CLAIMS

1. A pharmaceutical composition comprising a peptide that is a dimer comprising a first monomer covalently cross-linked with a second monomer, each monomer comprising a domain comprising an amino acid sequence derived from a cytoplasmic wedge domain of a receptor-type protein-tyrosine phosphatase (PTPR), and wherein the mass ratio of the dimer to free monomer in the pharmaceutical composition is greater than 1:20.

2. The pharmaceutical composition of claim 1, wherein the ratio is greater than 1:1.

3. The pharmaceutical composition of claim 1 or claim 2, wherein the ratio is greater than 10:1.

4. The pharmaceutical composition of any one of claims 1-3, wherein the dimer comprises a transport moiety attached to the domain via one cysteine residue or a peptide linker comprising one cysteine residue.

5. The pharmaceutical composition of claim 4, wherein the transport moiety comprises a TAT sequence.

6. The pharmaceutical composition of any one of claims 1-5, wherein the first monomer and the second monomer each independently comprise:

a first domain comprising an amino acid sequence that is at least 70% identical to the amino acid sequence of SEQ ID NO:5, 6, or 7;

a second domain comprising an amino acid sequence that is at least 70% identical to the amino acid sequence of SEQ ID NO:8, 9, 10, or 11; and

a cysteine residue;

wherein the dimer comprises a chemical linker or bond between the cysteine residue of the first monomer and the cysteine residue of the second monomer.

7. The pharmaceutical composition of claim 6, wherein the first domain comprises an amino acid sequence that is identical to the amino acid sequence of SEQ ID NO:5, 6, or 7.

8. The pharmaceutical composition of claim 6 or 7, wherein the second domain comprises an amino acid sequence that is identical to the amino acid sequence of SEQ ID NO:8, 9, 10, or 11.

9. The pharmaceutical composition of any one of claims 6-8, wherein the dimer has the following structure:

first domain—Cys—second domain
|
first domain—Cys—second domain

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10. The pharmaceutical composition of any one of claims 1-9, wherein the first monomer and the second monomer each independently comprise an amino acid sequence that is at least 70% identical to the amino acid sequence of SEQ ID NOS:1, 2, 3, or 4.

11. The pharmaceutical composition of any one of claims 1-10, wherein the first monomer and the second monomer each independently comprise an amino acid sequence that is identical to the amino acid sequence of SEQ ID NOS:1, 2, 3, or 4.

12. The pharmaceutical composition of any one of claims 1-11, wherein the dimer has a structure selected from the group consisting of:

GRKKRRQRRRCDLADNIERLKANDGLKFSQEYESI | GRKKRRQRRRCDLADNIERLKANDGLKFSQEYESI	SEQ ID NO:1 SEQ ID NO:1
GRKKRRQRRRCELADHIERLKANDNLKFSQEYESI | GRKKRRQRRRCELADHIERLKANDNLKFSQEYESI	SEQ ID NO:2 SEQ ID NO:2
GRKKRRQRRRCDMAEHTERLKANDSLKLSQEYESI | GRKKRRQRRRCDMAEHTERLKANDSLKLSQEYESI	SEQ ID NO:3 SEQ ID NO:3
GRKKRRQRRRCDMAEHMERLKANDSLKLSQEYESI | GRKKRRQRRRCDMAEHMERLKANDSLKLSQEYESI	SEQ ID NO:4 SEQ ID NO:4

13. Use of a pharmaceutical composition of any one of claims 1-12 in the manufacture of a medicament for repairing the nervous system and/or treating a neurological condition, disease or disorder selected from the group consisting of neural injury, neurological disease caused by inflammation or autoimmunity, and neurodegenerative disease.

14. The use of claim 13, wherein the neural injury is selected from the group consisting of acute neural injury, traumatic brain injury (TBI), spinal cord injury, concussion, stroke, including ischemic stroke, hemorrhagic stroke, and chronic stroke disease, aneurysm, cerebral hemorrhage, thrombus, and embolism.

15. The use of claim 13, wherein the neurological condition, disease or disorder is selected from the group consisting of Alzheimer's Disease, dementias related to Alzheimer's Disease, Lewy diffuse body diseases, senile dementia, Parkinson's Disease, amyotrophic lateral sclerosis, multiple sclerosis (MS), optic neuritis, Huntington's Disease, Tourette's syndrome, hereditary motor and sensory neuropathy, diabetic neuropathy, progressive supranuclear palsy, Jakob-Creutzfeldt disease, epilepsy, and infectious disease.

16. A process for preparing the pharmaceutical composition of any one of claims 1-12, the process comprising combining the first monomer and the second monomer in water and either a) adding an oxidating agent and/or b) oxygenizing the solution, such that the dimer forms.

17. A process for preparing the pharmaceutical composition of any one of claims 1-12, the process comprising combining the first monomer and the second monomer in a solvent with cupric sulfate to form a mixture to produce the dimer;

wherein the first monomer is identical to the second monomer.

18. A pharmaceutical agent for repairing the nervous system of a subject comprising a peptide dimer or pharmaceutically acceptable salt or solvate thereof, comprising two subunits, wherein each subunit comprises a peptide domain independently selected from receptor-type protein-tyrosine phosphatase (PTPR) wedge domains or variants having at least 70% homology thereto.

19. The pharmaceutical agent of claim 18, wherein each subunit comprises a transport moiety attached to the peptide domain via one cysteine residue or a peptide linker comprising one cysteine residue, wherein the two subunits are covalently cross-linked via a chemical linker between the cysteine residues on each subunit.

20. Use of the pharmaceutical agent of claim 18 or 19 in the manufacture of a medicament for repairing the nervous system and/or treatment of a neurological condition, disease or disorder selected from the group consisting of neural injury, neurological disease caused by inflammation or autoimmunity, and neurodegenerative disease.