Summary of the Invention

In a first aspect, there is provided a binding protein comprising first and second polypeptide chains, wherein the first polypeptide chain comprises a first VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region;

n is 0 or 1; and

wherein the second polypeptide chain comprises a second VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region;

n is 0 or 1; and

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein, in the first polypeptide chain, the VD1 or VD2 heavy chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 565, 670, 720, 740, 845, and 875 and

wherein, in the second polypeptide chain, the VD1 or VD2 light chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 570, 675, 725, 745, 850, and 880.

In a second aspect, there is provided a binding protein comprising four polypeptide chains, wherein two first polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region;

n is 0 or 1; and

wherein two second polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region;

n is 0 or 1; and

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein, in the two first polypeptide chains, the VD1 or VD2 heavy chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 565, 670, 720, 740, 845, and 875 and

wherein, in the two second polypeptide chains, the VD1 or VD2 light chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 570, 675, 725, 745, 850, and 880.

In a third aspect, there is provided a pharmaceutical composition comprising the binding protein as defined above and a pharmaceutically acceptable carrier.

In a fourth aspect, there is provided a pharmaceutical composition comprising the binding protein as defined above and a pharmaceutically acceptable carrier.

This ~~invention~~disclosure pertains to proteins that bind human IL- 17 (same as "IL- 17A"). Binding proteins of the ~~invention~~disclosure include but are not limited to antibodies, antigen binding portions thereof, and multivalent, multispecific binding proteins such as DVD-Ig™ binding proteins that can bind human IL- 17 and another target, such as TNF-α. The ~~invention~~disclosure also provides methods of making and using the IL-17 binding proteins described herein as well as various compositions that may be used in methods of detecting IL-17 in a sample or in methods of treating or preventing a disorder in an individual that is associated with or suspected to be associated with IL-17 activity. Binding proteins described herein may bind human IL-17A homodimer and/or heterodimers of IL-17A and the IL-17F homolog.

In one aspect of the ~~invention~~disclosure, there is provided a binding protein comprising an antigen binding domain capable of binding human IL-17, said antigen binding domain comprising at least one CDR comprising an amino acid sequence selected from the group consisting of:

CDR-H1. X_1-X_2-X_3-X_4-X_5 (SEQ ID NO:919), wherein;

X_1 is D or S;

X_2 is Y;

X_3 is E or G;

X_4 is I, M, V, or F;

X_5 is H;

CDR-H2. X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}-X_{17} (SEQ ID NO:920), wherein;

X_1 is V;

X_2 is T, I, or N;

X_3 is D, H, or W;

X_4 is P or is not present;

X_5 is E, G, or S;

X_6 is S, N, or D;

X_7 is G;

X_8 is G or T;

X_9 is T;

X_{10} is L, A, T, or F;

X_{11} is H or Y;

X_{12} is N;

X_{13} is P, Q, or S;

X_{14} is K, A, or N;

X_{15} is F or L;

X_{16} is D, K, or R; and

X_7 is S or T;

and

CDR-L3. X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9 (SEQ ID NO:924), wherein;

X_1 is Q, S, or H;

X_2 is Q;

X_3 is R, D, S, or G;

X_4 is S, Y, or T;

X_5 is S, G, or H;

X_6 is Y, S, V, or A;

X_7 is P or is not present;

X_8 is W, Y, or L; and

X_9 is T.

In an embodiment, a binding protein according to the ~~invention~~disclosure comprises at least one CDR comprising an amino acid sequence selected from the group consisting of:

residues 31-35 of SEQ ID NO:26; residues 50-66 of SEQ ID NO:26; residues 99-110 of SEQ ID NO:26;

residues 24-33 of SEQ ID NO:27; residues 49-55 of SEQ ID NO:27; residues 88-96 of SEQ ID NO:27;

residues 31-35 of SEQ ID NO:28; residues 50-66 of SEQ ID NO:28; residues 99-108 of SEQ ID NO:28;

residues 24-34 of SEQ ID NO:29; residues 50-56 of SEQ ID NO:29; residues 89-97 of SEQ ID NO:29;

residues 31-35 of SEQ ID NO:30; residues 50-66 of SEQ ID NO:30; residues 99-108 of SEQ ID NO:30;

residues 24-34 of SEQ ID NO:31; residues 50-56 of SEQ ID NO:31; residues 89-97 of SEQ ID NO:31;

residues 31-35 of SEQ ID NO:32; residues 50-65 of SEQ ID NO:32; residues 98-109 of SEQ ID NO:32;

residues 24-39 of SEQ ID NO:33; residues 55-61 of SEQ ID NO:33; residues 94-101 of SEQ ID NO:33;

residues 31-35 of SEQ ID NO:34; Residues 50-66 of SEQ ID NO:34; residues 99-110 of SEQ ID NO:34;

residues 24-33 of SEQ ID NO:35; residues 49-55 of SEQ ID NO:35; residues 88-96 of SEQ ID NO:35;

residues 31-35 of SEQ ID NO:36; residues 50-66 of SEQ ID NO:36; residues 99-108 of SEQ ID NO:36;

residues 24-34 of SEQ ID NO:37; residues 50-56 of SEQ ID NO:37; residues 89-97 of SEQ ID NO:37;

residues 31-35 of SEQ ID NO:38; residues 50-65 of SEQ ID NO:38; residues 98-107 of SEQ ID NO:38;

residues 24-39 of SEQ ID NO:39; residues 55-61 of SEQ ID NO:39; and residues 94-102 of SEQ ID NO:39.

In another embodiment, an IL- 17 binding protein of the ~~invention~~disclosure comprises at least 3 CDRs described above.

In another embodiment, an IL-17 binding protein comprises at least 3 CDRs selected from a variable domain CDR set consisting of:

VH 7D7 CDR Set	
VH 7D7 CDR-H1	Residues 31-35 of SEQ ID NO:26
VH 7D7 CDR-H2	Residues 50-66 of SEQ ID NO:26
VH 7D7 CDR-H3	Residues 99-110 of SEQ ID NO:26
VL 7D7 CDR Set	
VL 7D7 CDR-L1	Residues 24-33 of SEQ ID NO:27
VL 7D7 CDR-L2	Residues 49-55 of SEQ ID NO:27
VL 7D7 CDR-L3	Residues 88-96 of SEQ ID NO:27
VH 6C6 CDR Set	
VH 6C6 CDR-H1	Residues 31-35 of SEQ ID NO:28
VH 6C6 CDR-H2	Residues 50-66 of SEQ ID NO:28
VH 6C6 CDR-H3	Residues 99-108 of SEQ ID NO:28
VL 6C6 CDR Set	
VL 6C6 CDR-L1	Residues 24-34 of SEQ ID NO:29
VL 6C6 CDR-L2	Residues 50-56 of SEQ ID NO:29
VL 6C6 CDR-L3	Residues 89-97 of SEQ ID NO.:29
VH 1D8 CDR Set	
VH 1D8 CDR-H1	Residues 31-35 of SEQ ID NO:30
VH 1D8 CDR-H2	Residues 50-66 of SEQ ID NO:30
VH 1D8 CDR-H3	Residues 99-108 of SEQ ID NO:30
VL 1D8 CDR Set	
VL 1D8 CDR-L1	Residues 24-34 of SEQ ID NO:31
VL 1D8 CDR-L2	Residues 50-56 of SEQ ID NO:31
VL 1D8 CDR-L3	Residues 89-97 of SEQ ID NO:31
VH 8B12 CDR Set	
VH 8B12 CDR-H1	Residues 31-35 of SEQ ID NO:32
VH 8B12 CDR-H2	Residues 50-65 of SEQ ID NO:32
VH 8B12 CDR-H3	Residues 98-109 of SEQ ID NO:32
VL 8B12 CDR Set	
VL 8B12 CDR-L1	Residues 24-39 of SEQ ID NO:33
VL 8B12 CDR-L2	Residues 55-61 of SEQ ID NO:33
VL 8B12 CDR-L3	Residues 94-101 of SEQ ID NO:33
VH 10F7 CDR Set	
VH 10F7 CDR-H1	Residues 31-35 of SEQ ID NO:34
VH 10F7 CDR-H2	Residues 50-66 of SEQ ID NO:34
VH 10F7 CDR-H3	Residues 99-110 of SEQ ID NO:34
VL 10F7 CDR Set	
VL 10F7 CDR-L1	Residues 24-33 of SEQ ID NO:35
VL 10F7 CDR-L2	Residues 49-55 of SEQ ID NO:35
VL 10F7 CDR-L3	Residues 88-96 of SEQ ID NO:35
VH 5C5 CDR Set	

An IL-17 binding protein may comprise a human acceptor framework comprising at least one Framework Region amino acid substitution, wherein the amino acid sequence of the framework is at least 65% identical to the sequence of said human acceptor framework and comprises at least 70 amino acid residues identical to said human acceptor framework.

In another embodiment, an IL-17 binding protein comprises a human acceptor framework, wherein said acceptor framework comprises at least one framework region amino acid substitution at a key residue, said key residue selected from the group consisting of:

a residue adjacent to a CDR;

a glycosylation site residue;

a rare residue;

a residue capable of interacting with human IL-13;

a residue capable of interacting with a CDR;

a canonical residue;

a contact residue between heavy chain variable region and light chain variable region;

a residue within a Vernier zone; and

a residue in a region that overlaps between a Chothia-defined variable heavy chain CDR1 and a Kabat-defined first heavy chain framework.

In a preferred embodiment, an IL-17A binding protein may comprise a key residue, wherein said key residue is selected from the group consisting of: 2H, 4H, 24H, 26H, 27H, 29H, 34H, 35H, 37H, 39H, 44H, 45H, 47H, 48H, 49H, 50H, 51H, 58H, 59H, 60H, 63H, 67H, 69H, 71H, 73H, 76H, 78H, 91H, 93H, 94H, 2L, 4L, 25L, 29L, 27bL, 33L, 34L, 36L, 38L, 43L, 44L, 46L, 47L, 48L, 49L, 55L, 58L, 62L, 64L, 71L, 87L, 89L, 90L, 91L, 94L, 95L (all Kabat numbering). A preferred subset of these residues for the humanization of IL-17 antibodies consists of 27H, 48H, 67H, 69H, 93H, 36L, 43L, 46L, 47L, 49L, 58L, 71L, and 87L.

In yet another embodiment, an IL- 17 binding protein according to the ~~invention~~disclosure comprises a consensus human variable domain that is a consensus human variable domain described herein.

In a preferred embodiment, an IL-17 binding protein comprises at least one variable domain having an amino acid sequence selected from the group consisting of:

SEQ ID NO:60
SEQ ID NO:61
SEQ ID NO:62
SEQ ID NO:63
SEQ ID NO:64
SEQ ID NO:65
SEQ ID NO:66
SEQ ID NO:67
SEQ ID NO:68
SEQ ID NO:69
SEQ ID NO:70
SEQ ID NO:71
SEQ ID NO:72
SEQ ID NO:73
SEQ ID NO:74
SEQ ID NO:75
SEQ ID NO:76
SEQ ID NO:931
SEQ ID NO:932 AND
SEQ ID NO:933.

In another embodiment, a binding protein of the ~~invention~~disclosure comprises an antigen binding domain capable of binding human IL-17, said antigen binding domain comprising at least one CDR comprising an amino acid sequence selected from the group consisting of:

CDR-H1. X_1-X_2-X_3-X_4-X_5 (SEQ ID NO:925), wherein;
X_1 is N, A, D, or S;
X_2 is Y, F, or L;
X_3 is G, D, or A;
X_4 is M or I; and
X_5 is H, D, or S;

CDR-H2. X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}-X_{17} (SEQ ID NO:926), wherein;
X_1 is V, W, or G;
X_2 is I, T, M, or F;
X_3 is S, N, T, or D;
X_4 is Y or P;
X_5 is D, N, or I;
X_6 is G, S, L, or E;
X_7 is S or G;
X_8 is N, T, or E;
X_9 is K, T, or A;
X_{10} is Y, G, N, or V;
X_{11} is Y or V;
X_{12} is A;
X_{13} is D, P, or Q;
X_{14} is S, K, or N;
X_{15} is V or F;

residues 31-35 of SEQ ID NO:46; residues 50-66 of SEQ ID NO.:46; residues 99-115 of SEQ ID NO.:46;

residues 24-34 of SEQ ID NO:47; residues 50-56 of SEQ ID NO.:47; residues 89-97 of SEQ ID NO.:47;

residues 31-35 of SEQ ID NO:48; residues 50-66 of SEQ ID NO.:48; residues 99-101 of SEQ ID NO.:48;

residues 24-34 of SEQ ID NO:49; residues 50-56 of SEQ ID NO.:49; and residues 89-97 of SEQ ID NO.:49;

an amino acid sequence for a CDR-H1, an amino acid sequence for a CDR-H2, and an amino acid sequence for a CDR-H3 of a VH in Table 21, Table 23, Table 24, or Table 27; and

an amino acid sequence for a CDR-L1, an amino acid sequence for a CDR-L2, and an amino acid sequence for a CDR-L3 of a VL in Table 21, Table 23, Table 25, or Table 27.

In another embodiment, the IL- 17 binding protein of the ~~invention~~disclosure comprises at least 3 CDRs described above.

In another embodiment, an IL- 17 binding protein of the ~~invention~~disclosure comprises an antigen binding domain that comprises a V_H. More preferably, the V_H comprises an amino acid sequence selected from the group consisting of: SEQ ID NO:40, SEQ ID NO:42, SEQ ID NO:44, SEQ ID NO:46, SEQ ID NO:48, an amino acid sequence of a VH in Table 21, an amino acid sequence of a VH in Table 23, an amino acid sequence of a VH in Table 24, and an amino acid sequence of a VH in Table 27.

In another embodiment, the IL- 17 binding protein of the ~~invention~~disclosure comprises an antigen binding domain that comprises a V_L. Preferably, the V_L comprises an amino acid sequence selected from the group consisting of SEQ ID NO:41, SEQ ID NO:43, SEQ ID NO:45, SEQ ID NO:47, SEQ ID NO:49, an amino acid sequence of a VL in Table 21, an amino acid sequence of a VL in Table 23, an amino acid sequence of a VL in Table 25, and an amino acid sequence of a VL in Table 27.

In a further embodiment, the IL- 17 binding protein of the ~~invention~~disclosure comprises an antigen binding domain comprising a V_H and a V_L. In a preferred embodiment, the V_H comprises an amino acid sequence selected from the group consisting of: SEQ ID NO:40, SEQ ID NO:42, SEQ ID NO:44, SEQ ID NO:46, SEQ ID NO:48, an amino acid sequence of a VH in Table 21, an amino acid sequence of a VH in Table 23, an amino acid sequence of a VH in Table 24, and an amino acid sequence of a VH in Table 27.

More preferably, the V_L of an IL- 17 binding protein of the ~~invention~~disclosure comprises an amino acid sequence of a VL in Table 21, an amino acid sequence of a VL in Table 23, an amino acid

sequence of a VL in Table 25, or an amino acid sequence of a VL in Table 27 and the V_H comprises an amino acid sequence of a VH in Table 21, an amino acid sequence of a VH in Table 23, an amino acid sequence of a VH in Table 24, or an amino acid sequence of a VH in Table 27.

In another embodiment, an IL-17 binding protein described herein, further comprises a heavy chain immunoglobulin constant domain selected from the group consisting of: a human IgM constant domain; a human IgG1 constant domain; a human IgG2 constant domain; a human IgG3 constant domain; a human IgG4 constant domain; a human IgE constant domain and a human IgA constant domain. Preferably, the heavy chain immunoglobulin constant region is a human IgG1 constant domain. More preferably, the human IgG1 constant domain comprises amino acid sequence selected from the group consisting of SEQ ID NO:3 and SEQ ID NO:4.

In another embodiment, an IL-17 binding protein described herein comprises a light chain immunoglobulin constant domain is a human Ig kappa constant domain or a human Ig lambda constant domain. A preferred human Ig kappa constant domain comprises amino acid sequence SEQ ID NO:5. A preferred human Ig lambda constant domain comprises amino acid sequence SEQ ID NO:6.

In another embodiment, an IL-17 binding protein described herein is selected from the group consisting of: an immunoglobulin molecule; an scFv; a monoclonal antibody; a human antibody; a chimeric antibody; a humanized antibody; a single domain antibody; a Fab fragment; an Fab' fragment; an F(ab')2; an Fv; and a disulfide linked Fv. In a preferred embodiment, the IL-17 binding protein is a human antibody.

Another aspect of the ~~invention~~disclosure is a binding protein capable of binding human IL- 17, wherein the binding protein comprises:

an Ig constant heavy region having an amino acid sequence selected from the group consisting of SEQ ID NO:3 and SEQ ID NO: 4;

an Ig constant light region having an amino acid sequence selected from the group consisting of SEQ ID NO:5 and SEQ ID NO: 6;

an Ig variable heavy region having an amino acid sequence of a VH in Table 21, an amino acid sequence of a VH in Table 23, an amino acid sequence of a VH in Table 24, or an amino acid sequence of a VH in Table 27; and

an Ig variable light region having an amino acid sequence of a VL in Table 21, an amino acid sequence of a VL in Table 23, an amino acid sequence of a VL in Table 25, or an amino acid sequence of a VL in Table 27.

More preferably, a binding protein according to the ~~invention~~disclosure is capable of binding human IL-17 and comprises:

an Ig constant heavy region having an amino acid sequence of SEQ ID NO:3;

an Ig constant light region having an amino acid sequence of SEQ ID NO:5;

an Ig variable heavy region having an amino acid sequence of a VH in Table 21, an amino acid sequence of a VH in Table 23, an amino acid sequence of a VH in Table 24, or an amino acid sequence of a VH in Table 27; and

an Ig variable light region having an amino acid sequence of a VL in Table 21, an amino acid sequence of a VL in Table 23, an amino acid sequence of a VL in Table 25, or an amino acid sequence of a VL in Table 27.

In another aspect, the ~~invention~~disclosure provides a multivalent, multispecific DVD-Ig™ binding protein comprising a polypeptide chain, wherein said polypeptide chain comprises VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein VD1 comprises an amino acid sequence of a variable heavy region (VH) of an anti-TNF-α antibody wherein said amino acid sequence is any of SEQ ID NOs:563, 573, 578, 593, 628, 638, 648, 658, 668, 678, 688, 698, 708, 718, 728, 738, 748, 758, 763, 773, 783, 793, 803, 813, 823, 833, 843, 853, 863, 873, and 883; and

wherein VD2 comprises the amino acid sequence of a VH region of anti-IL-17 antibody wherein said amino acid sequence is any of SEQ ID NOs:565, 575, 580, 595, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 765, 775, 795, 805, 815, 825, 835, 845, 855, 865, 875, and 885.

In an embodiment of the DVD-Ig binding protein described above, VD1 and VD2 comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882.

In another embodiment, the ~~invention~~disclosure provides a multivalent, multispecific DVD-Ig binding protein comprising a polypeptide chain, wherein said polypeptide chain comprises VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein VD1 comprises an amino acid sequence of a variable light region (VL) of an anti-TNF-α antibody wherein said amino acid sequence is any of SEQ ID NOs:568, 583, 588, 598, 603, 608, 613, 618, 623, 633, 643, 653, 663, 673, 683, 693, 703, 713, 723, 733, 743, 753, 768, 778, 788, 798, 808, 818, 828, 848, 858, 868, and 878; and

wherein VD2 comprises an amino acid sequence of a VL region of anti-IL-17 antibody wherein said amino acid sequence is any of SEQ ID NOs:570, 585, 590, 600, 605, 610, 615, 620, 625, 635, 645, 655, 665, 675, 685, 695, 705, 715, 725, 735, 745, 755, 770, 780, 790, 800, 810, 820, 830, 850, 860, 870, and 880.

In an embodiment of the DVD-Ig binding protein described above the VD1 and VD2 light chain variable domains comprise an amino acid sequence of any of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

In a preferred embodiment of a multivalent, multispecific DVD-Ig binding protein described herein, n is 0.

In another embodiment, the ~~invention~~disclosure provides a multivalent, multispecific DVD-Ig binding protein comprising first and second polypeptide chains, wherein said first polypeptide chain comprises a first VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1; and

X2 is an Fc region; and

wherein said second polypeptide chain comprises a second VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein said VD1 and VD2 heavy chain variable domains comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697,

707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein said VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

In a preferred embodiment of a multivalent, multispecific DVD-Ig binding protein according to the ~~invention~~disclosure, Xl or X2 is an amino acid sequence selected from the group consisting of SEQ ID NOs:888-918.

In another embodiment, a multivalent, multispecific DVD-Ig binding protein described herein comprises two first polypeptide chains and two second polypeptide chains.

In an embodiment of a multivalent, multispecific DVD-Ig binding protein described herein, the Fc region is selected from the group consisting of native sequence Fc region and a variant sequence Fc region. Preferably, the Fc region is selected from the group consisting of an Fc region from an IgG1, IgG2, IgG3, IgG4, IgA, IgM, IgE, and IgD.

In another embodiment of a multivalent, multispecif DVD-Ig binding protein described herein comprising a first and second polypeptide chains, VD1 of the first polypeptide chain and said VD1 of the second polypeptide chain are obtained from the same first and second parent antibody, respectively, or antigen binding portion thereof.

In an embodiment of a TNF-α and IL-17 binding DVD-Ig protein described herein, a parental anti-TNF-α antibody binds TNF-α with a potency different from the potency with which a parental anti-IL-17 antibody binds human IL-17.

In another embodiment of a TNF-α and IL-17 binding DVD-Ig protein described herein, a parental anti-TNF-α antibody binds TNF-α with an affinity different from the affinity with which said anti-IL-17 antibody binds human IL-17.

In another embodiment of a TNF-α and IL-17 binding DVD-Ig protein described herein an anti-TNF-α antibody and said anti-IL-17 antibody are selected from the group consisting of a human antibody, a CDR grafted antibody, and a humanized antibody.

In another embodiment, a TNF-α and IL-17 binding DVD-Ig protein described herein possesses at least one desired property exhibited by said anti-TNF-α antibody or said anti-IL-17 antibody. Preferably, the desired property is selected from one or more antibody parameters. More preferably, the antibody parameters are selected from the group consisting of antigen specificity, affinity to antigen, potency, biological function, epitope recognition, stability, solubility, production efficiency, immunogenicity, pharmacokinetics, bioavailability, tissue cross reactivity, and orthologous antigen binding.

In another embodiment, the ~~invention~~disclosure provides a multivalent, multispecific DVD-Ig binding protein capable of binding two antigens comprising four polypeptide chains, wherein two polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1; and

X2 is an Fc region; and

wherein two polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the VD1 and VD2 heavy chain variable domains comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

In another embodiment, the ~~invention~~disclosure provides method of producing a multivalent, multispecific DVD-Ig binding protein described herein, comprising culturing a host cell carrying a vector comprising a nucleic acid described herein in culture medium under conditions sufficient to produce the binding protein. Preferably, 50%-75% of the binding protein produced according the method is a dual specific tetravalent DVD-Ig binding protein described herein. More preferably, 75%-90% of the binding protein produced according to this method is a dual specific tetravalent binding protein. Even more preferably, 90%-95% of the binding protein produced is a dual specific tetravalent binding protein.

Another embodiment of the ~~invention~~disclosure is a protein produced according to the described method.

In another embodiment, the ~~invention~~disclosure provides a pharmaceutical composition comprising a multivalent, multispecific DVD-Ig binding protein described herein and a pharmaceutically acceptable carrier.

In another embodiment, a pharmaceutical composition comprising a multivalent, multispecific DVD-Ig binding protein further comprises at least one additional agent. Preferably, the additional agent is selected from the group consisting of: therapeutic agent, imaging agent, cytotoxic agent, angiogenesis inhibitors; kinase inhibitors; co-stimulation molecule blockers; adhesion molecule blockers; anti-cytokine antibody or functional fragment thereof; methotrexate; cyclosporin; rapamycin; FK506; detectable label or reporter; a TNF antagonist; an antirheumatic; a muscle relaxant, a narcotic, a non-steroid anti-inflammatory drug (NSAID), an analgesic, an anesthetic, a sedative, a local anesthetic, a neuromuscular blocker, an antimicrobial, an antipsoriatic, a corticosteroid, an anabolic steroid, an erythropoietin, an immunization, an immunoglobulin, an immunosuppressive, a growth hormone, a hormone replacement drug, a radiopharmaceutical, an antidepressant, an antipsychotic, a stimulant, an asthma medication, a beta agonist, an inhaled steroid, an epinephrine or analog, a cytokine, and a cytokine antagonist.

Another embodiment of the ~~invention~~disclosure provides a method for treating a subject for a disease or a disorder by administering to the subject a multivalent, multispecific DVD-Ig binding protein described herein that binds TNF-α and IL-17 such that treatment is achieved.

The ~~invention~~disclosure also provides a method for generating a multivalent, multispecific DVD-Ig binding protein described herein capable of binding TNF-α and human IL-17 comprising the steps of :

a) obtaining a first parent antibody or antigen binding portion thereof, capable of binding TNF-α;

b) obtaining a second parent antibody or antigen binding portion thereof, capable of binding human IL-17;

c) constructing first and third polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second heavy chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1; and

d) constructing second and fourth polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

Fc region is selected from the group consisting of an Fc region from an IgG1, IgG2, IgG3, IgG4, IgA, IgM, IgE, and IgD.

In another embodiment, in a method described above, a desired property is selected from one or more antibody parameters of the first parent antibody or antigen binding portion thereof.

In another embodiment, in a method described above, a desired property is selected from one or more antibody parameters of the second parent antibody.

Preferably, said antibody parameters are selected from the group consisting of antigen specificity, affinity to antigen, potency, biological function, epitope recognition, stability, solubility, production efficiency, immunogenicity, pharmacokinetics, bioavailability, tissue cross reactivity, and orthologous antigen binding.

In another embodiment of the method described above, the first parent antibody or antigen binding portion thereof, binds said first antigen with a different affinity than the affinity with which said second parent antibody or antigen binding portion thereof, binds said second antigen.

In another embodiment, the first parent antibody or antigen binding portion thereof, binds said first antigen with a different potency than the potency with which said second parent antibody or antigen binding portion thereof, binds said second antigen.

In another embodiment, the ~~invention~~disclosure provides a method for generating a DVD-Ig binding protein capable of binding TNF-α and human IL-17 with desired properties comprising the steps of

a) obtaining a first parent antibody or antigen binding portion thereof, capable of binding TNF-α and possessing at least one desired property exhibited by the Dual Variable Domain Immunoglobulin;

b) obtaining a second parent antibody or antigen binding portion thereof, capable of binding human IL-17 and possessing at least one desired property exhibited by the Dual Variable Domain Immunoglobulin;

c) constructing first and third polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first heavy chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second heavy chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1;

d) constructing second and fourth polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first light chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second light chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

e) expressing said first, second, third, and fourth polypeptide chains;

such that a DVD-Ig binding capable of binding said TNF-α and human IL-17 with desired properties is generated,

wherein VD1 and VD2 heavy chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs: of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

In another embodiment, an IL-17 binding protein described herein binds human IL-17 and is capable of modulating a biological function of IL-17.

The ~~invention~~disclosure also provides a neutralizing binding protein, wherein the neutralizing binding protein comprises an IL-17 binding protein as described above, and wherein said neutralizing binding protein is capable of neutralizing IL-17.

In another embodiment, a neutralizing IL- 17 binding protein according to the ~~invention~~disclosure binds a human IL-17 is selected from the group consisting of pro-human IL-17; mature-human IL-17, and truncated-human IL-17.

Preferably a neutralizing IL-17 binding protein described herein diminishes the ability of IL-17 to bind to its receptor. Even more preferably, a neutralizing IL-17 binding protein diminishes the ability of pro-human IL-17, mature human IL-17, or a truncated human IL-17 to bind to the IL-17 receptor.

In another embodiment, a neutralizing IL-17 binding protein described herein is capable of reducing one or more of IL-17 biological activities selected from the group consisting of: Th1 modulation; Th2 modulation; Nk modulation; neutrophil modulation; monocyte-macrophage

lineage modulation; neutrophil modulation; eosinophil modulation; B-cells modulation; cytokine modulation; chemokine modulation; adhesion molecule modulation; and cell recruitment modulation.

Preferably, an IL- 17 binding protein of the ~~invention~~disclosure has an on rate constant (K_{on}) to said target selected from the group consisting of: at least about $10^2M^{-1}s^{-1}$; at least about $10^3M^{-1}s^{-1}$; at least about $10^4M^{-1}s^{-1}$; at least about $10^5M^{-1}s^{-1}$; and at least about $10^6M^{-1}s^{-1}$; as measured by surface plasmon resonance.

In another embodiment, an IL-17 binding protein has an off rate constant (K_{off}) to said target selected from the group consisting of: at most about $10^{-3}s^{-1}$; at most about $10^{-4}s^{-1}$; at most about $10^{-5}s^{-1}$; and at most about $10^{-6}s^{-1}$, as measured by surface plasmon resonance.

In another embodiment, an IL- 17 binding protein of the ~~invention~~disclosure has a dissociation constant (K_D) to said target selected from the group consisting of: at most about 10^{-7} M; at most about 10^{-8}M; at most about 10^{-9} M; at most about 10^{-10} M; at most about 10^{-11} M; at most about 10^{-12} M; and at most 10^{-13} M.

Another aspect of the ~~invention~~disclosure provides an IL- 17 binding protein construct that comprises an IL-17 binding protein described herein and further comprises a linker polypeptide or an immunoglobulin constant domain. Preferred IL- 17 binding protein constructs of the ~~invention~~disclosure comprise an IL-17 binding protein selected from the group consisting

an immunoglobulin molecule,
a monoclonal antibody,
a chimeric antibody,
a CDR-grafted antibody,
a humanized antibody,
a Fab,
a Fab',
a F(ab')2,
a Fv,
a disulfide linked Fv,
a scFv,
a single domain antibody,
a diabody,
a multispecific antibody,
a dual specific antibody,
a bispecific antibody, and
a DVD-Ig™.

In a preferred embodiment, an IL- 17 binding protein construct of the ~~invention~~disclosure comprises a heavy chain immunoglobulin constant domain selected from the group consisting of:

a human IgM constant domain,
a human IgG1 constant domain,
a human IgG2 constant domain,
a human IgG3 constant domain,
a human IgG4 constant domain,
a human IgE constant domain,
and
a human IgA constant domain.

In yet another embodiment, an IL-17 binding protein construct comprises an immunoglobulin constant domain having an amino acid sequence selected from the group consisting of:

SEQ ID NO:3

SEQ ID NO:4

SEQ ID NO:5

and

SEQ ID NO:6.

In another embodiment, an IL-17 binding protein construct described herein has a greater half life in vivo than the soluble counterpart of said IL-17 binding protein construct.

Another aspect of the ~~invention~~disclosure provides an IL- 17 binding protein conjugate comprising an IL-17 binding protein construct, wherein the IL-17 binding protein conjugate further comprises an agent selected from the group consisting of: an immunoadhesion molecule, an imaging agent, a therapeutic agent, and a cytotoxic agent.

Preferred imaging agents useful in making IL-17 binding protein conjugates and in other aspects of the ~~invention~~disclosure include, but are not limited to, a radiolabel, an enzyme, a fluorescent label, a luminescent label, a bioluminescent label, a magnetic label, and biotin.

Preferred radiolabels useful in the ~~invention~~disclosure include, but are not limited, to those selected from the group consisting of: ^{3}H, ^{14}C, ^{35}S, ^{90}Y, ^{99}Tc, ^{111}In, ^{125}I, ^{131}I, ^{177}Lu, ^{166}Ho, and ^{153}Sm.

In another embodiment, an IL- 17 binding protein conjugate of the ~~invention~~disclosure comprises a therapeutic or cytotoxic agent selected from the group consisting of an anti-metabolite, an alkylating agent, an antibiotic, a growth factor, a cytokine, an anti-angiogenic agent, an anti-mitotic agent, an anthracycline, toxin, and an apoptotic agent.

In another embodiment, binding proteins described herein possesses a human glycosylation pattern.

In another embodiment, an IL-17 binding protein described herein, including IL-17 binding protein constructs and IL-17 binding protein conjugates, may be in the form of a crystallized binding protein. Preferred crystalline forms retain at least some and preferably essentially all of the biologically activity of the uncrystallized form of an IL-17 binding protein described herein. Such crystalline forms may also be used as a carrier-free pharmaceutical controlled release crystallized IL-17 binding proteins.

In another embodiment, the ~~invention~~disclosure provides isolated nucleic acids encoding IL- 17 binding proteins, including binding protein constructs, described herein. Such nucleic acids may be inserted into a vector for carrying out various genetic analyses and recombinant techniques for

expressing, characterizing, or improving one or more properties of an IL-17 binding protein described herein. Preferred vectors for cloning nucleic acids encoding binding proteins described herein include, but are not limited, pcDNA, pTT, pTT3, pEFBOS, pBV, pJV, and pBJ.

The ~~invention~~disclosure also provides a host cell comprising a vector comprising a nucleic acid encoding a binding protein described herein. Host cells useful in the ~~invention~~disclosure may be prokaryotic or eukaryotic. A preferred prokaryotic host cell is *Escherichia coli*. Eukaryotic cells useful as host cells in the ~~invention~~disclosure include protist cell, animal cell, plant cell, and fungal cell.

A preferred fungal cell is a yeast cell, including *Saccharomyces cerevisiae*.

A preferred animal cell useful as a host cell according to the ~~invention~~disclosure includes, but is not limited to, a mammalian cell, an avian cell, and an insect cell. Preferred mammalian cells include CHO and COS cells. An insect cell useful as a host cell according to the ~~invention~~disclosure is an insect Sf9 cell.

A vector may comprise a nucleic acid encoding an IL-17 binding protein described herein in which the nucleic acid is operably linked to appropriate transcriptional and/or translational sequences that permit expression of the binding protein in a particular host cell carrying the vector.

In another aspect, the ~~invention~~disclosure provides a method of producing an IL- 17 binding protein comprising culturing a host cell comprising a vector encoding the IL-17 binding protein in culture medium under conditions sufficient to produce the binding protein capable of binding IL-17. The protein so produced can be isolated and used in various compositions and methods described herein.

Compositions of the ~~invention~~disclosure include a composition for the release of a binding protein said composition comprising:

(a) a formulation, wherein said formulation comprises a crystallized binding protein, described herein, and an ingredient; and

(b) at least one polymeric carrier.

Preferred polymeric carriers useful in compositions of the ~~invention~~disclosure include, without limitation, one or more of the group consisting of: poly (acrylic acid), poly (cyanoacrylates), poly (amino acids), poly (anhydrides), poly (depsipeptide), poly (esters), poly (lactic acid), poly (lactic-co-glycolic acid) or PLGA, poly (b-hydroxybutryate), poly (caprolactone), poly (dioxanone); poly (ethylene glycol), poly ((hydroxypropyl) methacrylamide, poly [(organo) phosphazene], poly (ortho esters), poly (vinyl alcohol), poly (vinylpyrrolidone), maleic anhydride- alkyl vinyl ether copolymers, pluronic polyols, albumin, alginate, cellulose and cellulose derivatives, collagen, fibrin, gelatin, hyaluronic acid, oligosaccharides, glycaminoglycans, sulfated polysaccharides, blends and copolymers thereof.

In another aspect, an ingredient of a composition of the ~~invention~~disclosure is selected from the

group consisting of albumin, sucrose, trehalose, lactitol, gelatin, hydroxypropyl-β- cyclodextrin, methoxypolyethylene glycol and polyethylene glycol.

In yet another embodiment, the ~~invention~~disclosure provides a method for treating a mammal comprising the step of administering to the mammal an effective amount of a composition described herein.

The ~~invention~~disclosure also provides pharmaceutical compositions comprising an IL- 17 binding protein described herein and a pharmaceutically acceptable carrier. A pharmaceutically acceptable carrier may also serve as an adjuvant to increase the absorption or dispersion of the IL-17 binding protein in a composition of the ~~invention~~disclosure. A preferred adjuvant is hyaluronidase.

In another embodiment, a pharmaceutical composition further comprises at least one additional therapeutic agent for treating a disorder in which IL-17 activity is detrimental.

In another embodiment, the ~~invention~~disclosure provides a method for reducing human IL- 17 activity comprising contacting human IL-17 with an IL-17 binding protein described herein such that human IL-17 activity is reduced.

In another embodiment, a pharmaceutical composition comprising an IL-17 binding protein described herein comprises at least one additional agent. Preferably, the additional agent is selected from the group consisting of: therapeutic agent, imaging agent, cytotoxic agent, angiogenesis inhibitors; kinase inhibitors; co-stimulation molecule blockers; adhesion molecule blockers; anti-cytokine antibody or functional fragment thereof; methotrexate; cyclosporin; rapamycin; FK506; detectable label or reporter; a TNF antagonist; an antirheumatic; a muscle relaxant, a narcotic, a non-steroid anti-inflammatory drug (NSAID), an analgesic, an anesthetic, a sedative, a local anesthetic, a neuromuscular blocker, an antimicrobial, an antipsoriatic, a corticosteroid, an anabolic steroid, an erythropoietin, an immunization, an immunoglobulin, an immunosuppressive, a growth hormone, a hormone replacement drug, a radiopharmaceutical, an antidepressant, an antipsychotic, a stimulant, an asthma medication, a beta agonist, an inhaled steroid, an epinephrine or analog, a cytokine, and a cytokine antagonist.

Another embodiment of the ~~invention~~disclosure provides a method for treating a subject for a disease or a disorder by administering to the subject a multivalent, multispecific DVD-Ig binding protein described herein that binds TNF-α and IL-17 such that treatment is achieved.

In another embodiment, a disorder that may treated by a method of the ~~invention~~disclosure comprising administering to a subject an IL-17 binding protein described herein is selected from the group comprising rheumatoid arthritis, osteoarthritis, juvenile chronic arthritis, septic arthritis, Lyme arthritis, psoriatic arthritis, reactive arthritis, spondyloarthropathy, systemic lupus erythematosus, Crohn's disease, ulcerative colitis, inflammatory bowel disease, insulin dependent diabetes mellitus, thyroiditis, asthma, allergic diseases, psoriasis, dermatitis scleroderma, graft versus host disease, organ transplant rejection, acute or chronic immune disease associated with

insufficiency, recurrent neuromyelitis optica, restenosis, rheumatic heart disease, sapho (synovitis, acne, pustulosis, hyperostosis, and osteitis), scleroderma, secondary amyloidosis, shock lung, scleritis, sciatica, secondary adrenal insufficiency, silicone associated connective tissue disease, sneddon-wilkinson dermatosis, spondylitis ankylosans, Stevens-Johnson syndrome (SJS), systemic inflammatory response syndrome, temporal arteritis, toxoplasmic retinitis, toxic epidermal necrolysis, transverse myelitis, TRAPS (tumor necrosis factor receptor, type 1 allergic reaction, type II diabetes, urticaria, usual interstitial pneumonia (UIP), vasculitis, vernal conjunctivitis, viral retinitis, Vogt-Koyanagi-Harada syndrome (VKH syndrome), wet macular degeneration, wound healing, yersinia and salmonella associated arthropathy.

Another embodiment of the ~~invention~~disclosure provides a method for treating a subject for a disease or a disorder in which IL-17 activity is detrimental by administering to the subject an IL-17 binding protein described herein such that treatment is achieved. The method can be used to a treat a disorder selected from the group consisting of respiratory disorders; asthma; allergic and nonallergic asthma; asthma due to infection; asthma due to infection with respiratory syncytial virus (RSV); chronic obstructive pulmonary disease (COPD); other conditions involving airway inflammation; eosinophilia; fibrosis and excess mucus production; cystic fibrosis; pulmonary fibrosis; atopic disorders; atopic dermatitis; urticaria; eczema; allergic rhinitis; and allergic enterogastritis; inflammatory and/or autoimmune conditions of the skin; inflammatory and/or autoimmune conditions of gastrointestinal organs; inflammatory bowel diseases (IBD); ulcerative colitis; Crohn's disease; inflammatory and/or autoimmune conditions of the liver; liver cirrhosis; liver fibrosis; liver fibrosis caused by hepatitis B and/or C virus; scleroderma; tumors or cancers; hepatocellular carcinoma; glioblastoma; lymphoma; Hodgkin's lymphoma; viral infections; HTLV-1 infection (e.g., from HTLV-1); suppression of expression of protective type 1 immune responses, and suppression of expression of protective type 1 immune responses during vaccination.

In a further embodiment of the above method, the administering to the subject is by at least one mode selected from parenteral, subcutaneous, intramuscular, intravenous, intra-articular, intrabronchial, intraabdominal, intracapsular, intracartilaginous, intracavitary, intracelial, intracerebellar, intracerebroventricular, intracolic, intracervical, intragastric, intrahepatic, intramyocardial, intraosteal, intrapelvic, intrapericardiac, intraperitoneal, intrapleural, intraprostatic, intrapulmonary, intrarectal, intrarenal, intraretinal, intraspinal, intrasynovial, intrathoracic, intrauterine, intravesical, bolus, vaginal, rectal, buccal, sublingual, intranasal, and transdermal.

Another aspect of the ~~invention~~disclosure is a method of treating a patient suffering from a disorder in which IL-17 is detrimental comprising the step of administering an IL-17A binding protein described herein before, concurrent, or after the administration of a second agent, wherein the

What is claimed is:

1. A binding protein comprising an antigen binding domain capable of binding human IL-17, said antigen binding domain comprises at least one CDR comprising an amino acid sequence selected from the group consisting of:

CDR-H1. $X_1-X_2-X_3-X_4-X_5$ (SEQ ID NO:919), wherein;
X_1 is D or S;
X_2 is Y;
X_3 is E or G;
X_4 is I, M, V, or F;
X_5 is H;

CDR-H2. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}-X_{17}$ (SEQ ID NO:920), wherein;
X_1 is V;
X_2 is T, I, or N;
X_3 is D, H, or W;
X_4 is P or is not present;
X_5 is E, G, or S;
X_6 is S, N, or D;
X_7 is G;
X_8 is G or T;
X_9 is T;
X_{10} is L, A, T, or F;
X_{11} is H or Y;
X_{12} is N;
X_{13} is P, Q, or S;
X_{14} is K, A, or N;
X_{15} is F or L;
X_{16} is D, K, or R; and
X_{17} is G, D, or S;

CDR-H3. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}$ (SEQ ID NO:921), wherein;
X_1 is Y, F, or D;
X_2 is Y, L, S, or G;
X_3 is K, T, R, or Y;
X_4 is Y or W;
X_5 is E, D, or I;
X_6 is S, G, or Y;
X_7 is F, Y, or T;
X_8 is Y, F, or M;

X_9 is G, T, or is not present;
X_{10} is M or is not present;
X_{11} is D; and
X_{12} is Y;

CDR-L1. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}$ (SEQ ID NO:922), wherein;
X_1 is S, K, or R;
X_2 is A or S;
X_3 is S;
X_4 is S or Q;
X_5 is S or is not present;
X_6 is L or is not present;
X_7 is V or is not present;
X_8 is H or is not present;
X_9 is S or is not present;
X_{10} is S, N, or is not present;
X_{11} is S, V, or G;
X_{12} is I, N, or S;
X_{13} is S, N, T, or I;
X_{14} is Y or D;
X_{15} is M, V, L, or I; and
X_{16} is C, A, H, Y, or G;

CDR-L2. $X_1-X_2-X_3-X_4-X_5-X_6-X_7$ (SEQ ID NO:923), wherein;
X_1 is D, Y, K, A, or H;
X_2 is T, A, or V;
X_3 is S or F;
X_4 is K, N, or E;
X_5 is L or R;
X_6 is A, Y, or F; and
X_7 is S or T;

and

CDR-L3. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9$ (SEQ ID NO:924), wherein;
X_1 is Q, S, or H;
X_2 is Q;
X_3 is R, D, S, or G;
X_4 is S, Y, or T;
X_5 is S, G, or H;
X_6 is Y, S, V, or A;
X_7 is P or is not present;
X_8 is W, Y, or L; and

X_9 is T.

2. The binding protein according to claim 1, wherein said at least one CDR comprises an amino acid sequence selected from the group consisting of:
residues 31-35 of SEQ ID NO:26; residues 50-66 of SEQ ID NO:26; residues 99-110 of SEQ ID NO:26;
residues 24-33 of SEQ ID NO:27; residues 49-55 of SEQ ID NO:27; residues 88-96 of SEQ ID NO:27;
residues 31-35 of SEQ ID NO:28; residues 50-66 of SEQ ID NO:28; residues 99-108 of SEQ ID NO:28;
residues 24-34 of SEQ ID NO:29; residues 50-56 of SEQ ID NO:29; residues 89-97 of SEQ ID NO:29;
residues 31-35 of SEQ ID NO:30; residues 50-66 of SEQ ID NO:30; residues 99-108 of SEQ ID NO:30;
residues 24-34 of SEQ ID NO:31; residues 50-56 of SEQ ID NO:31; residues 89-97 of SEQ ID NO:31;
residues 31-35 of SEQ ID NO:32; residues 50-65 of SEQ ID NO:32; residues 98-109 of SEQ ID NO:32;
residues 24-39 of SEQ ID NO:33; residues 55-61 of SEQ ID NO:33; residues 94-101 of SEQ ID NO:33;
residues 31-35 of SEQ ID NO:34; Residues 50-66 of SEQ ID NO:34; residues 99-110 of SEQ ID NO:34;
residues 24-33 of SEQ ID NO:35; residues 49-55 of SEQ ID NO:35; residues 88-96 of SEQ ID NO:35;
residues 31-35 of SEQ ID NO:36; residues 50-66 of SEQ ID NO:36; residues 99-108 of SEQ ID NO:36;
residues 24-34 of SEQ ID NO:37; residues 50-56 of SEQ ID NO:37; residues 89-97 of SEQ ID NO:37;
residues 31-35 of SEQ ID NO:38; residues 50-65 of SEQ ID NO:38; residues 98-107 of SEQ ID NO:38;
residues 24-39 of SEQ ID NO:39; residues 55-61 of SEQ ID NO:39; and residues 94-102 of SEQ ID NO:39.

3. The binding protein according to claim 2, wherein said binding protein comprises at least 3 CDRs.

4. The binding protein according to claim 3, wherein said at least 3 CDRs comprises a variable domain CDR set selected from the group consisting of:

VH 7D7 CDR Set	
VH 7D7 CDR-H1	Residues 31-35 of SEQ ID NO:26
VH 7D7 CDR-H2	Residues 50-66 of SEQ ID NO:26
VH 7D7 CDR-H3	Residues 99-110 of SEQ ID NO:26
VL 7D7 CDR Set	
VL 7D7 CDR-L1	Residues 24-33 of SEQ ID NO:27
VL 7D7 CDR-L2	Residues 49-55 of SEQ ID NO:27
VL 7D7 CDR-L3	Residues 88-96 of SEQ ID NO:27
VH 6C6 CDR Set	
VH 6C6 CDR-H1	Residues 31-35 of SEQ ID NO:28
VH 6C6 CDR-H2	Residues 50-66 of SEQ ID NO:28
VH 6C6 CDR-H3	Residues 99-108 of SEQ ID NO:28
VL 6C6 CDR Set	
VL 6C6 CDR-L1	Residues 24-34 of SEQ ID NO:29
VL 6C6 CDR-L2	Residues 50-56 of SEQ ID NO:29
VL 6C6 CDR-L3	Residues 89-97 of SEQ ID NO.:29
VH 1D8 CDR Set	
VH 1D8 CDR-H1	Residues 31-35 of SEQ ID NO:30
VH 1D8 CDR-H2	Residues 50-66 of SEQ ID NO:30
VH 1D8 CDR-H3	Residues 99-108 of SEQ ID NO:30
VL 1D8 CDR Set	
VL 1D8 CDR-L1	Residues 24-34 of SEQ ID NO:31
VL 1D8 CDR-L2	Residues 50-56 of SEQ ID NO:31
VL 1D8 CDR-L3	Residues 89-97 of SEQ ID NO:31
VH 8B12 CDR Set	
VH 8B12 CDR-H1	Residues 31-35 of SEQ ID NO:32
VH 8B12 CDR-H2	Residues 50-65 of SEQ ID NO:32
VH 8B12 CDR-H3	Residues 98-109 of SEQ ID NO:32
VL 8B12 CDR Set	
VL 8B12 CDR-L1	Residues 24-39 of SEQ ID NO:33
VL 8B12 CDR-L2	Residues 55-61 of SEQ ID NO:33
VL 8B12 CDR-L3	Residues 94-101 of SEQ ID NO:33
VH 10F7 CDR Set	
VH 10F7 CDR-H1	Residues 31-35 of SEQ ID NO:34
VH 10F7 CDR-H2	Residues 50-66 of SEQ ID NO:34
VH 10F7 CDR-H3	Residues 99-110 of SEQ ID NO:34
VL 10F7 CDR Set	
VL 10F7 CDR-L1	Residues 24-33 of SEQ ID NO:35
VL 10F7 CDR-L2	Residues 49-55 of SEQ ID NO:35
VL 10F7 CDR-L3	Residues 88-96 of SEQ ID NO:35
VH 5C5 CDR Set	
VH 5C5 CDR-H1	Residues 31-35 of SEQ ID NO:36
VH 5C5 CDR-H2	Residues 50-66 of SEQ ID NO:36
VH 5C5 CDR-H3	Residues 99-108 of SEQ ID NO:36
VL 5C5 CDR Set	
VL 5C5 CDR-L1	Residues 24-34 of SEQ ID NO:37
VL 5C5 CDR-L2	Residues 50-56 of SEQ ID NO:37
VL 5C5 CDR-L3	Residues 89-97 of SEQ ID NO:37
VH 10G9 CDR Set	
VH 10G9 CDR-H1	Residues 31-35 of SEQ ID NO:38
VH 10G9 CDR-H2	Residues 50-65 of SEQ ID NO:38
VH 10G9 CDR-H3	Residues 98-107 of SEQ ID NO:38
VL 10G9 CDR Set	
VL 10G9 CDR-L1	Residues 24-39 of SEQ ID NO:39

VL 10G9 CDR-L2	Residues 55-61 of SEQ ID NO:39
VL 10G9 CDR-L3	Residues 94-102 of SEQ ID NO:39

5. The binding protein according to claim 4, comprising at least two variable domain CDR sets.

6. The binding protein according to claim 5, wherein said at least two variable domain CDR sets are selected from a group consisting of:
VH 7D7 CDR Set and VL 7D7 CDR Set;
VH 6C6 CDR Set and VL 6C6 CDR Set;
VH 1D8 CDR Set and VL 1D8 CDR Set;
VH 8B12 CDR Set and VL 8B12 CDR Set;
VH 10F7 CDR Set and VL 10F7 CDR Set; and
VH 5C5 CDR Set and VL 5C5 CDR Set; and
VH 10G9 CDR Set and VL 10G9 Set.

7. The binding protein according to claim 6, further comprising a human acceptor framework.

8. The binding protein according to claim 7, wherein said human acceptor framework comprises an amino acid sequence selected from the group consisting of:

SEQ ID NO.:7	SEQ ID NO.:17
SEQ ID NO.:8	SEQ ID NO.:18
SEQ ID NO.:9	SEQ ID NO.:19
SEQ ID NO.:10	SEQ ID NO.:20
SEQ ID NO.:11	SEQ ID NO.:21
SEQ ID NO.:12	SEQ ID NO.:22
SEQ ID NO.:13	SEQ ID NO.:23
SEQ ID NO.:14	SEQ ID NO.:24 AND
SEQ ID NO.:15	SEQ ID NO.:25.
SEQ ID NO.:16	

9. The binding protein according to claim 7 or 8, wherein said human acceptor framework comprises at least one framework region amino acid substitution, wherein the amino acid sequence of the framework is at least 65% identical to the sequence of said human acceptor framework and comprises at least 70 amino acid residues identical to said human acceptor framework.

10. The binding protein according to claim 8, wherein said human acceptor framework comprises at least one framework region amino acid substitution at a key residue, said key residue selected from the group consisting of:

a residue adjacent to a CDR;

a glycosylation site residue;

a rare residue;

a residue capable of interacting with human IL-17;

a residue capable of interacting with a CDR;

a canonical residue;

a contact residue between heavy chain variable region and light chain variable region;

a residue within a Vernier zone; and

a residue in a region that overlaps between a Chothia-defined variable heavy chain CDR1 and a Kabat-defined first heavy chain framework.

11. The binding protein according to claim 10, wherein key residue selected from the group consisting of : 2H, 4H, 24H, 26H, 27H, 29H, 34H, 35H, 37H, 39H, 44H, 45H, 47H, 48H, 49H, 50H, 51H, 58H, 59H, 60H, 63H, 67H, 69H, 71H, 73H, 76H, 78H, 91H, 93H, 94H, 2L, 4L, 25L, 29L, 27bL, 33L, 34L, 36L, 38L, 43L, 44L, 46L, 47L, 48L, 49L, 55L, 58L, 62L, 64L, 71L, 87L, 89L, 90L, 91L, 94L, 95L.

12. The binding protein according to claim 11, wherein the binding protein is a consensus human variable domain.

13. The binding protein according to claim 1, wherein said binding protein comprises at least one variable domain having an amino acid sequence selected from the group consisting of:

SEQ ID NO:60
SEQ ID NO:61
SEQ ID NO:62
SEQ ID NO:63
SEQ ID NO:64
SEQ ID NO:65
SEQ ID NO:66
SEQ ID NO:67
SEQ ID NO:68
SEQ ID NO:69
SEQ ID NO:70
SEQ ID NO:71
SEQ ID NO:72
SEQ ID NO:73
SEQ ID NO:74
SEQ ID NO:75
SEQ ID NO:76
SEQ ID NO:931
SEQ ID NO:932 AND
SEQ ID NO:933.

14. The binding protein according to claim 13, wherein said binding protein comprises two variable domains, wherein said two variable domains have amino acid sequences selected from the group consisting of:

SEQ ID NO:60 & SEQ ID NO:62,
SEQ ID NO:60 & SEQ ID NO:63,
SEQ ID NO:60 & SEQ ID NO:64,
SEQ ID NO:60 & SEQ ID NO:65,
SEQ ID NO:60 & SEQ ID NO:66
SEQ ID NO:60 & SEQ ID NO:67,
SEQ ID NO:60 & SEQ ID NO:68,
SEQ ID NO:61 & SEQ ID NO:62,
SEQ ID NO:61 & SEQ ID NO:63,
SEQ ID NO:61 & SEQ ID NO:64,
SEQ ID NO:61 & SEQ ID NO:65,
SEQ ID NO:61 & SEQ ID NO:66,
SEQ ID NO:61 & SEQ ID NO:67, AND
SEQ ID NO:61 & SEQ ID NO:68.

15. The binding protein according to claim 11, wherein said binding protein comprises at least one variable domain having an amino acid sequence selected from the group consisting of:

SEQ ID NO:60 SEQ ID NO.:71
SEQ ID NO:61 SEQ ID NO.:72
SEQ ID NO:62 SEQ ID NO.:73
SEQ ID NO:63 SEQ ID NO.:74
SEQ ID NO:64 SEQ ID NO.:75
SEQ ID NO:65 SEQ ID NO.:76
SEQ ID NO:66 SEQ ID NO:931
SEQ ID NO:67 SEQ ID NO:932 AND
SEQ ID NO:68 SEQ ID NO:933.
SEQ ID NO:69
SEQ ID NO:70

16. The binding protein according to claim 1, wherein the binding protein binds IL-17.

17. The binding protein according to claim 14, wherein the binding protein binds IL-17.

18. The binding protein according to claim 17, wherein the binding protein is capable of modulating a biological function of IL-17.

19. The binding protein according to claim 17, wherein the binding protein is capable of neutralizing IL-17.

20. The binding protein according to claim 17, wherein said binding protein has an on rate constant (K_{on}) to said target selected from the group consisting of: at least about $10^2 M^{-1}s^{-1}$; at least about $10^3 M^{-1}s^{-1}$; at least about $10^4 M^{-1}s^{-1}$; at least about $10^5 M^{-1}s^{-1}$; and at least about $10^6 M^{-1}s^{-1}$; as measured by surface plasmon resonance.

21. The binding protein according to claim 17, wherein said binding protein has an off rate constant (K_{off}) to said target selected from the group consisting of: at most about $10^{-3}s^{-1}$; at most about $10^{-4}s^{-1}$; at most about $10^{-5}s^{-1}$; and at most about $10^{-6}s^{-1}$, as measured by surface plasmon resonance.

22. The binding protein according to claim 17, wherein said binding protein has a dissociation constant (K_D) to said target selected from the group consisting of: at most about 10^{-7} M; at most about 10^{-8} M; at most about 10^{-9} M; at most about 10^{-10} M; at most about 10^{-11} M; at most about 10^{-12} M; and at most 10^{-13} M.

23. An IL-17 binding protein construct comprising a binding protein described in claim 1, said IL-17 binding protein construct further comprising a linker polypeptide or an immunoglobulin constant domain.

24. The IL-17 binding protein construct according to claim 23, wherein said binding protein is selected from the group consisting of;

an immunoglobulin molecule,
a monoclonal antibody,
a chimeric antibody,
a CDR-grafted antibody,
a humanized antibody,
a Fab,
a bispecific antibody, and
a F(ab')2,
a Fv,
a disulfide linked Fv,
a scFv,
a single domain antibody,
a diabody,
a multispecific antibody,
a dual specific antibody,a Fab',
a DVD-Ig™.

25. The IL-17 binding protein construct according to claim 23, wherein said binding protein comprises a heavy chain immunoglobulin constant domain selected from the group consisting of;

a human IgM constant domain,
a human IgG1 constant domain,
a human IgG2 constant domain,
a human IgG3 constant domain,
a human IgG4 constant domain,
a human IgE constant domain,
and
a human IgA constant domain.

26. The IL-17 binding protein construct according to claim 23, comprising an immunoglobulin constant domain having an amino acid sequence selected from the group consisting of:

SEQ ID NO:3
SEQ ID NO:4
SEQ ID NO:5
and
SEQ ID NO:6.

27. An IL-17 binding protein conjugate comprising an IL-17 binding protein construct of claim 24, said IL-17 binding protein conjugate further comprising an agent selected from the group consisting of; an immunoadhesion molecule, an imaging agent, a therapeutic agent, and a cytotoxic agent.

28. The IL-17 binding protein conjugate according to claim 27, wherein said agent is an imaging agent selected from the group consisting of a radiolabel, an enzyme, a fluorescent label, a luminescent label, a bioluminescent label, a magnetic label, and biotin.

29. The IL-17 binding protein conjugate according to claim 27, wherein said imaging agent is a radiolabel selected from the group consisting of: ^{3}H, ^{14}C, ^{35}S, ^{90}Y, ^{99}Tc, ^{111}In, ^{125}I, ^{131}I, ^{177}Lu, ^{166}Ho, and ^{153}Sm.

30. The IL-17 binding protein conjugate according to claim 27, wherein said agent is a therapeutic or cytotoxic agent selected from the group consisting of: an anti-metabolite, an alkylating agent, an antibiotic, a growth factor, a cytokine, an anti-angiogenic agent, an anti-mitotic agent, an anthracycline, toxin, and an apoptotic agent.

31. The IL-17 binding protein construct according to claim 24, wherein said binding protein possesses a human glycosylation pattern.

32. The binding protein according to claim 1, wherein said binding protein is a crystallized binding protein.

33. The IL-17 binding protein construct according to claim 23, wherein said IL-17 binding protein construct is a crystallized IL-17 binding protein construct.

34. The IL-17 binding protein construct according to claim 33, wherein said crystallized IL-17 binding protein construct is a carrier-free pharmaceutical controlled release crystallized IL-17 binding protein construct.

35. The IL-17 binding protein construct according to claim 34, wherein said IL-17 binding protein construct has a greater half life in vivo than the soluble counterpart of said IL-17 binding protein construct.

36. The IL-17 binding protein construct according to claim 34, wherein said IL-17 binding protein construct retains biological activity.

37. An isolated nucleic acid encoding a binding protein amino acid sequence of claim 1.

38. An isolated nucleic acid encoding an IL-17 binding protein construct amino acid sequence of claim 23.

39. A vector comprising an isolated nucleic acid according to claim 37 or 38.

40. The vector of claim 39, wherein said vector is selected from the group consisting of pcDNA, pTT, pTT3, pEFBOS, pBV, pJV, and pBJ.

41. A host cell comprising a vector according to claim 39.

42. The host cell according to claim 41, wherein said host cell is a prokaryotic cell.

43. The host cell according to claim 42, wherein said host cell is *E. coli*.

44. The host cell according to claim 41, wherein said host cell is a eukaryotic cell.

45. The host cell according to claim 44, wherein said eukaryotic cell is selected from the group consisting of protist cell, animal cell, plant cell, and fungal cell.

46. The host cell according to claim 44, wherein said eukaryotic cell is an animal cell selected from the group consisting of a mammalian cell, an avian cell, and an insect cell.

47. The host cell according to claim 44, wherein said host cell is a CHO cell.

48. The host cell according to claim 44, wherein said host cell is COS.

49. The host cell according to claim 44, wherein said host cell is a yeast cell.

50. The host cell according to claim 49, wherein said yeast cell is *Saccharomyces cerevisiae*.

51. The host cell according to claim 44, wherein said host cell is an insect Sf9 cell.

52. A method of producing a protein capable of binding IL-17, comprising culturing a host cell of claim 41 in culture medium under conditions sufficient to produce a binding protein capable of binding IL-17.

53. A protein produced according to the method of claim 52.

54. A composition for the release of a binding protein said composition comprising:
(a) a formulation, wherein said formulation comprises a crystallized binding protein, according to claim 33, and an ingredient; and
(b) at least one polymeric carrier.

55. The composition according to claim 54, wherein said polymeric carrier is a polymer selected from one or more of the group consisting of: poly (acrylic acid), poly (cyanoacrylates), poly (amino acids), poly (anhydrides), poly (depsipeptide), poly (esters), poly (lactic acid), poly (lactic-co-glycolic acid) or PLGA, poly (b-hydroxybutryate), poly (caprolactone), poly (dioxanone); poly (ethylene glycol), poly ((hydroxypropyl) methacrylamide, poly [(organo) phosphazene], poly (ortho esters), poly (vinyl alcohol), poly (vinylpyrrolidone), maleic anhydride- alkyl vinyl ether copolymers, pluronic polyols, albumin, alginate, cellulose and cellulose derivatives, collagen, fibrin, gelatin, hyaluronic acid, oligosaccharides, glycaminoglycans, sulfated polysaccharides, blends and copolymers thereof.

56. The composition according to claim 54, wherein said ingredient is selected from the group consisting of albumin, sucrose, trehalose, lactitol, gelatin, hydroxypropyl-β-cyclodextrin, methoxypolyethylene glycol and polyethylene glycol.

57. A method for treating a mammal comprising the step of administering to the mammal an effective amount of the composition according to claim 54.

58. A pharmaceutical composition comprising the binding protein of claim 1, and a pharmaceutically acceptable carrier.

59. The pharmaceutical composition of claim 58, wherein said pharmaceutically acceptable carrier functions as adjuvant useful to increase the absorption or dispersion of said binding protein.

60. The pharmaceutical composition of claim 59, wherein said adjuvant is hyaluronidase.

61. The pharmaceutical composition of claim 58 further comprising at least one additional therapeutic agent for treating a disorder in which IL-17 activity is detrimental.

62. The pharmaceutical composition of claim 61, wherein said additional agent is selected from the group consisting of: therapeutic agent, imaging agent, cytotoxic agent, angiogenesis inhibitors; kinase inhibitors; co-stimulation molecule blockers; adhesion molecule blockers; anti-cytokine antibody or functional fragment thereof; methotrexate; cyclosporin; rapamycin; FK506; detectable label or reporter; a TNF antagonist; an anti-rheumatic; a muscle relaxant, a narcotic, a non-steroid anti-inflammatory drug (NSAID), an analgesic, an anesthetic, a sedative, a local anesthetic, a neuromuscular blocker, an antimicrobial, an antipsoriatic, a corticosteroid, an anabolic steroid, an erythropoietin, an immunization, an immunoglobulin, an immunosuppressive, a growth hormone, a hormone replacement drug, a radiopharmaceutical, an antidepressant, an antipsychotic, a stimulant, an asthma medication, a beta agonist, an inhaled steroid, an oral steroid, an epinephrine or analog, a cytokine, and a cytokine antagonist.

63. A method for reducing human IL-17 activity comprising contacting human IL-17 with the binding protein of claim 1 such that human IL-17 activity is reduced.

64. A method for reducing human IL-17 activity in a human subject suffering from a disorder in which IL-17 activity is detrimental, comprising administering to the human subject the binding protein of claim 1 such that human IL-17 activity in the human subject is reduced.

65. A method for treating a subject for a disease or a disorder in which IL-17 activity is detrimental by administering to the subject the binding protein of claim 1 such that treatment is achieved.

66. The method of claim 65, wherein said disorder is selected from the group consisting of respiratory disorders; asthma; allergic and nonallergic asthma; asthma due to infection; asthma due to infection with respiratory syncytial virus (RSV); chronic obstructive pulmonary disease (COPD); other conditions involving airway inflammation; eosinophilia; fibrosis and excess mucus production; cystic fibrosis; pulmonary fibrosis; atopic disorders; atopic dermatitis; urticaria; eczema; allergic rhinitis; and allergic

enterogastritis; inflammatory and/or autoimmune conditions of the skin; inflammatory and/or autoimmune conditions of gastrointestinal organs; inflammatory bowel diseases (IBD); ulcerative colitis; Crohn's disease; inflammatory and/or autoimmune conditions of the liver; liver cirrhosis; liver fibrosis; liver fibrosis caused by hepatitis B and/or C virus; scleroderma; tumors or cancers; hepatocellular carcinoma; glioblastoma; lymphoma; Hodgkin's lymphoma; viral infections; HTLV-1 infection (e.g., from HTLV-1); suppression of expression of protective type 1 immune responses, and suppression of expression of protective type 1 immune responses during vaccination.

67. The method of claim 64, wherein said disorder is selected from the group consisting of: rheumatoid arthritis, osteoarthritis, juvenile chronic arthritis, septic arthritis, Lyme arthritis, psoriatic arthritis, reactive arthritis, spondyloarthropathy, systemic lupus erythematosus, Crohn's disease, ulcerative colitis, inflammatory bowel disease, insulin dependent diabetes mellitus, thyroiditis, asthma, allergic diseases, psoriasis, dermatitis scleroderma, graft versus host disease, organ transplant rejection, acute or chronic immune disease associated with organ transplantation, sarcoidosis, atherosclerosis, disseminated intravascular coagulation, Kawasaki's disease, Grave's disease, nephrotic syndrome, chronic fatigue syndrome, Wegener's granulomatosis, Henoch-Schoenlein purpurea, microscopic vasculitis of the kidneys, chronic active hepatitis, uveitis, septic shock, toxic shock syndrome, sepsis syndrome, cachexia, infectious diseases, parasitic diseases, acquired immunodeficiency syndrome, acute transverse myelitis, Huntington's chorea, Parkinson's disease, Alzheimer's disease, stroke, primary biliary cirrhosis, hemolytic anemia, malignancies, heart failure, myocardial infarction, Addison's disease, sporadic, polyglandular deficiency type I and polyglandular deficiency type II, Schmidt's syndrome, adult (acute) respiratory distress syndrome, alopecia, alopecia areata, seronegative arthropathy, arthropathy, Reiter's disease, psoriatic arthropathy, ulcerative colitic arthropathy, enteropathic synovitis, chlamydia, yersinia and salmonella associated arthropathy, spondyloarthropathy, atheromatous disease/arteriosclerosis, atopic allergy, autoimmune bullous disease, pemphigus vulgaris, pemphigus foliaceus, pemphigoid, linear IgA disease, autoimmune haemolytic anaemia, Coombs positive haemolytic anaemia, acquired pernicious anaemia, juvenile pernicious anaemia, myalgic encephalitis/Royal Free Disease, chronic mucocutaneous candidiasis, giant cell arteritis, primary sclerosing hepatitis, cryptogenic autoimmune hepatitis, Acquired Immunodeficiency Disease Syndrome, Acquired Immunodeficiency Related Diseases, Hepatitis B, Hepatitis C, common varied immunodeficiency (common variable hypogammaglobulinaemia), dilated cardiomyopathy, female infertility, ovarian failure,

premature ovarian failure, fibrotic lung disease, cryptogenic fibrosing alveolitis, post-inflammatory interstitial lung disease, interstitial pneumonitis, connective tissue disease associated interstitial lung disease, mixed connective tissue disease associated lung disease, systemic sclerosis associated interstitial lung disease, rheumatoid arthritis associated interstitial lung disease, systemic lupus erythematosus associated lung disease, dermatomyositis/polymyositis associated lung disease, Sjögren's disease associated lung disease, ankylosing spondylitis associated lung disease, vasculitic diffuse lung disease, haemosiderosis associated lung disease, drug-induced interstitial lung disease, fibrosis, radiation fibrosis, bronchiolitis obliterans, chronic eosinophilic pneumonia, lymphocytic infiltrative lung disease, postinfectious interstitial lung disease, gouty arthritis, autoimmune hepatitis, type-1 autoimmune hepatitis (classical autoimmune or lupoid hepatitis), type-2 autoimmune hepatitis (anti-LKM antibody hepatitis), autoimmune mediated hypoglycaemia, type B insulin resistance with acanthosis nigricans, hypoparathyroidism, acute immune disease associated with organ transplantation, chronic immune disease associated with organ transplantation, osteoarthrosis, primary sclerosing cholangitis, psoriasis type 1, psoriasis type 2, idiopathic leucopaenia, autoimmune neutropaenia, renal disease NOS, glomerulonephritides, microscopic vasculitis of the kidneys, Lyme disease, discoid lupus erythematosus, male infertility idiopathic or NOS, sperm autoimmunity, multiple sclerosis (all subtypes), sympathetic ophthalmia, pulmonary hypertension secondary to connective tissue disease, Goodpasture's syndrome, pulmonary manifestation of polyarteritis nodosa, acute rheumatic fever, rheumatoid spondylitis, Still's disease, systemic sclerosis, Sjörgren's syndrome, Takayasu's disease/arteritis, autoimmune thrombocytopaenia, idiopathic thrombocytopaenia, autoimmune thyroid disease, hyperthyroidism, goitrous autoimmune hypothyroidism (Hashimoto's disease), atrophic autoimmune hypothyroidism, primary myxoedema, phacogenic uveitis, primary vasculitis, vitiligo acute liver disease, chronic liver diseases, alcoholic cirrhosis, alcohol-induced liver injury, choleosatatis, idiosyncratic liver disease, Drug-Induced hepatitis, Non-alcoholic Steatohepatitis, allergy and asthma, group B streptococci (GBS) infection, mental disorders (*e.g.*, depression and schizophrenia), Th2 Type and Th1 Type mediated diseases, acute and chronic pain (different forms of pain), and cancers such as lung, breast, stomach, bladder, colon, pancreas, ovarian, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma) Abetalipoproteinemia, Acrocyanosis, acute and chronic parasitic or infectious processes, acute leukemia, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), acute or chronic bacterial infection, acute pancreatitis, acute renal failure, adenocarcinomas, aerial ectopic beats, AIDS dementia complex, alcohol-induced

hepatitis, allergic conjunctivitis, allergic contact dermatitis, allergic rhinitis, allograft rejection, alpha-l- antitrypsin deficiency, amyotrophic lateral sclerosis, anemia, angina pectoris, anterior horn cell degeneration, anti-CD3 therapy, antiphospholipid syndrome, anti-receptor hypersensitivity reactions, aortic and peripheral aneurysms, aortic dissection, arterial hypertension, arteriosclerosis, arteriovenous fistula, ataxia, atrial fibrillation (sustained or paroxysmal), atrial flutter, atrioventricular block, B cell lymphoma, bone graft rejection, bone marrow transplant (BMT) rejection, bundle branch block, Burkitt's lymphoma, Burns, cardiac arrhythmias, cardiac stun syndrome, cardiac tumors, cardiomyopathy, cardiopulmonary bypass inflammation response, cartilage transplant rejection, cerebellar cortical degenerations, cerebellar disorders, chaotic or multifocal atrial tachycardia, chemotherapy associated disorders, chronic myelocytic leukemia (CML), chronic alcoholism, chronic inflammatory pathologies, chronic lymphocytic leukemia (CLL), chronic obstructive pulmonary disease (COPD), chronic salicylate intoxication, colorectal carcinoma, congestive heart failure, conjunctivitis, contact dermatitis, cor pulmonale, coronary artery disease, Creutzfeldt-Jakob disease, culture negative sepsis, cystic fibrosis, cytokine therapy associated disorders, Dementia pugilistica, demyelinating diseases, dengue hemorrhagic fever, dermatitis, dermatologic conditions, diabetes, diabetes mellitus, diabetic arteriosclerotic disease, Diffuse Lewy body disease, dilated congestive cardiomyopathy, disorders of the basal ganglia, Down's Syndrome in middle age, drug- induced movement disorders induced by drugs which block CNS dopamine receptors, drug sensitivity, eczema, encephalomyelitis, endocarditis, endocrinopathy, epiglottitis, Epstein-Barr virus infection, erythromelalgia, extrapyramidal and cerebellar disorders, familial hematophagocytic lymphohistiocytosis, fetal thymus implant rejection, Friedreich's ataxia, functional peripheral arterial disorders, fungal sepsis, gas gangrene, gastric ulcer, glomerular nephritis, graft rejection of any organ or tissue, gram negative sepsis, gram positive sepsis, granulomas due to intracellular organisms, hairy cell leukemia, Hallervorden-Spatz disease, Hashimoto's thyroiditis, hay fever, heart transplant rejection, hemachromatosis, hemodialysis, hemolytic uremic syndrome/thrombolytic thrombocytopenic purpura, hemorrhage, hepatitis (A), His bundle arrhythmias, HIV infection/HIV neuropathy, Hodgkin's disease, hyperkinetic movement disorders, hypersensitivity reactions, hypersensitivity pneumonitis, hypertension, hypokinetic movement disorders, hypothalamic-pituitary-adrenal axis evaluation, idiopathic Addison's disease, idiopathic pulmonary fibrosis, antibody mediated cytotoxicity, Asthenia, infantile spinal muscular atrophy, inflammation of the aorta, influenza a, ionizing radiation exposure, iridocyclitis/uveitis/optic neuritis, ischemia-reperfusion injury, ischemic stroke, juvenile rheumatoid arthritis, juvenile spinal muscular

atrophy, Kaposi's sarcoma, kidney transplant rejection, legionella, leishmaniasis, leprosy, lesions of the corticospinal system, lipedema, liver transplant rejection, lymphedema, malaria, malignant Lymphoma, malignant histiocytosis, malignant melanoma, meningitis, meningococcemia, metabolic/idiopathic, migraine headache, mitochondrial multi-system disorder, mixed connective tissue disease, monoclonal gammopathy, multiple myeloma, multiple systems degenerations (Mencel Dejerine- Thomas Shi-Drager and Machado-Joseph), myasthenia gravis, mycobacterium avium intracellulare, mycobacterium tuberculosis, myelodysplastic syndrome, myocardial infarction, myocardial ischemic disorders, nasopharyngeal carcinoma, neonatal chronic lung disease, nephritis, nephrosis, neurodegenerative diseases, neurogenic I muscular atrophies , neutropenic fever, non-Hodgkins lymphoma, occlusion of the abdominal aorta and its branches, occlusive arterial disorders, OKT3® therapy, orchitis/epidydimitis, orchitis/vasectomy reversal procedures, organomegaly, osteoporosis, pancreas transplant rejection, pancreatic carcinoma, paraneoplastic syndrome/hypercalcemia of malignancy, parathyroid transplant rejection, pelvic inflammatory disease, perennial rhinitis, pericardial disease, peripheral atherosclerotic disease, peripheral vascular disorders, peritonitis, pernicious anemia, pneumocystis carinii pneumonia, pneumonia, POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes syndrome), post perfusion syndrome, post pump syndrome, post-MI cardiotomy syndrome, preeclampsia, Progressive supranucleo Palsy, primary pulmonary hypertension, radiation therapy, Raynaud's phenomenon and disease, Raynaud's disease, Refsum's disease, regular narrow QRS tachycardia, renovascular hypertension, reperfusion injury, restrictive cardiomyopathy, sarcomas, scleroderma, senile chorea, Senile Dementia of Lewy body type, seronegative arthropathies, shock, sickle cell anemia, skin allograft rejection, skin changes syndrome, small bowel transplant rejection, solid tumors, specific arrhythmias, spinal ataxia, spinocerebellar degenerations, streptococcal myositis, structural lesions of the cerebellum, Subacute sclerosing panencephalitis, Syncope, syphilis of the cardiovascular system, systemic anaphylaxis, systemic inflammatory response syndrome, systemic onset juvenile rheumatoid arthritis, T-cell or FAB ALL, Telangiectasia, thromboangitis obliterans, thrombocytopenia, toxicity, transplants, trauma/hemorrhage, type III hypersensitivity reactions, type IV hypersensitivity, unstable angina, uremia, urosepsis, urticaria, valvular heart diseases, varicose veins, vasculitis, venous diseases, venous thrombosis, ventricular fibrillation, viral and fungal infections, viral encephalitis/aseptic meningitis, viral-associated hemaphagocytic syndrome, Wernicke- Korsakoff syndrome, Wilson's disease, xenograft rejection of any organ or tissue, acute coronary syndromes, acute idiopathic polyneuritis, acute inflammatory

demyelinating polyradiculoneuropathy, acute ischemia, adult Still's disease, alopecia areata, anaphylaxis, anti-phospholipid antibody syndrome, aplastic anemia, arteriosclerosis, atopic eczema, atopic dermatitis, autoimmune dermatitis, autoimmune disorder associated with streptococcus infection, autoimmune enteropathy, autoimmune hearing loss, autoimmune lymphoproliferative syndrome (ALPS), autoimmune myocarditis, autoimmune premature ovarian failure, blepharitis, bronchiectasis, bullous pemphigoid, cardiovascular disease, catastrophic antiphospholipid syndrome, celiac disease, cervical spondylosis, chronic ischemia, cicatricial pemphigoid, clinically isolated syndrome (cis) with risk for multiple sclerosis, conjunctivitis, childhood onset psychiatric disorder, chronic obstructive pulmonary disease (COPD), dacryocystitis, dermatomyositis, diabetic retinopathy, diabetes mellitus, disk herniation, disk prolapse, drug induced immune hemolytic anemia, endocarditis, endometriosis, endophthalmitis, episcleritis, erythema multiforme, erythema multiforme major, gestational pemphigoid, Guillain-Barré syndrome (GBS), hay fever, Hughes syndrome, idiopathic Parkinson's disease, idiopathic interstitial pneumonia, IgE-mediated allergy, immune hemolytic anemia, inclusion body myositis, infectious ocular inflammatory disease, inflammatory demyelinating disease, inflammatory heart disease, inflammatory kidney disease, IPF/UIP, iritis, keratitis, keratojunctivitis sicca, Kussmaul disease or Kussmaul-Meier disease, Landry's paralysis, Langerhan's cell histiocytosis, livedo reticularis, macular degeneration, microscopic polyangiitis, morbus bechterev, motor neuron disorders, mucous membrane pemphigoid, multiple organ failure, myasthenia gravis, myelodysplastic syndrome, myocarditis, nerve root disorders, neuropathy, non-A non-B hepatitis, optic neuritis, osteolysis, ovarian cancer, pauciarticular JRA, peripheral artery occlusive disease (PAOD), peripheral vascular disease (PVD), peripheral artery, disease (PAD), phlebitis, polyarteritis nodosa (or periarteritis nodosa), polychondritis, polymyalgia rheumatica, poliosis, polyarticular JRA, polyendocrine deficiency syndrome, polymyositis, polymyalgia rheumatica (PMR), post-pump syndrome, primary Parkinsonism, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma), prostatitis, pure red cell aplasia, primary adrenal insufficiency, recurrent neuromyelitis optica, restenosis, rheumatic heart disease, sapho (synovitis, acne, pustulosis, hyperostosis, and osteitis), scleroderma, secondary amyloidosis, shock lung, scleritis, sciatica, secondary adrenal insufficiency, silicone associated connective tissue disease, sneddon-wilkinson dermatosis, spondylitis ankylosans, Stevens-Johnson syndrome (SJS), systemic inflammatory response syndrome, temporal arteritis, toxoplasmic retinitis, toxic epidermal necrolysis, transverse myelitis, TRAPS (tumor necrosis factor receptor, type 1 allergic reaction, type II diabetes, urticaria, usual

interstitial pneumonia (UIP), vasculitis, vernal conjunctivitis, viral retinitis, Vogt-Koyanagi-Harada syndrome (VKH syndrome), wet macular degeneration, wound healing, yersinia and salmonella associated arthropathy.

68. A method of treating a patient suffering from a disorder in which IL-17 is detrimental comprising the step of administering the binding protein of claim 1 before, concurrent, or after the administration of a second agent, wherein the second agent is selected from the group consisting of inhaled steroids; beta-agonists; short-acting or long-acting beta-agonists; antagonists of leukotrienes or leukotriene receptors; ADVAIR; IgE inhibitors; anti-IgE antibodies; XOLAIR; phosphodiesterase inhibitors; PDE4 inhibitors; xanthines; anticholinergic drugs; mast cell-stabilizing agents; Cromolyn; IL-4 inhibitors; IL-5 inhibitors; eotaxin/CCR3 inhibitors; antagonists of histamine or its receptors including H1, H2, H3, and H4; antagonists of prostaglandin D or its receptors DP1 and CRTH2; TNF antagonists; a soluble fragment of a TNF receptor; ENBREL; TNF enzyme antagonists; TNF converting enzyme (TACE) inhibitors; muscarinic receptor antagonists; TGF-beta antagonists; interferon gamma; perfenidone; chemotherapeutic agents, methotrexate; leflunomide; sirolimus (rapamycin) or an analog thereof, CCI-779; COX2 or cPLA2 inhibitors; NSAIDs; immunomodulators; p38 inhibitors; TPL-2, MK-2 and NFkB inhibitors; budenoside; epidermal growth factor; corticosteroids; cyclosporine; sulfasalazine; aminosalicylates; 6-mercaptopurine; azathioprine; metronidazole; lipoxygenase inhibitors; mesalamine; olsalazine; balsalazide; antioxidants; thromboxane inhibitors; IL-1 receptor antagonists; anti-IL-1β antibodies; anti-IL-6 antibodies; growth factors; elastase inhibitors; pyridinyl-imidazole compounds; antibodies or agonists of TNF, LT, IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-14, IL-15, IL-16, IL-17, IL-18, IL-19, IL-20, IL-21, IL-22, IL-23, IL-24, IL-25, IL-26, IL-27, IL-28, IL-29, IL-30, IL-31, IL-32, IL-33, EMAP-II, GM-CSF, FGF, or PDGF; antibodies of CD2, CD3, CD4, CD8, CD25, CD28, CD30, CD40, CD45, CD69, CD90 or their ligands; FK506; rapamycin; mycophenolate mofetil; ibuprofen; prednisolone; phosphodiesterase inhibitors; adenosine agonists; antithrombotic agents; complement inhibitors; adrenergic agents; IRAK, NIK, IKK, p38, or MAP kinase inhibitors; IL-1β converting enzyme inhibitors; TNF-α converting enzyme inhibitors; T-cell signaling inhibitors; metalloproteinase inhibitors; 6-mercaptopurines; angiotensin converting enzyme inhibitors; soluble cytokine receptors; soluble p55 TNF receptor; soluble p75 TNF receptor; sIL-1RI; sIL-1RII; sIL-6R; anti-inflammatory cytokines; IL-4; IL-10; IL-11; and TGF-β.

69. The method according to claim 65, wherein said administering to the subject is by at least one mode selected from parenteral, subcutaneous, intramuscular, intravenous, intra-articular, intrabronchial, intraabdominal, intracapsular, intracartilaginous, intracavitary, intracelial, intracerebellar, intracerebroventricular, intracolic, intracervical, intragastric, intrahepatic, intramyocardial, intraosteal, intrapelvic, intrapericardiac, intraperitoneal, intrapleural, intraprostatic, intrapulmonary, intrarectal, intrarenal, intraretinal, intraspinal, intrasynovial, intrathoracic, intrauterine, intravesical, bolus, vaginal, rectal, buccal, sublingual, intranasal, and transdermal.

70. A binding protein comprising an antigen binding domain capable of binding human IL-17, said antigen binding domain comprises at least one CDR comprising an amino acid sequence selected from the group consisting of:

CDR-H1. $X_1-X_2-X_3-X_4-X_5$ (SEQ ID NO:925), wherein;
X_1 is N, A, D, or S;
X_2 is Y, F, or L;
X_3 is G, D, or A;
X_4 is M or I; and
X_5 is H, D, or S;

CDR-H2. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}-X_{17}$ (SEQ ID NO:926), wherein;
X_1 is V, W, or G;
X_2 is I, T, M, or F;
X_3 is S, N, T, or D;
X_4 is Y or P;
X_5 is D, N, or I;
X_6 is G, S, L, or E;
X_7 is S or G;
X_8 is N, T, or E;
X_9 is K, T, or A;
X_{10} is Y, G, N, or V;
X_{11} is Y or V;
X_{12} is A;
X_{13} is D, P, or Q;
X_{14} is S, K, or N;
X_{15} is V or F;
X_{16} is K, R, or Q; and
X_{17} is G;

CDR-H3. $X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13}-X_{14}-X_{15}-X_{16}-X_{17}$ (SEQ ID NO:927), wherein;

X_1 is V, S, E, or I;
X_2 is G, S, P, or R;
X_3 is A, E, N, or P;
X_4 is S, D, or W;
X_5 is G, E, F, or L;
X_6 is D, G, or W;
X_7 is Y, I, N, or G;
X_8 is Y, T, G, or A;
X_9 is Y or I;
X_{10} is S, G, or Y;
X_{11} is Y, F, or T;
X_{12} is G, T, or is not present;
X_{13} is L, H, or is not present;
X_{14} is H or is not present;
X_{15} is F or is not present;
X_{16} is D; and
X_{17} is V, N, or Y;

CDR-L1. X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11}-X_{12}-X_{13} (SEQ ID NO:928), wherein;
X_1 is S, R, or K;
X_2 is G or A;
X_3 is S or D;
X_4 is N, K, or Q;
X_5 is S or is not present;
X_6 is N or is not present;
X_7 is I, L, N, or D;
X_8 is G or I;
X_9 is S, N, G, or D;
X_{10} is H, R, S, or D;
X_{11} is S, Y, A, or D;
X_{12} is V, A, L, or M; and
X_{13} is N, C, or H;

CDR-L2. X_1-X_2-X_3-X_4-X_5-X_6-X_7 (SEQ ID NO:929), wherein;
X_1 is G, Q, Y, or E;
X_2 is I, D, or A;
X_3 is G, N, S, or T;
X_4 is Q, K, or T;
X_5 is R, S, or L;
X_6 is P, I, or V; and
X_7 is S or P;

and

CDR-L3. X_1-X_2-X_3-X_4-X_5-X_6-X_7-X_8-X_9-X_{10}-X_{11} (SEQ ID NO:930),

wherein;

X_1 is A, Q, H, or L;

X_2 is T or Q;

X_3 is W, S, or H;

X_4 is D or T;

X_5 is D or S;

X_6 is S, T, L, or F;

X_7 is L, T, or P;

X_8 is G, H, or Y;

X_9 is G, S, or T;

X_{10} is Y or is not present; and

X_{11} is V or is not present;

a CDR-H1, a CDR-H2, and a CDR-H3 of any variable heavy region (VH) in Table 21, Table 23, Table 24, or Table 27; and

a CDR-L1, a CDR-L2, and a CDR-L3 of any variable light region (VL) in Table 21, Table 23, Table 25, or Table 27.

71. The binding protein according to claim 70, wherein said at least one CDR comprises an amino acid sequence selected from the group consisting of:

residues 31-35 of SEQ ID NO:40; residues 50-66 of SEQ ID NO.:40; residues 99-103 of SEQ ID NO.:40;

residues 23-35 of SEQ ID NO:41; residues 51-57 of SEQ ID NO.:41; residues 90-110 of SEQ ID NO.:41;

residues 31-35 of SEQ ID NO:42; residues 50-66 of SEQ ID NO.:42; residues 99-103 of SEQ ID NO.:42;

residues 23-35 of SEQ ID NO:43; residues 51-57 of SEQ ID NO.:43; residues 90-110 of SEQ ID NO.:43;

residues 31-35 of SEQ ID NO:44; residues 50-66 of SEQ ID NO.:44; residues 99-101 of SEQ ID NO.:44;

residues 23-35 of SEQ ID NO:45; residues 51-57 of SEQ ID NO.:45; residues 90-110 of SEQ ID NO.:45;

residues 31-35 of SEQ ID NO:46; residues 50-66 of SEQ ID NO.:46; residues 99-115 of SEQ ID NO.:46;

residues 24-34 of SEQ ID NO:47; residues 50-56 of SEQ ID NO.:47; residues 89-97 of SEQ ID NO.:47;

residues 31-35 of SEQ ID NO:48; residues 50-66 of SEQ ID NO.:48; residues 99-101 of SEQ ID NO.:48;
residues 24-34 of SEQ ID NO:49; residues 50-56 of SEQ ID NO.:49; and residues 89-97 of SEQ ID NO.:49;
the amino acid sequence for a CDR-H1, a CDR-H2, and a CDR-H3 of a VH in Table 21, Table 23, Table 24, or Table 27; and
the amino acid sequence for a CDR-L1, a CDR-L2, and a CDR-L3 of a VL in Table 21, Table 23, Table 25, or Table 27.

72. The binding protein according to claim 71, wherein said binding protein comprises at least 3 CDRs.

73. The binding protein according to claim 71 wherein said antigen binding domain comprises a V_H.

74. The binding protein according to claim 73, wherein said V_H comprises an amino acid sequence selected from the group consisting of:
SEQ ID NO:40, SEQ ID NO:42, SEQ ID NO:44, SEQ ID NO:46, SEQ ID NO:48, and an amino acid sequence of a VH in Table 21, Table 23, Table 24, and Table 27.

75. The binding protein according to claim 71, wherein said antigen binding domain comprises a V_L.

76. The binding protein according to claim 75, wherein said V_L comprises an amino acid sequence selected from the group consisting of:
SEQ ID NO:41, SEQ ID NO:43, SEQ ID NO:45, SEQ ID NO:47, SEQ ID NO:49, and an amino acid sequence of a VL in Table 21, Table 23, Table 25, and Table 27.

77. The binding protein according to claim 71, wherein said antigen binding domain comprises a V_H and a V_L.

78. The binding protein according to claim 76, further comprising a V_H, wherein said V_H comprises an amino acid sequence selected from the group consisting of:
SEQ ID NO:40, SEQ ID NO:42, SEQ ID NO:44, SEQ ID NO:46, SEQ ID NO:48, and an amino acid sequence of a VH in Table 21, Table 23, Table 24, and Table 27.

79. The binding protein according to claim 77, wherein said V_L comprises an amino acid sequence of a VL in Table 21, Table 23, Table 25, or Table 27 and said V_H comprises an amino acid sequence of a VH in Table 21, Table 23, Table 24, or Table 27.

80. The binding protein according to claim 71, further comprising a heavy chain immunoglobulin constant domain selected from the group consisting of: a human IgM constant domain; a human IgG1 constant domain; a human IgG2 constant domain; a human IgG3 constant domain; a human IgG4 constant domain; a human IgE constant domain and a human IgA constant domain.

81. The binding protein according to claim 80, wherein said heavy chain immunoglobulin constant region domain is a human IgG1 constant domain.

82. The binding protein according to claim 81, wherein said human IgG1 constant domain comprises amino acid sequence selected from the group consisting of SEQ ID NO:3 and SEQ ID NO:4.

83. The binding protein according to claim 71, further comprising a light chain immunoglobulin constant domain selected from the group consisting of: a human Ig kappa constant domain and a human Ig lambda constant domain.

84. The binding protein according to claim 83, wherein said light chain immunoglobulin constant region domain is a human Ig kappa constant domain comprising amino acid sequence SEQ ID NO:5.

85. The binding protein according to claim 83, wherein said light chain immunoglobulin constant region domain is a human Ig lambda constant domain comprising amino acid sequence SEQ ID NO:6.

86. The binding protein according to claim 71, wherein said binding protein is selected from the group consisting of: an immunoglobulin molecule; an scFv; a monoclonal antibody; a human antibody; a chimeric antibody; a humanized antibody; a single domain antibody; a Fab fragment; an Fab' fragment; an F(ab')2; an Fv; and a disulfide linked Fv.

87. The binding protein according to claim 86, wherein said binding protein is a human antibody.

88. A binding protein capable of binding human IL-17, said binding protein comprising:
an Ig constant heavy region having an amino acid sequence selected from the group consisting of SEQ ID NO:3 and SEQ ID NO: 4;
an Ig constant light region having an amino acid sequence selected from the group consisting of SEQ ID NO:5 and SEQ ID NO: 6;
an Ig variable heavy region having an amino acid sequence of a VH in Table 21, Table 23, Table 24, or Table 27; and
an Ig variable light region having an amino acid sequence of a VL in Table 21, Table 23, Table 25, or Table 27.

89. A binding protein capable of binding human IL-17, said binding protein comprising:
an Ig constant heavy region having an amino acid sequence of SEQ ID NO:3;
an Ig constant light region having an amino acid sequence of SEQ ID NO:5;
an Ig variable heavy region having an amino acid sequence of a VH in Table 21, Table 23, Table 24, or Table 27; and
an Ig variable light region having an amino acid sequence of a VL in Table 21, Table 23, Table 25, or Table 27.

90. A neutralizing binding protein, wherein said neutralizing binding protein comprises a binding protein according to any one of claims 70-89, and wherein said neutralizing binding protein is capable of neutralizing IL-17.

91. The neutralizing binding protein according to claim 90, wherein said IL-17 is selected from the group consisting of pro-human IL-17; mature-human IL-17, and truncated-human IL-17.

92. The neutralizing binding protein according to claim 90, wherein said neutralizing binding protein diminishes the ability of IL-17 to bind to its receptor.

93. The neutralizing binding protein according to claim 92, wherein said neutralizing binding protein diminishes the ability of pro-human IL-17, mature-human IL-17, or truncated-human IL-17 to bind to its receptor.

94. The neutralizing binding protein according to claim 90, wherein said neutralizing binding protein is capable of reducing one or more of IL-17 biological activities selected from the

group consisting of: Th1 modulation; Th2 modulation; Nk modulation; neutrophil modulation; monocyte-macrophage lineage modulation; neutrophil modulation; eosinophil modulation; B-cells modulation; cytokine modulation; chemokine modulation; adhesion molecule modulation; and cell recruitment modulation.

95. The neutralizing binding protein according to claim 90, wherein said neutralizing binding protein has a dissociation constant (K_D) selected from the group consisting of: at most about 10^{-7} M; at most about 10^{-8} M; at most about 10^{-9} M; at most about 10^{-10} M; at most about 10^{-11} M; at most about 10^{-12} M; and at most 10^{-13} M.

96. The neutralizing binding protein according to claim 90, wherein said neutralizing binding protein has an on rate selected from the group consisting of: at least about $10^{2}M^{-1}s^{-1}$; at least about $10^{3}M^{-1}s^{-1}$; at least about $10^{4}M^{-1}s^{-1}$; at least about $10^{5}M^{-1}s^{-1}$; and at least about $10^{6}M^{-1}s^{-1}$.

97. The neutralizing binding protein according to claim 90, wherein said neutralizing binding protein has an off rate selected from the group consisting of: at most about $10^{-3}s^{-1}$; at most about $10^{-4}s^{-1}$; at most about $10^{-5}s^{-1}$; and at most about $10^{-6}s^{-1}$.

98. A labeled binding protein comprising a binding protein of any one of claims 70-89, wherein said binding protein is conjugated to a detectable label.

99. The labeled binding protein of claim 98, wherein the detectable label is selected from the group consisting of a radiolabel, an enzyme, a fluorescent label, a luminescent label, a bioluminescent label, a magnetic label, and biotin.

100. The labeled binding protein of claim 99, wherein said label is a radiolabel selected from the group consisting of: ^{3}H, ^{14}C, ^{35}S, ^{90}Y, ^{99}Tc, ^{111}In, ^{125}I, ^{131}I, ^{177}Lu, ^{166}Ho, and ^{153}Sm.

101. A conjugate binding protein comprising a binding protein of any one of claims 70-89, wherein said binding protein is conjugated to a therapeutic or cytotoxic agent.

102. The conjugate binding protein of claim 101, wherein said therapeutic or cytotoxic agent is selected from the group consisting of; an anti-metabolite, an alkylating agent, an antibiotic, a growth factor, a cytokine, an anti-angiogenic agent, an anti-mitotic agent, an

anthracycline, toxin, and an apoptotic agent.

103. An isolated nucleic acid encoding a binding protein amino acid sequence of any one of claims 70-89.

104. A vector comprising an isolated nucleic acid according to claim 103.

105. The vector of claim 104, wherein said vector is selected from the group consisting of; pcDNA, pTT, pTT3, pEFBOS, pBV, pJV, and pBJ.

106. A host cell comprising a vector according to any one of claims 104 or 105.

107. The host cell according to claim 106, wherein said host cell is a prokaryotic cell.

108. The host cell according to claim 107, wherein said host cell is *E. coli*.

109. The host cell according to claim 106, wherein said host cell is a eukaryotic cell.

110. The host cell according to claim 109, wherein said eukaryotic cell is selected from the group consisting of protist cell, animal cell, plant cell and fungal cell.

111. The host cell according to claim 110, wherein said eukaryotic cell is an animal cell selected from the group consisting of; a mammalian cell, an avian cell, and an insect cell.

112. The host cell according to claim 111, wherein said animal cell is a CHO cell.

113. The host cell according to claim 111, wherein said host cell is COS.

114. The host cell according to claim 110, wherein said eukaryotic cell is *Saccharomyces cerevisiae*.

115 The host cell according to claim 111, wherein said animal cell is an insect Sf9 cell.

116. A method of producing a binding protein that binds human IL-17, comprising culturing the host cell of any one of claims 106-115 in a culture medium under conditions sufficient to produce a binding protein that binds human IL-17.

117. A binding protein produced according to the method of claim 116.

118. A crystallized binding protein comprising a binding protein according to any one of claims 70-97, wherein said binding protein exists as a crystal.

119. The crystallized binding protein according to claim 118, wherein said crystal is a carrier-free pharmaceutical controlled release crystal.

120. The crystallized binding protein according to claim 118, wherein said binding protein has a greater half life in vivo than the soluble counterpart of said binding protein.

121. The crystallized binding protein according to claim 118, wherein said binding protein retains biological activity.

122. A composition for the release of a binding protein said composition comprising:
(a) a formulation, wherein said formulation comprises a crystallized binding protein, according to any one of claims 118-121, and an ingredient; and
(b) at least one polymeric carrier.

123. The composition according to claim 122, wherein said polymeric carrier is a polymer selected from one or more of the group consisting of: poly (acrylic acid), poly (cyanoacrylates), poly (amino acids), poly (anhydrides), poly (depsipeptide), poly (esters), poly (lactic acid), poly (lactic-co-glycolic acid) or PLGA, poly (b-hydroxybutryate), poly (caprolactone), poly (dioxanone); poly (ethylene glycol), poly ((hydroxypropyl) methacrylamide, poly [(organo)phosphazene], poly (ortho esters), poly (vinyl alcohol), poly (vinylpyrrolidone), maleic anhydride- alkyl vinyl ether copolymers, pluronic polyols, albumin, alginate, cellulose and cellulose derivatives, collagen, fibrin, gelatin, hyaluronic acid, oligosaccharides, glycaminoglycans, sulfated polysaccharides, blends and copolymers thereof.

124. The composition according to claim 122, wherein said ingredient is selected from the group consisting of albumin, sucrose, trehalose, lactitol, gelatin, hydroxypropyl-β-cyclodextrin, methoxypolyethylene glycol and polyethylene glycol.

125. A method for treating a mammal comprising the step of administering to the mammal an effective amount of the composition according to claim 122.

126. A pharmaceutical composition comprising the binding protein of any one of claims 70-97, and a pharmaceutically acceptable carrier.

127. The pharmaceutical composition of claim 126 which further comprises at least one additional therapeutic agent for treating a disorder in which IL-17 activity is detrimental.

128. The pharmaceutical composition of claim 127, wherein said additional agent is selected from the group consisting of: angiogenesis inhibitors; kinase inhibitors; co-stimulation molecule blockers; adhesion molecule blockers; anti-cytokine antibody or functional fragment thereof; methotrexate; corticosteroids; cyclosporin; rapamycin; FK506; and non-steroidal anti-inflammatory agents.

129. A method for reducing human IL-17 activity comprising contacting human IL-17 with the binding protein of any one of claims 70-97 such that human IL-17 activity is reduced.

130. A method for reducing human IL-17 activity in a human subject suffering from a disorder in which IL-17 activity is detrimental, comprising administering to the human subject the binding protein of any one of claims 70-97 such that human IL-17 activity in the human subject is reduced.

131. A method for treating a subject for a disease or a disorder in which IL-17 activity is detrimental by administering to the subject the binding protein of any one of claims 70-97 such that treatment is achieved.

132. The method of claim 131, wherein said disorder is selected from the group consisting of: rheumatoid arthritis, osteoarthritis, juvenile chronic arthritis, septic arthritis, Lyme arthritis, psoriatic arthritis, reactive arthritis, spondyloarthropathy, systemic lupus erythematosus, Crohn's disease, ulcerative colitis, inflammatory bowel disease, insulin dependent diabetes mellitus, thyroiditis, asthma, allergic diseases, psoriasis, dermatitis scleroderma, graft versus host disease, organ transplant rejection, acute or chronic immune disease associated with organ transplantation, sarcoidosis, atherosclerosis, disseminated intravascular coagulation, Kawasaki's disease, Grave's disease, nephrotic syndrome, chronic fatigue syndrome, Wegener's granulomatosis, Henoch-Schoenlein

purpurea, microscopic vasculitis of the kidneys, chronic active hepatitis, uveitis, septic shock, toxic shock syndrome, sepsis syndrome, cachexia, infectious diseases, parasitic diseases, acquired immunodeficiency syndrome, acute transverse myelitis, Huntington's chorea, Parkinson's disease, Alzheimer's disease, stroke, primary biliary cirrhosis, hemolytic anemia, malignancies, heart failure, myocardial infarction, Addison's disease, sporadic, polyglandular deficiency type I and polyglandular deficiency type II, Schmidt's syndrome, adult (acute) respiratory distress syndrome, alopecia, alopecia areata, seronegative arthropathy, arthropathy, Reiter's disease, psoriatic arthropathy, ulcerative colitic arthropathy, enteropathic synovitis, chlamydia, yersinia and salmonella associated arthropathy, spondyloarthropathy, atheromatous disease/arteriosclerosis, atopic allergy, autoimmune bullous disease, pemphigus vulgaris, pemphigus foliaceus, pemphigoid, linear IgA disease, autoimmune haemolytic anaemia, Coombs positive haemolytic anaemia, acquired pernicious anaemia, juvenile pernicious anaemia, myalgic encephalitis/Royal Free Disease, chronic mucocutaneous candidiasis, giant cell arteritis, primary sclerosing hepatitis, cryptogenic autoimmune hepatitis, Acquired Immunodeficiency Disease Syndrome, Acquired Immunodeficiency Related Diseases, Hepatitis B, Hepatitis C, common varied immunodeficiency (common variable hypogammaglobulinaemia), dilated cardiomyopathy, female infertility, ovarian failure, premature ovarian failure, fibrotic lung disease, cryptogenic fibrosing alveolitis, post-inflammatory interstitial lung disease, interstitial pneumonitis, connective tissue disease associated interstitial lung disease, mixed connective tissue disease associated lung disease, systemic sclerosis associated interstitial lung disease, rheumatoid arthritis associated interstitial lung disease, systemic lupus erythematosus associated lung disease, dermatomyositis/polymyositis associated lung disease, Sjögren's disease associated lung disease, ankylosing spondylitis associated lung disease, vasculitic diffuse lung disease, haemosiderosis associated lung disease, drug-induced interstitial lung disease, fibrosis, radiation fibrosis, bronchiolitis obliterans, chronic eosinophilic pneumonia, lymphocytic infiltrative lung disease, postinfectious interstitial lung disease, gouty arthritis, autoimmune hepatitis, type-1 autoimmune hepatitis (classical autoimmune or lupoid hepatitis), type-2 autoimmune hepatitis (anti-LKM antibody hepatitis), autoimmune mediated hypoglycaemia, type B insulin resistance with acanthosis nigricans, hypoparathyroidism, acute immune disease associated with organ transplantation, chronic immune disease associated with organ transplantation, osteoarthrosis, primary sclerosing cholangitis, psoriasis type 1, psoriasis type 2, idiopathic leucopaenia, autoimmune neutropaenia, renal disease NOS, glomerulonephritides, microscopic vasculitis of the kidneys, Lyme disease, discoid lupus erythematosus, male infertility idiopathic or NOS,

sperm autoimmunity, multiple sclerosis (all subtypes), sympathetic ophthalmia, pulmonary hypertension secondary to connective tissue disease, Goodpasture's syndrome, pulmonary manifestation of polyarteritis nodosa, acute rheumatic fever, rheumatoid spondylitis, Still's disease, systemic sclerosis, Sjörgren's syndrome, Takayasu's disease/arteritis, autoimmune thrombocytopaenia, idiopathic thrombocytopaenia, autoimmune thyroid disease, hyperthyroidism, goitrous autoimmune hypothyroidism (Hashimoto's disease), atrophic autoimmune hypothyroidism, primary myxoedema, phacogenic uveitis, primary vasculitis, vitiligo acute liver disease, chronic liver diseases, alcoholic cirrhosis, alcohol-induced liver injury, choleosatatis, idiosyncratic liver disease, Drug-Induced hepatitis, Non-alcoholic Steatohepatitis, allergy and asthma, group B streptococci (GBS) infection, mental disorders (*e.g.*, depression and schizophrenia), Th2 Type and Th1 Type mediated diseases, acute and chronic pain (different forms of pain), and cancers such as lung, breast, stomach, bladder, colon, pancreas, ovarian, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma) Abetalipoproteinemia, Acrocyanosis, acute and chronic parasitic or infectious processes, acute leukemia, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), acute or chronic bacterial infection, acute pancreatitis, acute renal failure, adenocarcinomas, aerial ectopic beats, AIDS dementia complex, alcohol-induced hepatitis, allergic conjunctivitis, allergic contact dermatitis, allergic rhinitis, allograft rejection, alpha-1- antitrypsin deficiency, amyotrophic lateral sclerosis, anemia, angina pectoris, anterior horn cell degeneration, anti-CD3 therapy, antiphospholipid syndrome, anti-receptor hypersensitivity reactions, aortic and peripheral aneurysms, aortic dissection, arterial hypertension, arteriosclerosis, arteriovenous fistula, ataxia, atrial fibrillation (sustained or paroxysmal), atrial flutter, atrioventricular block, B cell lymphoma, bone graft rejection, bone marrow transplant (BMT) rejection, bundle branch block, Burkitt's lymphoma, Burns, cardiac arrhythmias, cardiac stun syndrome, cardiac tumors, cardiomyopathy, cardiopulmonary bypass inflammation response, cartilage transplant rejection, cerebellar cortical degenerations, cerebellar disorders, chaotic or multifocal atrial tachycardia, chemotherapy associated disorders, chronic myelocytic leukemia (CML), chronic alcoholism, chronic inflammatory pathologies, chronic lymphocytic leukemia (CLL), chronic obstructive pulmonary disease (COPD), chronic salicylate intoxication, colorectal carcinoma, congestive heart failure, conjunctivitis, contact dermatitis, cor pulmonale, coronary artery disease, Creutzfeldt-Jakob disease, culture negative sepsis, cystic fibrosis, cytokine therapy associated disorders, Dementia pugilistica, demyelinating diseases, dengue hemorrhagic fever, dermatitis, dermatologic conditions, diabetes, diabetes mellitus, diabetic arteriosclerotic disease, Diffuse Lewy

body disease, dilated congestive cardiomyopathy, disorders of the basal ganglia, Down's Syndrome in middle age, drug- induced movement disorders induced by drugs which block CNS dopamine receptors, drug sensitivity, eczema, encephalomyelitis, endocarditis, endocrinopathy, epiglottitis, Epstein-Barr virus infection, erythromelalgia, extrapyramidal and cerebellar disorders, familial hematophagocytic lymphohistiocytosis, fetal thymus implant rejection, Friedreich's ataxia, functional peripheral arterial disorders, fungal sepsis, gas gangrene, gastric ulcer, glomerular nephritis, graft rejection of any organ or tissue, gram negative sepsis, gram positive sepsis, granulomas due to intracellular organisms, hairy cell leukemia, Hallervorden-Spatz disease, Hashimoto's thyroiditis, hay fever, heart transplant rejection, hemachromatosis, hemodialysis, hemolytic uremic syndrome/thrombolytic thrombocytopenic purpura, hemorrhage, hepatitis (A), His bundle arrhythmias, HIV infection/HIV neuropathy, Hodgkin's disease, hyperkinetic movement disorders, hypersensitivity reactions, hypersensitivity pneumonitis, hypertension, hypokinetic movement disorders, hypothalamic-pituitary-adrenal axis evaluation, idiopathic Addison's disease, idiopathic pulmonary fibrosis, antibody mediated cytotoxicity, Asthenia, infantile spinal muscular atrophy, inflammation of the aorta, influenza a, ionizing radiation exposure, iridocyclitis/uveitis/optic neuritis, ischemia-reperfusion injury, ischemic stroke, juvenile rheumatoid arthritis, juvenile spinal muscular atrophy, Kaposi's sarcoma, kidney transplant rejection, legionella, leishmaniasis, leprosy, lesions of the corticospinal system, lipedema, liver transplant rejection, lymphedema, malaria, malignant Lymphoma, malignant histiocytosis, malignant melanoma, meningitis, meningococcemia, metabolic/idiopathic, migraine headache, mitochondrial multi-system disorder, mixed connective tissue disease, monoclonal gammopathy, multiple myeloma, multiple systems degenerations (Mencel Dejerine- Thomas Shi-Drager and Machado-Joseph), myasthenia gravis, mycobacterium avium intracellulare, mycobacterium tuberculosis, myelodysplastic syndrome, myocardial infarction, myocardial ischemic disorders, nasopharyngeal carcinoma, neonatal chronic lung disease, nephritis, nephrosis, neurodegenerative diseases, neurogenic I muscular atrophies , neutropenic fever, non-Hodgkins lymphoma, occlusion of the abdominal aorta and its branches, occlusive arterial disorders, OKT3® therapy, orchitis/epidydimitis, orchitis/vasectomy reversal procedures, organomegaly, osteoporosis, pancreas transplant rejection, pancreatic carcinoma, paraneoplastic syndrome/hypercalcemia of malignancy, parathyroid transplant rejection, pelvic inflammatory disease, perennial rhinitis, pericardial disease, peripheral atherosclerotic disease, peripheral vascular disorders, peritonitis, pernicious anemia, pneumocystis carinii pneumonia, pneumonia, POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes syndrome),

post perfusion syndrome, post pump syndrome, post-MI cardiotomy syndrome, preeclampsia, Progressive supranucleo Palsy, primary pulmonary hypertension, radiation therapy, Raynaud's phenomenon and disease, Raynaud's disease, Refsum's disease, regular narrow QRS tachycardia, renovascular hypertension, reperfusion injury, restrictive cardiomyopathy, sarcomas, scleroderma, senile chorea, Senile Dementia of Lewy body type, seronegative arthropathies, shock, sickle cell anemia, skin allograft rejection, skin changes syndrome, small bowel transplant rejection, solid tumors, specific arrhythmias, spinal ataxia, spinocerebellar degenerations, streptococcal myositis, structural lesions of the cerebellum, Subacute sclerosing panencephalitis, Syncope, syphilis of the cardiovascular system, systemic anaphylaxis, systemic inflammatory response syndrome, systemic onset juvenile rheumatoid arthritis, T-cell or FAB ALL, Telangiectasia, thromboangitis obliterans, thrombocytopenia, toxicity, transplants, trauma/hemorrhage, type III hypersensitivity reactions, type IV hypersensitivity, unstable angina, uremia, urosepsis, urticaria, valvular heart diseases, varicose veins, vasculitis, venous diseases, venous thrombosis, ventricular fibrillation, viral and fungal infections, viral encephalitis/aseptic meningitis, viral-associated hemaphagocytic syndrome, Wernicke- Korsakoff syndrome, Wilson's disease, xenograft rejection of any organ or tissue, acute coronary syndromes, acute idiopathic polyneuritis, acute inflammatory demyelinating polyradiculoneuropathy, acute ischemia, adult Still's disease, alopecia areata, anaphylaxis, anti-phospholipid antibody syndrome, aplastic anemia, arteriosclerosis, atopic eczema, atopic dermatitis, autoimmune dermatitis, autoimmune disorder associated with streptococcus infection, autoimmune enteropathy, autoimmune hearing loss, autoimmune lymphoproliferative syndrome (ALPS), autoimmune myocarditis, autoimmune premature ovarian failure, blepharitis, bronchiectasis, bullous pemphigoid, cardiovascular disease, catastrophic antiphospholipid syndrome, celiac disease, cervical spondylosis, chronic ischemia, cicatricial pemphigoid, clinically isolated syndrome (cis) with risk for multiple sclerosis, conjunctivitis, childhood onset psychiatric disorder, chronic obstructive pulmonary disease (COPD), dacryocystitis, dermatomyositis, diabetic retinopathy, diabetes mellitus, disk herniation, disk prolapse, drug induced immune hemolytic anemia, endocarditis, endometriosis, endophthalmitis, episcleritis, erythema multiforme, erythema multiforme major, gestational pemphigoid, Guillain-Barré syndrome (GBS), hay fever, Hughes syndrome, idiopathic Parkinson's disease, idiopathic interstitial pneumonia, IgE-mediated allergy, immune hemolytic anemia, inclusion body myositis, infectious ocular inflammatory disease, inflammatory demyelinating disease, inflammatory heart disease, inflammatory kidney disease, IPF/UIP, iritis, keratitis, keratojunctivitis sicca, Kussmaul disease or Kussmaul-Meier

disease, Landry's paralysis, Langerhan's cell histiocytosis, livedo reticularis, macular degeneration, microscopic polyangiitis, morbus bechterev, motor neuron disorders, mucous membrane pemphigoid, multiple organ failure, myasthenia gravis, myelodysplastic syndrome, myocarditis, nerve root disorders, neuropathy, non-A non-B hepatitis, optic neuritis, osteolysis, ovarian cancer, pauciarticular JRA, peripheral artery occlusive disease (PAOD), peripheral vascular disease (PVD), peripheral artery, disease (PAD), phlebitis, polyarteritis nodosa (or periarteritis nodosa), polychondritis, polymyalgia rheumatica, poliosis, polyarticular JRA, polyendocrine deficiency syndrome, polymyositis, polymyalgia rheumatica (PMR), post-pump syndrome, primary Parkinsonism, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma), prostatitis, pure red cell aplasia, primary adrenal insufficiency, recurrent neuromyelitis optica, restenosis, rheumatic heart disease, sapho (synovitis, acne, pustulosis, hyperostosis, and osteitis), scleroderma, secondary amyloidosis, shock lung, scleritis, sciatica, secondary adrenal insufficiency, silicone associated connective tissue disease, sneddon-wilkinson dermatosis, spondylitis ankylosans, Stevens-Johnson syndrome (SJS), systemic inflammatory response syndrome, temporal arteritis, toxoplasmic retinitis, toxic epidermal necrolysis, transverse myelitis, TRAPS (tumor necrosis factor receptor, type 1 allergic reaction, type II diabetes, urticaria, usual interstitial pneumonia (UIP), vasculitis, vernal conjunctivitis, viral retinitis, Vogt-Koyanagi-Harada syndrome (VKH syndrome), wet macular degeneration, wound healing, yersinia and salmonella associated arthropathy.

133. A method of treating a patient suffering from a disorder in which IL-17 is detrimental comprising the step of administering the binding protein of any one of claims 70-97 before, concurrent, or after the administration of a second agent, wherein the second agent is selected from the group consisting of an antibody, or fragment thereof, capable of binding human IL-12; methotrexate; an antibody, or fragment thereof, capable of binding human TNF, corticosteroids, cyclosporin, rapamycin, FK506, and non-steroidal anti-inflammatory agents.

134. A binding protein comprising a polypeptide chain, wherein said polypeptide chain comprises VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein VD1 comprises an amino acid sequence of a variable heavy region (VH) of an anti-TNF-α antibody wherein said amino acid sequence is any of SEQ ID NOs:563, 573, 578, 593, 628, 638, 648, 658, 668, 678, 688, 698, 708, 718, 728, 738, 748, 758, 763, 773, 783, 793, 803, 813, 823, 833, 843, 853, 863, 873, and 883; and

wherein VD2 comprises the amino acid sequence of a VH region of anti-IL-17 antibody wherein said amino acid sequence is any of SEQ ID NOs:565, 575, 580, 595, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 765, 775, 795, 805, 815, 825, 835, 845, 855, 865, 875, and 885.

135. The binding protein according to claim 134, wherein VD1 and VD2 comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882.

136. A binding protein comprising a polypeptide chain, wherein said polypeptide chain comprises VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein VD1 comprises an amino acid sequence of a variable light region (VL) of an anti-TNF-α antibody wherein said amino acid sequence is any of SEQ ID NOs:568, 583, 588, 598, 603, 608, 613, 618, 623, 633, 643, 653, 663, 673, 683, 693, 703, 713, 723, 733, 743, 753, 768, 778, 788, 798, 808, 818, 828, 848, 858, 868, and 878; and

wherein VD2 comprises an amino acid sequence of a VL region of anti-IL-17 antibody wherein said amino acid sequence is any of SEQ ID NOs:570, 585, 590, 600, 605, 610, 615, 620, 625, 635, 645, 655, 665, 675, 685, 695, 705, 715, 725, 735, 745, 755, 770, 780, 790, 800, 810, 820, 830, 850, 860, 870, and 880.

137. The binding protein according to claim 136, wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence of any of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

138. The binding protein according to claim 134 or 136, wherein n is 0.

139. A binding protein comprising first and second polypeptide chains, wherein said first polypeptide chain comprises a first VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1; and

X2 is an Fc region; and

wherein said second polypeptide chain comprises a second VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein said VD1 and VD2 heavy chain variable domains comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein said VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

140. The binding protein according to claim 134, 136, or 139, wherein X1 or X2 is an amino acid sequence selected from the group consisting of SEQ ID NOs:888-918.

141. The binding protein according to claim 139, wherein the binding protein comprises two first polypeptide chains and two second polypeptide chains.

142. The binding protein according to claim 134, 136, or 139, wherein the Fc region is selected from the group consisting of native sequence Fc region and a variant sequence Fc region.

143. The binding protein according to claim 142, wherein the Fc region is selected from the group consisting of an Fc region from an IgG1, IgG2, IgG3, IgG4, IgA, IgM, IgE, and IgD.

144. The binding protein according to claim 134, 136, or 139, wherein said VD1 of the first polypeptide chain and said VD1 of the second polypeptide chain are obtained from the same first and second parent antibody, respectively, or antigen binding portion thereof.

145. The binding protein according to any one of claims 134-144, wherein said anti-TNF-α antibody binds TNF-α with a potency different from the potency with which said anti-IL-17 antibody binds human IL-17.

146. The binding protein according to any one of claims 134-144, wherein said anti-TNF-α antibody binds TNF-α with an affinity different from the affinity with which said anti-IL-17 antibody binds human IL-17.

147. The binding protein according to any one of claims 134-144, wherein said anti-TNF-α antibody and said anti-IL-17 antibody are selected from the group consisting of a human antibody, a CDR grafted antibody, and a humanized antibody.

148. The binding protein according to claim 134, 136, or 139, wherein said binding protein possesses at least one desired property exhibited by said anti-TNF-α antibody or said anti-IL-17 antibody.

149. The binding protein according to claim 148, wherein said desired property is selected from one or more antibody parameters.

150. The binding protein according to claim 149, wherein said antibody parameters are selected from the group consisting of antigen specificity, affinity to antigen, potency, biological function, epitope recognition, stability, solubility, production efficiency,

immunogenicity, pharmacokinetics, bioavailability, tissue cross reactivity, and orthologous antigen binding.

151. A binding protein capable of binding two antigens comprising four polypeptide chains, wherein two polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1; and

X2 is an Fc region; and

wherein two polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

wherein the VD1 and VD2 heavy chain variable domains comprise an amino acid sequence of any of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

152. The binding protein according to claim 134, 136, 139, or 151, wherein said binding protein has an on rate constant (Kon) to said one or more targets selected from the group consisting of: at least about $10^2 M^{-1}s^{-1}$; at least about $10^3 M^{-1}s^{-1}$; at least about $10^4 M^{-1}s^{-1}$; at least about $10^5 M^{-1}s^{-1}$; and at least about $10^6 M^{-1}s^{-1}$, as measured by surface plasmon resonance.

153. The binding protein according to claim 134, 136, 139, or 151, wherein said binding protein has an off rate constant (Koff) to said one or more targets selected from the group consisting of: at most about $10^{-3}s^{-1}$; at most about $10^{-4}s^{-1}$; at most about $10^{-5}s^{-1}$; and at most about $10^{-6}s^{-1}$, as measured by surface plasmon resonance.

154. The binding protein according to claim 134, 136, 139, or 151, wherein said binding protein has a dissociation constant (K_D) to said one or more targets selected from the group consisting of: at most about 10^{-7} M; at most about 10^{-8} M; at most about 10^{-9} M; at most about 10^{-10} M; at most about 10^{-11} M; at most about 10^{-12} M; and at most 10^{-13} M.

155. A binding protein conjugate comprising a binding protein according to any one of claims 134, 136, 139, or 151, said binding protein conjugate further comprising an agent selected from the group consisting of; an immunoadhesion molecule, an imaging agent, a therapeutic agent, and a cytotoxic agent.

156. The binding protein conjugate according to claim 155, wherein said agent is an imaging agent selected from the group consisting of: a radiolabel, an enzyme, a fluorescent label, a luminescent label, a bioluminescent label, a magnetic label, and biotin.

157. The binding protein conjugate according to claim 156, wherein said imaging agent is a radiolabel selected from the group consisting of: ^{3}H, ^{14}C, ^{35}S, ^{90}Y, ^{99}Tc, ^{111}In, ^{125}I, ^{131}I, ^{177}Lu, ^{166}Ho, and ^{153}Sm.

158. The binding protein conjugate according to claim 156, wherein said agent is a therapeutic or cytotoxic agent selected from the group consisting of: an anti-metabolite, an alkylating agent, an antibiotic, a growth factor, a cytokine, an anti-angiogenic agent, an anti-mitotic agent, an anthracycline, toxin, and an apoptotic agent.

159. The binding protein according to claim 134, 136, 139, or 151, wherein said binding protein is a crystallized binding protein.

160. The binding protein according to claim 159, wherein said crystal is a carrier-free pharmaceutical controlled release crystal.

161. The binding protein according to claim 159, wherein said binding protein has a greater half life in vivo than the soluble counterpart of said binding protein.

162. The binding protein according to claim 159, wherein said binding protein retains biological activity.

163. An isolated nucleic acid encoding a binding protein amino acid sequence according to any one of claims 134, 136, 139, or 151.

164. A vector comprising an isolated nucleic acid according to claim 163.

165. The vector according to claim 164, wherein said vector is selected from the group consisting of pcDNA, pTT, pTT3, pEFBOS, pBV, pJV, pcDNA3.1 TOPO, pEF6 TOPO, and pBJ.

166. A host cell comprising a vector according to claim 164.

167. The host cell according to claim 166, wherein said host cell is a prokaryotic cell.

168. The host cell according to claim 167, wherein said host cell is *E. coli*.

169. The host cell according to claim 166, wherein said host cell is a eukaryotic cell.

170. The host cell according to claim 166, wherein said eukaryotic cell is selected from the group consisting of protist cell, animal cell, plant cell, and fungal cell.

171. The host cell according to claim 169, wherein said eukaryotic cell is an animal cell selected from the group consisting of a mammalian cell, an avian cell, and an insect cell.

172. The host cell according to claim 171, wherein said host cell is a CHO cell.

173. The host cell according to claim 171, wherein said host cell is COS.

174. The host cell according to claim 166, wherein said host cell is a yeast cell.

175. The host cell according to claim 174, wherein said yeast cell is *Saccharomyces cerevisiae*.

176. The host cell according to claim 171, wherein said host cell is an insect Sf9 cell.

177. A method of producing a binding protein, comprising culturing a host cell described in any one of claims 166-176 in culture medium under conditions sufficient to produce the binding protein.

178. The method according to claim 177, wherein 50%-75% of the binding protein produced is a dual specific tetravalent binding protein.

179. The method according to claim 177, wherein 75%-90% of the binding protein produced is a dual specific tetravalent binding protein.

180. The method according to claim 177, wherein 90%-95% of the binding protein produced is a dual specific tetravalent binding protein.

181. A protein produced according to the method of claim 177.

182. A pharmaceutical composition comprising the binding protein of any one of claims 134-162 and 181, and a pharmaceutically acceptable carrier.

183. The pharmaceutical composition of claim 182 further comprising at least one additional therapeutic agent.

184. The pharmaceutical composition of claim 183, wherein said additional therapeutic agent is selected from the group consisting of: therapeutic agent, imaging agent, cytotoxic agent, angiogenesis inhibitors; kinase inhibitors; co-stimulation molecule blockers; adhesion molecule blockers; anti-cytokine antibody or functional fragment thereof; methotrexate; cyclosporin; rapamycin; FK506; detectable label or reporter; a TNF antagonist; an antirheumatic; a muscle relaxant, a narcotic, a non-steroid anti-inflammatory drug (NSAID), an analgesic, an anesthetic, a sedative, a local anesthetic, a neuromuscular blocker, an antimicrobial, an antipsoriatic, a corticosteroid, an anabolic steroid, an erythropoietin, an immunization, an immunoglobulin, an immunosuppressive, a growth hormone, a hormone replacement drug, a radiopharmaceutical, an antidepressant, an antipsychotic, a stimulant, an asthma medication, a beta agonist, an inhaled steroid, an epinephrine or analog, a cytokine, and a cytokine antagonist.

185. A method for treating a subject for a disease or a disorder by administering to the subject the binding protein of any one of claims 134-162 and 181 such that treatment is achieved.

186. The method of claim 185, wherein said disorder is selected from the group comprising rheumatoid arthritis, osteoarthritis, juvenile chronic arthritis, septic arthritis, Lyme

arthritis, psoriatic arthritis, reactive arthritis, spondyloarthropathy, systemic lupus erythematosus, Crohn's disease, ulcerative colitis, inflammatory bowel disease, insulin dependent diabetes mellitus, thyroiditis, asthma, allergic diseases, psoriasis, dermatitis scleroderma, graft versus host disease, organ transplant rejection, acute or chronic immune disease associated with organ transplantation, sarcoidosis, atherosclerosis, disseminated intravascular coagulation, Kawasaki's disease, Grave's disease, nephrotic syndrome, chronic fatigue syndrome, Wegener's granulomatosis, Henoch-Schoenlein purpurea, microscopic vasculitis of the kidneys, chronic active hepatitis, uveitis, septic shock, toxic shock syndrome, sepsis syndrome, cachexia, infectious diseases, parasitic diseases, acquired immunodeficiency syndrome, acute transverse myelitis, Huntington's chorea, Parkinson's disease, Alzheimer's disease, stroke, primary biliary cirrhosis, hemolytic anemia, malignancies, heart failure, myocardial infarction, Addison's disease, sporadic, polyglandular deficiency type I and polyglandular deficiency type II, Schmidt's syndrome, adult (acute) respiratory distress syndrome, alopecia, alopecia areata, seronegative arthropathy, arthropathy, Reiter's disease, psoriatic arthropathy, ulcerative colitic arthropathy, enteropathic synovitis, chlamydia, yersinia and salmonella associated arthropathy, spondyloarthropathy, atheromatous disease/arteriosclerosis, atopic allergy, autoimmune bullous disease, pemphigus vulgaris, pemphigus foliaceus, pemphigoid, linear IgA disease, autoimmune haemolytic anaemia, Coombs positive haemolytic anaemia, acquired pernicious anaemia, juvenile pernicious anaemia, myalgic encephalitis/Royal Free Disease, chronic mucocutaneous candidiasis, giant cell arteritis, primary sclerosing hepatitis, cryptogenic autoimmune hepatitis, Acquired Immunodeficiency Disease Syndrome, Acquired Immunodeficiency Related Diseases, Hepatitis B, Hepatitis C, common varied immunodeficiency (common variable hypogammaglobulinaemia), dilated cardiomyopathy, female infertility, ovarian failure, premature ovarian failure, fibrotic lung disease, cryptogenic fibrosing alveolitis, post-inflammatory interstitial lung disease, interstitial pneumonitis, connective tissue disease associated interstitial lung disease, mixed connective tissue disease associated lung disease, systemic sclerosis associated interstitial lung disease, rheumatoid arthritis associated interstitial lung disease, systemic lupus erythematosus associated lung disease, dermatomyositis/polymyositis associated lung disease, Sjögren's disease associated lung disease, ankylosing spondylitis associated lung disease, vasculitic diffuse lung disease, haemosiderosis associated lung disease, drug-induced interstitial lung disease, fibrosis, radiation fibrosis, bronchiolitis obliterans, chronic eosinophilic pneumonia, lymphocytic infiltrative lung disease, postinfectious interstitial lung disease, gouty arthritis, autoimmune hepatitis, type-1 autoimmune hepatitis (classical autoimmune or lupoid

hepatitis), type-2 autoimmune hepatitis (anti-LKM antibody hepatitis), autoimmune mediated hypoglycaemia, type B insulin resistance with acanthosis nigricans, hypoparathyroidism, acute immune disease associated with organ transplantation, chronic immune disease associated with organ transplantation, osteoarthrosis, primary sclerosing cholangitis, psoriasis type 1, psoriasis type 2, idiopathic leucopaenia, autoimmune neutropaenia, renal disease NOS, glomerulonephritides, microscopic vasculitis of the kidneys, Lyme disease, discoid lupus erythematosus, male infertility idiopathic or NOS, sperm autoimmunity, multiple sclerosis (all subtypes), sympathetic ophthalmia, pulmonary hypertension secondary to connective tissue disease, Goodpasture's syndrome, pulmonary manifestation of polyarteritis nodosa, acute rheumatic fever, rheumatoid spondylitis, Still's disease, systemic sclerosis, Sjörgren's syndrome, Takayasu's disease/arteritis, autoimmune thrombocytopaenia, idiopathic thrombocytopaenia, autoimmune thyroid disease, hyperthyroidism, goitrous autoimmune hypothyroidism (Hashimoto's disease), atrophic autoimmune hypothyroidism, primary myxoedema, phacogenic uveitis, primary vasculitis, vitiligo acute liver disease, chronic liver diseases, alcoholic cirrhosis, alcohol-induced liver injury, choleosatatis, idiosyncratic liver disease, Drug-Induced hepatitis, Non-alcoholic Steatohepatitis, allergy and asthma, group B streptococci (GBS) infection, mental disorders (*e.g.*, depression and schizophrenia), Th2 Type and Th1 Type mediated diseases, acute and chronic pain (different forms of pain), and cancers such as lung, breast, stomach, bladder, colon, pancreas, ovarian, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma) Abetalipoproteinemia, Acrocyanosis, acute and chronic parasitic or infectious processes, acute leukemia, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), acute or chronic bacterial infection, acute pancreatitis, acute renal failure, adenocarcinomas, aerial ectopic beats, AIDS dementia complex, alcohol-induced hepatitis, allergic conjunctivitis, allergic contact dermatitis, allergic rhinitis, allograft rejection, alpha-l- antitrypsin deficiency, amyotrophic lateral sclerosis, anemia, angina pectoris, anterior horn cell degeneration, anti-CD3 therapy, antiphospholipid syndrome, anti-receptor hypersensitivity reactions, aortic and peripheral aneurysms, aortic dissection, arterial hypertension, arteriosclerosis, arteriovenous fistula, ataxia, atrial fibrillation (sustained or paroxysmal), atrial flutter, atrioventricular block, B cell lymphoma, bone graft rejection, bone marrow transplant (BMT) rejection, bundle branch block, Burkitt's lymphoma, Burns, cardiac arrhythmias, cardiac stun syndrome, cardiac tumors, cardiomyopathy, cardiopulmonary bypass inflammation response, cartilage transplant rejection, cerebellar cortical degenerations, cerebellar disorders, chaotic or multifocal atrial tachycardia, chemotherapy associated disorders, chronic myelocytic

leukemia (CML), chronic alcoholism, chronic inflammatory pathologies, chronic lymphocytic leukemia (CLL), chronic obstructive pulmonary disease (COPD), chronic salicylate intoxication, colorectal carcinoma, congestive heart failure, conjunctivitis, contact dermatitis, cor pulmonale, coronary artery disease, Creutzfeldt-Jakob disease, culture negative sepsis, cystic fibrosis, cytokine therapy associated disorders, Dementia pugilistica, demyelinating diseases, dengue hemorrhagic fever, dermatitis, dermatologic conditions, diabetes, diabetes mellitus, diabetic arteriosclerotic disease, Diffuse Lewy body disease, dilated congestive cardiomyopathy, disorders of the basal ganglia, Down's Syndrome in middle age, drug- induced movement disorders induced by drugs which block CNS dopamine receptors, drug sensitivity, eczema, encephalomyelitis, endocarditis, endocrinopathy, epiglottitis, Epstein-Barr virus infection, erythromelalgia, extrapyramidal and cerebellar disorders, familial hematophagocytic lymphohistiocytosis, fetal thymus implant rejection, Friedreich's ataxia, functional peripheral arterial disorders, fungal sepsis, gas gangrene, gastric ulcer, glomerular nephritis, graft rejection of any organ or tissue, gram negative sepsis, gram positive sepsis, granulomas due to intracellular organisms, hairy cell leukemia, Hallervorden-Spatz disease, Hashimoto's thyroiditis, hay fever, heart transplant rejection, hemachromatosis, hemodialysis, hemolytic uremic syndrome/thrombolytic thrombocytopenic purpura, hemorrhage, hepatitis (A), His bundle arrhythmias, HIV infection/HIV neuropathy, Hodgkin's disease, hyperkinetic movement disorders, hypersensitivity reactions, hypersensitivity pneumonitis, hypertension, hypokinetic movement disorders, hypothalamic-pituitary-adrenal axis evaluation, idiopathic Addison's disease, idiopathic pulmonary fibrosis, antibody mediated cytotoxicity, Asthenia, infantile spinal muscular atrophy, inflammation of the aorta, influenza a, ionizing radiation exposure, iridocyclitis/uveitis/optic neuritis, ischemia-reperfusion injury, ischemic stroke, juvenile rheumatoid arthritis, juvenile spinal muscular atrophy, Kaposi's sarcoma, kidney transplant rejection, legionella, leishmaniasis, leprosy, lesions of the corticospinal system, lipedema, liver transplant rejection, lymphedema, malaria, malignant Lymphoma, malignant histiocytosis, malignant melanoma, meningitis, meningococcemia, metabolic/idiopathic, migraine headache, mitochondrial multi-system disorder, mixed connective tissue disease, monoclonal gammopathy, multiple myeloma, multiple systems degenerations (Mencel Dejerine- Thomas Shi-Drager and Machado-Joseph), myasthenia gravis, mycobacterium avium intracellulare, mycobacterium tuberculosis, myelodysplastic syndrome, myocardial infarction, myocardial ischemic disorders, nasopharyngeal carcinoma, neonatal chronic lung disease, nephritis, nephrosis, neurodegenerative diseases, neurogenic I muscular atrophies , neutropenic fever, non-Hodgkins lymphoma, occlusion of the abdominal aorta and its branches, occlusive arterial

disorders, OKT3® therapy, orchitis/epidydimitis, orchitis/vasectomy reversal procedures, organomegaly, osteoporosis, pancreas transplant rejection, pancreatic carcinoma, paraneoplastic syndrome/hypercalcemia of malignancy, parathyroid transplant rejection, pelvic inflammatory disease, perennial rhinitis, pericardial disease, peripheral atherosclerotic disease, peripheral vascular disorders, peritonitis, pernicious anemia, pneumocystis carinii pneumonia, pneumonia, POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes syndrome), post perfusion syndrome, post pump syndrome, post-MI cardiotomy syndrome, preeclampsia, Progressive supranucleo Palsy, primary pulmonary hypertension, radiation therapy, Raynaud's phenomenon and disease, Raynaud's disease, Refsum's disease, regular narrow QRS tachycardia, renovascular hypertension, reperfusion injury, restrictive cardiomyopathy, sarcomas, scleroderma, senile chorea, Senile Dementia of Lewy body type, seronegative arthropathies, shock, sickle cell anemia, skin allograft rejection, skin changes syndrome, small bowel transplant rejection, solid tumors, specific arrhythmias, spinal ataxia, spinocerebellar degenerations, streptococcal myositis, structural lesions of the cerebellum, Subacute sclerosing panencephalitis, Syncope, syphilis of the cardiovascular system, systemic anaphylaxis, systemic inflammatory response syndrome, systemic onset juvenile rheumatoid arthritis, T-cell or FAB ALL, Telangiectasia, thromboangitis obliterans, thrombocytopenia, toxicity, transplants, trauma/hemorrhage, type III hypersensitivity reactions, type IV hypersensitivity, unstable angina, uremia, urosepsis, urticaria, valvular heart diseases, varicose veins, vasculitis, venous diseases, venous thrombosis, ventricular fibrillation, viral and fungal infections, viral encephalitis/aseptic meningitis, viral-associated hemaphagocytic syndrome, Wernicke- Korsakoff syndrome, Wilson's disease, xenograft rejection of any organ or tissue, acute coronary syndromes, acute idiopathic polyneuritis, acute inflammatory demyelinating polyradiculoneuropathy, acute ischemia, adult Still's disease, alopecia areata, anaphylaxis, anti-phospholipid antibody syndrome, aplastic anemia, arteriosclerosis, atopic eczema, atopic dermatitis, autoimmune dermatitis, autoimmune disorder associated with streptococcus infection, autoimmune enteropathy, autoimmune hearing loss, autoimmune lymphoproliferative syndrome (ALPS), autoimmune myocarditis, autoimmune premature ovarian failure, blepharitis, bronchiectasis, bullous pemphigoid, cardiovascular disease, catastrophic antiphospholipid syndrome, celiac disease, cervical spondylosis, chronic ischemia, cicatricial pemphigoid, clinically isolated syndrome (cis) with risk for multiple sclerosis, conjunctivitis, childhood onset psychiatric disorder, chronic obstructive pulmonary disease (COPD), dacryocystitis, dermatomyositis, diabetic retinopathy, diabetes mellitus, disk herniation, disk prolapse,

drug induced immune hemolytic anemia, endocarditis, endometriosis, endophthalmitis, episcleritis, erythema multiforme, erythema multiforme major, gestational pemphigoid, Guillain-Barré syndrome (GBS), hay fever, Hughes syndrome, idiopathic Parkinson's disease, idiopathic interstitial pneumonia, IgE-mediated allergy, immune hemolytic anemia, inclusion body myositis, infectious ocular inflammatory disease, inflammatory demyelinating disease, inflammatory heart disease, inflammatory kidney disease, IPF/UIP, iritis, keratitis, keratojunctivitis sicca, Kussmaul disease or Kussmaul-Meier disease, Landry's paralysis, Langerhan's cell histiocytosis, livedo reticularis, macular degeneration, microscopic polyangiitis, morbus bechterev, motor neuron disorders, mucous membrane pemphigoid, multiple organ failure, myasthenia gravis, myelodysplastic syndrome, myocarditis, nerve root disorders, neuropathy, non-A non-B hepatitis, optic neuritis, osteolysis, ovarian cancer, pauciarticular JRA, peripheral artery occlusive disease (PAOD), peripheral vascular disease (PVD), peripheral artery, disease (PAD), phlebitis, polyarteritis nodosa (or periarteritis nodosa), polychondritis, polymyalgia rheumatica, poliosis, polyarticular JRA, polyendocrine deficiency syndrome, polymyositis, polymyalgia rheumatica (PMR), post-pump syndrome, primary Parkinsonism, prostate and rectal cancer and hematopoietic malignancies (leukemia and lymphoma), prostatitis, pure red cell aplasia, primary adrenal insufficiency, recurrent neuromyelitis optica, restenosis, rheumatic heart disease, sapho (synovitis, acne, pustulosis, hyperostosis, and osteitis), scleroderma, secondary amyloidosis, shock lung, scleritis, sciatica, secondary adrenal insufficiency, silicone associated connective tissue disease, sneddon-wilkinson dermatosis, spondylitis ankylosans, Stevens-Johnson syndrome (SJS), systemic inflammatory response syndrome, temporal arteritis, toxoplasmic retinitis, toxic epidermal necrolysis, transverse myelitis, TRAPS (tumor necrosis factor receptor, type 1 allergic reaction, type II diabetes, urticaria, usual interstitial pneumonia (UIP), vasculitis, vernal conjunctivitis, viral retinitis, Vogt-Koyanagi-Harada syndrome (VKH syndrome), wet macular degeneration, wound healing, yersinia and salmonella associated arthropathy.

187. The method according to claim 186, wherein said administering to the subject is by at least one mode selected from parenteral, subcutaneous, intramuscular, intravenous, intra-articular, intrabronchial, intraabdominal, intracapsular, intracartilaginous, intracavitary, intracelial, intracerebellar, intracerebroventricular, intracolic, intracervical, intragastric, intrahepatic, intramyocardial, intraosteal, intrapelvic, intrapericardiac, intraperitoneal, intrapleural, intraprostatic, intrapulmonary, intrarectal, intrarenal, intraretinal, intraspinal,

intrasynovial, intrathoracic, intrauterine, intravesical, bolus, vaginal, rectal, buccal, sublingual, intranasal, and transdermal.

188. A method for generating a DVD-Ig binding protein capable of binding two antigens comprising the steps of

a) obtaining a first parent antibody or antigen binding portion thereof, capable of binding TNF-α;

b) obtaining a second parent antibody or antigen binding portion thereof, capable of binding human IL-17;

c) constructing first and third polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second heavy chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1; and

d) constructing second and fourth polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second light chain variable domain obtained from said second parent antibody or antigen binding thereof;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1; and

e) expressing said first, second, third and fourth polypeptide chains;

such that a DVD-Ig binding protein capable of binding TNF-α and human IL-17 is generated, wherein the binding protein is capable of binding TNF-α and human IL-17;

wherein VD1 and VD2 heavy chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs: of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

189. The method of claim 188, wherein said first parent antibody or antigen binding portion thereof, and said second parent antibody or antigen binding portion thereof, are selected from the group consisting of a human antibody, a CDR grafted antibody, and a humanized antibody.

190. The method of claim 188, wherein said first parent antibody or antigen binding portion thereof, and said second parent antibody or antigen binding portion thereof, are selected from the group consisting of a Fab fragment, a $F(ab')_2$ fragment, a bivalent fragment comprising two Fab fragments linked by a disulfide bridge at the hinge region; a Fd fragment consisting of the VH and CH1 domains; a Fv fragment consisting of the VL and VH domains of a single arm of an antibody, a dAb fragment, an isolated complementarity determining region (CDR), a single chain antibody, and diabodies.

191. The method of claim 188, wherein said first parent antibody or antigen binding portion thereof possesses at least one desired property exhibited by the DVD-Ig binding protein.

192. The method of claim 188, wherein said second parent antibody or antigen binding portion thereof possesses at least one desired property exhibited by the DVD-Ig binding protein.

193. The method of claim 188, wherein the Fc region is selected from the group consisting of a native sequence Fc region and a variant sequence Fc region.

194. The method of claim 193, wherein the Fc region is selected from the group consisting of an Fc region from an IgG1, IgG2, IgG3, IgG4, IgA, IgM, IgE, and IgD.

195. The method of claim 191, wherein said desired property is selected from one or more antibody parameters.

196. The method of claim 192, wherein said desired property is selected from one or more antibody parameters.

197. The method of claim 195, wherein said antibody parameters are selected from the group consisting of antigen specificity, affinity to antigen, potency, biological function, epitope recognition, stability, solubility, production efficiency, immunogenicity, pharmacokinetics, bioavailability, tissue cross reactivity, and orthologous antigen binding.

198. The method of claim 196, wherein said antibody parameters are selected from the group consisting of antigen specificity, affinity to antigen, potency, biological function, epitope recognition, stability, solubility, production efficiency, immunogenicity, pharmacokinetics, bioavailability, tissue cross reactivity, and orthologous antigen binding.

199. The method of claim 188, wherein said first parent antibody or antigen binding portion thereof, binds said first antigen with a different affinity than the affinity with which said second parent antibody or antigen binding portion thereof, binds said second antigen.

200. The method of claim 188, wherein said first parent antibody or antigen binding portion thereof, binds said first antigen with a different potency than the potency with which said second parent antibody or antigen binding portion thereof, binds said second antigen.

201. A method for generating a DVD-Ig binding protein capable of binding TNF-α and human IL-17 with desired properties comprising the steps of

a) obtaining a first parent antibody or antigen binding portion thereof, capable of binding TNF-α and possessing at least one desired property exhibited by the Dual Variable Domain Immunoglobulin;

b) obtaining a second parent antibody or antigen binding portion thereof, capable of binding human IL-17 and possessing at least one desired property exhibited by the Dual Variable Domain Immunoglobulin;

c) constructing first and third polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first heavy chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second heavy chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region; and

n is 0 or 1;

d) constructing second and fourth polypeptide chains comprising VD1-(X1)n-VD2-C-(X2)n, wherein;

VD1 is a first light chain variable domain obtained from said first parent antibody or antigen binding portion thereof;

VD2 is a second light chain variable domain obtained from said second parent antibody or antigen binding portion thereof;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region; and

n is 0 or 1;

e) expressing said first, second, third, and fourth polypeptide chains;

such that a DVD-Ig binding capable of binding said TNF-α and human IL-17 with desired properties is generated,

wherein VD1 and VD2 heavy chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs: of SEQ ID NOs: 562, 572, 577, 592, 627, 637, 647, 657, 667, 677, 687, 697, 707, 717, 727, 737, 747, 757, 762, 772, 782, 792, 802, 812, 822, 832, 842, 852, 862, 872, and 882; and

wherein the VD1 and VD2 light chain variable domains comprise an amino acid sequence selected from the group consisting of SEQ ID NOs:567, 582, 587, 597, 602, 607, 612, 617, 622, 632, 642, 652, 662, 672, 682, 692, 702, 712, 722, 732, 742, 752, 767, 777, 787, 797, 807, 817, 827, 847, 857, 867, and 877.

What is claimed is:

1. A binding protein comprising first and second polypeptide chains, wherein the first polypeptide chain comprises a first VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region;

n is 0 or 1; and

wherein the second polypeptide chain comprises a second VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region;

n is 0 or 1; and

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein, in the first polypeptide chain, the VD1 or VD2 heavy chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 565, 670, 720, 740, 845, and 875 and

wherein, in the second polypeptide chain, the VD1 or VD2 light chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 570, 675, 725, 745, 850, and 880.

2. The binding protein of claim 1, wherein X1 in the first and second polypeptide chain independently comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 887-918.

3. A binding protein comprising four polypeptide chains, wherein two first polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first heavy chain variable domain;

VD2 is a second heavy chain variable domain;

C is a heavy chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 is an Fc region;

n is 0 or 1; and

wherein two second polypeptide chains comprise VD1-(X1)n-VD2-C-(X2)n, wherein

VD1 is a first light chain variable domain;

VD2 is a second light chain variable domain;

C is a light chain constant domain;

X1 is a linker with the proviso that it is not CH1;

X2 does not comprise an Fc region;

n is 0 or 1; and

wherein the binding protein is capable of binding human IL-17 and TNF-α;

wherein, in the two first polypeptide chains, the VD1 or VD2 heavy chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 565, 670, 720, 740, 845, and 875 and

wherein, in the two second polypeptide chains, the VD1 or VD2 light chain variable domain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 570, 675, 725, 745, 850, and 880

4. A pharmaceutical composition comprising the binding protein of any one of claims 1-3 and 28 and a pharmaceutically acceptable carrier.

5. The binding protein of claim 1, wherein the other of the VD1 or VD2 heavy variable region comprises an amino acid sequence of a variable heavy region (VH) of an anti-TNF-α antibody wherein the amino acid sequence is SEQ ID NO: 668.

6. The binding protein of claim 1, wherein the first polypeptide chain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 562, 572, 667, 677, 687, 697, 707, 717, 727, 737, 842, 852, 862, 872, and 882.

7. The binding protein of claim 1, wherein the other of the VD1 or VD2 light chain variable region comprises an amino acid sequence of a variable light region (VL) of an anti-TNF-α antibody wherein the amino acid sequence is SEQ ID NO: 673.

8. The binding protein of claim 1, wherein the second polypeptide chain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 567, 672, 682, 692, 702, 712, 722, 732, 742, 847, 857, 867, and 877.

9. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 565, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 570, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

10. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 670, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 675, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668 and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

11. The binding protein of claim 1, wherein the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 670, the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 675, the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

12. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 720, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 725, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

13. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 740, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 745, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

14. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 845, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 850, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

15. The binding protein of claim 1, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 875, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 880, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

16. The binding protein of claim 3, wherein the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

17. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 565 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 570.

18. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 670 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 675.

19. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 720 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 725.

20. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 740 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 745.

21. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 845 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 850.

22. The binding protein of claim 16, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NOs 875 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 880.

23. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 565, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 570, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

24. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 670, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 675, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668 and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

25. The binding protein of claim 3, wherein the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 670, the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 675, the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668 and the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

26. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 720, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 725, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

27. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 740, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 745, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

28. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 845, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 850, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

29. The binding protein of claim 3, wherein the VD2 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 875, the VD2 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 880, the VD1 heavy chain variable domain comprises the amino acid sequence of SEQ ID NO: 668, and the VD1 light chain variable domain comprises the amino acid sequence of SEQ ID NO: 673.

30. A pharmaceutical composition comprising the binding protein of claim 3 and a pharmaceutically acceptable carrier.