X4-S-G-V-P- S-R, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 759)	Consensus__ 2	based on Aho	CDR-L2
752	A-X1-S-S-L-Q-S, wherein X1 is A or E (SEQ ID NO: 752)	Consensus__ 1	based on Cross- linking	CDR-L2
753	X1-X2-S-X3-L-X4-S, wherein X1 is A, K, or S; X2 is A, E, or V; X3 is S, N, or T; and X4 is Q or E (SEQ ID NO: 753)	Consensus__ 2	based on Cross- linking	CDR-L2
760	X1-Q-X2-X3-K4-X5-P-X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	Consensus__ 1	based on Kabat	CDR-L3
761	X1-Q-X2-X3-K4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)	Consensus__ 2	based on Kabat	CDR-L3
760	X1-Q-X2-X3-K4-X5-P-X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	Consensus__ 1	based on Chothia	CDR-L3

761	X1-Q-X2-X3-X4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)	Consensus__ 2	based on Chothia	CDR-L3
760	X1-Q-X2-X3-X4-X5-P-X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	Consensus__ 1	based on AbM	CDR-L3
761	X1-Q-X2-X3-X4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)	Consensus__ 2	based on AbM	CDR-L3
762	X1-Q-X2-X3-X4-X5-P-X6, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 762)	Consensus__ 1	based on Contact	CDR-L3
763	X1-Q-X2-X3-X4-X5-X6-X7, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 763)	Consensus__ 2	based on Contact	CDR-L3
760	X1-Q-X2-X3-X4-X5-P-X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	Consensus__ 1	based on IMGT	CDR-L3
761	X1-Q-X2-X3-X4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)	Consensus__ 2	based on IMGT	CDR-L3
764	X1-X2-X3-X4-P-X5, wherein X1 is D, Y, or A; X2 is F, V, or N; X3 is N, T, or S; X4 is Y or F; X5 is Y or L (SEQ ID NO: 764)	Consensus__ 1	based on Aho	CDR-L3

765	X1-X2-X3-X4-X5-X6, wherein X1 is D, Y, A, or S; X2 is F, V, N, or Y; X3 is N, T, or S; X4 is Y, F, T, or V; X5 is P or S; X6 is Y, L or R (SEQ ID NO: 765)	Consensus__ 2	based on Aho	CDR-L3
760	X1-Q-X2-X3-X4-X5-P-X6-T, wherein X1 is L or Q; X2 is D, Y, or A; X3 is F, V, or N; X4 is N, T, or S; X5 is Y or F; X6 is Y or L (SEQ ID NO: 760)	Consensus__ 1	based on Cross- linking	CDR-L3
761	X1-Q-X2-X3-X4-X5-X6-X7-T, wherein X1 is L or Q; X2 is D, Y, A, or S; X3 is F, V, N, or Y; X4 is N, T, or S; X5 is Y, F, T, or V; X6 is P or S; X7 is Y, L or R (SEQ ID NO: 761)	Consensus__ 2	based on Cross- linking	CDR-L3
500	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGGPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYITLPPSRDELTKNQVSLTC LVKGFYPDSIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMEALHNHYTQKSLS LSPGK	CONSTANT_L 234A_L235A		
501	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPELEGGPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYITLPPSRDELTKNQVSLTC LVKGFYPDSIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMEALHNHYTQKSLS LSPGK	CONSTANT_L 235E		

502	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGAPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMHEALHNHYTQKSLS LSPGK	CONSTANT_L 234A_L235A _G237A		
503	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGAPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMHEALHNHYTQKSLS LSPGK	CONSTANT_L 234A_L235E _G237A		
504	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGAPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALAAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMHEALHNHYTQKSLS LSPGK	CONSTANT_L 234A_L235A _P329A		
505	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGAPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALAAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW	CONSTANT_L 234A_L235A _P329G		

	QQGNVFSCSVMEALHNHYTQKSLS LSPGK			
506	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEAAGGPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALAAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMEALHNHYTQKSLS LSPGK	CONSTANT_P 329A		
507	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPEEFGGPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYNSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPASIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMEALHNHYTQKSLS LSPGK	CONSTANT_L 234E_L235F _P331S		
508	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPELLGGPSVFL FPPKPKDTLMISRTPEVTCVVAVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYGSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMEALHNHYTQKSLS LSPGK	CONSTANT_D 265A_N297G		

509	ASTKGPSVFPLAPSSKSTSGGTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTQTYICNVNHKPSNTKVDKKVEP KSCDKTHTCPPCPAPELLGGPSVFL FPPKPKDTLMISRTPEVTCVVDVS HEDPEVKFNWYVDGVEVHNAKTKPR EEQYGSTYRVVSVLTVLHQDWLNGK EYKCKVSNKALPAPIEKTISKAKGQ PREPQVYTLPPSRDELTKNQVSLTC LVKGFYPSDIAVEWESNGQPENNYK TTPPVLDSDGSFFLYSKLTVDKSRW QQGNVFSCSVMHEALHNHYTQKSLS LSPGK	CONSTANT_N 297G		
510	ASTKGPSVFPLAPCSRSTSESTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTKTYTCNVDHKPSNTKVDKRVES KYGPPCPPCPAPEFLGGPSVFLFPP KPKDTLMISRTPEVTCVVDVSQED PEVQFNWYVDGVEVHNAKTKPREEQ FNSTYRVVSVLTVLHQDWLNGKEYK CKVSNKGLPSSIEKTISKAKGQPRE PQVYTLPPSQEEMTKNQVSLTCLVK GFYPSDIAVEWESNGQPENNYKTTP PVLDS DGSFFLYSRLTVDKSRWQEG NVFSCSVMHEALHNHYTQKSLSLSL GK	CONSTANT_S 228P		
511	ASTKGPSVFPLAPCSRSTSESTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTKTYTCNVDHKPSNTKVDKRVES KYGPPCPPCPAPEFEGGPSVFLFPP KPKDTLMISRTPEVTCVVDVSQED PEVQFNWYVDGVEVHNAKTKPREEQ FNSTYRVVSVLTVLHQDWLNGKEYK CKVSNKGLPSSIEKTISKAKGQPRE PQVYTLPPSQEEMTKNQVSLTCLVK GFYPSDIAVEWESNGQPENNYKTTP PVLDS DGSFFLYSRLTVDKSRWQEG NVFSCSVMHEALHNHYTQKSLSLSL GK	CONSTANT_S 228P_L235E		
512	ASTKGPSVFPLAPCSRSTSESTAAL GCLVKDYFPEPVTVSWNSGALTSGV HTFPAVLQSSGLYSLSSVVTVPSSS LGTKTYTCNVDHKPSNTKVDKRVES KYGPPCPPCPAPEAAGGPSVFLFPP KPKDTLMISRTPEVTCVVDVSQED PEVQFNWYVDGVEVHNAKTKPREEQ FNSTYRVVSVLTVLHQDWLNGKEYK CKVSNKGLPSSIEKTISKAKGQPRE PQVYTLPPSQEEMTKNQVSLTCLVK GFYPSDIAVEWESNGQPENNYKTTP PVLDS DGSFFLYSRLTVDKSRWQEG	CONSTANT_S 228P_F234A _L235A		

	NVFSCSVMHEALHNHYTQKSLSLSL GK			
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CLAIMS

Listing of Claims

1. An antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-139, 220-234, 465-489, 628-641, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-179, 235-249, 490-499, 513-527, 642-655, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-219, 250-264, 528-552, 656-669, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-339, 420-434, 553-577, 670-683, and 744-751;

(d) CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-379, 435-449, 578-602, 684-697, and 752-759; and/or

(e) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-419, 450-464, 603-627, 698-711, and 760-765.

2. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-109, 628, 635, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-149, 642, 649, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-189, 656, 663, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-309, 670, 677, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-349, 684, 691, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID Nos: 380-389, 698, 705, and 760-765.

3. The antibody or antigen binding fragment thereof of claim 1 or 2, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 100-104;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 140-144;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 180-184;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 300-304;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 340-344; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 380-384.

4. The antibody or antigen binding fragment thereof of claim 1 or 2, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 105-109, 628, 635, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 145-149, 642, 649, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 185-189, 656, 663, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 305-309, 670, 677, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 345-349, 684, 691, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 385-389, 698, 705, and 760-765.

5. The antibody or antigen binding fragment thereof of any one of claims 1 to 4, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1 and 2; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3 and 4.

6. An antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof binds to an epitope comprising one or more amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

7. The antibody or antigen binding fragment thereof of claim 6, wherein the antibody or antigen binding fragment thereof binds to an epitope comprising:

(i) any one amino acid in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64;

(ii) any two amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64;

(iii) any three amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64;

(iv) any four amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64;

(ii) any five amino acids in CD30L selected from the group consisting of K16, S21, R30, K48, R63, and Y64; or

(ii) K16, S21, R30, K48, R63, and Y64 in CD30L;

wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

8. An antibody or antigen binding fragment thereof that binds CD30L, wherein the antibody or antigen binding fragment thereof binds to an epitope comprising K16 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

9. The antibody or antigen binding fragment thereof of claim 8, wherein the epitope further comprises S21 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

10. The antibody or antigen binding fragment thereof of claim 8 or 9, wherein the epitope further comprises R30 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

11. The antibody or antigen binding fragment thereof of any one of claims 8 to 10, wherein the epitope further comprises K48 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

12. The antibody or antigen binding fragment thereof of any one of claims 8 to 11, wherein the epitope further comprises R63 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

13. The antibody or antigen binding fragment thereof of any one of claims 8 to 12, wherein the epitope further comprises Y64 in CD30L, wherein the amino acids are numbered according to the amino acid sequence of CD30L as set forth in SEQ ID NO:34.

14. The antibody or antigen binding fragment thereof of any one of claims 1 and 6 to 13, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-119, 629, 636, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-159, 643, 650, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-199, 657, 664, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-319, 671, 678, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-359, 685, 692, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-399, 699, 706, and 760-765.

15. The antibody or antigen binding fragment thereof of any one of claims 1 and 6 to 13, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 110-114;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 150-154;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 190-194;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 310-314;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 350-354; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 390-394.

16. The antibody or antigen binding fragment thereof of any one of claims 1 and 6 to 13, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 115-119, 629, 636, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 155-159, 643, 650, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 195-199, 657, 664, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 315-319, 671, 678, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 355-359, 685, 692, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 395-399, 699, 706, and 760-765.

17. The antibody or antigen binding fragment thereof of any one of claims 1, 6 to 13, and 14 to 16, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 5 and 6; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 7 and 8.

18. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-129, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-169, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-209, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-329, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-369, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-409, and 760-765.

19. The antibody or antigen binding fragment thereof of claim 1 or 18, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 120-124;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 160-164;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 200-204;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 320-324;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 360-364; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 400-404.

20. The antibody or antigen binding fragment thereof of claim 1 or 18, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 125-129, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 165-169, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 205-209, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 325-329, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 365-369, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 405-409, and 760-765.

21. The antibody or antigen binding fragment thereof of any one of claims 1 and 18 to 20, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 9 and 10; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 11 and 12.

22. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-139, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-179, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-219, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-339, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-379, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-419, and 760-765.

23. The antibody or antigen binding fragment thereof of claim 1 or 22, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 130-134;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 170-174;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 210-214;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 330-334;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 370-374; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 410-414.

24. The antibody or antigen binding fragment thereof of claim 1 or 22, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 135-139, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 175-179, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 215-219, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 335-339, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 375-379, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 415-419, and 760-765.

25. The antibody or antigen binding fragment thereof of any one of claims 1 and 22 to 24, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 13 and 14; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 15 and 16.

26. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 220-224, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 235-239, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 250-254, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 420-424, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 435-439, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 450-454, and 760-765.

27. The antibody or antigen binding fragment thereof of claim 1 or 26, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 17; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 18.

28. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 225-229, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 240-244, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 255-259, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 425-429, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 440-444, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 455-459, and 760-765.

29. The antibody or antigen binding fragment thereof of claim 1 or 28, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 19; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 20.

30. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 230-234, and 712-723;

(b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 245-249, and 724-735;

(c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 260-264, and 736-743;

(d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 430-434, and 744-751;

(e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 445-449, and 752-759; and/or

(f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 460-464, and 760-765.

31. The antibody or antigen binding fragment thereof of claim 1 or 30, comprising an immunoglobulin variable region heavy chain and an immunoglobulin variable region light chain, wherein:

(a) the immunoglobulin variable region heavy chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 21; and/or

(b) the immunoglobulin variable region light chain comprises an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 22.

32. The antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 465-469, 631, 638, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth

in any one of SEQ ID NOs: 490-494, 645, 652, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 528-532, 659, 666, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 553-557, 673, 680, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 578-582, 687, 694, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 603-607, 701, 708, and 760-765;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 470-474, 632, 639, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 495-499, 646, 653, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 533-537, 660, 667, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 558-562, 674, 681, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 583-587, 688, 695, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 608-612, 702, 709, and 760-765;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 475-479, 633, 640, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 513-517, 647, 654, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 538-542, 661, 668, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 563-567, 675, 682, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 588-592, 689, 696, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 613-617, 703, 710, and 760-765;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 480-484, 630, 637, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 518-522, 644, 651, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 543-547, 658, 665, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 568-572, 672, 679, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 593-597, 686, 693, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 618-622, 700, 707, and 760-765; or

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 485-489, 634, 641, and 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 523-527, 648, 655, and 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 548-552, 662, 669, and 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 573-577, 676, 683, and 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 598-602, 690, 697, and 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 623-627, 704, 711, and 760-765.

33. The antibody or antigen binding fragment thereof of any one of claims 1 and 6 to 13, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712-723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724-735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736-743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744-751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752-759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760-765;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 712, 714, 716, 718, 720, and 722; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 724, 726, 728, 730, 732, and 734; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 736, 738, 740, and 742; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 744, 746, 748, and 750; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 752, 754, 756, and 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 760, 762, and 764;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 713, 715, 717, 719, 721, and 723; (b) a CDR-H2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 725, 727, 729, 731, 733, and 735; (c) a CDR-H3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 737, 739, 741, and 743; (d) a CDR-L1 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 745, 747, 749, and 751; (e) a CDR-L2 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 753, 755, 757, and 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth in any one of SEQ ID NOs: 761, 763, and 765;

- (iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760;
- (v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761; (vi)
- (vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 712; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 724; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760;
- (vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 713; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 725; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761;
- (viii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 714; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 726; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760;
- (ix) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 715; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 727; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino

acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761;

(x) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 716; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 728; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 736; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 744; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 752; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760;

(xi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 717; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 729; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 737; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 745; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 753; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761;

(xii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 718; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 730; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 738; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 746; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 754; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 762;

(xiii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 719; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 731; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 739; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 747; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 755; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 763;

(xiv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 720; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 732; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 740; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 748; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 756; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 760;

(xv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 721; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 733; (c) a CDR-H3

comprising the amino acid sequence set forth in SEQ ID NO: 741; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 749; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 757; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 761;

(xvi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 722; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 734; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 742; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 750; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 758; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 764; or

(xvii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 723; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 735; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 743; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 751; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 759; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 765.

34. The antibody or antigen binding fragment thereof of any one of claims 1 to 4 and 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 635; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 649; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 663; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 677; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 691; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 705;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 107; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 147; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 187; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 307; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 347; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 387;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 105; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 145; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 185; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 305; (e) a CDR-L2 comprising the amino

acid sequence set forth SEQ ID NO: 345; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 385;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 106; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 146; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 186; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 306; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 346; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 386;

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 108; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 148; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 188; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 308; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 348; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 388;

(vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 109; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 149; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 189; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 309; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 349; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 389; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 628; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 642; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 656; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 670; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 684; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 698.

35. The antibody or antigen binding fragment thereof of any one of claims 1, 6 to 16, and 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 636; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 650; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 664; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 678; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 692; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 706;

- (ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 117; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 157; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 197; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 317; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 357; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 397;
- (iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 115; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 155; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 195; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 315; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 355; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 395;
- (iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 116; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 156; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 196; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 316; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 356; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 396;
- (v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 118; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 158; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 198; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 318; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 358; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 398;
- (vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 119; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 159; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 199; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 319; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 359; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 399; or
- (vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 629; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 643; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 657; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 671; (e) a CDR-L2 comprising the amino

acid sequence set forth SEQ ID NO: 685; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 699.

36. The antibody or antigen binding fragment thereof of claim 1 or 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 637; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 651; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 665; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 679; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 693; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 707;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 482; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 520; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 545; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 570; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 595; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 620;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 480; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 518; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 543; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 568; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 593; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 618;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 481; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 519; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 544; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 569; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 594; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 619;

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 483; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 521; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 546; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 571; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 596; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 621;

(vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 484; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 522; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 547; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 572; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 597; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 622; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 630; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 644; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 658; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 672; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 686; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 700.

37. The antibody or antigen binding fragment thereof of claim 1 or 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 638; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 652; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 666; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 680; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 694; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 708;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 467; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 492; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 530; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 555; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 580; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 605;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 465; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 490; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 528; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 553; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 578; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 603;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 466; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 491; (c) a CDR-H3

comprising the amino acid sequence set forth in SEQ ID NO: 529; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 554; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 579; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 604;

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 468; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 493; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 531; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 556; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 581; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 606;

(vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 469; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 494; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 532; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 557; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 582; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 607; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 631; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 645; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 659; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 673; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 687; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 701.

38. The antibody or antigen binding fragment thereof of claim 1 or 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 639; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 653; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 667; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 681; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 695; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 709;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 472; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 497; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 535; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 560; (e) a CDR-L2 comprising the amino

acid sequence set forth SEQ ID NO: 585; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 610;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 470; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 495; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 533; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 558; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 583; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 608;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 471; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 496; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 534; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 559; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 584; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 609;

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 473; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 498; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 536; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 561; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 586; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 611;

(vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 474; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 499; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 537; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 562; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 587; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 612; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 632; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 646; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 660; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 674; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 688; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 702.

39. The antibody or antigen binding fragment thereof of claim 1 or 33, wherein the antibody or antigen binding fragment thereof comprises:

- (i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 640; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 654; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 668; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 682; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 696; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 710;
- (ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 477; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 515; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 540; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 565; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 590; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 615;
- (iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 475; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 513; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 538; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 563; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 588; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 613;
- (iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 476; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 514; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 539; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 564; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 589; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 614;
- (v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 478; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 516; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 541; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 566; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 591; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 616;
- (vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 479; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 517; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 542; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 567; (e) a CDR-L2 comprising the amino

acid sequence set forth SEQ ID NO: 592; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 617; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 633; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 647; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 661; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 675; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 689; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 703.

40. The antibody or antigen binding fragment thereof of claim 1 or 33, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 641; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 655; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 669; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 683; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 697; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 711;

(ii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 487; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 525; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 550; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 575; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 600; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 625;

(iii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 485; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 523; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 548; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 573; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 598; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 623;

(iv) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 486; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 524; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 549; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 574; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 599; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 624;

(v) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 488; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 526; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 551; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 576; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 601; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 626;

(vi) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 489; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 527; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 552; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 577; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 602; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 627; or

(vii) (a) a CDR-H1 comprising the amino acid sequence set forth in SEQ ID NO: 634; (b) a CDR-H2 comprising the amino acid sequence set forth in SEQ ID NO: 648; (c) a CDR-H3 comprising the amino acid sequence set forth in SEQ ID NO: 662; (d) a CDR-L1 comprising the amino acid sequence set forth in SEQ ID NO: 676; (e) a CDR-L2 comprising the amino acid sequence set forth SEQ ID NO: 690; and/or (f) a CDR-L3 comprising the amino acid sequence set forth SEQ ID NO: 704.

41. The antibody or antigen binding fragment thereof of any one of claims 1 to 40, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) an immunoglobulin variable region heavy chain (VH) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) an immunoglobulin variable region light chain (VL) comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30;

(ii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 3;

(iii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 4;

- (iv) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 7;
- (v) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 8;
- (vi) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 11;
- (vii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 12;
- (viii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 15;
- (ix) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 16;
- (x) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 24;
- (xi) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 26;
- (xii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 27; and/or (b) a VL comprising an amino acid

sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 28;

(xiii) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 30; or

(xiv) (a) a VH comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence having at least about 90, 95, 97, 98, 99, or 100 % sequence identity to SEQ ID NO: 32.

42. The antibody or antigen binding fragment thereof of any one of claims 1, 33, and 41, wherein the antibody or antigen binding fragment thereof comprises:

(i) (a) a VH comprising an amino acid sequence set forth in any one of SEQ ID NOs: 1, 2, 5, 6, 9, 10, 13, 14, 17, 19, 21, 23, 25, 27, 29, and 31; and/or (b) a VL comprising an amino acid sequence set forth in any one of SEQ ID NOs: 3, 4, 7, 8, 11, 12, 15, 16, 18, 20, 22, 24, 26, 28, and 30;

(ii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 1; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 3;

(iii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 2; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 4;

(iv) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 5; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 7;

(v) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 6; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 8;

(vi) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 9; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 11;

(vii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 10; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 12;

(viii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 13; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 15;

(ix) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 14; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 16;

(x) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 23; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 24;

- (xi) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 25; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 26;
- (xii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 27; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 28;
- (xiii) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 29; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 30; or
- (xiv) (a) a VH comprising an amino acid sequence set forth in SEQ ID NO: 31; and/or (b) a VL comprising an amino acid sequence set forth in SEQ ID NO: 32.

43. The antibody or antigen binding fragment thereof of any one of claims 1 to 42, further comprising an IgG constant region.

44. The antibody or antigen binding fragment thereof of any one of claims 1 to 43, further comprising an IgG constant region having reduced antibody-dependent cell-mediated cytotoxicity (ADCC) function as compared to human IgG and/or reduced complement-dependent cytotoxicity (CDC) as compared to human IgG.

45. The antibody or antigen binding fragment thereof of claim 43 or 44, wherein the constant region comprises an amino acid sequence having 80, 85, 90, 95, 97, 98, 99, or 100 % sequence identity to the amino acid sequence set forth by any one of SEQ ID NOs: 500-512.

46. The antibody or antigen binding fragment thereof of any one of claims 43 to 45, wherein the constant region comprises the amino acid sequence set forth by any one of SEQ ID NOs: 500-512.

47. The antibody or antigen binding fragment thereof of any one of claims 1 to 46, comprising a constant region having an amino acid sequence variant corresponding to (a) 297A, 297Q, 297G, or 297D, (b) 279F, 279K, or 279L, (c) 228P, (d) 235A, 235E, 235G, 235Q, 235R, or 235S, (e) 237A, 237E, 237K, 237N, or 237R, (f) 234A, 234V, or 234F, (g) 233P, (h) 328A, (i) 327Q or 327T, (j) 329A, 329G, 329Y, or 329R (k) 331S, (l) 236F or 236R, (m) 238A, 238E, 238G, 238H, 238I, 238V, 238W, or 238Y, (n) 248A, (o) 254D, 254E, 254G, 254H, 254I, 254N, 254P, 254Q, 254T, or 254V, (p) 255N, (q) 256H, 256K, 256R, or 256V, (r) 264S, (s) 265H, 265K, 265S, 265Y, or 265A, (t) 267G, 267H, 267I, or 267K, (u) 268K, (v) 269N or 269Q, (w) 270A, 270G, 270M, or 270N, (x) 271T, (y) 272N, (z) 292E, 292F, 292G, or 292I, (aa) 293S, (bb) 301W, (cc) 304E, (dd) 311E, 311G, or 311S, (ee) 316F, (ff) 328V, (gg) 330R, (hh) 339E or 339L, (ii) 343I or 343V, (jj) 373A, 373G, or 373S, (kk) 376E, 376W, or 376Y, (ll) 380D, (mm) 382D or 382P, (nn) 385P, (oo) 424H, 424M, or 424V, (pp) 434I, (qq) 438G, (rr) 439E, 439H, or 439Q, (ss) 440A, 440D, 440E, 440F, 440M,

440T, or 440V, (tt) E233P, (uu) L235E, (vv) L234A and L235A, (ww) L234A, L235A, and G237A, (xx) L234A, L235A, and P329G, (yy) L234F, L235E, and P331S, (zz) L234A, L235E, and G237A, (aaa) L234A, L235E, G237A, and P331S (bbb) L234A, L235A, G237A, P238S, H268A, A330S, and P331S, (ccc) L234A, L235A, and P329A, (ddd) G236R and L328R, (eee) G237A, (fff) F241A, (ggg) V264A, (hhh) D265A, (iii) D265A and N297A, (jjj) D265A and N297G, (kkk) D270A, (lll) A330L, (mmm) P331A or P331S, or (nnn) any combination of (a) – (mmm), per EU numbering.

48. The antibody or antigen binding fragment thereof of any one of claims 1 to 47, wherein the antibody or antigen binding fragment thereof is an IgG antibody.

49. The antibody or antigen binding fragment thereof of claim 48, wherein the IgG antibody is IgG1, IgG2, IgG3, or IgG4.

50. The antibody or antigen binding fragment thereof of any one of claims 1 to 49, wherein the antibody or antigen binding fragment thereof is human, chimeric, or humanized.

51. The antibody or antigen binding fragment thereof of any one of claims 1 to 50, wherein the antibody or antigen binding fragment thereof is a Fab, F(ab')₂, a single-domain antibody, or a single chain variable fragment (scFv).

52. The antibody or antigen binding fragment thereof of any one of claims 1 to 51, wherein the antibody or antigen binding fragment thereof is a bispecific or multispecific antibody.

53. The antibody or antigen binding fragment thereof of any one of claims 1 to 52, wherein the antibody or antigen binding fragment thereof binds one or more amino acids residues of CD30L that interact with CD30.

54. The antibody or antigen binding fragment thereof of any one of claims 1 to 53, wherein the antibody or antigen binding fragment thereof inhibits a binding interaction between CD30L and CD30.

55. The antibody or antigen binding fragment thereof of any one of claims 1 to 53, wherein the antibody or antigen binding fragment thereof blocks a binding interaction between CD30L and CD30.

56. The antibody or antigen binding fragment thereof of claim 54 or 55, wherein the inhibition or blocking is determined in an ELISA assay, a cell binding assay with CD30L expressing cells, or a surface plasmon resonance (SPR) assay.

57. The antibody or antigen binding fragment thereof of any one of claims 1 to 56, wherein the antibody or antigen binding fragment thereof specifically binds to CD30L.

58. The antibody or antigen binding fragment thereof of any one of claims 1 to 57, wherein the antibody or antigen binding fragment thereof (i) inhibits interleukin-8 secretion in a cell-based assay, (ii) inhibits interleukin-6 secretion in a cell-based assay, or (iii) both (i) and (ii).

59. The antibody or antigen binding fragment thereof of any one of claims 1 to 57, wherein the antibody or antigen binding fragment thereof (i) blocks interleukin-8 secretion in a cell-based assay, (ii) blocks interleukin-6 secretion in a cell-based assay, or (iii) both (i) and (ii).

60. The antibody or antigen binding fragment thereof of claim 58 or 59, wherein the cell-based assay is a dual cell assay with a cell expressing CD30 and a cell expressing CD30L.

61. The antibody or antigen binding fragment thereof of any one of claims 1 to 60, wherein the antibody or antigen binding fragment thereof binds to (i) human CD30L, (ii) cynomolgus CD30L, or (iii) both human CD30L and cynomolgus CD30L.

62. The antibody or antigen binding fragment thereof of any one of claims 1 to 61, wherein the antibody or antigen binding fragment thereof binds to CD30L with a dissociation equilibrium constant (K_D) of no more than 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, or 1000 pM.

63. The antibody or antigen binding fragment thereof of any one of claims 1 to 62, wherein the antibody or antigen binding fragment thereof binds to CD30L with an association rate constant (k_{on}) of at least 0.1×10^6 , 0.2×10^6 , 0.3×10^6 , 0.4×10^6 , 0.5×10^6 , 0.6×10^6 , 0.7×10^6 , 0.8×10^6 , 0.9×10^6 , 1.0×10^6 , 1.1×10^6 , 1.2×10^6 , 1.3×10^6 , 1.4×10^6 , 1.5×10^6 , or $1.55 \times 10^6 \text{ M}^{-1}\text{S}^{-1}$.

64. The antibody or antigen binding fragment thereof of any one of claims 1 to 63, wherein the antibody or antigen binding fragment thereof binds to CD30L with a dissociation rate constant (k_{off}) of no more than 1.4×10^{-4} , 1.41×10^{-4} , 1.5×10^{-4} , 1.6×10^{-4} , 1.7×10^{-4} , 1.8×10^{-4} , 1.9×10^{-4} , 2.0×10^{-4} , 2.1×10^{-4} , 2.2×10^{-4} , 2.3×10^{-4} , 2.4×10^{-4} , 2.5×10^{-4} , 2.6×10^{-4} , 2.7×10^{-4} , 2.8×10^{-4} , 2.9×10^{-4} , 3.0×10^{-4} , 3.1×10^{-4} , 3.2×10^{-4} , 3.3×10^{-4} , 3.4×10^{-4} , or $3.5 \times 10^{-4} \text{ S}^{-1}$.

65. The antibody or antigen binding fragment thereof of any one of claims 1 to 64, wherein the antibody or antigen binding fragment thereof is recombinant antibody or antigen binding fragment thereof.

66. The antibody or antigen binding fragment thereof of any one of claims 1 to 65, wherein the antibody or antigen binding fragment thereof is isolated antibody or antigen binding fragment thereof.

67. A nucleic acid encoding the antibody or antigen binding fragment thereof of any one of claims 1 to 66.
68. A cell comprising the antibody or antigen binding fragment thereof of any one of claims 1 to 66 or the nucleic acid of claim 67.
69. The cell of claim 68, wherein the cell is a eukaryotic cell.
70. The cell of claim 68, wherein the cell is a prokaryotic cell.
71. The antibody or antigen binding fragment thereof of any one of claims 1 to 66 for use in a method of inhibiting binding of CD30L to CD30.
72. The antibody or antigen binding fragment thereof of any one of claims 1 to 66 for use in a method of inhibiting activation of CD30 signaling in a cell.
73. The antibody or antigen binding fragment thereof of any one of claims 1 to 66 for use in a method of inhibiting activation, expression, and/or secretion of a pro-inflammatory cytokine protein.
74. The method of claim 73, wherein the pro-inflammatory cytokine protein is interleukin-8 and/or interleukin-6.
75. The method of claim 74, wherein the interleukin-8 is expressed or released by a T lymphocyte.
76. The antibody or antigen binding fragment thereof of any one of claims 1 to 66 for use in treating an autoimmune disease in an individual in need thereof.
77. The antibody or antigen binding fragment thereof for the use of claim 76, wherein the autoimmune disease is irritable bowel disease.
78. The antibody or antigen binding fragment thereof for the use of claim 77, wherein the irritable bowel disease comprises **ulcerative colitis (UC) or Crohn's Disease (CD)**.
79. A method of treating or ameliorating an autoimmune disease in an individual in need thereof, the method comprising administering to the individual the antibody or antigen binding fragment thereof of any one of claims 1 to 66, thereby treating or ameliorating the autoimmune disease.
80. The method of claim 79, wherein the autoimmune disease is irritable bowel disease.
81. The method of claim 80, wherein the irritable bowel disease comprises **ulcerative colitis (UC) or Crohn's Disease (CD)**.
82. A method for inhibiting and/or reducing binding of CD30L to CD30 in an individual afflicted with an inflammatory or autoimmune disorder, the method comprising

administering to the individual afflicted with the inflammatory or autoimmune disorder the antibody or antigen binding fragment thereof of any one of claims 1 to 66, thereby inhibiting and/or reducing the binding of CD30L to CD30.

83. The method of claim 82, wherein the individual is afflicted with an autoimmune disease.

84. The method of claim 83, wherein the autoimmune disease is irritable bowel disease.

85. The method of claim 84, wherein the irritable bowel disease comprises **ulcerative colitis (UC) or Crohn's Disease (CD)**.

86. A method of reducing and/or inhibiting inflammation in an individual, the method comprising administering to the individual the antibody or antigen binding fragment thereof of any one of claims 1 to 66, thereby reducing and/or inhibiting inflammation.

87. The method of claim 86, wherein reducing and/or inhibiting inflammation comprises reducing an amount of pro-inflammatory cytokine expression or secretion in the individual or a tissue of the individual.

88. The method of claim 86 or 87, wherein reducing and/or inhibiting inflammation comprises reducing an amount of pro-inflammatory cytokine expression or secretion by a T lymphocyte of the individual.

89. The method of claim 87 or 88, wherein the pro-inflammatory cytokine comprises interleukin-8.

90. The method of any one of claims 86 to 89, wherein the individual has an autoimmune disease.

91. The method of claim 90, wherein the autoimmune disease is irritable bowel disease.

92. The method of claim 91, wherein the irritable bowel disease comprises **ulcerative colitis (UC) or Crohn's Disease (CD)**.