

~~What is claimed is:~~ CLAIMS

1. A method of preserving an organ or tissue for organ transplantation comprising contacting the organ with a solution comprising an isolated polypeptide comprising the carboxy-terminal amino acid sequence of an alpha connexin, or a conservative variant thereof.

2. The method of claim 1, wherein the organ is selected from the group consisting of heart, kidneys, liver, lungs, pancreas, intestine, and thymus.

~~3. The method of claim 2, wherein the organ is a kidney.~~

~~4. The method of claim 2, wherein the organ is a heart.~~

53. The method of any one of claims 1-4, wherein the polypeptide inhibits cellular injury in the organ or tissue.

64. The method of any one of claims 1-4, wherein the method reverses cellular injury in the organ or tissue.

75. The method of any one of claims 1-4, wherein the method rescues a marginal organ or tissue for transplantation, wherein the marginal organ or tissue would not otherwise be suitable for transplantation.

86. The method of any one of claims 1-7, wherein the polypeptide promotes cell-cell communication in the organ.

97. The method of any one of claims 1-8, wherein the polypeptide stabilizes gap junctions in cells of the organ and/or stabilizes tight junctions in cells of the organ.

~~10. The method of any one of claims 1-9, wherein the polypeptide stabilizes tight junctions in cells of the organ.~~

118. The method of any one of claims 1-~~107~~, wherein the polypeptide inhibits or mitigates hemichannel activity in cells of the organ, inhibits apoptosis in cells of the organ, inhibits

pro-inflammatory cytokine release from cells in the organ and/or inhibits mitochondrial oxidant production in cells of the organ.

~~12. The method of any one of claims 1-11, wherein the polypeptide inhibits apoptosis in cells of the organ.~~

~~13. The method of any one of claims 1-12, wherein the polypeptide inhibits mitochondrial oxidant production in cells of the organ.~~

~~149.~~ The method of any one of claims 1-~~138~~, wherein the polypeptide promotes the integrity of endothelial cells of the organ and/or promotes barrier function of endothelial cells of the organ.

~~15. The method of any one of claims 1-14, wherein the polypeptide promotes barrier function of endothelial cells of the organ.~~

~~16. The method of any one of claims 1-15, wherein the polypeptide inhibits pro-inflammatory cytokine release from cells in the organ.~~

~~17. The method of claim 16, wherein the pro-inflammatory cytokine is IL-8.~~

~~18~~10. The method of claim ~~5 or 6~~ 3 or 4, wherein the cellular injury is caused by cold preservation induced damage or hypoxia.

~~19. The method of claim 5 or 6, wherein the cellular injury is caused by hypoxia.~~

~~20~~11. The method of claim ~~5 or 6~~ 3 or 4, wherein the cellular injury is ischemia reperfusion injury (IRI) or ischemic reperfusion induced graft injury.

~~21. The method of claim 5 or 6, wherein the cellular injury is ischemic reperfusion induced graft injury.~~

~~22~~12. The method of any one of claims 1-~~21~~11, wherein the polypeptide comprises the amino acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, and SEQ ID NO: 5.

~~23. The method of claim 22, wherein the polypeptide comprises the amino acid sequence of SEQ ID NO: 2.~~

~~24~~13. The method of any one of claims 1-~~24~~11, wherein the polypeptide comprises an amino acid sequence with at least 65% sequence identity to the c-terminal most 9 amino acids of SEQ ID NO: 1.

~~25~~14. The method of any one of claims 1-~~24~~11, wherein the polypeptide comprises from 4 to 30 contiguous amino acids of the carboxy-terminus of the alpha connexin.

~~26. The method of claim 25, wherein the polypeptide comprises from 5 to 19 contiguous amino acids of the carboxy terminus of the alpha connexin.~~

~~27. The method of any one of claims 1-26, wherein the alpha connexin is connexin 43.~~

~~28~~15. The method of any one of claims 1-~~14~~27, wherein the isolated peptide comprises a cellular penetration sequence.

~~29~~16. The method of claim ~~28~~15, wherein the isolated peptide comprises SEQ ID NO: 9.

~~30~~17. The method of any one of claims 1-~~29~~16, wherein the polypeptide is present in the solution at a concentration of about 1 μ M to about 10 μ M, less than about 10 μ M or about 1 μ M.

~~31. The method of any one of claims 1-29, wherein the polypeptide is present in the solution at a concentration of less than about 10 μ M.~~

~~32. The method of any one of claims 1-29, wherein the polypeptide is present in the solution at a concentration of about 1 μ M.~~

~~33~~18. The method of any one of claims 1-~~32~~17, wherein the organ or tissue is contacted with the solution via *ex vivo* incubation, perfusion, or nebulization.

~~34~~19. An organ or tissue preservation solution comprising a polypeptide comprising the carboxy-terminal amino acid sequence of an alpha connexin, or a conservative variant

thereof, wherein the polypeptide is present in the solution in an amount effective for reversing cellular injury in the organ or tissue.

~~3520.~~ The organ preservation solution of claim ~~34~~19, wherein the polypeptide comprises a sequence selected from the group consisting of SEQ ID NOs: 1, 2, 3, 4, 5, and 9.

~~3621.~~ The organ preservation solution of claim ~~34 or 35~~19 or 20, wherein the polypeptide is present in the solution at a concentration of about 1 μ M to about 10 μ M, less than about 10 μ M or about 1 μ M.

~~37.—The organ preservation solution of claim 34 or 35, wherein the polypeptide is present in the solution at a concentration of less than about 10 μ M.~~

~~38.—The organ preservation solution of claim 34 or 35, wherein the polypeptide is present in the solution at a concentration of about 1 μ M.~~

~~3922.~~ A composition comprising (i) one or more organs or tissues for transplant and (ii) a polypeptide comprising the carboxy-terminal amino acid sequence of an alpha connexin, or a conservative variant thereof, wherein the polypeptide is present in the composition in an amount of about 1 μ M to about 10 μ M, less than about 10 μ M or about 1 μ M.

~~40.—The composition of claim 39, wherein the polypeptide is present in the composition in an amount of less than about 10 μ M.~~

~~41.—The composition of claim 39 or 40, wherein the polypeptide is present in the composition in an amount of about 1 μ M.~~

~~4223.~~ The composition of ~~any one of claims 39-41~~claim 22, wherein the polypeptide comprises a sequence selected from the group consisting of SEQ ID NOs: 1, 2, 3, 4, and 5.

~~4324.~~ The composition of ~~any one of claims 39-42~~claim 22 or 23, wherein the organ is selected from the group consisting of heart, kidneys, liver, lungs, pancreas, intestine, and thymus.