CLAIMS

1. A pharmaceutical composition for the treatment of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system comprising a therapeutically effective amount of an antibody or a functional fragment thereof comprising a light chain complementarity determining region 1 (CDR1) having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14, wherein the antibody or functional fragment thereof specifically binds to amyloid-beta.

2. The pharmaceutical composition of claim 1, wherein the ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system is selected from the group consisting of cortical visual deficits, glaucoma, primary retinal degeneration, optic nerve drusen, optic neuropathy, optic neuritis, cataract, ocular amyloidosis and lattice dystrophy.

3. A pharmaceutical composition for the treatment of cortical visual deficits, glaucoma, optic neuritis or lattice dystrophy, comprising a therapeutically effective amount of an antibody or a functional fragment thereof comprising a light chain complementarity determining region 1 (CDR1) having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14, wherein the antibody or functional fragment thereof specifically binds to amyloid-beta.

4. The pharmaceutical composition of claims 2 or 3, wherein the ocular disease is glaucoma.

5. The pharmaceutical composition of claim 4, wherein the glaucoma is selected from the group consisting of chronic open-angle glaucoma (COAG), acute angle closure glaucoma (AACG), mixed or combined mechanism glaucoma, normal tension glaucoma, congenital glaucoma, secondary glaucoma, pigmentary glaucoma and exfoliative glaucoma.

6. The pharmaceutical composition of claims 1 or 3 for reducing the plaque load in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

7. The pharmaceutical composition of claims 1 or 3 for reducing the amount of plaques in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

8. The pharmaceutical composition of claims 1 or 3 for decreasing the total amount of soluble amyloid-beta in the retinal ganglion cell layer of a subject.

9. The pharmaceutical composition of claims 1 or 3 for preventing, treating or alleviating the effects of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject.

10. The pharmaceutical composition of claims 1 or 3 for retaining or decreasing ocular pressure in the eyes of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

11. The pharmaceutical composition of any one of claims 1-10, wherein the antibody is a monoclonal antibody.

12. The pharmaceutical composition of any one of claims 1-10, wherein the antibody is a chimeric antibody or a humanized antibody.

13. The pharmaceutical composition of any one of claims 1-12, wherein the antibody or functional fragment thereof comprises a light chain variable region comprising the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region comprising the amino acid sequence of SEQ ID NO: 8.

14. The pharmaceutical composition of any one of claims 1, 2 or 6-12, wherein the ocular disease is not macular degeneration.

15. The pharmaceutical composition of any one of claims 6 to 10, wherein the subject is a mammal.

16. The pharmaceutical composition of claim 15, wherein the mammal is a human.

17. A method for diagnosing an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject comprising the steps of:

(a) bringing a sample of visual system tissue into contact with an antibody or functional fragment thereof, which antibody or functional fragment thereof binds an epitope of amyloid-beta;

(b) allowing the antibody or functional fragment thereof to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex; and

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample;

wherein the antibody or functional fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

18. A method for diagnosing a predisposition to an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject comprising the steps of:

(a) bringing a sample of visual system tissue into contact with an antibody or functional fragment thereof, wherein the antibody or functional fragment thereof binds a conformational epitope of amyloid-beta;

(b) allowing the antibody or functional fragment thereof to bind to amyloid-beta in the sample to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex to a normal control value,

wherein an increase in the amount of said complex compared to a normal control value indicates that the subject is suffering from or is at risk of developing an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system; and

wherein the antibody or functional fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the

amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

19. A method for monitoring minimal residual ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject following treatment with the pharmaceutical composition of claims 1 or 3, wherein said method comprises:

(a) bringing a sample of visual system tissue into contact with an antibody or functional fragment thereof, which antibody or functional fragment thereof binds an epitope of amyloid-beta;

(b) allowing the antibody or functional fragment thereof to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex to a normal control value,

wherein an increase in the amount of said complex compared to a normal control value indicates that the subject still suffers from a minimal residual ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system; and

wherein the antibody or functional fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

20. A method for predicting responsiveness of a subject being treated with the pharmaceutical composition of claims 1 or 3 comprising the steps of:

(a) bringing a sample of visual system tissue suspected to contain amyloid-beta into contact with an antibody or functional fragment thereof, which antibody or functional fragment thereof binds an epitope of amyloid-beta;

(b) allowing the antibody to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex before and after onset of the treatment,

wherein a decrease in the amount of said immunological complex indicates that the subject has a high potential of being responsive to the treatment; and

wherein the antibody or functional fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

21. The method of any one of claims 17-19, wherein the ocular disease is selected from cortical visual deficits, glaucoma, optic neuritis and lattice dystrophy.

22. The method of any one of claims 17-21, wherein the subject is a mammal.

23. The method of claim 22, wherein the mammal is a human.

24. The method of any one of claims 17-21, wherein the antibody is a monoclonal antibody.

25. The method of any one of claims 17-21, wherein the antibody is a chimeric antibody or a humanized antibody.

26. The method of any one of claims 17-25, wherein the antibody or functional fragment thereof comprises a light chain variable region having the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region having the amino acid sequence of SEQ ID NO: 8.

27. The method of any one of claims 17-20 or 22-26, wherein the ocular disease is not macular degeneration.

28. Use of a pharmaceutical composition of claims 1 or 3 in the preparation of a medicament for reducing the plaque load in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

29. Use of a pharmaceutical composition of claims 1 or 3 in the preparation of a medicament for reducing the amount of plaques in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

30. Use of a pharmaceutical composition of claims 1 or 3 in the preparation of a medicament for decreasing the total amount of soluble amyloid-beta in the retinal ganglion cell layer of a subject.

31. Use of a pharmaceutical composition of claims 1 or 3 in the preparation of a medicament for preventing, treating or alleviating the effects of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

32. Use of a pharmaceutical composition of claims 1 or 3 in the preparation of a medicament for retaining or decreasing ocular pressure in the eyes of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

33. The use of any one of claims 28-32, wherein the ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system is selected from the group consisting of cortical visual deficits, glaucoma, primary retinal degeneration, optic nerve drusen, optic neuropathy, optic neuritis, cataract, ocular amyloidosis and lattice dystrophy.

34. The use of any one of claims 28-33, wherein the ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system is selected from the group consisting of cortical visual deficits, glaucoma, optic neuritis, and lattice dystrophy.

35. The use of claims 33 or 34, wherein the ocular disease is glaucoma.

36. The use of claim 35, wherein the glaucoma is selected from the group consisting of chronic open-angle glaucoma (COAG), acute angle closure glaucoma (AACG), mixed or combined mechanism glaucoma, normal tension glaucoma, congenital glaucoma, secondary glaucoma, pigmentary glaucoma and exfoliative glaucoma.

37. The use of any one of claims 28-36, wherein the antibody is a monoclonal antibody.

38. The use of any one of claims 28-36, wherein the antibody is a chimeric antibody or a humanized antibody.

39. The use of any one of claims 28-38, wherein the antibody or functional fragment thereof comprises a light chain variable region comprising the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region comprising the amino acid sequence of SEQ ID NO: 8.

40. The use of any one of claims 28-33 or 37-39, wherein the ocular disease is not macular degeneration.

41. The use of any one of claims 28-40, wherein the subject is a mammal.

42. The use of any one of claims 28-40, wherein the mammal is a human.

CLAIMS

1. A pharmaceutical composition for the treatment of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject, comprising a therapeutically effective amount of an antibody or an antigen-binding fragment thereof comprising a light chain complementarity determining region 1 (CDR1) having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14, wherein the antibody or antigen-binding fragment thereof specifically binds to amyloid-beta.

2. A pharmaceutical composition for preventing, treating or alleviating one or more effects of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject, comprising a therapeutically effective amount of an antibody or an antigen-binding fragment thereof comprising a light chain complementarity determining region 1 (CDR1) having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14, wherein the antibody or antigen-binding fragment thereof specifically binds to amyloid-beta.

3. The pharmaceutical composition of claim 1 or 2, wherein the ocular disease is glaucoma.

4. The pharmaceutical composition of claim 3, wherein the glaucoma is selected from the group consisting of chronic open-angle glaucoma (COAG), acute angle closure glaucoma (AACG), mixed or combined mechanism glaucoma, normal tension glaucoma, congenital glaucoma, secondary glaucoma, pigmentary glaucoma and exfoliative glaucoma.

5. The pharmaceutical composition of claim 1 or 2 for reducing the plaque load in the retinal ganglion cell layer of the subject.

6. The pharmaceutical composition of claim 1 or 2 for reducing the amount of plaques in the retinal ganglion cell layer of the subject.

7. The pharmaceutical composition of claim 1 or 2 for decreasing the total amount of soluble amyloid-beta in the retinal ganglion cell layer of the subject.

8. The pharmaceutical composition of claim 1 or 2 for retaining or decreasing ocular pressure in the eyes of the subject.

9. The pharmaceutical composition of any one of claims 1, 2, 5, 6, 7, or 8 wherein the ocular disease is not macular degeneration.

10. The pharmaceutical composition of any one of claims 1-9, wherein the antibody is a monoclonal antibody.

11. The pharmaceutical composition of any one of claims 1-9, wherein the antibody is a chimeric antibody or a humanized antibody.

12. The pharmaceutical composition of any one of claims 1-11, wherein the antibody or antigen-binding fragment thereof comprises a light chain variable region comprising the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region comprising the amino acid sequence of SEQ ID NO: 8.

13. The pharmaceutical composition of any one of claims 1-12, wherein the subject is a mammal.

14. The pharmaceutical composition of claim 13, wherein the mammal is a human.

15. A method for diagnosing an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject comprising the steps of:

(a) bringing a sample of visual system tissue from the subject into contact with an antibody or an antigen-binding fragment thereof, which antibody or antigen-binding fragment thereof binds an epitope of amyloid-beta;

(b) allowing the antibody or antigen-binding fragment thereof to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex; and

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample;

wherein the antibody or antigen-binding fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

16. A method for diagnosing a predisposition to an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject comprising the steps of:

(a) bringing a sample of visual system tissue from the subject into contact with an antibody or an antigen-binding fragment thereof, wherein the antibody or antigen-binding fragment thereof binds a conformational epitope of amyloid-beta;

(b) allowing the antibody or antigen-binding fragment thereof to bind to amyloid-beta in the sample to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex to a normal control value,

wherein an increase in the amount of said complex compared to a normal control value indicates that the subject is suffering from or is at risk of developing an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system; and

wherein the antibody or antigen-binding fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

17. A method for monitoring minimal residual ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system in a subject being treated for an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system with a pharmaceutical composition comprising an antibody or antigen-binding fragment thereof that specifically binds to amyloid-beta, wherein said method comprises:

(a) bringing a sample of visual system tissue from the subject into contact with the antibody or antigen-binding fragment thereof;

(b) allowing the antibody or antigen-binding fragment thereof to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex to a normal control value,

wherein an increase in the amount of said complex compared to a normal control value indicates that the subject still suffers from a minimal residual ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system; and

wherein the antibody or antigen-binding fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

18. A method for predicting responsiveness of a subject being treated for an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system with a pharmaceutical composition comprising an antibody or antigen-binding fragment thereof that specifically binds to amyloid-beta, wherein said method comprises:

(a) bringing a sample of visual system tissue from the subject suspected to contain amyloid-beta into contact with the antibody or antigen-binding fragment thereof;

(b) allowing the antibody or antigen-binding fragment thereof to bind to amyloid-beta to form an immunological complex;

(c) detecting the formation of the immunological complex;

(d) correlating the presence or absence of the immunological complex with the presence or absence of amyloid-beta in the sample; and

(e) comparing the amount of said immunological complex before and after onset of the treatment,

wherein a decrease in the amount of said immunological complex indicates that the subject has a high potential of being responsive to the treatment; and

wherein the antibody or antigen-binding fragment thereof comprises a light chain CDR1 having the amino acid sequence of SEQ ID NO: 9; a light chain CDR2 having the amino acid sequence

of SEQ ID NO: 10; a light chain CDR3 having the amino acid sequence of SEQ ID NO: 11; a heavy chain CDR1 having the amino acid sequence of SEQ ID NO: 12; a heavy chain CDR2 having the amino acid sequence of SEQ ID NO: 13; and a heavy chain CDR3 having the amino acid sequence of SEQ ID NO: 14.

19. The method of any one of claims 15-18, wherein the ocular disease is glaucoma.

20. The method of any one of claims 15-18, wherein the ocular disease is not macular degeneration.

21. The method of any one of claims 15-20, wherein the antibody is a monoclonal antibody.

22. The method of any one of claims 15-20, wherein the antibody is a chimeric antibody or a humanized antibody.

23. The method of any one of claims 15-22, wherein the antibody or antigen-binding fragment thereof comprises a light chain variable region having the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region having the amino acid sequence of SEQ ID NO: 8.

24. The method of any one of claims 15-23, wherein the subject is a mammal.

25. The method of claim 24, wherein the mammal is a human.

26. Use of the pharmaceutical composition of claim 1 or 2 in the preparation of a medicament for reducing the plaque load in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

27. Use of the pharmaceutical composition of claim 1 or 2 in the preparation of a medicament for reducing the amount of plaques in the retinal ganglion cell layer of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

28. Use of the pharmaceutical composition of claim 1 or 2 in the preparation of a medicament for decreasing the total amount of soluble amyloid-beta in the retinal ganglion cell layer of a subject.

29. Use of the pharmaceutical composition of claim 1 or 2 in the preparation of a medicament for preventing, treating or alleviating the effects of an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

30. Use of the pharmaceutical composition of claim 1 or 2 in the preparation of a medicament for retaining or decreasing ocular pressure in the eyes of a subject suffering from an ocular disease associated with amyloid-beta-related pathological abnormalities or changes in the tissues of the visual system.

31. The use of any one of claims 26-30, wherein the ocular disease is glaucoma.

32. The use of claim 31, wherein the glaucoma is selected from the group consisting of chronic open-angle glaucoma (COAG), acute angle closure glaucoma (AACG), mixed or combined mechanism glaucoma, normal tension glaucoma, congenital glaucoma, secondary glaucoma, pigmentary glaucoma and exfoliative glaucoma.

33. The use of any one of claims 26-30, wherein the ocular disease is not macular degeneration.

34. The use of any one of claims 26-33, wherein the antibody is a monoclonal antibody.

35. The use of any one of claims 26-33, wherein the antibody is a chimeric antibody or a humanized antibody.

36. The use of any one of claims 26-35, wherein the antibody or antigen-binding fragment thereof comprises a light chain variable region comprising the amino acid sequence of SEQ ID NO: 7 and a heavy chain variable region comprising the amino acid sequence of SEQ ID NO: 8.

37. The use of any one of claims 26-36, wherein the subject is a mammal.

38. The use of claim 37, wherein the mammal is a human.