Claims:

1. A humanized antibody or fragment thereof which binds to beta-amyloid, wherein the humanized antibody or fragment thereof comprises:

I. (A) (i) a heavy chain variable region (HCVR) comprising (a) a complementarity determining region (CDR)1 comprising the amino acid sequence of SEQ ID NO: 1, (b) a CDR2 comprising the amino acid sequence of SEQ ID NO: 2, and (c) a CDR3 comprising the amino acid sequence of SEQ ID NO: 3; and (ii) a light chain variable region (LCVR) comprising an amino acid sequence that is at least 98% identical to the amino acid sequence of SEQ ID NO: 12; or

(B) (i) an LCVR comprising (a) a CDR1 comprising the amino acid sequence of SEQ ID NO: 4, (b) a CDR2 comprising the amino acid sequence of SEQ ID NO: 5, or the amino acid sequence RVSNRFS, or the amino acid sequence KVSSRFS, and (c) a CDR3 comprising the amino acid sequence of SEQ ID NO: 6; and (ii) a heavy chain variable region comprising an amino acid sequence that is at least 98% identical to the amino acid sequence of SEQ ID NO: 15; and

II. an IgG1 Fc region comprising an amino acid modification at any one or more of amino acid positions 238, 239, 248, 249, 252, 254, 265, 268, 269, 270, 272, 278, 289, 292, 293, 294, 295, 296, 298, 301, 303, 322, 324, 327, 329, 333, 335, 338, 340, 373, 376, 382, 388, 389, 414, 416, 419, 434, 435, 437, 438 or 439 of the Fc region.

2. The humanized antibody or antigen-binding fragment thereof according to claim 1, wherein the LCVR CDR2 comprises the amino acid sequence of SEQ ID NO: 5.

3. The humanized antibody or fragment thereof according to claim 1, wherein the LCVR CDR2 comprises the amino acid sequence RVSNRFS or the amino acid sequence KVSSRFS.

4. The humanized antibody or fragment thereof according to any one of claims 1-3, wherein the amino acid modification results in a reduced effector function.

5. The humanized antibody or fragment thereof according to any one of claims 1-4, comprising the Fc region variant D265A.

6. The humanized antibody or fragment thereof according to any one of claims 1-5, wherein the heavy chain variable region (HCVR) comprises the amino acid sequence set forth in SEQ ID NO: 15.

7. The humanized antibody or fragment thereof according to any one of claims 1-5, wherein the light chain variable region (LCVR) comprises the amino acid sequence set forth in SEQ ID NO: 12.

8. The humanized antibody or fragment thereof according to any one of claims 1-5, wherein the HCVR comprises an amino acid sequence that is at least 98% identical to SEQ ID NO: 15 and the LCVR comprises an amino acid sequence that is at least 98% identical to SEQ ID NO: 12.

9. The humanized antibody or fragment thereof according to any one of claims 1-5, wherein the LCVR comprises the amino acid sequence of SEQ ID NO: 12 and the HCVR comprises the amino acid sequence of SEQ ID NO: 15.

10. The humanized antibody or fragment thereof according to claim any one of claims 1-5, wherein:

(a) the amino acid in Kabat position 47 in the Heavy Chain Variable Region is Leu; and/or

(b) the amino acid in Kabat position 94 in the Heavy Chain Variable Region is Ser; and/or

(c) the amino acid in Kabat position 87 in the Light Chain Variable Region is Phe or Tyr; and/or

(d) the amino acid in Kabat position 45 in the Light Chain Variable Region is Lys or Gln.

11. The humanized antibody or fragment thereof according to any one of claims 1-5, comprising a light chain comprising the amino acid sequence of SEQ ID NO: 13.

12. A nucleic acid molecule comprising a nucleotide sequence encoding the humanized antibody or fragment thereof according to any one of claims 1-11.

13. The nucleic acid molecule according to claim 12 comprising a nucleotide sequence selected from: a sequence encoding SEQ ID NO: 2 and SEQ ID NO: 3 representing the Complementarity Determining Regions (CDRs) 2 and 3 of the Heavy Chain Variable Region (HCVR), respectively; a sequence encoding SEQ ID NO: 4 representing CDR 1 of the Light Chain Variable Region (LCVR); SEQ ID NO: 18 encoding CDR2 of the HCVR; SEQ ID NO: 19 encoding CDR3 of the HCVR; SEQ ID NO: 20 encoding CDR1 of the LCVR; SEQ ID NO: 21 encoding a light chain variable region; SEQ ID NO: 24 encoding a heavy chain variable region; and SEQ ID NO: 22 encoding a light chain.

14. An expression vector comprising the nucleic acid molecule of claim 12 or 13.

15. A cell comprising an expression vector comprising the nucleic acid molecule of claim 12 or 13 or an expression vector according to claim 14.

16. A composition comprising the humanized antibody or fragment thereof according to any one of claims 1-11 .

17. A composition comprising the humanized antibody or fragment thereof according to any one of claims 1-11 in a therapeutically effective amount, and further comprising one or more of the following: a biologically active substance, a pharmaceutically acceptable carrier, a diluent, or an excipient.

18. The composition according to claim 17, wherein the biologically active substance is a compound used in the treatment of amyloidosis.

19. The composition according to claim 18, wherein the further biologically active substance comprises at least one compound selected from the group consisting of anti-oxidative stress compounds, anti-apoptotic compounds, metal chelators, inhibitors of DNA repair, 3-amino-1-propanesulfonic acid (3APS), 1,3-propanedisulfonate (1,3PDS), α-secretase activators, β- and γ–secretase inhibitors, tau proteins, neurotransmitters, β-sheet breakers, attractants for beta-amyloid clearing/depleting cellular components, inhibitors of N-

terminal truncated beta-amyloid , anti-inflammatory molecules, cholinesterase inhibitors (ChEIs), M1 agonists, amyloid- or tau- modifying drugs and nutritive supplements.

20. The composition according to claim 19, wherein the DNA repair inhibitor is pirenzepin or a metabolite thereof.

21. The composition according to claim 19, wherein the inhibitor of N-terminal truncated beta-amyloid is pyroglutamated beta-amyloid 3-42.

22. The composition according to claim 19, wherein the cholinesterase inhibitor (ChEI) is selected from the group consisting of tacrine, rivastigmine, donepezil, and galantamine.

23. The composition according to claim 18, wherein the compound is tacrine, rivastigmine, donepezil, galantamine, niacin, or memantine.

24. Use of the humanized antibody or fragment thereof according to any one of claims 1-11 for the preparation of a medicament for preventing, treating or alleviating one or more effects of amyloidosis.

25. The use according to claim 24, wherein the amyloidosis is secondary amyloidosis, age-related amyloidosis, Alzheimer's Disease (AD), Lewy body dementia, Down's syndrome, hereditary cerebral hemorrhage with amyloidosis (Dutch type), the Guam Parkinson-Dementia complex; progressive supranuclear palsy, multiple sclerosis, Creutzfeld Jacob disease, Parkinson's disease, HIV-related dementia, ALS (amyotropic lateral sclerosis), Adult Onset Diabetes, senile cardiac amyloidosis, endocrine tumors, beta-amyloid-induced neuron degradation, macular degeneration, cataract, and drusen-related optic neuropathy, in a subject in need thereof.

26. The use according to claim 24, wherein the amyloidosis is Alzheimer's Disease (AD).

27. The use according to any one of claims 25-26, wherein the amyloidosis is characterized by a loss of cognitive memory capacity.

28. The use according to claim 27, wherein the treatment of the subject leads to:

i) retention of cognitive memory capacity;

ii) an increase of the cognitive memory capacity; or

iii) complete restoration of the cognitive memory capacity.

29. The use according to any one of claims 25-28, wherein the subject is a mammal.

30. The use according to any one of claims 25-28, wherein the subject is a human.

31. An *in vitro* method of diagnosis of an amyloid-associated disease or condition comprising:

(a) bringing an isolated tissue sample of a subject suspected to contain beta-amyloid into contact with the humanized antibody or fragment thereof according to any one of claims 1-11;

(b) allowing the antibody or fragment thereof to bind to the beta-amyloid;

(c) detecting the antibody or fragment thereof bound to the beta-amyloid; and

(d) correlating the presence or absence of antibody or fragment thereof binding with the presence or absence of beta-amyloid in the sample.

32. An *in vitro* method of determining the extent of amyloidogenic plaque burden in an isolated sample of tissue and/or isolated body fluids of a subject comprising:

(a) testing said sample for the presence of beta-amyloid with the humanized antibody or fragment thereof according to any one of claims 1-11;

(b) determining the amount of antibody or fragment thereof bound to the beta-amyloid; and

(c) calculating the plaque burden in the tissue and/or body fluids of the subject.

33. A test kit for the detection and diagnosis of amyloid-associated diseases and conditions comprising the humanized antibody or fragment thereof according to any one of claims 1-11 and instructions for using the antibodies or fragment thereof for the purpose of binding to beta-amyloid to form an immunological complex and detecting the formation of the immunological complex such that presence or absence of the immunological complex correlates with the presence or absence of beta-amyloid.

34. A method of producing the humanized antibody or fragment thereof according to any one of claims 1-11, wherein the method comprises culturing the cell of claim 15.

35. The method of claim 34, further comprising the step of purifying the humanized antibody or fragment thereof produced by the cell.

36. A method of producing the humanized antibody or fragment thereof, wherein the method comprises expressing the nucleic acid molecule of claim 12 or 13 or the expression vector of claim 14.

37. The method of claim 36, further comprising the step of purifying the humanized antibody or fragment thereof.

38. A humanized antibody or fragment thereof according to any of claims 1-11 for use in protecting neurons from beta-amyloid-induced degeneration.

39. Use of the humanized antibody or fragment thereof according to any of claims 1-11 for the preparation of a medicament for preventing degeneration of neurons upon exposure to beta-amyloid oligomers in a subject suffering from amyloidosis.

40. A humanized antibody or fragment thereof according to any of claims 1-11 for use in disaggregating preformed beta-amyloid fibers.

41. Use of the humanized antibody or fragment thereof according to any one of claims 1-11 for the preparation of a medicament for disaggregating preformed beta-amyloid fibers in a subject suffering from amyloidosis.

Claims

1. A chimeric antibody or fragment thereof, or humanized antibody or a fragment thereof capable of specifically binding beta amyloid, wherein the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof comprises the amino acid sequence of SEQ ID NO:1 representing CDR1, the amino acid sequence of SEQ ID NO: 2 representing CDR2 and the amino acid sequence of SEQ ID NO: 3 representing CDR3 of the Heavy Chain Variable Region (HCVR) and wherein the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof comprises an IgG1 Fc region comprising an amino acid modification at any one or more of amino acid positions 238, 239, 248, 249, 252, 254, 265, 268, 269, 270, 272, 278, 289, 292, 293, 294, 295, 296, 298, 301, 303, 322, 324, 327, 329, 333, 335, 338, 340, 373, 376, 382, 388, 389, 414, 416, 419, 434, 435, 437, 438 or 439 of the Fc region.

2. A chimeric antibody or fragment thereof, or humanized antibody or a fragment thereof capable of specifically binding beta amyloid, wherein the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof comprises the amino acid sequence of SEQ ID NO: 4 representing CDR1, the amino acid sequence of SEQ ID NO: 5 or SEQ ID NO: 5 with one amino acid modification representing CDR2, and the amino acid sequence of SEQ ID NO: 6 representing CDR3 of the Light Chain Variable Region (LCVR) and wherein the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof, comprises an IgG1 Fc region comprising an amino acid modification at any one or more of amino acid positions 238, 239, 248, 249, 252, 254, 265, 268, 269, 270, 272, 278, 289, 292, 293, 294, 295, 296, 298, 301, 303, 322, 324, 327, 329, 333, 335, 338, 340, 373, 376, 382, 388, 389, 414, 416, 419, 434, 435, 437, 438 or 439 of the Fc region.

3. The chimeric antibody or fragment thereof, or humanized antibody or a fragment thereof, according to claim 1, wherein the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof further comprises the amino acid sequence of SEQ ID NO: 4 representing CDR1, the amino acid sequence of SEQ ID NO: 5 or SEQ ID NO: 5 with one amino acid modification representing CDR2, and the amino acid sequence of SEQ ID NO: 6 representing CDR3 of the Light Chain Variable Region (LCVR).

4. The chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to claim 1 wherein within the amino acid sequence of CDR2

of the light chain variable region (LCVR) as given in SEQ ID NO: 5, the Lys at Kabat position 50 is replaced by Arg, Gln or Glu, but particularly by Arg, and/or the Ser at Kabat position 53 is replaced by Asn or Thr, but particularly by Asn, and/or the Asn at Kabat position 53 is replaced by Ala, Val, Leu, Ser or Ile, but especially Ser.

5. The humanized antibody or the fragment thereof according to claim 1, 2, or 3, wherein the humanized antibody or the fragment thereof comprises variable regions with human- or primate-derived framework regions, and wherein at least one of the amino acids of the human- or primate-derived framework region is changed through a substitution to an amino acid from the corresponding region of murine antibody ACI-01-Ab7C2, deposited on December 1, 2005 with the "Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH" (DSMZ) in Braunschweig, Mascheroder Weg 1 B, 38124 Branuschweig, under the provisions of the Budapest Treaty under accession no DSM ACC2750, or a substitution conservative thereto.

6. The humanized antibody or the fragment thereof according to claim 5, wherein the humanized antibody or the fragment thereof comprises variable regions with human- or primate-derived framework regions, and wherein:

(a) the Trp in Kabat position 47 in the human- or primate-derived framework region of the Heavy Chain Variable Region is replaced by an amino acid selected from the group consisting of Leu, norleucine, Ile, Val, Met, Ala, and Phe; and/or

(b) the Arg in Kabat position 94 in the human- or primate-derived framework region of the Heavy Chain Variable Region is replaced by Ser, and/or

(c) the Tyr in Kabat position 87 in the human- or primate-derived framework region of the Light Chain Variable Region is replaced by an amino acid selected from the group consisting of Phe, Leu, Val, Ile, and Ala.

(d) the Gln in Kabat position 45 in the human- or primate-derived framework region of

the Light Chain Variable Region is replaced by Lys.

7. The humanized antibody or the fragment thereof according to claim 1, 2, or 3, wherein the humanized antibody or the fragment thereof comprises variable regions with human- or primate-derived framework regions, and wherein the heavy chain variable region (HCVR) comprises an amino acid sequence that is 90%, particularly 95%, more particularly 98%, even more particularly 100% identical to the sequence set forth in SEQ ID NO: 15.

8. The humanized antibody or the fragment thereof according to claim 1, 2, or 3, wherein the humanized antibody or the fragment thereof comprises variable regions with human- or primate-derived framework regions, and wherein the light chain variable region (LCVR) comprises an amino acid sequence that is 90%, particularly 95%, more particularly 98%, even more particularly 100% identical to the sequence set forth in SEQ ID NO: 12.

9. The humanized antibody or the fragment thereof according to claim 1, 2, or 3, wherein the humanized antibody or the fragment thereof comprises variable regions with human- or primate-derived framework regions, and wherein the LCVR comprises the amino acid sequence of SEQ ID NO: 12 and the HCVR comprises the amino acid sequence of SEQ ID NO: 15.

10. The chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof of claim 1, 2, or 3, wherein the amino acid modification results in a reduced effector function.

11. The chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-9, comprising the Fc region variant D265A.

12. A nucleic acid molecule comprising a nucleotide sequence encoding the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof, according to claim 1, 2, or 3, or a nucleotide sequence selected from: a sequence encoding SEQ ID NO: 2 and SEQ ID NO: 3 representing the Complementarity Determining Regions (CDRs) 2 and 3 of the Heavy Chain Variable Region (HCVR), respectively; a sequence encoding SEQ ID NO: 4 representing CDR 1 of the Light Chain Variable Region (LCVR); SEQ ID NO: 18 encoding CDR2 of the HCVR; SEQ ID NO: 19 encoding CDR3 of the HCVR; SEQ ID NO: 20 encoding CDR1 of the LCVR; SEQ ID NO: 21 encoding a light chain variable region; SEQ ID NO: 24 encoding a heavy chain variable region, or SEQ ID NO: 22 encoding a light chain.

13. An expression vector comprising the nucleic acid molecule of claim 12.

14. A cell comprising an expression vector according to claim 13.

15. A composition comprising the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof, according to any one of claims 1-11 in a therapeutically effective amount and optionally further comprising a pharmaceutically acceptable carrier.

16. A composition comprising the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11 and, optionally, further comprising a further biologically active substance in a therapeutically effective amount and/or a pharmaceutically acceptable carrier and/or a diluent and/or an excipient, wherein the further biologically active substance is selected from a compound used in the treatment of amyloidosis, compounds against oxidative stress, anti-apoptotic compounds, metal chelators, inhibitors of DNA repair such as pirenzepin and metabolites, 3-amino-1-propanesulfonic acid (3APS), 1,3-propanedisulfonate (1,3PDS), α-secretase activators, β- and γ–secretase inhibitors, tau proteins, neurotransmitters, β-sheet breakers, attractants for amyloid beta clearing/depleting cellular components, inhibitors of N-terminal truncated amyloid beta including pyroglutamated amyloid beta 3-42, anti-inflammatory molecules, and cholinesterase inhibitors (ChEIs), such as tacrine, rivastigmine, donepezil, and/or galantamine, M1 agonists and other drugs including any amyloid or tau modifying drug and nutritive supplements, and, optionally, a pharmaceutically acceptable carrier and/or a diluent and/or an excipient.

17. Use of the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11 in the preparation of a medicament for preventing, treating or alleviating the effects of one or more amyloidosis-related diseases selected from amyloidosis, neurological disorders such as Alzheimer's Disease (AD), Lewy body dementia, Down's syndrome, hereditary cerebral hemorrhage with amyloidosis (Dutch type), the Guam Parkinson-Dementia complex; progressive supranuclear palsy, multiple sclerosis; Creutzfeld Jacob disease, Parkinson's disease, HIV-related dementia, ALS (amyotropic lateral sclerosis), Adult Onset Diabetes, senile cardiac amyloidosis, endocrine tumors, Abeta-induced neuron degradation, and macular degeneration, in a subject in need thereof.

18. The use according to claim 17, wherein treatment of a subject, particularly a mammal or a human, suffering from an amyloid-associated condition characterized by a loss of cognitive memory capacity leads to an increase in the retention of cognitive memory capacity or complete restoration thereof.

19. An *in vitro* method of diagnosis of an amyloid-associated disease or condition comprising:

(a) bringing an isolated tissue sample of a subject suspected to contain the amyloid protein into contact with the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11;

(b) allowing the antibody or fragment thereof to bind to the amyloid protein;

(c) detecting the antibody or fragment thereof bound to the protein; and

(d) correlating the presence or absence of antibody or fragment thereof binding with the presence or absence of amyloid protein in the sample or specific body part.

20. An *in vitro* method of determining the extent of amyloidogenic plaque burden in an isolated sample of tissue and/or isolated body fluids of a subject comprising:

(a) testing said sample for the presence of amyloid protein with the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11;

(b) determining the amount of antibody or fragment thereof bound to the protein; and

(c) calculating the plaque burden in the tissue and/or body fluids of the subject.

21. A test kit for the detection and diagnosis of amyloid-associated diseases and conditions comprising the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11 and optionally further comprising instructions for using the antibodies for the purpose of binding to amyloid protein to form an immunological complex and detecting the formation of the immunological complex such that presence or absence of the immunological complex correlates with the presence or absence of amyloid protein.

22. A nucleic acid molecule comprising a nucleotide sequence encoding the chimeric antibody or the fragment thereof, or the humanized antibody or the fragment thereof according to any one of claims 1-11.

23. A method for preparing a chimeric antibody or fragment thereof, or humanized antibody or fragment thereof, wherein the method comprises culturing a cell comprising the nucleic acid molecule of claim 12 or claim 22.

24. A method for preparing a chimeric antibody or fragment thereof, or humanized antibody or fragment thereof, wherein the method comprises expressing the nucleic acid molecule of claim 12 or claim 22 or the vector of claim 13.