

SUMMARY

After intensive study and creative effort, the inventors used mammalian cell expression systems to express recombinant IL-17A (24-155) as an antigen to immunize mice, and obtained a large number of hybridoma cell samples by fusion of mouse spleen cells and myeloma cells. The inventors obtained the following two hybridoma cell lines separately by screening a large number of the samples:

hybridoma cell line LT006 (IL-17A-13E9), which was deposited at China Center for Type Culture Collection (CCTCC) on September 12, 2017 with an accession number of CCTCC NO: C2017102;

and hybridoma cell line LT007 (IL-17A-2G2), which was deposited at China Center for Type Culture Collection (CCTCC) on September 12, 2017 with an accession number of CCTCC NO: C2017165.

The inventors surprisingly found:

the hybridoma cell line LT006 may secrete and produce a specific monoclonal antibody (named as 13E9) that specifically binds to IL-17A, and the monoclonal antibody can block the binding of IL-17A to IL-17RA very effectively;

the hybridoma cell line LT007 may secrete and produce a specific monoclonal antibody (named as 2G2) that specifically binds to IL-17A, and the monoclonal antibody can block the binding of IL-17A to IL-17RA very effectively;

furthermore, the inventors creatively prepared anti-IL-17A humanized antibodies (named as 13E9 H1L1, 13E9 H2L2, 13E9 H3L2; and 2G2 H1L1, 2G2 H2L2, 2G2 H3L3, respectively), all of which may bind to human IL-17A effectively, block the binding of IL-17A to IL-17A receptors, and inhibit the activation of downstream signaling pathways of the IL-17A receptors;

the antibody of the present disclosure has the potential to produce drugs for preventing and/or treating autoimmune diseases such as psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic lupus erythematosus.

In one aspect, the present disclosure refers to a monoclonal antibody, or an

antigen binding fragment thereof, comprising: a) a heavy chain variable region (VH) comprising complementary determining regions (CDRs) having the amino acid sequences set forth in SEQ ID NOs: 31-33; and b) a light chain variable region (VL) comprising CDRs having the amino acid sequences set forth in SEQ ID NOs: 34-36.

In another aspect, the present disclosure refers to a monoclonal antibody, or an antigen binding fragment thereof, comprising: a) a heavy chain variable region (VH) comprising complementary determining regions (CDRs) having the amino acid sequences set forth in SEQ ID NOs: 37-39; and b) a light chain variable region (VL) comprising CDRs having the amino acid sequences set forth in SEQ ID NOs: 40-42.

In another aspect, the present disclosure refers to an isolated nucleic acid molecule, comprising a nucleic acid encoding the heavy chain variable region and the light chain variable region of the monoclonal antibody or antigen binding fragment thereof as disclosed herein.

In another aspect, the present disclosure refers to a conjugate comprising the monoclonal antibody or antigen binding fragment thereof as disclosed herein and a conjugated portion comprising a detectable label.

In another aspect, the present disclosure refers to a reagent kit comprising the monoclonal antibody or antigen binding fragment thereof as disclosed herein.

In another aspect, the present disclosure refers to a pharmaceutical composition, comprising the monoclonal antibody or antigen binding fragment thereof as disclosed herein and at least one pharmaceutically acceptable carrier or excipient.

In yet another aspect, the present disclosure refers to a use of the monoclonal antibody or antigen binding fragment thereof as disclosed herein in the

manufacture of a medicament for the treatment of an autoimmune disease in a subject, wherein the monoclonal antibody or antigen binding fragment thereof is for administration to the subject in at least one effective amount.

5 The following disclosure is thus provided:

one aspect of the present disclosure relates to a monoclonal antibody or an antigen binding fragment thereof, wherein,

10 the heavy chain variable region (VH) of the monoclonal antibody comprises: HCDR1-HCDR3 with the amino acid sequences shown in SEQ ID NOs: 31-33 respectively, or HCDR1-HCDR3 with the amino acid sequences shown in SEQ ID NOs: 37-39 respectively; and

15 the light chain variable region (VL) of the monoclonal antibody comprises: LCDR1-LCDR3 with the amino acid sequences shown in SEQ ID NOs: 34-36 respectively, or LCDR1-LCDR3 with the amino acid sequences shown in SEQ ID NOs: 40-42 respectively.

20 The variable regions of the light chain and the heavy chain determine the binding of the antigen; the variable region of each chain contains three hypervariable regions, namely complementarity determining regions (CDRs) (the CDRs of the heavy chain (H) include HCDR1, HCDR2, HCDR3, and the CDRs of the light chain (L) include LCDR1, LCDR2, LCDR3; defined by Kabat et al., see Sequences of Proteins of Immunological Interest, Fifth Edition (1991), Volumes 1-3, NIH Publication 91-3242, Bethesda Md).

25 The amino acid sequences of the CDR regions of the monoclonal antibody in (1) to (2) above are analyzed by technical means well known to those skilled in the art, for example, by a VBASE2 database:

the antibodies 13E9, 13E9 H1L1, 13E9 H2L2, and 13E9 H3L2 of the present disclosure have the same CDRs:

30 the amino acid sequences of the three CDR regions of the heavy chain variable region are as follows:

HCDR1: SYSFTSDYA (SEQ ID NO: 31),

HCDR2: ITYSGVT (SEQ ID NO: 32),

HCDR3: ARADYDSYYTMDY (SEQ ID NO: 33); and

the amino acid sequences of the three CDR regions of the light chain variable region are as follows:

LCDR1: QSLVHSNGNTY (SEQ ID NO: 34),

LCDR2: KVS (SEQ ID NO: 35),

5 **LCDR3: SQSTHFWT (SEQ ID NO: 36).**

The antibodies 2G2, 2G2 H1L1, 2G2 H2L2, and 2G2 H3L3 of the present disclosure have the same CDRs:

10 **the amino acid sequences of the three CDR regions of the heavy chain variable region are as follows:**

HCDR1: SEVFPIAD (SEQ ID NO: 37),

HCDR2: ILPSFGRT (SEQ ID NO: 38),

HCDR3: ARGNYGFAY (SEQ ID NO: 39); and

15 **the amino acid sequences of the three CDR regions of the light chain variable region are as follows:**

LCDR1: QSLNSDGKTY (SEQ ID NO: 40),

LCDR2: LVS (SEQ ID NO: 41),

LCDR3: WQGSHPQT (SEQ ID NO: 42).

20 **In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein,**
the heavy chain variable region (VH) of the monoclonal antibody comprises HCDR1-HCDR3 with the amino acid sequences shown in SEQ ID NOs: 31-33 respectively, and

25 **the light chain variable region (VL) of the monoclonal antibody comprises LCDR1-LCDR3 with the amino acid sequences shown in SEQ ID NOs: 34-36 respectively.**

30 **In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein,**

the heavy chain variable region (VH) of the monoclonal antibody comprises HCDR1-HCDR3 with the amino acid sequences shown in SEQ ID NOs: 37-39 respectively, and

5 the light chain variable region (VL) of the monoclonal antibody comprises LCDR1-LCDR3 with the amino acid sequences shown in SEQ ID NOs: 40-42 respectively.

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein,

10 the amino acid sequence of the heavy chain variable region is selected from SEQ ID NO: 2, SEQ ID NO: 6, SEQ ID NO: 10, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 20, SEQ ID NO: 24, and SEQ ID NO: 28;

and

15 the amino acid sequence of the light chain variable region is selected from SEQ ID NO: 4, SEQ ID NO: 8, SEQ ID NO: 12, SEQ ID NO: 18, SEQ ID NO: 22, SEQ ID NO: 26, and SEQ ID NO: 30.

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein,

20 the amino acid sequence of the heavy chain variable region is selected from SEQ ID NO: 2, SEQ ID NO: 6, SEQ ID NO: 10, and SEQ ID NO: 14, and the amino acid sequence of the light chain variable region is selected from SEQ ID NO: 4, SEQ ID NO: 8, and SEQ ID NO: 12;

or

25 the amino acid sequence of the heavy chain variable region is selected from SEQ ID NO: 16, SEQ ID NO: 20, SEQ ID NO: 24, and SEQ ID NO: 28, and the amino acid sequence of the light chain variable region is selected from SEQ ID NO: 18, SEQ ID NO: 22, SEQ ID NO: 26, and SEQ ID NO: 30.

30 In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein the heavy chain variable region and light chain variable region are selected from any one of the following (1) to (8):

(1) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 2, and

a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 4;

(2) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 6, and

5 a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 8;

(3) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 10, and

10 a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 12;

(4) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 14, and

a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 12;

15 (5) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 16, and

a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 18;

20 (6) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 20, and

a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 22;

(7) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 24, and

25 a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 26; and

(8) a heavy chain variable region comprising the amino acid sequence shown in SEQ ID NO: 28, and

30 a light chain variable region comprising the amino acid sequence shown in SEQ ID NO: 30.

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein the monoclonal antibody or the antigen binding fragment thereof is selected from a Fab, a

Fab', an F(ab')₂, an Fd, an Fv, a dAb, a complementarity determining region fragment, a single chain antibody, a humanized antibody, a chimeric antibody and a diabody.

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein, the monoclonal antibody binds to IL-17A protein with an EC₅₀ of less than about 100 nM, such as less than about 10 nM, 5 nM, 4 nM, 3 nM, 2.5 nM, 2 nM, or less; preferably, the EC₅₀ is measured by a competitive ELISA method.

In some embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein the monoclonal antibody binds to IL-17A protein with a K_D of less than about 10⁻⁵ M, such as less than about 10⁻⁶ M, 10⁻⁷ M, 10⁻⁸ M, 10⁻⁹ M, 10⁻¹⁰ M, or less; preferably, the K_D is measured by a Fortebio molecular interaction instrument.

In some embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein the monoclonal antibody binds to IL-17A protein with an EC₅₀ of less than about 100 nM, such as less than about 10 nM, 1 nM, 0.9 nM, 0.8 nM, 0.7 nM, 0.6 nM, 0.5 nM, 0.4 nM, 0.3 nM, 0.2 nM, 0.1 nM, or less; in particular, the EC₅₀ is measured by an indirect ELISA method.

In one or more embodiments of the present disclosure, the monoclonal antibody comprises non-CDR regions, and the non-CDR regions are from species other than murine, such as from a human antibody.

In some embodiments of the present disclosure, the constant region of the immunoglobulin is humanized, for example, the heavy chain constant regions use Ig gamma-1 chain C region, **ACCESSION: P01857; and the light chain constant regions use Ig kappa chain C region, **ACCESSION: P01834**.**

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof, wherein:

the monoclonal antibody is produced by the hybridoma cell line LT006, which was deposited at China Center for Type Culture Collection (CCTCC) with an accession number of CCTCC NO: C2017102; or

the monoclonal antibody is produced by the hybridoma cell line LT007, which was deposited at China Center for Type Culture Collection (CCTCC) with an accession number of CCTCC NO: C2017165.

In one or more embodiments of the present disclosure, the monoclonal antibody or the antigen binding fragment thereof is used to prevent and/or treat tumors or autoimmune diseases, or to diagnose autoimmune diseases; preferably, the autoimmune disease is selected from psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic lupus erythematosus; preferably, the psoriasis is moderate to severe plaque psoriasis.

In one or more embodiments of the present disclosure, the monoclonal antibody or an antigen binding fragment thereof is used for: blocking the binding of IL-17A to IL-17RA, regulating (e.g., down-regulating) IL-17A activity or level, or inhibiting IL-6 expression in cells.

Another aspect of the present disclosure relates to an isolated nucleic acid molecule comprising nucleotide sequences encoding the heavy chain variable region and light chain variable region of any one of the monoclonal antibodies described in the present disclosure.

In one or more embodiments of the present disclosure, the isolated nucleic acid molecule comprises nucleotide sequences selected from any of the following (1) to (8):

(1) SEQ ID NO: 1, SEQ ID NO: 3;

5 **(2) SEQ ID NO: 5, SEQ ID NO: 7;**

(3) SEQ ID NO: 9, SEQ ID NO: 11;

(4) SEQ ID NO: 13, SEQ ID NO: 11;

(5) SEQ ID NO: 15, SEQ ID NO: 17;

(6) SEQ ID NO: 19, SEQ ID NO: 21;

10 **(7) SEQ ID NO: 23, SEQ ID NO: 25; and**

(8) SEQ ID NO: 27, SEQ ID NO: 29.

Another aspect of the present disclosure relates to a recombinant vector comprising the isolated nucleic acid molecule of the present disclosure.

15 **Preferably, the recombinant vector is a recombinant expression vector, such as a recombinant prokaryotic expression vector or a recombinant eukaryotic expression vector.**

Another aspect of the present disclosure relates to a host cell comprising the recombinant vector of the present disclosure.

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Another aspect of the present disclosure relates to a method for preparing any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure, comprising the steps of culturing

the host cell in the present disclosure under appropriate conditions and isolating the monoclonal antibody or the antigen binding fragment thereof from the cell cultures.

5 Another example of the present disclosure relates to a hybridoma cell line selected from:

the hybridoma cell line LT006, which was deposited at China Center for Type Culture Collection (CCTCC) with an accession number of CCTCC NO: C2017102; and

10 the hybridoma cell line LT007, which was deposited at China Center for Type Culture Collection (CCTCC) with an accession number of CCTCC NO: C2017165.

Another example of the present disclosure relates to a conjugate comprising a
15 monoclonal antibody or an antigen binding fragment thereof and a conjugated portion, wherein the monoclonal antibody is any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure, the conjugated portion is a detectable label; preferably, the detectable label is a radioactive isotope, a luminescent
20 substance such as a fluorescent substance, a colored substance, or an enzyme.

Another example of the present disclosure relates to a kit comprising any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or comprising the conjugate of the present
25 disclosure;

preferably, the kit further comprises a second antibody which specifically recognizes the monoclonal antibody or the antigen binding fragment thereof; optionally, the second antibody further comprises a detectable label; preferably, the detectable label is a radioactive isotope, a luminescent substance such as a fluorescent substance, a colored substance, or an enzyme.

Another example of the present disclosure relates to use of any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure in the preparation of a kit for qualitative or quantitative detection for IL-17A. The qualitative detection refers to detecting the presence of IL-17A in the sample to be tested, and the quantitative detection refers to detecting the concentration or content of IL-17A in the sample to be tested.

Another example of the present disclosure relates to a pharmaceutical composition comprising any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure; optionally, the pharmaceutical composition further comprises pharmaceutically acceptable carriers or excipients.

Another example of the present disclosure relates to use of any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure in the preparation of a drug for preventing and/or treating tumors or autoimmune diseases, or use in the preparation of a drug for diagnosing autoimmune diseases; preferably, the autoimmune disease is selected from psoriasis,

rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic lupus erythematosus; preferably, the psoriasis is moderate to severe plaque psoriasis.

In particular, the inventors found from animal experiments (Example 11) that 13E9H3L2 can effectively inhibit the increase in the epidermal thickness of a C57BL/6 mouse model with psoriasis, which is shown as the antibody drug 13E9H3L2 can significantly inhibit the increase of epidermal thickness of the mouse caused by IL-17A and subcutaneous injection, having an efficacy equivalent to the marketed monoclonal antibody drug Secukinumab for the same target.

In some embodiments of the present disclosure, the autoimmune diseases (e.g., psoriasis such as moderate to severe plaque psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis or systemic lupus erythematosus) are caused by an elevated IL-17A expression level. The elevated expression level described here refers to the expression level higher than that of healthy people and has reached a pathogenic level.

Another example of the present disclosure relates to use of any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure in the preparation of the following drugs:

drugs blocking the binding of IL-17A to IL-17RA,
drugs regulating (e.g., down-regulating) IL-17A activity or level, or
drugs inhibiting IL-6 expression in cells.

Another example of the present disclosure relates to an in vivo or in vitro method comprising the step of administering to a cell or a subject in need an

effective amount of any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure, and the method is selected from the following:

- 5 methods for blocking the binding of IL-17A to IL-17RA,
- methods for regulating (e.g., down-regulating) IL-17A activity or level, or
- methods for inhibiting IL-6 expression in fibroblasts.

In a specific embodiment of the present disclosure, the in vitro method is non-therapeutic and/or non-diagnostic.

- 10 Interleukin 6 (abbreviated as IL-6 or IL 6) can be produced by fibroblasts, monocytes/macrophages, T lymphocytes, B lymphocytes, epithelial cells, keratinocytes, and various tumor cells. Interleukin 6 is an important factor regulating immune response, and IL-6 and IL-1 can synergistically promote T cell proliferation, stimulate B cell differentiation, and participate in the
- 15 body's inflammatory responses (Schoenborn et al. Advances in Immunology 96: 41-101 (2007)). The in vitro experiment (Example 10) of the present disclosure shows that the anti-IL-17A antibody can significantly reduce the secretion of IL-6 and inhibit IL-6-mediated immune response.

- Another example of the present disclosure relates to a method for treating
- 20 and/or preventing tumors or autoimmune diseases, and the method comprises the step of administering to a subject in need an effective amount of any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure; preferably, the autoimmune disease is selected from psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic
 - 25 lupus erythematosus; preferably, the psoriasis is moderate to severe plaque psoriasis.

Another example of the present disclosure relates to a method for diagnosing autoimmune diseases, and the method comprises the step of applying a sample to be tested (such as a tissue sample, a cell sample, or a blood sample) or administering to a subject in need an effective amount of any one of the
5 monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure; preferably, the autoimmune disease is selected from psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic lupus erythematosus; preferably, the psoriasis is moderate to severe plaque psoriasis.

10 In some examples of the present disclosure, considering that autoimmune diseases (e.g., psoriasis, such as moderate to severe plaque psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis or systemic lupus erythematosus) are caused by an elevated IL-17A expression level, thus the diagnosis can be performed by detecting the IL-17A expression level
15 using any one of the monoclonal antibodies or the antigen binding fragments thereof described in the present disclosure or the conjugate of the present disclosure. If the IL-17A expression level is higher than that of healthy people and has reached the pathogenic level, the diagnosis is a positive result; otherwise, the diagnosis is a negative result.

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CLAIMS

1. A monoclonal antibody, or an antigen binding fragment thereof, comprising:

5 a) a heavy chain variable region (VH) comprising complementary determining regions (CDRs) having the amino acid sequences set forth in SEQ ID NOs: 31-33; and

b) a light chain variable region (VL) comprising CDRs having the amino acid sequences set forth in SEQ ID NOs: 34-36.

10 2. A monoclonal antibody, or an antigen binding fragment thereof, comprising:

15 a) a heavy chain variable region (VH) comprising complementary determining regions (CDRs) having the amino acid sequences set forth in SEQ ID NOs: 37-39; and

b) a light chain variable region (VL) comprising CDRs having the amino acid sequences set forth in SEQ ID NOs: 40-42.

20 3. The monoclonal antibody or antigen binding fragment thereof of claim 1, wherein

the VH comprises the amino acid sequence set forth in SEQ ID NO: 2, and

the VL comprises the amino acid sequence set forth in SEQ ID NO: 4.

4. The monoclonal antibody or antigen binding fragment thereof of claim 1, wherein

the VH comprises the amino acid sequence set forth in SEQ ID NO: 6, and

5 the VL comprises the amino acid sequence set forth in SEQ ID NO: 8.

5. The monoclonal antibody or antigen binding fragment thereof of claim 1, wherein

10 the VH region comprises the amino acid sequence set forth in SEQ ID NO: 10, and

the VL comprises the amino acid sequence set forth in SEQ ID NO: 12.

15 6. The monoclonal antibody or antigen binding fragment thereof of claim 1, wherein

the VH comprises the amino acid sequence set forth in SEQ ID NO: 14, and

20 the VL comprises the amino acid sequence set forth in SEQ ID NO: 12.

7. The monoclonal antibody or antigen binding fragment thereof of claim 2, wherein

25 the VH comprises the amino acid sequence set forth in SEQ ID NO: 16, and

the VL comprises the amino acid sequence set forth in SEQ ID NO:
18.

8. The monoclonal antibody or antigen binding fragment thereof of
5 claim 2, wherein

the VH comprises the amino acid sequence set forth in SEQ ID NO:
20, and

the VL comprises the amino acid sequence set forth in SEQ ID NO:
22.

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9. The monoclonal antibody or antigen binding fragment thereof
of claim 2, wherein

the VH comprises the amino acid sequence set forth in SEQ ID NO:
24, and

15 the VL comprises the amino acid sequence set forth in SEQ ID NO:
26.

10. The monoclonal antibody or antigen binding fragment thereof
of claim 2, wherein

20 the VH comprises the amino acid sequence set forth in SEQ ID NO:
28, and

the VL comprises the amino acid sequence set forth in SEQ ID NO:
30.

25 11. The monoclonal antibody or antigen binding fragment thereof

of any one of claims 1-10, wherein the monoclonal antibody or antigen binding fragment thereof is selected from an Fab, an Fab', an F(ab')₂, an Fd, an Fv, a dAb, a single chain antibody, a humanized antibody, a chimeric antibody, and a diabody.

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12. The monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10, wherein the monoclonal antibody or antigen binding fragment thereof binds to IL-17A with an EC₅₀ of less than about 100 nM.

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13. The monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10, wherein the monoclonal antibody or antigen binding fragment thereof comprises non-CDR regions derived from species other than mouse.

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14. An isolated nucleic acid molecule, comprising a nucleic acid encoding the heavy chain variable region and the light chain variable region of the monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10.

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15. A conjugate comprising the monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10 and a conjugated portion comprising a detectable label.

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16. A reagent kit comprising the monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10.

17. A pharmaceutical composition, comprising the monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10 and at least one pharmaceutically acceptable carrier or excipient.

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18. Use of the monoclonal antibody or antigen binding fragment thereof of any one of claims 1-10 in the manufacture of a medicament for the treatment of an autoimmune disease in a subject, wherein the monoclonal antibody or antigen binding fragment thereof is for administration to the subject in at least one effective amount.

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19. The use of claim 18, wherein the autoimmune disease is selected from psoriasis, moderate to severe plaque psoriasis, rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and systemic lupus erythematosus.

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