CLAIMS

1. An antigenic peptide which is obtainable from a tau protein which peptide is modified through linkage to a lipophilic or hydrophobic moiety that facilitates insertion into the lipid bilayer of a liposome and is reconstituted in a liposome.

2. The antigenic peptide of claim 1, wherein said peptide consists of between 5 and 25 amino acid residues, or a functional fragment thereof.

3. The antigenic peptide of any one of the preceding claims, wherein said peptide is a phospho-peptide mimicking a major pathological phospho-epitope of protein tau.

4. The antigenic peptide of any one of the preceding claims, wherein said peptide does not contain a T-cell epitope.

5. The antigenic peptide of any one of the preceding claims, wherein said peptide is presented in a highly repetitive array on the surface of the liposome.

6. The antigenic peptide of any one of the preceding claims, wherein said peptide upon administration to an animal or a human in the form of a pharmaceutical composition, is capable of eliciting a conformation specific and T-cell independent immune response.

7. The peptide or fragment according to any one of the preceding claims, wherein the lipophilic or hydrophobic moiety is a fatty acid, a triglyceride, a diglyceride, a steroid, a sphingolipid, a glycolipid or a phospholipid.

8. The peptide or fragment according to any of the preceding claims, wherein the lipophilic or hydrophobic moiety is a fatty acid, particularly a fatty acid with a carbon back bone of at least 10, particularly at least 12 carbon atoms, particularly at least 16 carbon atoms.

9. The peptide or fragment according to any of the preceding claims, wherein the hydrophobic moiety is palmitic acid.

10. The peptide or fragment according to any of the preceding claims, wherein said hydrophilic or hydrophobic moiety is covalently bound to each of the termini of the peptide or peptide fragment through at least one, particularly

~~one or two amino acids such as, for example, lysine, glutamic acid and cystein.~~

11. The peptide or fragment according to any of the preceding claims, wherein said peptide is further modified through linkage to a hydrophilic moiety.

12. The peptide or fragment according to claim 11, wherein said hydrophilic moiety is polyethylene glycol.

13. The peptide or fragment according to any of the preceding claims, wherein said tau protein is a human protein.

14. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 2 or an amino acid sequence of SEQ ID NO: 2 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

15. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 3 or an amino acid sequence of SEQ ID NO: 3 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

16. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 4 or an amino acid sequence of SEQ ID NO: 4 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

17. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 5 or an amino acid sequence of SEQ ID NO: 5 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

18. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 6 or an amino acid sequence of SEQ ID NO; 6 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

19. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 7 or an amino acid sequence of SEQ ID NO: 7 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

20. The peptide or fragment according to claim 13, which has an amino acid sequence of SEQ ID NO: 8 or an amino acid sequence of SEQ ID NO: 8 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

21. The peptide or fragment according to claim 13, which has an ammo acid sequence of SEQ ID NO: 9 or an amino acid sequence of SEQ ID NO: 9 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same or essentially the same antigenic potential as the unmodified sequence.

22. The peptide or fragment according to claim 14, which is obtainable from a human tau protein between position 5 and 20 and wherein the tyrosine at position 18 is phosphorylated.

23. The peptide or fragment according to claim 15 and 16, which is obtainable from a human tau protein between position 196-221 and wherein at least one, particularly at least two, particularly at least 3, but especially all 4 of the amino acids at position 202, 205, 212, 214 are phosphorylated.

24. The peptide or fragment according to claim 17, which is obtainable from a human tau protein between position 393 and 408 and wherein at least one

~~of the amino acids, but especially all amino acids at position 396, 404 are phosphorylated.~~

25. The peptide or fragment according to claim 18, which is obtainable from a human tau protein between position 401 and 418 and wherein at least one of the amino acids, but especially all amino acids at position 404 and 409 are phosphorylated.

26. The peptide or fragment according to claim 19, which is obtainable from a human tau protein between position 200 and 216 and wherein at least one of the amino acids, but especially all amino acids at position 202 and 205 and/or at position 212 and 214, are phosphorylated.

27. The peptide or fragment according to claim 20, which is obtainable from a human tau protein between position 407 and 418 and wherein the serine at position 409 is phosphorylated.

28. The peptide or fragment according to claim 21, which is obtainable from a human tau protein between position 399 and 408 and wherein the serine at position 404 is phosphorylated.

29. The peptide or fragment according to claim 14, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 2 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 2, wherein the amino acid residue corresponding to amino acid residue 18 (P-Tyr_{18}) of SEQ ID NO: 2 is phosphorylated (T1).

30. The peptide or fragment according to claim 15, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 3 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 3, wherein at least one, particularly at least 2 of amino acid residues corresponding to amino acid residues 212 (P-Thr_{212}) and 214 (P- Ser_{214}) of SEQ ID NO: 3 are phosphorylated.

31. The peptide or fragment according to claim 16, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 4 of at least 95%, and

~~has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 4,~~ wherein at least one, particularly at least 2 of amino acid residues corresponding to amino acid residues 202 (P-Ser_{202}) and 205 (P- Thr_{205}) of SEQ ID NO: 4 are phosphorylated.

32. The peptide or fragment according to claim 17, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 5 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 5, wherein at least one, but especially all of amino acid residues corresponding to amino acid residues 396 (P-Ser_{396}) and 404 (P- Ser_{404}) of SEQ ID NO: 5 are phosphorylated.

33. The peptide or fragment according to claim 18, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 6 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 6, wherein at least one, but especially all of amino acid residues corresponding to amino acid residues 404 (P-Ser_{404}) and 409 (P- Ser_{409}) of SEQ ID NO: 6 are phosphorylated.

34. The peptide or fragment according to claim 19, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 7 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 7, wherein at least one, particularly at least 2, particularly a least 3, but especially all of amino acid residues corresponding to amino acid residues 202 (P-Ser_{202}), 205 (P-Thr_{205}), 212 (P-Thr_{212}), and 214 (P- Ser_{214}) of SEQ ID NO: 7 are phosphorylated.

35. The peptide or fragment according to claim 20, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 8 of at least 95%, and has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO; 8, wherein the amino acid residue corresponding to amino acid residue 409 (P-Ser_{409}) of SEQ ID NO: 8 is phosphorylated.

36. The peptide or fragment according to claim 21, wherein said tau protein has an amino acid sequence identity to SEQ ID NO: 9 of at least 95%, and

~~has substantially the same immunogenic activity as said antigenic peptide of SEQ ID NO: 9,~~ wherein the amino acid residue corresponding to amino acid residue 404 (P-Ser_{404}) of SEQ ID NO: 9 is phosphorylated.

37. The peptide according to claim 29, wherein said tau protein has an amino acid sequence of SEQ ID NO: 2.

38. The peptide according to claim 30, wherein said tau protein has an amino acid sequence of SEQ ID NO: 3.

39. The peptide according to claim 31, wherein said tau protein has an amino acid sequence of SEQ ID NO: 4.

40. The peptide according to claim 32, wherein said tau protein has an amino acid sequence of SEQ ID NO: 5.

41. The peptide according to claim 33, wherein said tau protein has an amino acid sequence of SEQ ID NO: 6.

42. The peptide according to claim 34, wherein said tau protein has an amino acid sequence of SEQ ID NO: 7.

43. The peptide according to claim 35, wherein said tau protein has an amino acid sequence of SEQ ID NO: 8.

44. The peptide according to claim 36, wherein said tau protein has an amino acid sequence of SEQ ID NO: 9.

45. The peptide or fragment according to any of the preceding claims, or a combination thereof, for use in the treatment of neurodegenerative disorders such as tauopathies.

46. The peptide or fragment according to claim 45 for use in the treatment of Alzheimer's Disease.

47. A pharmaceutical composition comprising the peptide or fragment of any of the preceding claims or a combination thereof.

48. A pharmaceutical composition according to claim 47, which contains a pharmaceutically acceptable adjuvant and/or immunomodulator.

49. A pharmaceutical composition according to claim 48, wherein the immunomodulator is detoxified lipid A, such as monophosphoryl or diphosphoryl lipid A.

50. A pharmaceutical composition according to any of the preceding claims for use in the treatment of a neurodegenerative disorder such as tauopathy.

51. A pharmaceutical composition according to claim 50 for the treatment of diseases and disorders which are caused by or associated with the formation of neurofibrillary lesions, the predominant brain pathology in tauopathy comprising a heterogenous group of neurodegenerative diseases or disorders including diseases or disorders which show co-existence of tau and amyloid pathologies including, but not limited to, Alzheimer's Disease, Creutzfeldt-Jacob disease, Dementia pugilistica, Down's Syndrome, Gerstmann-Sträussler-Scheinker disease, inclusion-body myositis, and prion protein cerebral amyloid angiopathy, traumatic brain injury and further diseases or disorders which do not show a distinct amyloid pathology including, but not limited to, amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam, Non-Guamanian motor neuron disease with neurofibrillary tangles, argyrophilic grain dementia, corticobasal degeneration, diffuse neurofibrillary tangles with calcification, frontotemporal dementia with parkinsonism linked to chromosome 17, Hallevorden-Spatz disease, multiple system atrophy, Niemann-Pick disease, type C, Pick's disease, progressive subcortical gliosis, progressive supranuclear palsy, Subacute sclerosing panencephalitis, Tangle only dementia, Postencephalitic Parkinsonism, Myotonic dystrophy.

52. A pharmaceutical composition according to claim 51 for use in the treatment of Alzheimer's Disease.

53. Use of a therapeutic pharmaceutical composition as claimed in any of the preceding claims in the manufacture of a medicament for the treatment of a neurodegenerative disease or disorder such as tauopathy in an animal, particularly in a mammal, but especially in a human.

54. A use according to claim 53 for the treatment of diseases and disorders which are caused by or associated with the formation of neurofibrillary lesions, the predominant brain pathology in tauopathy comprising a heterogenous group of neurodegenerative diseases or disorders including diseases or disorders which show co-existence of tau and amyloid pathologies including, but not limited to, Alzheimer's Disease, Creutzfeldt-Jacob disease, Dementia pugilistica, Down's Syndrome, Gerstmann-Straussier-Scheinker disease, inclusion-body myositis, and prion protein cerebral amyloid angiopathy, traumatic brain injury and further diseases or disorders which do not show a distinct amyloid pathology including, but not limited to, amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam, Non-Guamanian motor neuron disease with neurofibrillary tangles, argyrophilic grain dementia, corticobasal degeneration, diffuse neurofibrillary tangles with calcification, frontotemporal dementia with parkinsonism linked to chromosome 17, Hallevorden-Spatz disease, multiple system atrophy, Niemann-Pick disease, type C, Pick's disease, progressive subcortical gliosis, progressive supranuclear palsy, Subacute sclerosing panencephalitis Tangle only dementia, Postencephalitic Parkinsonism, Myotonic dystrophy.

55. Use of an antigenic peptide or a therapeutic composition as claimed in any of the preceding claims in the manufacture of a medicament for inducing an immune response in an animal, particularly a mammal or a human, suffering from a neurodegenerative disorder such as tauopathy.

56. An antibody, particularly a monoclonal antibody or functional parts thereof according to any of the preceding claims, which antibody recognize and bind a phosphorylated pathological protein tau-conformer or those parts of the conformer which causes the pathological properties of said conformer, particularly a pathological phospho-epitope of protein tau.

57. An antibody, particularly a monoclonal antibody or functional parts thereof, according to claim 56 capable of recognizing and binding to a peptide fragment according to any of the preceding claims.

58. An antibody, particularly a monoclonal antibody or functional parts thereof according to any of the preceding claims, obtainable by immunizing a suitable animal with an antigenic peptide of any of the preceding claims, particularly an antigenic peptide comprising an amino acid sequence as given in SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8 and SEQ ID NO: 9 including a functional fragment or a variant fragment thereof.

59. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line ACI-41-Ab1 deposited on March 3, 2010 as DSM ACC3043.

60. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 59 produced by hybridoma cell line ACI-41-Ab1 deposited on March 3, 2010 as DSM ACC3043.

61. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an

antibody produced by hybridoma cell line 2B6 deposited on March 10, 2010 as DSM ACC3044.

62. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 61 produced by hybridoma cell line 2B6 deposited on March 10, 2010 as DSM ACC3044.

63. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 3A8 deposited on March 10, 2010 as DSM ACC3045.

64. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 63 produced by hybridoma cell line 3A8 deposited on March 10, 2010 as DSM ACC3045.

65. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 4C1 deposited on March 10, 2010 as DSM ACC3046.

66. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 65 produced by hybridoma cell line 4C1 deposited on March 10, 2010 as DSM ACC3046.

67. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 5D10A3 deposited on March 10, 2010 as DSM ACC3047.

68. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 67 produced by hybridoma cell line 5D10A3 deposited on March 10, 2010 as DSM ACC3047.

69. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 6C10 deposited on March 10, 2010 as DSM ACC3048.

70. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 69 produced by hybridoma cell line 6C10 deposited on March 10, 2010 as DSM ACC3048.

71. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 6H1 deposited on March 10, 2010 as DSM ACC3049.

72. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 71 produced by hybridoma cell line 6H1 deposited on March 10, 2010 as DSM ACC3049.

73. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to any of the preceding claims, which antibody has the characteristic properties of an antibody produced by hybridoma cell line 7C2 deposited on March 10, 2010 as DSM ACC3050.

74. An antibody, particularly a monoclonal antibody including any functionally equivalent antibody or functional parts thereof according to claim 73

~~- produced by hybridoma cell line 7C2 deposited on March 10, 2010 as DSM ACC3050.~~

75. The antibody according to any of the preceding claims, which is a polyclonal antibody,

76. The antibody according to any of the preceding claims which is a monoclonal antibody.

77. An antibody of any of the preceding claims, particularly a monoclonal antibody or functional parts thereof, that directly and specifically bind to an epitope on the tau protein, particularly to an epitope of a phosphorylated pathological protein tau-conformer, particularly to an epitope as represented by or comprised in a peptide sequence selected from the group of sequences as given in SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8 and SEQ ID NO: 9 and variant fragments thereof.

78. A pharmaceutical composition comprising an antibody of any of the preceding claims together with a pharmaceutically acceptable carrier.

79. The pharmaceutical composition of claim 78 for the treatment of diseases and disorders which are caused by or associated with the formation of neurofibrillary lesions, the predominant brain pathology in tauopathy comprising a heterogenous group of neurodegenerative diseases or disorders including diseases or disorders which show co-exsistance of tau and amyloid pathologies including, but not limited to, Alzheimer's Disease, Creutzfeld-Jacob disease, Dementia pugilistica, Down's Syndrome, Gerstmann-Sträussler-Scheinker disease, inclusion-body myositis, and prion protein cerebral amyloid angiopathy, traumatic brain injury and further diseases or disorders which do not show a distinct amyloid pathology including, but not limited to, amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam, Non-Guamanian motor neuron disease with neurofibrillary tangles x, argyrophilic grain dementia, corticobasal degeneration, diffuse neurofibrillary tangles with

calcification, frontotemporal dementia with parkinsonism linked to chromosome 17, Hallevorden-Spatz disease, multiple system atrophy, Niemann-Pick disease, type C, Pick's disease, progressive subcortical gliosis, progressive supranuclear palsy, Subacute sclerosing panencephalitis Tangle only dementia, Postencephalitic Parkinsonism, Myotonic dystrophy.

80. Use of an antibody or a pharmaceutical composition as claimed in any of the preceding claims in the manufacture of a medicament for the treatment of a neurodegenerative disease or disorder such as tauopathy in an animal, particularly in a mammal, but especially in a human.

81. A method of diagnosing a tau-protein-associated disease, disorder or condition in a patient comprising detecting the immunospecific binding of an antibody or an active fragment thereof to an epitope of the tau protein in a sample which includes the steps of

(a) bringing the sample suspected to contain the tau protein into contact with an antibody according to any one of claims 56-77, which antibody binds an epitope of the tau protein;

(b) allowing the antibody to bind to the tau protein 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 tau protein in the sample .

82. A method for diagnosing a predisposition to tau-protein-associated disease, disorder or condition in a patient comprising detecting the immunospecific binding of a monoclonal antibody or an active fragment thereof to an epitope of the tau protein in a sample which includes the steps of

(a) bringing the sample suspected to contain the tau antigen into contact with an antibody according to

~~any one of claims 56-77, which antibody binds an epitope of the tau protein;~~

(b) allowing the antibody to bind to the tau antigen 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 tau antigen in the sample ,

(e) comparing the amount of said immunological complex to a normal control value, wherein an increase in the amount of said aggregate compared to a normal control value indicates that said patient is suffering from or is at risk of developing an tau protein-associated disease or condition.

83. A method for monitoring minimal residual disease in a patient following treatment with an antibody or a pharmaceutical composition according to any one of the preceding claims, wherein said method comprises:

(a) bringing the sample suspected to contain the tau antigen into contact with an antibody according to any one of claims 56-77, which antibody binds an epitope of the tau protein;

(b) allowing the antibody to bind to the tau antigen 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 tau antigen in the sample ,

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

wherein an increase in the amount of said aggregate compared to a normal control value indicates that said patient still suffers from a minimal residual disease.

84. A method for predicting responsiveness of a patient being treated with an antibody or a pharmaceutical composition according to any one of the preceding claims comprising

(a) bringing the sample suspected to contain the tau antigen into contact with an antibody according to any one of claims 56-77, which antibody binds an epitope of the tau protein;

(b) allowing the antibody to bind to the tau antigen 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 tau antigen in the sample ,

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

wherein an decrease in the amount of said aggregate indicates that said patient has a high potential of being responsive to the treatment.

85. A test kit for detection and diagnosis of tau protein-associated diseases, disorders or conditions comprising an antibody according to any one of claims 56-77.

86. A test kit according to claim 85 comprising a container holding one or more antibodies according to the present invention and instructions for using the antibodies for the purpose of binding to tau antigen to form an immunological complex and detecting the formation of the immunological complex such that presence or absence of the immunological complex correlates with presence or absence of tau antigen.

87. An epitope as represented by or comprised in a peptide sequence selected from the group of sequences as given in SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO; 7, SEQ SD NO: 8 and SEQ ID NO: 9 and variant fragments thereof.

~~88. A cell line producing an antibody according to any of the preceding claims.~~

89. A cell line according to claim 88, which is hybridoma cell line ACI-41-Ab1 deposited on March 3, 2010 as DSM ACC3043.

90. A cell line according to claim 88, which is hybridoma cell line 2B6 deposited on March 10, 2010 as DSM ACC3044.

91. A cell line according to claim 88, which is hybridoma cell line 3A8 deposited on March 10, 2010 as DSM ACC3045.

92. A cell line according to claim 88, which is hybridoma cell line 4C1 deposited on March 10, 2010 as DSM ACC3046.

93. A cell line according to claim 88, which is hybridoma cell line 5D10A3 deposited on March 10, 2010 as DSM ACC3047.

94. A cell line according to claim 88, which is hybridoma cell line 6C10 deposited on March 10, 2010 as DSM ACC3048.

95. A cell line according to claim 88, which is hybridoma cell line 6H1 deposited on March 10, 2010 as DSM ACC3049.

96. A cell line according to claim 88, which is hybridoma cell line 7C2 deposited on March 10, 2010 as DSM ACC3050.

CLAIMS

1. An antigenic construct comprising an antigenic peptide corresponding to a sequence within the tau protein comprising a phospho-epitope, which peptide is (a) modified through linkage to a lipophilic or hydrophobic moiety that facilitates insertion into the lipid bilayer of a liposome and (b) reconstituted in a liposome such that the peptide is presented on the surface of the liposome.

2. The antigenic construct of claim 1, wherein said peptide consists of between 5 and 25 amino acid residues.

3. The antigenic construct of any one of the preceding claims, wherein said peptide comprises a major pathological phospho-epitope of protein tau corresponding to a sequence within the tau protein featuring a characteristic phosphorylation pattern which is associated with a pathologic condition or disorder.

4. The antigenic construct of any one of the preceding claims, wherein said peptide does not contain a T-cell epitope.

5. The antigenic construct of any one of the preceding claims, wherein said peptide is presented in a highly repetitive array on the surface of the liposome.

6. The antigenic construct of any one of the preceding claims, wherein said peptide upon administration to an animal or a human in form of a pharmaceutical composition, is capable of eliciting a conformation specific and T-cell independent immune response.

7. The antigenic construct according to any one of the preceding claims, wherein the lipophilic or hydrophobic moiety is a fatty acid, a triglyceride, a diglyceride, a steroid, a sphingolipid, a glycolipid or a phospholipid.

8. The antigenic construct according to any one of the preceding claims, wherein the lipophilic or hydrophobic moiety is a fatty acid, particularly a fatty acid with a carbon back bone of at least 10, particularly at least 12 carbon atoms, particularly at least 16 carbon atoms.

9. The antigenic construct according to any one of the preceding claims, wherein the hydrophobic moiety is palmitic acid.

10. The antigenic construct according to any one of the preceding claims, wherein said hydrophilic or hydrophobic moiety is covalently bound to each of the termini of the peptide or peptide fragment through at least one, particularly one or two amino acids such as, for example, lysine, glutamic acid and cysteine.

11. The antigenic construct according to any one of the preceding claims, wherein said peptide is further modified through linkage to a hydrophilic moiety.

12. The antigenic construct according to claim 11, wherein said hydrophilic moiety is polyethylene glycol.

13. The antigenic construct according to any one of the preceding claims, wherein said tau protein is a human protein.

14. The antigenic construct according to claim 13, wherein said antigenic peptide has an amino acid sequence of:

a. SEQ ID NO: 2 or an amino acid sequence of SEQ ID NO: 2 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

b. SEQ ID NO: 3 or an amino acid sequence of SEQ ID NO: 3 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

c. SEQ ID NO: 4 or an amino acid sequence of SEQ ID NO: 4 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

d. SEQ ID NO: 5 or an amino acid sequence of SEQ ID NO: 5 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

e. SEQ ID NO: 6 or an amino acid sequence of SEQ ID NO: 6 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

f. SEQ ID NO: 7 or an amino acid sequence of SEQ ID NO: 7 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence;

g. SEQ ID NO: 8 or an amino acid sequence of SEQ ID NO: 8 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence; or

h. SEQ ID NO: 9 or an amino acid sequence of SEQ ID NO: 9 modified through conservative substitution, deletion or insertion of at least one but not more than 5 amino acids and still has the same antigenic potential as the unmodified sequence.

15. The antigenic construct according to claim 14, wherein the antigenic peptide corresponds to a human tau protein between

a. position 5-20 and wherein the tyrosine at position 18 is phosphorylated;
b. position 196-221 and wherein at least one, particularly at least two, particularly at least 3, but especially all 4 of the amino acids at positions 202, 205, 212, 214 are phosphorylated;
c. position 393-408 and wherein at least one of the amino acids, but especially all amino acids at positions 396, 404 are phosphorylated;
d. position 401- 418 and wherein at least one of the amino acids, but especially all amino acids at positions 404 and 409 are phosphorylated;

e. position 200-216 and wherein at least one of the amino acids, but especially all amino acids at positions 202, 205, 212 and 214, are phosphorylated;
f. position 407-418 and wherein the serine at position 409 is phosphorylated; or
g. position 399-408 and wherein the serine at position 404 is phosphorylated.

16. The antigenic construct according to claim 14, wherein said antigenic peptide has an amino acid sequence identity to:

a. SEQ ID NO: 2 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 2, wherein the amino acid residue corresponding to amino acid residue 18 (P-Tyr_{18}) of SEQ ID NO: 2 is phosphorylated;

b. SEQ ID NO: 3 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 3, wherein at least one, particularly at least 2 of amino acid residues corresponding to amino acid residues 212 (P-Thr_{212}) and 214 (P-Ser_{214}) of SEQ ID NO: 3 are phosphorylated;

c. SEQ ID NO: 4 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 4, wherein at least one, particularly at least 2 of amino acid residues corresponding to amino acid residues 202 (P-Ser_{202}) and 205 (P-Thr_{205}) of SEQ ID NO: 4 are phosphorylated;

d. SEQ ID NO: 5 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 5, wherein at least one, but especially all of amino acid residues corresponding to amino acid residues 396 (P-Ser_{396}) and 404 (P-Ser_{404}) of SEQ ID NO: 5 are phosphorylated;

e. SEQ ID NO: 6 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 6, wherein at least one, but especially all of amino acid residues corresponding to amino acid residues 404 (P-Ser_{404}) and 409 (P-Ser_{409}) of SEQ ID NO: 6 are phosphorylated;

f. SEQ ID NO: 7 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 7, wherein at least one, particularly at

least 2, particularly a least 3, but especially all of amino acid residues corresponding to amino acid residues 202 (P-Ser_{202}), 205 (P-Thr_{205}), 212 (P-Thr_{212}), and 214 (P-Ser_{214}) of SEQ ID NO: 7 are phosphorylated;

g. SEQ ID NO: 8 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 8, wherein the amino acid residue corresponding to amino acid residue 409 (P-Ser_{409}) of SEQ ID NO: 8 is phosphorylated; or

h. SEQ ID NO: 9 of at least 95%, and the immunogenic activity of said antigenic peptide of SEQ ID NO: 9, wherein the amino acid residue corresponding to amino acid residue 404 (P-Ser_{404}) of SEQ ID NO: 9 is phosphorylated.

17. The antigenic construct according to claim 14, wherein said tau peptide has an amino acid sequence of SEQ ID NO: 2; SEQ ID NO: 3; SEQ ID NO: 4; SEQ ID NO: 5; SEQ ID NO: 6; SEQ ID NO: 7; SEQ ID NO: 8; or SEQ ID NO: 9.

18. The antigenic construct according to any one of the preceding claims, or a combination thereof, for use in the treatment of neurodegenerative disorders such as tauopathies.

19. The antigenic construct according to claim 18 for use in the treatment of Alzheimer's Disease.

20. A pharmaceutical composition comprising the antigenic construct of any one of the preceding claims or a combination thereof.

21. A pharmaceutical composition according to claim 20, which contains a pharmaceutically acceptable adjuvant and/or immunomodulator.

22. A pharmaceutical composition which is a vaccine comprising an antigenic peptide of SEQ ID NO: 5, which peptide is modified by palmitic acid covalently bound to each of the termini of the peptide, and further comprising a pharmaceutically acceptable adjuvant and/or immunomodulator.

23. A pharmaceutical composition which is a vaccine comprising an antigenic peptide of SEQ ID NO: 3, which peptide is modified by palmitic acid covalently bound to each of the termini of the peptide, and further comprising a pharmaceutically acceptable adjuvant and/or immunomodulator.

24. A pharmaceutical composition which is a vaccine comprising an antigenic peptide of SEQ ID NO: 3 and SEQ ID NO: 4, which peptides are modified by palmitic acid covalently bound to each of the termini of the peptides, and further comprising a pharmaceutically acceptable adjuvant and/or immunomodulator.

25. The pharmaceutical composition of any one of claims 22 to 24, wherein said antigenic peptide of SEQ ID NO: 5, SEQ ID NO: 3 and SEQ ID NO: 4, respectively, is a tetrapalmitoylated peptide, wherein two palmitic acid moieties are bound to each of the termini of the peptide.

26. A pharmaceutical composition according to any one of claims 21 to 25, wherein the immunomodulator is detoxified lipid A, such as monophosphoryl or diphosphoryl lipid A.

27. A pharmaceutical composition according to any one of claims 20 to 26 for use in the treatment of a neurodegenerative disorder such as tauopathy.

28. A pharmaceutical composition according to claim 27 for the treatment of diseases and disorders which are caused by or associated with the formation of neurofibrillary lesions, the predominant brain pathology in tauopathy comprising a heterogenous group of neurodegenerative diseases or disorders including diseases or disorders which show co-existence of tau and amyloid pathologies including, but not limited to, Alzheimer's Disease, Creutzfeldt-Jacob disease, Dementia pugilistica, Down's Syndrome, Gerstmann-Sträussler-Scheinker disease, inclusion-body myositis, and prion protein cerebral amyloid angiopathy, traumatic brain injury and further diseases or disorders which do not show a distinct amyloid pathology including, but not limited to, amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam, Non-Guamanian motor

neuron disease with neurofibrillary tangles, argyrophilic grain dementia, corticobasal degeneration, diffuse neurofibrillary tangles with calcification, frontotemporal dementia with parkinsonism linked to chromosome 17, Hallevorden-Spatz disease, multiple system atrophy, Niemann-Pick disease, type C, Pick's disease, progressive subcortical gliosis, progressive supranuclear palsy, Subacute sclerosing panencephalitis, Tangle only dementia, Postencephalitic Parkinsonism and Myotonic dystrophy.

29. A pharmaceutical composition according to claim 28 for use in the treatment of Alzheimer's Disease.

30. Use of a therapeutic pharmaceutical composition according to any one of claims 20 to 26 in the manufacture of a medicament for the treatment of a neurodegenerative disease or disorder such as tauopathy in an animal, particularly in a mammal, but especially in a human.

31. Use according to claim 30 for the treatment of diseases and disorders which are caused by or associated with the formation of neurofibrillary lesions, the predominant brain pathology in tauopathy comprising a heterogenous group of neurodegenerative diseases or disorders including diseases or disorders which show co-existence of tau and amyloid pathologies including, but not limited to, Alzheimer's Disease, Creutzfeldt-Jacob disease, Dementia pugilistica, Down's Syndrome, Gerstmann-Straussier-Scheinker disease, inclusion-body myositis, and prion protein cerebral amyloid angiopathy, traumatic brain injury and further diseases or disorders which do not show a distinct amyloid pathology including, but not limited to, amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam, Non-Guamanian motor neuron disease with neurofibrillary tangles, argyrophilic grain dementia, corticobasal degeneration, diffuse neurofibrillary tangles with calcification, frontotemporal dementia with parkinsonism linked to chromosome 17, Hallevorden-Spatz disease, multiple system atrophy, Niemann-Pick disease, type C, Pick's disease, progressive subcortical gliosis, progressive supranuclear palsy, Subacute sclerosing panencephalitis Tangle only dementia, Postencephalitic Parkinsonism and Myotonic dystrophy.

32. Use of an antigenic peptide or a therapeutic composition as claimed in any of the preceding claims in the manufacture of a medicament for inducing an immune response in an animal, particularly a mammal or a human, suffering from a neurodegenerative disorder such as tauopathy.

33. A peptide fragment representing an epitope, the sequence of which is comprised in a peptide sequence selected from the group of sequences as given in SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8 and SEQ ID NO: 9.