

with Down's syndrome and other cognitive disorders, Cerebral amyloid angiopathy (CAA), and the ocular disease Age-Related Macular Degeneration.

[0005] A principal constituent of the plaques is a peptide termed A β or β -amyloid peptide. A β peptide is a 4-kDa internal fragment of 38-43 amino acids of a larger transmembrane glycoprotein named amyloid precursor protein (APP). As a result of proteolytic processing of APP by different secretase enzymes, A β is primarily found in both a short form, 40 amino acids in length, and a long form, ranging from 42-43 amino acids in length. Part of the hydrophobic transmembrane domain of APP is found at the carboxy end of A β , and may account for the ability of A β to aggregate into plaques, particularly in the case of the long form. Accumulation of amyloid plaques in the brain eventually leads to neuronal cell death. The cognitive and physical symptoms associated with this type of neural deterioration characterize Alzheimer's disease.

[0006] Another protein reported to occur at increased levels in Alzheimer's patients relative to the general population is tau, the principal constituent of neurofibrillary tangles, which together with amyloid plaques are a hallmark characteristic of Alzheimer's disease. Tau tangles constitute abnormal fibrils measuring 10 nm in diameter occurring in pairs wound in a helical fashion with a regular periodicity of 80 nm. The tau within neurofibrillary tangles is abnormally phosphorylated (hyperphosphorylated) with phosphate groups attached to specific sites on the molecule. Severe involvement of neurofibrillary tangles is seen in the layer II neurons of the entorhinal cortex, the CA1 and subicular regions of the hippocampus, the amygdala, and the deeper layers (layers III, V, and superficial VI) of the neocortex in Alzheimer's disease. Tau pathologies are known to correlate to cognitive decline.

[0007] Accordingly, there exists the need for new therapies and reagents for the prevention or treatment of Alzheimer's disease, in particular, therapies and reagents capable of causing an immune response to the A β and Tau present in patients.

SUMMARY

[0007a] In one aspect, the disclosure is directed to a polypeptide comprising a first peptide comprising 3-10 amino acids from residues 1-10 of SEQ ID NO:01

linked to a second peptide comprising 3-13 amino acids from residues 244-400 of SEQ ID NO:02.

[0007b] In another aspect, the disclosure is directed to an immunotherapy composition, comprising the polypeptide disclosed herein, wherein the polypeptide is linked to a carrier.

[0007c] In another aspect, the disclosure is directed to a pharmaceutical formulation comprising (a) the polypeptide disclosed herein or the immunotherapy composition disclosed herein and (b) at least one adjuvant.

[0007d] In another aspect, the disclosure is directed to an immunotherapy composition, comprising a first peptide sequence comprising 3-10 amino acid residues from the first ten N-terminal residues of SEQ ID NO:01 and a second peptide sequence comprising 3-13 amino acids from residues 244-400 of SEQ ID NO:02.

[0007e] In another aspect, the disclosure is directed to a pharmaceutical formulation comprising the immunotherapy composition disclosed herein and at least one adjuvant.

[0007f] In another aspect, the disclosure is directed to a nucleic acid comprising a nucleic acid sequence encoding a polypeptide disclosed herein of the immunotherapy composition disclosed herein.

[0007g] In another aspect, the disclosure is directed to a nucleic acid immunotherapy composition comprising the nucleic acid disclosed herein and at least one adjuvant.

[0007h] In another aspect, the disclosure is directed to a use of the immunotherapy composition disclosed herein, or the pharmaceutical formulation disclosed herein, in the manufacture of a medicament for treating or effecting prophylaxis of Alzheimer's disease.

[0007i] In another aspect, the disclosure is directed to a use of the immunotherapy composition disclosed herein, or the pharmaceutical formulation disclosed herein, in the manufacture of a medicament for inhibiting or reducing aggregation of at least one of A β and tau in a subject having or at risk of developing Alzheimer's disease.

[0007j] In another aspect, the disclosure is directed to a use of the nucleic acid immunotherapy composition disclosed herein in the manufacture of a medicament for treating or effecting prophylaxis of Alzheimer's disease in a subject.

[0007k] In another aspect, the disclosure is directed to a use of the nucleic acid immunotherapy composition disclosed herein in the manufacture of a medicament for inhibiting or reducing aggregation of at least one of A β and tau in a subject having or at risk of developing Alzheimer's disease.

[0007l] In another aspect, the disclosure is directed to an immunization kit comprising the immunotherapy composition disclosed herein.

[0007m] In another aspect, the disclosure is directed to a kit comprising the nucleic acid immunotherapy composition disclosed herein.

[0007n] In another aspect, the disclosure is directed to the immunotherapy composition disclosed herein, or the pharmaceutical formulation disclosed herein, or the nucleic acid immunotherapy composition disclosed herein, for use in therapy.

[0008] In some embodiments, disclosure is directed to a polypeptide including a first peptide comprising 3-10 amino acids from residues 1-10 of SEQ ID NO:01