**CLAIMS:**

1. A device for implanting cells in a host body, comprising:

a porous scaffold comprising at least one chamber having a proximal end and a distal end, wherein the chamber comprises an opening at either or both of the proximal and distal ends and a non-porous seal to close the opening, the porous scaffold having pores sized to facilitate growth of vascular and connective tissues into the at least one chamber; and

at least one removable plug configured to be positioned within the at least one chamber;

wherein the porous scaffold comprises a polypropylene mesh.

2. The device of claim 1, wherein the at least one seal comprises at least one surgical clip, removable plug, surgical suture, or reversible lock.

3. The device of claim 1, wherein at least a part of the porous scaffold is coated with one or more growth factors, one or more biodegradable materials that fill the pores of the porous scaffold, or one or more substances to stimulate angiogenesis and tissue incorporation into the at least one chamber,

wherein the one or more growth factors, biodegradable materials, or substances optionally comprise vascular endothelial growth factor (VEGF), an antifibrotic agent, a polymer, a drug-eluting polymer, collagen, fibronectin, or membrane cytoskeletal proteins.

4. The device of claim 1, wherein at least a part of the porous scaffold is roughened to stimulate tissue incorporation into the at least one chamber.

5. The device of claim 1, wherein the porous scaffold comprises multiple chambers that are connected laterally, optionally wherein the multiple chambers are formed by

ultrasonic welding and comprise a common seal for the multiple chambers or a seal for each chamber.

6. The device of claim 1, wherein the device comprises at least one two-plug system comprising an outer plug configured to be positioned within the at least one chamber, and an inner plug configured to be positioned within the outer plug; and at least one seal configured to enclose the opening at either or both the proximal end and the distal end of the chamber.

7. The device of claim 1, wherein the porous scaffold comprises interwoven polypropylene and silk.

8. The device of claim 6, wherein the outer plug and the inner plug comprise complementary sealing mechanisms or wherein the inner wall of the outer plug comprises at least one protrusion along the length of the outer plug.

9. The device of claim 6, further comprising a cell delivery device comprising at least one cell infusion tube configured to be positioned within the outer plug.

10. The device of claim 9, wherein the cell delivery device further comprises a connector configured to connect to the outer plug when the at least one cell infusion tube is inserted into the outer plug.

11. The device of claim 10, wherein the connector comprises a clip for connecting to the outer plug or wherein attachment of the connector to the outer plug allows the connector and the outer plug to be retracted from the device as a single unit.

12. The device of claim 1, wherein the porous scaffold comprises one chamber, two chambers, three chambers, four chambers, five chambers, six chambers, seven

chambers, eight chambers, nine chambers, ten chambers, eleven chambers, twelve chambers, or more chambers.

13. A device for use in a method of transplanting cells in a host body, wherein the method comprises the steps of:

a. providing an implantable device for holding cells in the host body, the implantable device comprising:

a porous scaffold comprising at least one chamber having an opening at either or both a proximal end and a distal end of the chamber, wherein the chamber comprises an opening at either or both of the proximal and distal ends, the porous scaffold comprising a polypropylene mesh having pores sized to facilitate growth of vascular and connective tissues into the porous scaffold;

at least one two-plug system configured to be positioned within the at least one chamber; and

at least one seal configured to enclose the opening at either or both the proximal end and the distal end of the porous scaffold;

wherein the at least one two-plug system comprises an outer plug configured to be positioned within the at least one chamber, and an inner plug configured to be positioned within the outer plug;

b. implanting the device in the host body;

c. maintaining the device in the host body until the device is infiltrated with vascular and connective tissues;

d. providing a cell delivery device comprising at least one cell infusion tube loaded with a cell preparation, the cell infusion tube configured to be positioned within the outer plug;

e. accessing the implanted device through a surgical incision and opening the at least one seal;

f. withdrawing the inner plug from the two-plug system;

g. inserting the cell infusion tube into the outer plug;

h. withdrawing the outer plug from the at least one chamber and infusing the chamber with the cell preparation; and

i. reclosing the at least one seal.

14. The device of claim 13, wherein the method further comprises the step of imaging the porous scaffold prior to delivering cells.

15. The device of claim 13, wherein the cell delivery device further comprises a connector configured to connect to the plug system when the cell infusion tube is inserted into the outer plug.

16. The device of claim 13, wherein the inner wall of the outer plug comprises at least one protrusion extending along the length of the outer plug, optionally wherein the at least one protrusion creates an air space between the inner wall of the outer plug and the inner plug and the air space prevents vacuum formation within the porous scaffold when the inner plug is extracted from the outer plug.

17. The device of claim 13, wherein the growth of vascular and connective tissues into the porous chamber encapsulates the at least one plug system in a neovascularized collagen matrix and withdrawal of the plug system from the chamber creates a space within the chamber that is encapsulated in the neovascularized collagen matrix.

18. The device of claim 13, wherein the cell preparation comprises islet of Langerhans cells and/or Sertoli cells.

19. The device of claim 13, wherein the cell preparation comprises stem cells, dopaminergic neurons, neural stem cells, mesenchymal stem cells, allogeneic, xenogeneic or syngeneic donor cells, genetically engineered cells or cell lines, or a combination of cell types.

20. The device of claim 13, wherein at least one of the inner and outer plugs is formed of polytetrafluoroethylene.

21. A device for use in a method of transplanting cells in a host body, wherein the method comprises the steps of:

a. providing an implantable device for holding cells in the host body, the implantable device comprising:

a porous scaffold comprising at least one chamber having a proximal end and a distal end, wherein the chamber comprises an opening at either or both of the proximal and distal ends and a non-porous seal to close the opening, the porous scaffold having pores sized to facilitate growth of vascular and connective tissues into the at least one chamber; and

at least one plug configured to be positioned within the at least one chamber;

wherein the porous scaffold comprises a polypropylene mesh; and

the least one chamber comprises an opening at either or both the proximal end and the distal end;

b. implanting the device in the host body and closing the opening at either or both the proximal end and the distal end of the chamber;

c. maintaining the device in the host body until the device is infiltrated with vascular and connective tissues;

d. accessing the implanted device through one or more surgical incisions and reopening either or both the proximal end and the distal end of the chamber;

e. withdrawing the at least one plug from the chamber;

f. delivering a cell preparation into the chamber; and

g. resealing the opening at either or both the proximal end and the distal end of the chamber.

22. The device of claim 21, wherein the opening at either or both the proximal end and the distal end of the chamber is closed using surgical sutures or vascular clips.

23. The device of claim 21, wherein the at least one plug is formed of polytetrafluoroethylene.

24. The device of any one of claims 13-23, wherein the host body suffers from diabetes, Parkinson's disease, an acquired disease, or a congenital disease.

25. A device for implanting cells in a host body, comprising:

a porous polypropylene mesh scaffold comprising at least one chamber and having pores sized to facilitate growth of vascular and connective tissues into the at least one chamber;

wherein the porous scaffold is coated with a biocompatible, biodegradable material that fills the pores of the scaffold, wherein the biocompatible, biodegradable material is optionally selected from collagen, fibronectin, extracellular matrix proteins, and membrane cytoskeletal proteins.

26. The device of claim 25, wherein the chamber is filled with cells to be transplanted and optionally mixed with biodegradable polymer.

27. The device of claim 26, wherein the biodegradable polymer is selected from polyethylene-imine and dextran sulfate, poly(vinylsiloxane)eco-polymerepolyethyleneimine, phosphorylcholine, poly(ethylene glycol), poly(lactic-glycolic acid), poly(lactic acid), polyhydroxyvalerte and copolymers, polyhydroxybutyrate and copolymers, polydiaxanone, polyanhydrides, poly(amino acids), poly(orthoesters), polyesters, collagen, gelatin, cellulose polymers, chitosans, alginates, fibronectin, extracellular matrix proteins, vinculin, agar, agarose, hyaluronic acid, matrigel and combinations thereof.

28. A device for use in a method of transplanting cells in a host body, wherein the method comprises the steps of:

a. providing an implantable device for holding cells in the host body, the implantable device comprising a porous polypropylene mesh scaffold comprising at least one chamber and having pores sized to facilitate growth of vascular and connective tissues into the porous scaffold, wherein the porous scaffold is coated with a biocompatible, biodegradable material that fills the pores of the scaffold, wherein the biocompatible, biodegradable material is optionally selected from collagen, fibronectin, extracellular matrix proteins, and membrane cytoskeletal proteins;

b. delivering a preparation of cells into the chamber and sealing the chamber; and

c. implanting the device in the host body.

29. The device of claim 28, wherein the chamber is filled with cells to be transplanted and optionally mixed with biodegradable polymer.

30. The device of claim 29, wherein the biodegradable polymer is selected from polyethylene-imine and dextran sulfate, poly(vinylsiloxane)eco-polymerepolyethyleneimine, phosphorylcholine, poly(ethylene glycol), poly(lactic-glycolic acid), poly(lactic acid), polyhydroxyvalerte and copolymers, polyhydroxybutyrate and copolymers, polydiaxanone, polyanhydrides, poly(amino acids), poly(orthoesters), polyesters, collagen, gelatin, cellulose polymers, chitosans, alginates, fibronectin, extracellular matrix proteins, vinculin, agar, agarose, hyaluronic acid, matrigel and combinations thereof.

**CLAIMS**

1. A device for implanting cells in a host body, comprising:

a porous scaffold comprising at least one chamber having a proximal end and a distal end, wherein the chamber comprises an opening at either or both of the proximal and distal ends and a non-porous seal to close the opening, the porous scaffold having pores sized to facilitate growth of vascular and connective tissues into the at least one chamber; and

at least one two-plug system configured to be positioned within the at least one chamber;

wherein the porous scaffold comprises a polypropylene mesh, and wherein the at least one two-plug system comprises an outer plug configured to be positioned within the at least one chamber and an inner plug configured to be positioned within the outer plug.

2. The device of claim 1, wherein the at least one seal comprises at least one surgical clip, removable plug, surgical suture, or reversible lock.

3. The device of claim 1 or claim 2, wherein at least a part of the porous scaffold is coated with one or more growth factors, one or more biodegradable materials that fill the pores of the porous scaffold, or one or more substances to stimulate angiogenesis and tissue incorporation into the at least one chamber,

wherein the one or more growth factors, biodegradable materials, or substances optionally comprise vascular endothelial growth factor (VEGF), an antifibrotic agent, a polymer, a drug-eluting polymer, collagen, fibronectin, or membrane cytoskeletal proteins.

4. The device of claim 1 or claim 2, wherein at least a part of the porous scaffold is roughened to stimulate tissue incorporation into the at least one chamber.

5. The device of any one of claims 1 to 4, wherein the porous scaffold comprises multiple chambers that are connected laterally, optionally wherein the multiple

chambers are formed by ultrasonic welding and/or comprise a common seal for the multiple chambers or a seal for each chamber.

6. The device of any one of claims 1 to 5, wherein the porous scaffold comprises interwoven polypropylene and silk.

7. The device of any one of claims 1 to 6, wherein the outer plug and the inner plug comprise complementary sealing mechanisms or wherein the inner wall of the outer plug comprises at least one protrusion along the length of the outer plug.

8. The device of any one of claims 1 to 7, further comprising a cell delivery device comprising at least one cell infusion tube configured to be positioned within the outer plug.

9. The device of claim 8, wherein the cell delivery device further comprises a connector configured to connect to the outer plug when the at least one cell infusion tube is inserted into the outer plug.

10. The device of claim 9, wherein the connector comprises a clip for connecting to the outer plug or wherein attachment of the connector to the outer plug allows the connector and the outer plug to be retracted from the device as a single unit.

11. The device of any one of claims 1 to 4, wherein the porous scaffold comprises one chamber, two chambers, three chambers, four chambers, five chambers, six chambers, seven chambers, eight chambers, nine chambers, ten chambers, eleven chambers, twelve chambers, or more chambers.

12. A device for implanting cells in a host body, comprising:

a porous polypropylene mesh scaffold comprising at least one chamber and having pores sized to facilitate growth of vascular and connective tissues into the at least one chamber;

wherein the porous scaffold is coated with a biocompatible, biodegradable material that fills the pores of the scaffold and is capable of temporarily isolating the at least one chamber during device encapsulation following implantation, wherein the biocompatible, biodegradable material is optionally selected from collagen, fibronectin, extracellular matrix proteins, and membrane cytoskeletal proteins.

13. The device of claim 12, wherein the chamber is filled with cells to be transplanted and optionally mixed with biodegradable polymer.

14. The device of claim 13, wherein the biodegradable polymer is selected from polyethylene-imine and dextran sulfate, poly(vinylsiloxane)eco-polymerepolyethyleneimine, phosphorylcholine, poly(ethylene glycol), poly(lactic-glycolic acid), poly(lactic acid), polyhydroxyvalerte and copolymers, polyhydroxybutyrate and copolymers, polydiaxanone, polyanhydrides, poly(amino acids), poly(orthoesters), polyesters, collagen, gelatin, cellulose polymers, chitosans, alginates, fibronectin, extracellular matrix proteins, vinculin, agar, agarose, hyaluronic acid, matrigel and combinations thereof.