CLAIMS

1. An isolated human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof, wherein the antibody or α-synuclein binding fragment thereof comprises:

a VH CDR1 comprising residues 31-35 of SEQ ID NO:9,

a VH CDR2 comprising residues 50-68 of SEQ ID NO:9,

a VH CDR3 comprising residues 101-102 of SEQ ID NO:9,

a VL CDR1 comprising residues 23-33 of SEQ ID NO:12,

a VL CDR2 comprising residues 49-55 of SEQ ID NO:12, and

a VL CDR3 comprising residues 88-98 of SEQ ID NO:12.

2. An isolated human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof comprising:

a) a VH region comprising the amino acid sequence of SEQ ID NO:10 and

b) a VL region comprising the amino acid sequence of SEQ ID NO:13.

3. An isolated human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof comprising:

a) a VH region comprising the amino acid sequence of SEQ ID NO:9 and

b) a VH region comprising the amino acid sequence of SEQ ID NO:12.

4. The antibody or α-synuclein binding fragment thereof of any one of claims 1-3, which is

(i) detectably labeled, wherein the detectable label is selected from the group consisting of an enzyme, a radioisotope, a fluorophore and a heavy metal; or

(ii) attached to a drug.

5. The antibody or α-synuclein binding fragment thereof of any one of claims 1-3 comprising a human IgG 1 heavy chain constant region.

6. The antibody or α-synuclein binding fragment thereof of claim 5 comprising a human lambda light chain constant region.

7. The antibody or α-synuclein binding fragment thereof of any one of claims 1-5 comprising a human lambda light chain constant region.

8. A composition comprising the antibody or α-synuclein binding fragment thereof of any one of claims 1-7 wherein the composition is

(i) a pharmaceutical composition further comprising a pharmaceutically acceptable carrier; or

(ii) a diagnostic composition further comprising one or more immuno or nucleic acid based diagnostic reagents.

9. A kit for the diagnosis of a synucleinopathic disease, said kit comprising the antibody or α-synuclein binding fragment thereof of any one of claims 1-7 with reagents and/or instructions for use.

10. The kit of claim 9, wherein the synucleinopathic disease is Parkinson's disease.

11. An isolated polynucleotide or polynucleotides encoding the antibody or α-synuclein binding fragment thereof of any one of claims 1-7.

12. An expression vector or vectors comprising the polynucleotide or polynucleotides of claim 11.

13. A host cell comprising the expression vector or vectors of claim 12.

14. A method for preparing an anti-α-synuclein antibody or fragment thereof, said method comprising:

(a) culturing the cell of claim 13; and

(b) isolating said antibody or fragment thereof from the culture.

15. The use of the antibody or α-synuclein binding fragment thereof of any one of claims 1-7 in the manufacture of a medicament for treatment of a synucleinopathic disease in a human subject.

16. The use of claim 15, wherein the synucleinopathic disease is Parkinson's disease.

17. The use of claim 16, wherein the human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof, comprises:

a VH CDR1 comprising residues 31-35 of SEQ ID NO:9,

a VH CDR2 comprising residues 50-68 of SEQ ID NO:9,

a VH CDR3 comprising residues 101-102 of SEQ ID NO:9,

a VL CDR1 comprising residues 23-33 of SEQ ID NO:12,

a VL CDR2 comprising residues 49-55 of SEQ ID NO:12, and

a VL CDR3 comprising residues 88-98 of SEQ ID NO:12.

18. The use of claim 16, wherein the human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof, comprises:

a) a VH region comprising the amino acid sequence of SEQ ID NO:10 and

b) a VL region comprising the amino acid sequence of SEQ IDNO:13.

19. A method of diagnosing a synucleinopathic disease in a human subject, the method comprising:

(a) assessing a level of α-synuclein in a sample from the subject to be diagnosed with the antibody or α-synuclein binding fragment thereof of any one of claims 1-7; and

(b) comparing the level of the α-synuclein to a control, wherein a difference or similarity between the level of the α-synuclein and the indicates that the subject has a synucleinopathic disease.

20. The method of claim 19, wherein the synucleinopathic disease is Parkinson's disease.

21. The use of the antibody or α-synuclein binding fragment thereof of any one of claims 1-7 attached to a therapeutic or diagnostic agent in the manufacture of a medicament for *in vivo* detection of or targeting a therapeutic and/or diagnostic agent to α-synuclein in a human subject, wherein α-synuclein is detected by positron emission tomography (PET), single photon emission tomography 20 (SPECT), near infrared (NIR) optical imaging, magnetic resonance imaging (MRI), or a combination thereof.

22. The antibody or α-synuclein binding fragment thereof of any one of claims 1-7 for use as a medicament.

23. The antibody or α-synuclein binding fragment thereof for use of claim 22, wherein the human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof, comprises:

a VH CDR1 comprising residues 31-35 of SEQ ID NO:9,
a VH CDR2 comprising residues 50-68 of SEQ ID NO:9,
a VH CDR3 comprising residues 101-102 of SEQ ID NO:9,
a VL CDR1 comprising residues 23-33 of SEQ ID NO:12,
a VL CDR2 comprising residues 49-55 of SEQ ID NO:12, and
a VL CDR3 comprising residues 88-98 of SEQ ID NO:12.

24. The antibody or α-synuclein binding fragment thereof for use of claim 22, wherein the human monoclonal anti-α-synuclein antibody, or an α-synuclein binding fragment thereof, comprises:

a) a VH region comprising the amino acid sequence of SEQ ID NO:10 and
b) a VL region comprising the amino acid sequence of SEQ IDNO:13.