CLAIMS

We claim:

1. An isolated peptide of Formula I:

X1–X2–X3–X4–X5 (SEQ ID NO:1)

or a salt thereof, wherein

X1 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain;

X2 is selected from an amino acid having a hydrophobic side chain, an amino acid having a positively charged side chain, or an amino acid having a polar uncharged side chain;

X3 is selected from an amino acid having a positively charged side chain;

X4 is selected from an amino acid having a positively charged side chain; and

X5 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain.

2. The isolated peptide of claim 1, wherein:

X1 is V or R;

X2 is S, A, or H;

X3 is K or R;

X4 is K or R; and

X5 is R, L, or K.

3. The peptide of claim 2, wherein Formula I comprises VSRKR (SEQ ID NO:2), VSKRR (SEQ ID NO:3), VSRRR (SEQ ID NO:4), VARKL (SEQ ID NO:5), RHKKL (SEQ ID NO:6), RARRL (SEQ ID NO:7), RSKKL (SEQ ID NO:8), RHKRR (SEQ ID NO:9), VARRL (SEQ ID NO:10), VARRK (SEQ ID NO:11), or RSKRR (SEQ ID NO:12).

4. The peptide of claim 1, wherein the peptide does not have primary polypeptide sequence identity with any region of 5 consecutive amino acids of human ApoE protein (SEQ ID NO:14).

5. The peptide of claim 4, wherein the peptide does not have primary polypeptide sequence identity with any 5 consecutive amino acids from residue 130 to residue 150 of human ApoE protein (SEQ ID NO:14).

6. The peptide of claim 1, wherein the peptide suppresses activation of microglial cells.

7. The peptide of claim 6, wherein the peptide suppresses secretion of TNF-α by cultured microglial cells exposed to lipopolysaccharide.

8. The peptide of claim 6, wherein the peptide suppresses secretion of nitric oxide by cultured microglial cells exposed to lipopolysaccharide.

9. The peptide of claim 1, wherein the peptide binds a cell-surface ApoE receptor.

10. The peptide of claim 1, wherein the peptide blocks NMDA receptor mediated excitotoxicity.

11. A method of reducing inflammation in a subject in need thereof, the method comprising administering to the subject an effective amount of a peptide of Formula I:

X1–X2–X3–X4–X5 (SEQ ID NO:1)

or a salt thereof, wherein

X1 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain;

X2 is selected from an amino acid having a hydrophobic side chain, an amino acid having a positively charged side chain, or an amino acid having a polar uncharged side chain;

X3 is selected from an amino acid having a positively charged side chain;

X4 is selected from an amino acid having a positively charged side chain; and

X5 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain.

12. The method of claim 11, wherein the peptide comprising administering the peptide by an injection, inhalation, transdermal, intravenous, intranasal, intracranial, and/or intrathecal route.

13. A method of treating a neurological condition in a subject in need thereof, the method comprising administering to the subject a composition comprising an effective amount of a peptide of Formula I:

X1–X2–X3–X4–X5 (SEQ ID NO:1)

or a salt thereof, wherein

X1 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain;

X2 is selected from an amino acid having a hydrophobic side chain, an amino acid having a positively charged side chain, or an amino acid having a polar uncharged side chain;

X3 is selected from an amino acid having a positively charged side chain;

X4 is selected from an amino acid having a positively charged side chain; and

X5 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain.

14. The method of claim 13, wherein the neurological condition is selected from at least one of traumatic CNS injury, subarachnoid hemorrhage, intracranial hemorrhage, stroke, experimental allergic encephalomyelitis, multiple sclerosis, neuroinflammation, chronic neurological disease, ALS, dementia, neuropathy, epilepsy, Parkinson's disease, and Alzheimer's disease.

15. The isolated peptide according to claim 1, wherein the peptide comprises Formula II:

X1–X2–X3–X4–X5–X6–X7–X8–X9 (SEQ ID NO:17);

or a salt thereof, wherein X1 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain; X2 is selected from an amino acid having a hydrophobic side chain, an amino acid having a positively charged side chain, or an amino acid having a polar uncharged side chain; X3 is selected from an amino acid having a positively charged side chain; X4 is selected from an amino acid having a positively charged side chain; X5 is selected from an amino acid having a hydrophobic side chain or an amino acid having a positively charged side chain; and each of X6, X7, X8, and X9 are independently selected from any amino acid, and are optionally absent.

16. A composition comprising the peptide of claim 15 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

17. A composition comprising the peptide of claim 1 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

18. A method of reducing inflammation in a subject in need thereof, the method comprising administering to the subject an effective amount of a peptide of claim 15.

19. A method of treating a neurological condition in a subject in need thereof, the method comprising administering to the subject an effective amount of a peptide of claim 15.

20. The method of claim 19, wherein the neurological condition is selected from at least one of traumatic CNS injury, subarachnoid hemorrhage, intracranial hemorrhage, stroke, experimental allergic encephalomyelitis, multiple sclerosis, neuroinflammation, chronic neurological disease, ALS, dementia, neuropathy, epilepsy, Parkinson's disease, and Alzheimer's disease.

We claim:

1. An isolated pentapeptide of Formula I:

(SEQ ID NO: 1)

X1-X2-X3-X4-X5

or a salt thereof, wherein
X1 is V;
X2 is S;
X3 is K or R;
X4 is K or R; and
X5 is R;
and wherein said pentapeptide is optionally N-terminal acetylated and/or C-terminal amidated.

2. The isolated pentapeptide of claim 1, wherein said pentapeptide is N-terminal acetylated and/or C-terminal amidated.

3. The pentapeptide of claim 2, wherein said pentapeptide is N-terminal acetylated and/or C-terminal amidated and has the amino acid sequence of VSRKR (SEQ ID NO:2), VSKRR (SEQ ID NO:3), or VSRRR (SEQ ID NO:4).

4. The pentapeptide of claim 1, wherein said pentapeptide is VSKRR (SEQ ID NO:3) modified by both N-terminal acetylation and C-terminal amidation.

5. The pentapeptide of claim 1, wherein said pentapeptide is VSRRR (SEQ ID NO: 4) modified by both N-terminal acetylation and C-terminal amidation.

6. A method of reducing inflammation in a subject in need thereof, the method comprising administering to the subject an effective amount of a pentapeptide of claim 1.

7. The method of claim 6, comprising administering the pentapeptide by an injection, inhalation, transdermal, intravenous, intranasal, intracranial, and/or intrathecal route.

8. A composition comprising the pentapeptide of claim 1 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

9. A composition comprising the pentapeptide of claim 2 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

10. A composition comprising the pentapeptide of claim 3 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

11. A composition comprising the pentapeptide of claim 4 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.

12. A composition comprising the pentapeptide of claim 5 and a pharmaceutically acceptable carrier, vehicle, diluent, or adjuvant.