

In one aspect, there is provided an isolated antibody or antigen binding fragment thereof that binds to human IL-6, comprising (i) a VH CDR1 comprising the sequence of SEQ ID NO:31, a VH CDR2 comprising the sequence of SEQ ID NO:32, a VH CDR3 comprising the sequence of SEQ ID NO:33, a VL CDR1 comprising the sequence of SEQ ID NO:34, a VL CDR2 comprising the sequence of SEQ ID NO:35, and a VL CDR3 comprising the sequence of SEQ ID NO:36.

In one aspect, there is provided an isolated antibody or antigen binding fragment comprising a heavy chain variable region comprising SEQ ID NO:37 and a light chain variable region comprising SEQ ID NO:38.

In one aspect, there is provided an isolated antibody or antigen binding fragment comprising a heavy chain sequence comprising SEQ ID NO:41 or SEQ ID NO: 47 and a light chain sequence comprising SEQ ID NO:42.

In one aspect, there is provided an isolated antigen binding fragment of an antibody comprising a heavy chain sequence comprising SEQ ID NO:39 or SEQ ID NO:54 and a light chain sequence comprising SEQ ID NO:42.

In one aspect, there is provided an isolated antibody or antigen binding fragment comprising a heavy chain sequence comprising SEQ ID NO:47 and a light chain sequence comprising SEQ ID NO:42.

In one aspect, there is provided a host cell comprising the vector as described herein.

In one aspect, there is provided a method of antagonizing IL-6 comprising contacting IL-6 with the antibody or antibody fragment as described herein.

In one aspect, there is provided a use of an antibody or antigen binding fragment as described herein in the manufacture of a medicament for treating an IL-6 associated disease characterized by an elevated level of IL-6 in the vitreous.

What is claimed is:

1. An isolated antibody or antigen binding fragment thereof that binds to human IL-6, comprising (i) a VH CDR1 comprising the sequence of SEQ ID NO:31, a VH CDR2 comprising
5 the sequence of SEQ ID NO:32, a VH CDR3 comprising the sequence of SEQ ID NO:33, a VL CDR1 comprising the sequence of SEQ ID NO:34, a VL CDR2 comprising the sequence of SEQ ID NO:35, and a VL CDR3 comprising the sequence of SEQ ID NO:36.

2. The antibody or antigen binding fragment of claim 1, wherein the antibody or antigen
10 binding fragment comprises a heavy chain variable region sequence comprising SEQ ID NO:37.

3. The antibody or antigen binding fragment of claim 12, wherein the antibody or antigen binding fragment comprises a heavy chain sequence comprising SEQ ID NO:39 or SEQ ID NO:54.
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4. The antibody or antigen binding fragment of claim 1, wherein the antibody or antigen binding fragment comprises a heavy chain sequence comprising SEQ ID NO:41.

5. The antibody or antigen binding fragment of claim 1, wherein the antibody or antigen
20 binding fragment comprises a heavy chain sequence comprising SEQ ID NO:47.

6. The antibody or antigen binding fragment of any one of claims 1-5, wherein the antibody or antigen binding fragment further comprises a light chain variable region sequence comprising SEQ ID NO:38.
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7. The antibody or antigen binding fragment of any one of claims 1-5, wherein the antibody or antigen binding fragment further comprises a light chain sequence comprising SEQ ID NO:42.

8. An isolated antibody or antigen binding fragment comprising a heavy chain variable
30 region comprising SEQ ID NO:37 and a light chain variable region comprising SEQ ID NO:38.

9. An isolated antibody or antigen binding fragment comprising a heavy chain sequence comprising SEQ ID NO:41 or SEQ ID NO: 47 and a light chain sequence comprising SEQ ID NO:42.

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10. An isolated antigen binding fragment of an antibody comprising a heavy chain sequence comprising SEQ ID NO:39 or SEQ ID NO:54 and a light chain sequence comprising SEQ ID NO:42.

10 11. The antibody or antigen binding fragment of claims 4 or 9, wherein the antibody or antigen binding fragment comprises a mutation at one or more positions corresponding to H311, D313, I254, or H436 in SEQ ID NO:41.

15 12. The antibody or antigen binding fragment of any one of the preceding claims, wherein the antibody or antigen binding fragment is an IgG2-A isoform or an IgG2-A/B isoform, but not an IgG2-B isoform.

13. An isolated antibody or antigen binding fragment comprising a heavy chain sequence comprising SEQ ID NO:47 and a light chain sequence comprising SEQ ID NO:42.

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14. A composition comprising the antibody or antigen binding fragment of any one of claims 1 to 13 and, a pharmaceutically acceptable carrier.

25 15. A nucleic acid comprising a sequence encoding an antibody or antigen binding fragment according to any one of claims 1 to 13.

16. A vector comprising the nucleic acid of claim 15.

17. A host cell comprising the vector of claim 16.

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18. A method of antagonizing IL-6 comprising contacting IL-6 with the antibody or antibody fragment of any one of claims 1-13.

5 19. Use of an antibody or antigen binding fragment of any of claims 1-13 in the manufacture of a medicament for treating an IL-6 associated disease characterized by an elevated level of IL-6 in the vitreous.

10 20. Use of an antibody or antigen binding fragment of any of claims 1-13 in the manufacture of a medicament for treating diabetic macular edema (DME), diabetic retinopathy, uveitis, dry eye (e.g., dry eye disease or dry eye syndrome), age-related macular degeneration (AMD), proliferative diabetic retinopathy (PDR), retinal vein occlusion (RVO), neuromyelitis optica (NMO), corneal transplant, corneal abrasion, or physical injury to the eye.

15 21. The use of claim 20, for the treatment of diabetic macular edema, wherein the antibody or fragment thereof is to be delivered to the vitreous of a subject's eye.

20 22. The isolated antibody or antigen binding fragment of claim 11, wherein the mutation at position I254 are selected from I254A and I254R.

23. The isolated antibody or antigen binding fragment of claim 11, wherein the mutation at position H311 are selected from H311A, H331E and H311N.

25 24. The isolated antibody or antigen binding fragment of claim 11, wherein the mutation at position D313 is D313T.

25. The isolated antibody or antigen binding fragment of claim 11, wherein the mutation at position H436 is H436A.