CLAIMS

1. A polypeptide comprising a variant of starting amino acid sequence SEQ ID NO:16, wherein the variant differs from SEQ ID NO:16 by one or more sets of amino acid changes selected from:

a) substitution of T50 with any amino acid and H55T;

b) N137G;

c) N142A;

d) R143V and Q144N; or

R143V, Q144N, and A146V; or

R143V, Q144N, and A146T; or

R143V, Q144N, and A146K; and

e) Q156V, G157N, ΔT158, ΔD159, ΔP160, and V161G; or

Q156Y, G157N, ΔT158, ΔD159, ΔP160, and V161G; or

G157N, ΔT158, ΔD159, ΔP160, and V161G; or

ΔT158, ΔD159, ΔP160, and V161G;

wherein the variant optionally further differs from SEQ ID NO:16 by one or more sets of amino acid changes selected from:

f) ΔM1; or

ΔM1 and ΔA2; and

g) substitution of N38 with any amino acid other than cysteine; or

substitution of N38 with any amino acid other than cysteine, and substitution of G40 with any amino acid other than cysteine; or

substitution of G40 with any amino acid other than cysteine, threonine, or serine.

2. The polypeptide of claim 1, wherein the T50 substitution is selected from the group consisting of T50G, T50H, T50K, and T50R.

3. The polypeptide of claim 2, wherein the T50 substitution is T50H.

4. The polypeptide of claim 1, wherein the variant differs from SEQ ID NO:16 at least by ΔM1 and ΔA2.

5. The polypeptide of any one of claims 1-4, wherein the variant differs from SEQ ID NO:16 at least by N137G and/or N142A.

6. The polypeptide of claim 4, wherein the variant further differs from SEQ ID NO:16 by one or more sets of amino acid changes selected from:

a) substitution of T50 with any amino acid and H55T; and

b) R143V and Q144N; or

R143V, Q144N, and A146V; or

R143V, Q144N, and A146T; or

R143V, Q144N, and A146K;

7. The polypeptide of claim 6, wherein the T50 substitution is selected from the group consisting of T50G, T50H, T50K, and T50R.

8. The polypeptide of claim 7, wherein the T50 substitution is T50H.

9. The polypeptide of claim 1, wherein the variant of SEQ ID NO:16 is selected from the group consisting of SEQ ID NO:19, SEQ ID NO:20, SEQ ID NO:21, SEQ ID NO:22, SEQ ID NO:23, SEQ ID NO:24, SEQ ID NO:25, and SEQ ID NO:26.

10. The polypeptide of any one of claims 1-9, further comprising an immunoglobulin constant region.

11. The polypeptide of claim 10, wherein the immunoglobulin constant region sequence is the Fe portion of a human lgG.

12. The polypeptide of claim 11, consisting essentially of the polypeptide of any one of claims 1-9 and the Fe portion of a human lgG.

13. The polypeptide of claim 12, wherein the human lgG is human lgG1.

14. A polypeptide consisting essentially of an amino acid sequence selected from:

a) SEQ ID NO:29;

b) SEQ ID NO:30;

c) SEQ ID NO:31;

d) SEQ ID NO:32;

e) SEQ ID NO:33;

f) SEQ ID NO:34;

g) SEQ ID NO:35; and

h) SEQ ID NO:36;

wherein the variant optionally has one or more sets of amino acid changes selected from:

i) ΔM1; or

ΔM1 and ΔA2; and

j) ΔK485.

15. A pharmaceutical composition comprising the polypeptide of any one of claims 1- 14 and a pharmaceutically acceptable carrier.

16. An oligonucleotide comprising a nucleic acid encoding a polypeptide of any one of claims 1-14.

17. The oligonucleotide of claim 16, wherein the nucleic acid encoding the polypeptide comprises a sequence selected from SEQ ID NO:37, SEQ ID NO:38, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:41, SEQ ID NO:42, SEQ ID NO:43, and SEQ ID NO:44.

18. The oligonucleotide of claim 16, wherein the nucleic acid encoding the polypeptide consists of a sequence selected from SEQ ID NO:45, SEQ ID NO:46, SEQ ID NO:47, SEQ ID NO:48, SEQ ID NO:49, SEQ ID NO:50, SEQ ID NO:51, and SEQ ID NO:52.

19. A vector comprising the nucleic acid of any one of claims 16-18.

20. A host cell comprising the vector of claim 19.

21. The host cell of claim 20, wherein the host cell is selected from the group consisting of an insect cell, a fungal cell, a plant cell, a bacterial cell, a mammalian cell, and a transgenic animal cell.

22. The host cell of claim 21, wherein the host cell is selected from the group consisting of HEK293 cells, HEK293-derived cells, CHO cells, CHO-derived cells, Hela cells, and COS cells.

23. A method of making a protein that binds amyloid, comprising expressing the protein encoded by the nucleic acid in the vector of claim 19 and isolating the expressed protein.

24. A protein that binds amyloid, produced by expressing the protein encoded by the nucleic acid in the vector of claim 19 and isolating the expressed protein.

25. The protein of claim 24, wherein the protein is expressed by culturing the host cell of any one of claims 20-22.

26. Use of a polypeptide of any one of claims 1-14 or the pharmaceutical composition of claim 15 in the manufacture of a medicament for reducing amyloid, inhibiting amyloid formation, inhibiting amyloid aggregation, or removing and/or preventing the formation of toxic oligomers in a subject in need thereof.

27. Use of a polypeptide of any one of claims 1-14 or the pharmaceutical composition of claim 15 in the manufacture of a medicament for treating a disease selected from Alzheimer's disease; early onset Alzheimer's disease; late onset Alzheimer's disease; presymptomatic Alzheimer's disease; AL amyloidosis; amyotrophic lateral sclerosis (ALS); Amyotrophic lateral sclerosis/parkinsonism-dementia complex; Argyrophilic grain dementia; Aortic medial amyloidosis; ApoAI amyloidosis; ApoAII amyloidosis; ApoAIV amyloidosis; Atrial amyloidosis; British/Danish dementia; Cataract; Corticobasal degeneration; Corneal amyloidosis associated with trichiasis; cystatin C plaque-related disease; cystatin C plaque-related coronary disease; cystatin C plaque-related kidney disease; cutaneous lichen amyloidosis; Dementia pugilistica; dentatorubral-pallidoluysian atrophy; diffuse neurofibrillary tangles with calcification; dementia with Lewy bodies; Down's syndrome; Familial Amyloidotic Cardiomyopathy (FAC); Familial Amyloidotic Polyneuropathy (FAP); Familial British dementia; Familia Danish dementia; familial encephalopathy; Familial Mediterranean fever; Fibrinogen amyloidosis; Finnish hereditary amyloidosis; Frontotemporal dementia with Parkinsonism; frontotemporal lobar degeneration (FTLDs); frontotemporal lobe dementia; Hallervorden-Spatz disease; Hemodialysis-related amyloidosis; hereditary cerebral amyloid angiopathy; hereditary cerebral hemorrhage with amyloidosis; hereditary lattice corneal dystrophy; Huntington's disease; Icelandic hereditary cerebral amyloid angiopathy; Inclusion-body myositis; Injection-localized amyloidosis; islet amyloid polypeptide amyloidosis; Lysozyme amyloidosis; multiple myeloma; Myotonic dystrophy; Niemann-Pick disease type C; Non-Guamanian motor neuron disease with neurofibrillary tangles; Parkinson's disease; peripheral amyloidosis; Pick's disease; Pituitary prolactinoma; Postencephalitic parkinsonism; Prion protein cerebral amyloid angiopathy; prion-mediated disease; kuru; Creutzfeldt-Jakob disease (CJD); Gerstmann-Sträussler-Scheinker disease (GSS); fatal familial insomnia (FFI); scrapie; spongiform encephalopathy; pulmonary alveolar proteinosis; Progressive subcortical gliosis; Progressive supranuclear palsy; Senile Systemic Amyloidosis; serum AA amyloidosis; spinal and bulbar muscular atrophy; spinocerebellar ataxia (SCA1, SCA3, SCA6, or SCA7); Subacute sclerosing panencephalitis; systemic amyloidosis; familial amyloidosis; wild-type amyloidosis; Tangle only dementia; and Tauopathies.

28. A polypeptide of any one of claims 1-14 or the pharmaceutical composition of claim 15 for use in reducing amyloid, inhibiting amyloid formation, inhibiting amyloid aggregation, or removing and/or preventing the formation of toxic oligomers in a subject in need thereof.

29. A polypeptide of any one of claims 1-14 or the pharmaceutical composition of claim 15 for use in treating a disease in a subject in need thereof, wherein the disease selected from Alzheimer's disease; early onset Alzheimer's disease; late onset Alzheimer's disease; presymptomatic Alzheimer's disease; AL amyloidosis; amyotrophic lateral sclerosis (ALS); Amyotrophic lateral sclerosis/parkinsonism-dementia complex; Argyrophilic grain dementia; Aortic medial amyloidosis; ApoAI amyloidosis; ApoAII amyloidosis; ApoAIV amyloidosis; Atrial amyloidosis; British/Danish dementia; Cataract; Corticobasal degeneration; Corneal amyloidosis associated with trichiasis; cystatin C plaque-related disease; cystatin C plaque-related coronary disease; cystatin C plaque-related kidney disease; cutaneous lichen amyloidosis; Dementia pugilistica; dentatorubral-pallidoluysian atrophy; diffuse neurofibrillary tangles with calcification; dementia with Lewy bodies; Down's syndrome; Familial Amyloidotic Cardiomyopathy (FAC); Familial Amyloidotic Polyneuropathy (FAP); Familial British dementia; Familia Danish dementia; familial encephalopathy; Familial Mediterranean fever; Fibrinogen amyloidosis; Finnish hereditary amyloidosis; Frontotemporal dementia with Parkinsonism; frontotemporal lobar degeneration (FTLDs); frontotemporal lobe dementia; Hallervorden-Spatz disease; Hemodialysis-related amyloidosis; hereditary cerebral amyloid angiopathy; hereditary cerebral hemorrhage with amyloidosis; hereditary lattice corneal dystrophy; Huntington's disease; Icelandic hereditary cerebral amyloid angiopathy; Inclusion-body myositis; Injection-localized amyloidosis; islet amyloid polypeptide amyloidosis; Lysozyme amyloidosis; multiple myeloma; Myotonic dystrophy; Niemann-Pick disease type C; Non-Guamanian motor neuron disease with neurofibrillary tangles; Parkinson's disease; peripheral amyloidosis; Pick's disease; Pituitary prolactinoma; Postencephalitic parkinsonism; Prion protein cerebral amyloid angiopathy; prion-mediated disease; kuru; Creutzfeldt-Jakob disease (CJD); Gerstmann-Sträussler-Scheinker disease (GSS); fatal familial insomnia (FFI); scrapie; spongiform encephalopathy; pulmonary alveolar proteinosis; Progressive subcortical gliosis; Progressive supranuclear palsy; Senile Systemic Amyloidosis; serum AA amyloidosis; spinal and bulbar muscular atrophy; spinocerebellar ataxia (SCA1, SCA3, SCA6, or SCA7); Subacute sclerosing panencephalitis; systemic amyloidosis; familial amyloidosis; wild-type amyloidosis; Tangle only dementia; and Tauopathies.