[0009] In one configuration, a scaffold for tissue engineering is provided. The scaffold includes a vascular tube that defines a vascular diameter and is configured to receive vascular system seed cells, a non-vascular tube that defines a non-vascular tube diameter and is configured to receive organ system seed cells, and an opening formed between the vascular tube and the non-vascular tube and sized such that diffusion can occur but seeded cells are inhibited from migration between the vascular tube and the non-vascular tube. Thus, in one aspect, there is provided a scaffold for engineering tissues comprising:

a vascular tube defining a vascular diameter and configured to receive vascular system seed cells;

a non-vascular tube defining a non-vascular tube diameter and configured to receive organ system seed cells; and

a barrier formed between the vascular tube and the non-vascular tube.

[0010] In another configuration, a method is provided for populating a tubular structure including a vascular tube configured to receive vascular system seed cells, and an organ tissue tube configured to receive organ system seed cells. The method includes flowing hydrogel through the vascular tube in a first direction, flowing hydrogel through the organ tissue tube in a second direction opposite the first direction, introducing a chelating agent, forming a barrier between the vascular tube and the organ tissue tube while maintaining flow through the vascular tube and through the organ tissue tube, flushing the hydrogel from the vascular tube and the organ tissue tube while maintain the barrier intact, seeding the vascular tube with vascular system cells, and seeding the organ tissue tube with organ tissue cells. Thus, in another aspect, there is provided a method of populating a tubular structure including a vascular tube configured to receive vascular system seed cells, and an organ tissue tube configured to receive organ system seed cells, the method comprising:

flowing hydrogel through the vascular tube in a first direction;

flowing hydrogel through the organ tissue tube in a second direction opposite the first direction;

introducing a chelating agent;

forming a barrier between the vascular tube and the organ tissue tube while maintaining flow through the vascular tube and through the organ tissue tube;

flushing the hydrogel from the vascular tube and the organ tissue tube while maintain the barrier intact;

seeding the vascular tube with vascular system cells; and

seeding the organ tissue tube with organ tissue cells.

[0011] In another configuration, another method is provided for populating a tubular structure including a vascular tube configured to receive vascular system seed cells, and an organ tissue tube configured to receive organ system seed cells. The method includes filling the organ tissue tube with hydrogel, maintaining the tubular structure at about thirty-seven degrees Celsius, seeding the vascular tube with vascular system cells, cooling the tubular structure to below about thirty-seven degrees Celsius, draining the hydrogel from the organ tissue tube while creating a barrier at the interface of the vascular tube and the organ tissue tube, and seeding the organ tissue tube with organ tissue cells. Thus, in a further aspect, there is provided a method of populating a tubular structure including a vascular tube configured to receive vascular system seed cells, and an organ tissue tube configured to receive organ system seed cells, the method comprising:

filling the organ tissue tube with hydrogel;

maintaining the tubular structure at about thirty-seven degrees Celsius;

seeding the vascular tube with vascular system cells;

cooling the tubular structure to below about thirty-seven degrees Celsius;

draining the hydrogel from the organ tissue tube while creating a barrier at the interface of the vascular tube and the organ tissue tube; and

seeding the organ tissue tube with organ tissue cells.

[0012] These and other features and advantages of the present invention will become apparent upon reading the following detailed description when taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS