WHAT CLAIMED IS:

1. An antibody or antigen-binding fragment thereof which binds to LILRB4, comprising:

one, two or three heavy chain complementarity determining regions (HCDR1, HCDR2 and/or HCDR3) contained within any one of the heavy chain variable (VH) region sequences selected from the group consisting of SEQ ID NOs: 23, 31, 39, 47, 55, 63, 71, 79, 87, 95, 103, 111, 119, 127, 135, 143, 151, 154 and 156; and/or

one, two or three light chain complementarity determining regions (LCDR1, LCDR2 and LCDR3) contained within any one of the light chain variable (VL) region sequences selected from the group consisting of SEQ ID NOs: 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 155 and 157.

2. The antibody or antigen-binding fragment thereof of claim 1, wherein the antibody or antigen-binding fragment comprises at least one heavy or light chain complementarity determining region (CDR) comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 17, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 30, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 49, 50, 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 65, 66, 67, 68, 69, 70, 73, 74, 75, 76, 77, 78, 81, 82, 83, 84, 85, 86, 89, 90, 91, 92, 93, 94, 97, 98, 99, 100, 101, 102, 105, 106, 107, 108, 109, 110, 113, 114, 115, 116, 117, 118, 121, 122, 123, 124, 125, 126, 129, 130, 131, 132, 133, 134, 137, 138, 139, 140, 141, 142, 145, 146, 147, 148, 149, 150 and 158.

3. The antibody or antigen-binding fragment thereof of claim 1 or 2, comprising:

a) one or two or three of HCDR1, HCDR2 and HCDR3 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 17, 18, 19, 25, 26, 27, 33, 34, 35, 41, 42, 43, 49, 50, 51, 57, 58, 59, 65, 66, 67, 73, 74, 75, 81, 82, 83, 89, 90, 91, 97, 98, 99, 105, 106, 107, 113, 114, 115, 121, 122, 123, 129, 130, 131, 137, 138, 139, 145, 146, 147 and 158; or

b) one or two or three of LCDR1, LCDR2 and LCDR3 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 20, 21, 22, 28, 29, 30, 36, 37, 38, 44, 45, 46, 52, 53, 54, 60, 61, 62, 68, 69, 70, 76, 77, 78, 84, 85, 86, 92, 93, 94, 100, 101, 102, 108, 109, 110, 116, 117, 118, 124, 125, 126, 132, 133, 134, 140, 141, 142, 148, 149 and 150.

4. The antibody or antigen-binding fragment thereof of any one of the preceding claims, comprising:

i. a HCDR1 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 17, 25, 33, 41, 49, 57, 65, 73, 81, 89, 97, 105, 113, 121, 129, 137 and 145;

ii. a HCDR2 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 18, 26, 34, 42, 50, 58, 66, 74, 82, 90, 98, 106, 114, 122, 130, 138, 146 and 158; and

iii. a HCDR3 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 19, 27, 35, 43, 51, 59, 67, 75, 83, 91, 99, 107, 115, 123, 131, 139 and 147;

or

i. a LCDR1 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 20, 28, 36, 44, 52, 60, 68, 76, 84, 92, 100, 108, 116, 124, 132, 140 and 148;

ii. a LCDR2 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 21, 29, 37, 45, 53, 61, 69, 77, 85, 93, 101, 109, 117, 125, 133, 141 and 149; and

iii. a LCDR3 comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 22, 30, 38, 46, 54, 62, 70, 78, 86, 94, 102, 110, 118, 126, 134, 142 and 150;

preferably

i. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 17, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 18, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 19;

ii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 25, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 26, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 27;

iii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 33, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 34, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 35;

iv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 41, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 42, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 43;

v. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 41, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 158, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 43;

vi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 49, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 50, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 51;

vii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 57, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 58, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 59;

viii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 65, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 66, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 67;

ix. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 73, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 74, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 75;

x. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 81, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 82, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 83;

xi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 89, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 90, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 91;

xii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 97, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 98, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 99;

xiii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 105, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 106, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 107;

xiv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 113, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 114, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 115;

xv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 121, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 122, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 123;

xvi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 129, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 130, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 131;

xvii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 137, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 138, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 139; or

xviii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 145, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 146, and a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 147;

or

i. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 20, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 21, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 22;

ii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 28, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 29, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 30;

iii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 36, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 37,

and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 38;

iv. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 44, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 45, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 46;

v. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 52, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 53, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 54;

vi. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 60, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 61, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 62;

vii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 68, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 69, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 70;

viii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 76, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 77, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 78;

ix. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 84, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 85, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 86;

x. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 92, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 93, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 94;

xi. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 100, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 101, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 102;

xii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 108, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 109, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 110;

xiii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 116, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 117, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 118;

xiv. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 124, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 125, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 126;

xv. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 132, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 133, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 134;

xvi. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 140, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 141, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 142; or

xvii. a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 148, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 149, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 150.

5. The antibody or antigen-binding fragment thereof of any one of the preceding claims, comprising:

i. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 17, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 18, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 19, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 20, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 21, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 22;

ii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 25, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 26, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 27, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 28, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 29, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 30;

iii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 33, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 34, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 35, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 36, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 37, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 38;

iv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 41, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 42, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 43, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 44, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 45, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 46;

v. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 41, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 158, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 43, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 44, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 45, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 46;

vi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 49, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 50, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 51, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 52, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 53, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 54;

vii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 57, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 58, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 59, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 60, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 61, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 62;

viii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 65, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 66, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 67, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 68, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 69, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 70;

ix. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 73, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 74, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 75, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 76, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 77, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 78;

x. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 81, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 82, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 83, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 84, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 85, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 86;

xi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 89, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 90, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 91, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 92, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 93, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 94;

xii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 97, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 98, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 99, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 100, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 101, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 102;

xiii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 105, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 106, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 107, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 108, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 109, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 110;

xiv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 113, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 114, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 115, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 116, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 117, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 118;

xv. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 121, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 122, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 123, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 124, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 125, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 126;

xvi. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 129, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 130, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 131, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 132, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 133, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 134;

xvii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 137, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 138, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 139, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 140, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 141, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 142; or

xviii. a HCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 145, a HCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 146, a HCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 147, a LCDR1 comprising an amino acid sequence as set forth in SEQ ID NO: 148, a LCDR2 comprising an amino acid sequence as set forth in SEQ ID NO: 149, and a LCDR3 comprising an amino acid sequence as set forth in SEQ ID NO: 150.

6. The antibody or antigen-binding fragment thereof of any one of the preceding claims, comprising:

a) a VH region having an amino acid sequence as set forth in SEQ ID NOs: 23, 31, 39, 47, 55, 63, 71, 79, 87, 95, 103, 111, 119, 127, 135, 143, 151, 154 or 156, or a homologous sequence thereof having at least 80% sequence identity to SEQ ID NOs: 23, 31, 39, 47, 55, 63, 71, 79, 87, 95, 103, 111, 119, 127, 135, 143, 151, 154 or 156; or

b) a VL region having an amino acid sequence as set forth in SEQ ID NOs: 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 155 or 157, or a homologous sequence thereof having at least 80% sequence identity to SEQ ID NOs:24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 155 or 157.

7. The antibody or antigen-binding fragment thereof of any one of the preceding claims, comprising a VH/VL amino acid sequence pair selected from the group consisting of SEQ ID NOs: 23/24, 31/32, 39/40, 47/48, 55/56, 63/64, 71/72, 79/80, 87/88, 95/96, 103/104, 111/112, 119/120, 127/128, 135/136, 143/144, 151/152, 154/155, and 156/157.

8. The antibody or antigen-binding fragment thereof of any one of the preceding claims, further comprising:

I) one or more amino acid residue substitutions or modifications yet retains binding affinity to LILRB4; optionally wherein at least one of the substitutions or modifications is in one or more of the CDR sequences of the VH region or VL region, or wherein at least one of the substitutions or modifications is in one or more of the non-CDR sequences of the VH region or VL region; and/or

II) one or more non-natural amino acid (NNAA) substitution, optionally wherein the NNAA is capable of being conjugated.

9. The antibody or antigen-binding fragment thereof of any one of the preceding claims, having one or more binding properties to LILRB4 selected from the group consisting of:

i. being capable of specifically binding to human LILRB4 as measured by FACS assay;

ii. being capable of specifically binding to human LILRB4 and human LILRB3 as measured by FACS assay;

iii. being capable of specifically binding to human LILRB4 and cynomolgus LILRB4 as measured by FACS assay;

iv. being with potent ADCP effect on a human AML cell line;

v. being with potent ADCC effect on a human AML cell line;

vi. being capable of blocking the LILRB4-fibronectin interaction to reprogram tolerogenic dendritic cells to be mature dendritic cells which stimulate T cell activation as measured by FcγR stimulation assay;

vii. being capable of inducing TNF-α production;

viii. being capable of reprograming tolerogenic DC to activate T cells;

ix. being capable of reversing macrophage-mediated T cell suppression;

x. being capable of reversing THP-1-mediated T cell suppression; and

xi. being capable of potentiating $CD8^+$ T cell-mediated cytotoxicity on THP-1 cells.

10. An antibody or antigen-binding fragment thereof, which competes for binding to LILRB4 with the antibody or antigen-binding fragment thereof any of the preceding claims.

11. The antibody or antigen-binding fragment thereof of any one of the preceding claims, which is:

a) a chimeric, a humanized or a human antibody or an antigen-binding fragment thereof; and/or

b) a labeled antibody, a bivalent antibody, an anti-idiotypic antibody or a fusion protein; and/or

c) a diabody, a Fab, a Fab', a $F(ab')_2$, a Fd, an Fv fragment, a disulfide stabilized Fv fragment (dsFv), a $(dsFv)_2$, a bispecific dsFv (dsFv-dsFv'), a disulfide stabilized diabody (ds diabody), a single-chain antibody molecule (scFv), an scFv dimer

(bivalent diabody), a camelized single domain antibody, a nanobody, a domain antibody, or a bivalent domain antibody.

12. The antibody or antigen-binding fragment thereof of any one of the preceding claims, further comprising an Fc region, optionally an Fc region of human immunoglobulin (Ig), or optionally an Fc region of human IgG; preferably wherein the Fc region is derived from human IgG1, IgG2, IgG3, or IgG4; preferably wherein the Fc region comprises an amino acid sequence as set forth in SEQ ID NO: 153.

13. The antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the light chain is a λ light chain or a κ light chain.

14. The antibody or antigen-binding fragment thereof of any one of the preceding claims, which is a bispecific or multi-specific antibody or an antigen-binding fragment thereof; preferably which is capable of specifically binding to one or more additional antigens other than LILRB4, or a second epitope on LILRB4; preferably wherein the one or more additional antigens other than LILRB4 are selected from the group consisting of CD3, CD16a, CD33, CD38, CD45, CD123, CD146, CD228, CLL-1, Flt3, TAF1, TgPRF, HVCN1, IL-6R, IL-11R, IL17A, IL-23R, IL-33, ILDR2, LAP, TSLP, TREM-1, ANGPT2, APOE, IFNAR, CypA, DOG-1, NKp30, CSF-1R, CCR2, LRRC15, mesothelin, Dickkopf2, DLL3, HER-2, C10orf54, TrkA, MEKK1, KRAS, ERK, XPO1, mTORC1/2, PAK4, NAMPT, ATR, EGFR, FGFR, VEGF, c-MET, Her2, Her3, CTLA4, GITA, CD112R, CD2, CD7, CD16, CD19, CD20, CD24, CD27, CD30, CD34, CD37, CD39, CD70, CD73, CD83, CD28, CD80 (B7-1), CD86 (B7-2), CD40, CD40L (CD154), CD47, SIRPα, CD122, CD137, CD137L, OX40 (CD134), OX40L (CD252), BCMA (*e.g.*, BCMA02), PSMA, CLDN18 (*e.g.*, CLDN18.2), NKG2C, 4-1BB, LIGHT, PVRIG, SLAMF7, HVEM, BAFFR, ICAM-1, 2B4, LFA-1, GITR, ICOS (CD278), ICOSLG (CD275), LAG3 (CD223), A2AR, B7-H3 (CD276), B7-H4 (VTCN1), B7-H5, BTLA (CD272), BTLA, CD160, CTLA-4 (CD152), GPRC5D, IDO1, IDO2, ILT3, TDO, KIR, LAIR-1, NOX2, PD-1, PD-L1, PD-L2, TIM-3, VISTA, SIGLEC-7 (CD328), SIGLEC-9 (CD329), SIGLEC-15,

TIGIT, PVR (CD155), LILRB2, LILRB3, FLT3, FLT3L, TLR3, CLEC9A, DEC-205, STING, IL-12, IDO, and TGFβ.

15. The antibody or antigen-binding fragment thereof of any one of the preceding claims, which is linked to one or more conjugate moieties, preferably wherein the conjugate moiety comprises a clearance-modifying agent, a chemotherapeutic agent, a toxin, a radioactive isotope, a lanthanide, a detectable label, a DNA-alkylator, a topoisomerase inhibitor, a tubulin-binder, a purification moiety or other anticancer drugs; optionally wherein the conjugate moiety is covalently attached either directly or via a linker.

16. A pharmaceutical composition comprising the antibody or antigen-binding fragment thereof of any one of the preceding claims, and one or more pharmaceutically acceptable carriers.

17. A chimeric antigen receptor, comprising the antibody or antigen-binding fragment thereof of any one of claims 1-15, a transmembrane region and an intracellular signal region, preferably wherein the transmembrane region comprises a transmembrane region of CD3, CD4, CD8 or CD28; optionally wherein the intracellular signal region is selected from the group consisting of: an intracellular signal regions sequence of CD3, FcγRI, CD27, CD28, CD137, CD134, MyD88, CD40, CD278, TLRs, or a combination thereof; optionally wherein the antigen-binding fragment is a scFv; optionally wherein the chimeric antigen receptor is grafted onto an allogeneic cell, an autologous cell or a xenogeneic cell, preferably wherein the chimeric antigen receptor is grafted onto an immune effector cell, preferably wherein the chimeric antigen receptor is grafted onto a T cell, a natural killer cell, a macrophage cell, or a tumor-infiltrating lymphocyte.

18. An isolated polynucleotide encoding the antibody or antigen-binding fragment thereof of any one of claims 1-15, and/or the chimeric antigen receptor of claim 17.

19. A vector comprising the isolated polynucleotide of claim 18.

20. A host expression system comprising the vector of claim 19 or having the polynucleotide of claim 18 integrated into genome thereof; preferably the host expression system is a microorganism, a yeast, or a mammalian cell, optionally, wherein the microorganism is selected from the group consisting of *E. coli* and *B. subtilis*, wherein the yeast is *Saccharomyces*, and wherein the mammalian cell is selected from the group consisting of COS, CHO-S, CHO-K1, HEK-293, and 3T3 cells.

21. A virus comprising the vector of claim 19.

22. A kit comprising the antibody or antigen-binding fragment thereof of any one of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17, and optionally further a second therapeutic agent; optionally useful in detecting LILRB4, optionally recombinant LILRB4, LILRB4 expressed on cell surface, or LILRB4-expressing cells.

23. A method of expressing the antibody or antigen-binding fragment thereof of any one of claims 1-14 or the chimeric antigen receptor of claim 17, comprising culturing the host expression system of claim 20 under the condition at which the antibody or antigen-binding fragment of any one of claims 1-14 or the chimeric antigen receptor of claim 17 is expressed.

24. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17 in the manufacture of a medicament for the treatment, prevention or alleviation of a disease, disorder or condition in a subject, comprising is to be administered to the subject, a therapeutically effective amount of the antibody or antigen-binding fragment thereof and/or the pharmaceutical composition and/or the chimeric antigen receptor, optionally wherein the disease, disorder or condition is immune disease, inflammatory disease, cancer or neurological disease, preferably wherein the cancer is a solid tumor or hematologic tumor; optionally wherein the disease, disorder or condition is selected from the group consisting of Kawasaki

disease, T. gondii, multiple sclerosis, systematic Lupus erythematosus, lung cancer (*e.g.*, non-small-cell lung cancer (NSCLC), small cell lung cancer (SCLC), adenocarcinoma of the lung, squamous cell carcinoma of the lung, Lewis lung carcinoma, or radiation therapy resistant Lewis lung carcinoma), peritoneal cancer, carcinoid cancer, bone cancer, pancreatic cancer, primitive neuroectodermal tumor, skin cancer, gallbladder cancer, cancer of the head or neck, squamous cell cancer, uterine cancer, ovarian cancer, rectal cancer, prostate cancer, bladder cancer (*e.g.*, urothelial cancer), cancer of the anal region (*e.g.*, anal squamous cell carcinoma), gastric or stomach cancer (*e.g.*, gastrointestinal cancer), esophageal cancer, colon cancer, breast cancer, uterine cancer, liver cancer (*e.g.*, hepatoblastoma, hepatocellular carcinoma/hepatoma, or hepatic carcinoma), cholangiocarcinoma, sarcoma, colorectal cancer, carcinoma of the fallopian tubes, salivary gland carcinoma, carcinoma of the cervix, endometrial or uterine carcinoma, osteosarcoma, carcinoma of the vagina, carcinoma of the vulva, cancer of the esophagus, cancer of the small intestine, cancer of the endocrine system, cancer of the thyroid gland, cancer of the parathyroid gland, cancer of the adrenal gland, cancer of the nasopharynx, sarcoma of soft tissue, polycythemia vera, cancer of the urethra, cancer of the penis, cancer of the kidney or ureter (*e.g.*, rhabdoid tumor of the kidney), cutaneous T-cell lymphoma, medulloblastoma, nephroblastoma, myelodysplastic syndrome, chronic and non-chronic myeloproliferative disorder, choroid plexus papilloma, renal cell carcinoma, carcinoma of the renal pelvis, neoplasms of the central nervous system (CNS), soft tissue sarcoma (*e.g.*, rhabdomyosarcoma, fibrosarcoma, Kaposi's sarcoma), spinal axis tumors, glioma (*e.g.*, ependymoma, astrocytoma, anaplastic astrocytoma, oligodendroglioma, eye cancer (*e.g.*, retinoblastoma), brain stem glioma, or mixed glioma such as oligoastrocytoma), brain tumor (*e.g.*, glioblastoma/glioblastoma multiforme (GBM), non-glioblastoma brain tumor, or meningioma), melanoma (*e.g.*, cutaneous or intraocular melanoma), thrombocythemia, mesothelioma, mycosis fungoides, Sezary syndrome, idiopathic myelofibrosis, solitary plasmacytoma, vestibular schwannoma, Ewing’s sarcoma, chondrosarcoma, MYH associated polyposis, pituitary adenoma, pediatric cancers

such as pediatric sarcomas (*e.g.*, neuroblastoma, rhabdomyosarcoma, and osteosarcoma), hematological cancer, lymphoma, Hodgkin's lymphoma, non-Hodgkin's lymphoma, leukemia (*e.g.,* lymphocytic/lymphoblastic leukemia), chronic or acute leukemia, mast cell leukemia, lymphocytic lymphomas, primary CNS lymphoma, chronic lymphocytic leukemia (CLL), acute lymphocytic leukemia (ALL), chronic myeloid leukemia (CML), acute myeloid leukemia (AML), chronic myelomonocytic leukemia (CMML), chronic lymphoblastic leukemia, acute lymphoblastic leukemia, hairy cell leukemia (HCL), Burkitt's lymphoma (BL), multiple myeloma (*e.g.,* relapsed or refractory multiple myeloma), T or B cell lymphoma, mantle cell lymphoma (MCL) (*e.g.,* relapsed or refractory mantle cell lymphoma), malignant melanoma, diffuse large B cell lymphoma (DLBCL), DLBCL that results from follicular lymphoma, high-grade B-cell lymphoma, primary mediastinal large B-cell lymphoma, follicular lymphoma (FL), and primary mediastinal B-cell lymphoma; optionally wherein the subject is human; optionally wherein the administration is through a parenteral route comprising subcutaneous, intraperitoneal, intravenous, intramuscular, or intradermal injection; or a non-parenteral route comprising transdermal, oral, intranasal, intraocular, sublingual, rectal, or topical; optionally wherein the treatment, prevention or alleviation further includes is to be administered to the subject in need thereof an additional therapeutic agent, preferably wherein the additional therapeutic agent is selected from the group consisting of: an active agent, an imaging agent, a cytotoxic agent, and angiogenesis inhibitor, a kinase inhibitor, a co-stimulation molecule agonist, a co-inhibition molecule blocker, an adhesion molecule blocker, an anti-cytokine antibody or functional fragment thereof, a detectable label or reporter, an antimicrobial, a gene editing agent, a beta agonist, an viral RNA inhibitor, a polymerase inhibitor, an interferon, and a microRNA; optionally wherein the additional therapeutic agent is to be administered to the subject in need before, after or simultaneously with the antibody or antigen-binding fragment thereof of any one of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17.

25. The antibody or antigen-binding fragment thereof of any one of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17 for use in:

I) modulating LILRB4 activity in a LILRB4-expressing cell, comprising exposing the LILRB4-expressing cell to the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17, preferably wherein the LILRB4-expressing cell is a dendritic cell, monocyte, macrophage, B cell, Treg, progenitor mast cell, endothelial cell, or osteoclast;

II) inducing phagocytosis of a target cell *in vitro*, comprising exposing the target cell to the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17, preferably wherein the target cell is an antigen presenting cell, a cancer cell or a cell infected by a pathogen;

III) inducing TNF-α production, comprising exposing the tolerogenic dendritic cell to the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17;

IV) reprogramming a tolerogenic dendritic cell to a mature dendritic cell, comprising exposing the tolerogenic dendritic cell to the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17;

V) detecting presence or amount of LILRB4 in a sample, comprising contacting the sample with the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16 and/or the chimeric antigen receptor of claim 17, and determining the presence or the amount of LILRB4 in the sample; or

VI) diagnosing a LILRB4 related disease or condition in a subject, comprising: a) obtaining a sample from the subject; b) contacting the sample obtained from the subject with the antibody or antigen-binding fragment thereof of any of claims 1-15 and/or the pharmaceutical composition of claim 16; c) determining presence or amount of LILRB4 in the sample; and d) correlating the presence or the amount of LILRB4 to existence or status of the LILRB4 related disease or condition in the subject.