

- 17 -

WHAT IS CLAIMED IS:

1. A device for use in cardiopulmonary bypass, the device comprising a cannula configured to be positioned in at least one of a right atrium, a superior vena cava, or an inferior vena cava of a patient, the cannula having a first end, a second end, and a longitudinal axis extending between the first end and the second end, the cannula comprising:

a first section at the first end, the first section comprising an outer wall and having at least one opening therethrough;

a second section connected to the first section along the longitudinal axis, the second section comprising an outer wall and having at least one opening therethrough; and

a third section connected to the second section along the longitudinal axis on a side of the second section opposite the first section, the third section comprising an outer wall and having at least one opening therethrough;

wherein in a first configuration, the openings in each of the first section, the second section, and the third section are respectively open to inner spaces defined by the first section, the second section, and the third section; and

wherein in a second configuration, the at least one opening in the second section is occluded to restrict communication with the inner space defined by the second section, while the openings in the first section and the third section remain open to the inner spaces defined by the first section and the third section, respectively.

2. The device of claim 1, wherein in the first configuration, the cannula is configured as a multi-stage femoral venous cannula.

- 18 -

3. The device of claim 1 or 2, wherein in the second configuration, the cannula is configured as a bi-caval femoral venous cannula.
4. The device of one of claims 1 to 3, wherein a material of the second section of the cannula is more rigid than a material of at least one of the first section of the cannula or the third section of the cannula.
5. The device of one of claims 1 to 4, wherein the cannula further comprises a wall movable relative to the second section between a first position wherein the device is in the first configuration and the at least one opening in the second section of the cannula is open, and a second position wherein the device is in the second configuration and the at least one opening in the second section of the cannula is occluded by the wall.
6. The device of claim 5, wherein the wall is positioned along an inner surface of the outer wall of the second section of the cannula.
7. The device of claim 5 or 6, wherein the wall rotates circumferentially around the longitudinal axis to move between the first position and the second position.
8. The device of one of claims 5 to 7, wherein the wall moves laterally relative to the longitudinal axis towards either the first end or the second end of the cannula to move between the first position and the second position.
9. The device of one of claims 5 to 8, wherein the wall comprises a plurality of wall segments.

- 19 -

10. The device of one of claims 1 to 9, further comprising a tubular cover configured to be placed around the outer wall of the second section to occlude the at least one opening in the second section when the device is in the second configuration.

11. The device of claim 10, wherein the cannula is a multi-stage cannula.

12. The device of claim 10 or 11, wherein the cover is impermeable to blood.

13. The device of one of claims 10 to 12, wherein an adhesive on the cover permanently adheres the cover to the second section of the cannula when the device is in the second configuration.

14. The device of one of claims 10 to 13, wherein one cover is selected from a plurality of covers having different sizes for placement around the outer wall of the second section of the cannula when the device is in the second configuration.

15. A method for adjusting and positioning a femoral venous cannula in a patient for cardiopulmonary bypass during a cardiac procedure, the cannula having a first end, a second end, and a longitudinal axis extending between the first end and the second end, the cannula comprising a first section at the first end and comprising an outer wall and having at least one opening therethrough, a second section connected to the first section along the longitudinal axis and comprising an outer wall and having at least one opening therethrough, and a third section connected to the second section along the longitudinal axis on a side of the second section opposite the first section and comprising an outer wall and having at least one opening therethrough, wherein in a first configuration, the openings in each of the first section, the second section, and the third section are

- 20 -

respectively open to inner spaces defined by the first section, the second section, and the third section, and wherein in a second configuration, the at least one opening in the second section is occluded to restrict communication with the inner space defined by the second section, while the openings in the first section and the third section remain open to the inner spaces defined by the first section and the third section, respectively, the method comprising:

- adjusting the cannula to one of the first configuration or the second configuration;
- inserting the cannula through the femoral vein of the patient and advancing the cannula towards the heart of the patient; and
- positioning the cannula at a first position in the patient wherein the at least one opening of the first section of the cannula is arranged in the superior vena cava, the at least one opening of the second section of the cannula is arranged in the right atrium, and the at least one opening of the third section of the cannula is arranged in the inferior vena cava.

16. The method of claim 15, wherein the cannula is adjusted to the first configuration when at least one of the left atrium or the left ventricle of the heart of the patient is accessed during the cardiac procedure.

17. The method of claim 15 or 16, wherein the cannula is adjusted to the second configuration when at least one of the right atrium or the right ventricle of the heart of the patient is accessed during the cardiac procedure.

18. The method of one of claims 15 to 17, further comprising adjusting the cannula to the other one of the first configuration or the second configuration when the cannula is at the first position in the patient.