

CLAIMS

What is claimed is:

1. A rapidly insertable central catheter (“RICC”) assembly for direct insertion into a blood-vessel lumen of a patient, comprising:
 - a RICC including:
 - a catheter tube including a side aperture through a side of the catheter tube in a distal-end portion thereof, the side aperture opening into an introducing lumen of the catheter tube that extends from at least the side aperture to a distal end of the RICC;
 - a catheter hub coupled to a proximal-end portion of the catheter tube; and
 - one or more extension legs, each extension leg of the one-or-more extension legs coupled to the catheter hub by a distal-end portion thereof;
 - an introducer including an introducer needle having a needle shaft extending through the distal end of the RICC when the RICC assembly is in at least a ready-to-deploy state of the RICC assembly, the introducer configured to be actuated with a single finger of a hand while holding a distal-end portion of the introducer between a thumb and another finger or fingers of the hand; and
 - a coupling system configured to couple the RICC and the introducer together, the coupling system including a distal coupler slidably attached to the catheter tube proximal of the side aperture.
2. The RICC assembly of claim 1, the catheter tube further including:
 - a first section formed of a first material having a first durometer, the side aperture proximal of the first section of the catheter tube; and
 - a second section formed of a second material having a second durometer less than the first durometer, the catheter tube thereby configured with both column strength and compliance for advancing the catheter tube into the blood-vessel lumen and through a vasculature of the patient.
3. The RICC assembly of either claim 1 or claim 2, wherein the needle shaft further extends through a longitudinal through hole of the distal coupler, through the side aperture of the catheter tube, and along the introducing lumen of the catheter tube before exiting through

the distal end of the RICC when the RICC assembly is in at least the ready-to-deploy state thereof.

4. The RICC assembly of any of claims 1-3, wherein the distal coupler includes a push tab configured to allow a clinician to single handedly advance the RICC off the needle shaft with the single finger of the hand while holding the distal-end portion of the introducer between the thumb and the other finger or fingers of the hand.

5. The RICC assembly of any of claims 1-4, the introducer further including:

a syringe including:

a barrel having a syringe tip in a distal-end portion thereof coupled to a needle hub of the introducer needle in at least the ready-to-deploy state of the RICC assembly;

a plunger disposed in the barrel; and

a syringe housing around the barrel having a distal-end portion and a proximal-end portion, the proximal-end portion of the syringe housing either integral with or coupled to a proximal-end portion of the plunger such that proximally sliding the syringe housing relative to the barrel withdraws the plunger from the barrel.

6. The RICC assembly of claim 5, the syringe further including a push tab proximally extending over the barrel from the distal-end portion of the barrel to which the push tab is coupled, the push tab configured for pushing against with the single finger while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand to proximally slide the syringe housing relative to the barrel and withdraw the plunger from the barrel.

7. The RICC assembly of either claim 5 or claim 6, the introducer further including an access guidewire disposed in an access-guidewire lumen formed of at least a plunger lumen of the plunger and a needle lumen of the introducer needle, the access guidewire having a length sufficient for extension of the access guidewire through the distal end of the RICC and into the blood-vessel lumen of the patient.

8. The RICC assembly of claim 7, wherein the plunger includes a sealing mechanism in a distal-end portion of the plunger for sealing off the access-guidewire lumen

distal of the sealing mechanism, the sealing mechanism configured to maintain a vacuum for aspirating blood when the plunger is withdrawn from the barrel.

9. The RICC assembly of either claim 7 or claim 8, the syringe further including a slider distally extending over the barrel from the syringe housing configured for actuating the access guidewire with the single finger while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand, the slider including an extension extending through a longitudinal slot in each of the barrel and the plunger into the access-guidewire lumen proximal of the sealing mechanism where the extension is coupled to the access guidewire.

10. The RICC assembly of any of claims 5-9, the introducer further including a fluid-pressure indicator extending from a side arm of the needle hub, the fluid-pressure indicator fluidly coupled to the needle lumen of the introducer needle by way of a side-arm lumen of the side arm for observing blood flashback due to an accidental arterial puncture.

11. The RICC assembly of any of claims 5-10, the coupling system further including a proximal coupler coupled to the syringe and slidably attached to the catheter hub in at least the ready-to-deploy state of the RICC assembly, the coupling system configured to allow the RICC to slide relative to the introducer.

12. The RICC assembly of claim 11, wherein the proximal coupler includes a catheter-hub clip from which the RICC is configured to suspend by the catheter hub in at least the ready-to-deploy state of the RICC assembly or the one-or-more extension legs when the proximal coupler is advanced thereover in an operating state of the RICC assembly.

13. The RICC assembly of claim 12, the RICC further including a collapsible catheter-tube sterile barrier over the catheter tube between the catheter hub and the distal coupler to which distal coupler the catheter-tube sterile barrier is coupled, the catheter-tube sterile barrier configured to split apart when a sterile-barrier pull tab of the catheter-tube sterile barrier is removed from the catheter-hub clip and the catheter-tube sterile barrier is pulled away from the catheter tube by the sterile-barrier pull tab.

14. The RICC assembly of claim 13, wherein the catheter-tube sterile barrier has sufficient tensile strength to pull the distal coupler off the catheter tube without breaking when

the catheter-tube sterile barrier splits down to the distal coupler while being pulled away from the catheter tube.

15. The RICC assembly of any of claims 1-14, wherein the RICC includes a set of three lumens including a primary lumen, a secondary lumen, and a tertiary lumen formed of fluidly connected portions of three catheter-tube lumens, three hub lumens, and three extension-leg lumens, the introducing lumen of the catheter tube coincident with a distal-end portion of the primary lumen.

16. The RICC assembly of claim 15, wherein the primary lumen has a primary-lumen aperture in a distal end of the RICC, the secondary lumen has a secondary-lumen aperture in the side of the catheter tube distal of the side aperture, and the tertiary lumen has a tertiary-lumen aperture in the side of the catheter tube distal of the side aperture but proximal of the secondary-lumen aperture.

17. The RICC assembly of any of claims 1-16, the RICC further including a maneuver guidewire disposed in the primary lumen having a length sufficient for extension of the maneuver guidewire to a lower $\frac{1}{3}$ of a superior vena cava of a heart, the maneuver guidewire captively disposed in the RICC by a stop about a proximal-end portion of the maneuver guidewire and a closed end of a fixed-length maneuver-guidewire sterile barrier coupled to a Luer connector, the stop providing a distal limit to advancing the maneuver guidewire and the closed end of the maneuver-guidewire sterile barrier around the maneuver guidewire providing a proximal limit to withdrawing the maneuver guidewire.

18. A syringe, comprising:
a barrel having a syringe tip in a distal-end portion thereof;
a plunger disposed in the barrel; and
a syringe housing around the barrel having a distal-end portion and a proximal-end portion of the syringe housing either integral with or coupled to a proximal-end portion of the plunger such that proximally sliding the syringe housing relative to the barrel withdraws the plunger from the barrel, the syringe configured to be actuated with a single finger of a hand while holding a distal-end portion of the syringe between a thumb and another finger or fingers of the hand.

19. The syringe of claim 18, further comprising a push tab proximally extending over the barrel from the distal-end portion of the barrel to which the push tab is coupled, the push tab configured for pushing against with the single finger of the hand while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand to proximally slide the syringe housing relative to the barrel and withdraw the plunger from the barrel.

20. The syringe of either claim 18 or claim 19, further comprising an access guidewire disposed in an access-guidewire lumen formed of at least a plunger lumen of the plunger, the access guidewire having a length sufficient for extension of the access guidewire through the syringe tip and into a blood-vessel lumen of a patient.

21. The syringe of claim 20, wherein the plunger includes a sealing mechanism in a distal-end portion of the plunger for sealing off the access-guidewire lumen distal of the sealing mechanism, the sealing mechanism configured to maintain a vacuum for aspirating blood when the plunger is withdrawn from the barrel.

22. The syringe of claim 21, further comprising a slider distally extending over the barrel from the syringe housing configured for actuating the access guidewire with the single finger while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand, the slider including an extension extending through a longitudinal slot in each of the barrel and the plunger into the access-guidewire lumen proximal of the sealing mechanism where the extension is coupled to the access guidewire.

23. A method for inserting a rapidly insertable central catheter ("RICC") into a blood-vessel lumen of a patient, comprising:

obtaining a RICC assembly including the RICC, an introducer including a syringe coupled to an introducer needle, and a coupling system including a distal coupler that couples the RICC and the introducer together by distal-end portions thereof in at least a ready-to-deploy state of the RICC assembly;

establishing a needle tract from an area of skin to the blood-vessel lumen of the patient with a needle shaft of the introducer needle while holding a distal-end portion of a syringe housing around a barrel of the syringe between a thumb and another finger or fingers of a hand and keeping at least a single

finger of the hand readily available, the needle shaft extending through a longitudinal through hole of the distal coupler, through a side aperture in a distal-end portion of a catheter tube of the RICC, along an introducing lumen of the catheter tube, and out a distal end of the RICC for establishing the needle tract;

advancing a distal-end portion of a first section of the catheter tube into the blood-vessel lumen over the needle shaft; and

withdrawing the needle shaft from the introducing lumen by way of the side aperture of the catheter tube.

24. The method of claim 23, further comprising aspirating blood with the syringe to confirm a needle tip is disposed in the blood-vessel lumen of the patient before withdrawing the needle shaft from the introducing lumen, the aspirating including pushing a push tab extending over the barrel from a distal-end portion thereof with the single finger of the hand while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand to proximally slide the syringe housing relative to the barrel and withdraw a syringe housing-connected plunger from the barrel.

25. The method of claim 23, wherein advancing the distal-end portion of the first section of the catheter tube into the blood-vessel lumen includes advancing the catheter tube into the blood-vessel lumen by a push tab of the distal coupler with the single finger of the hand while holding the distal-end portion of the syringe housing around a barrel of the syringe between the thumb and the other finger or fingers of the hand.

26. The method of claim 23, wherein advancing the distal-end portion of the first section of the catheter tube into the blood-vessel lumen includes advancing a catheter hub of the RICC from a catheter-hub clip of a proximal coupler of the coupling system and, thereafter, one or more extension legs of the RICC within the catheter-hub clip, the RICC configured to suspend from the coupling system until at least withdrawing the needle shaft from both the introducing lumen and the longitudinal through hole of the distal coupler.

27. The method of claim 24, further comprising advancing an access guidewire disposed in an access-guidewire lumen formed of at least a plunger lumen of the syringe and a needle lumen of the introducer needle into the blood-vessel lumen beyond a needle tip of the introducer needle before advancing the distal-end portion of the first section of the catheter

tube into the blood-vessel lumen over the needle shaft, the advancing including distally advancing a slider coupled to the access guidewire over the barrel with the single finger while holding the distal-end portion of the syringe housing between the thumb and the other finger or fingers of the hand.

28. The method of any of claims 24-27, further comprising advancing a maneuver guidewire into the blood-vessel lumen by way of a primary lumen having a primary-lumen aperture in the distal end of the RICC, the introducing lumen of the catheter tube coincident with a distal-end portion of the primary lumen, thereby mandating withdrawing the needle shaft from the introducing lumen before advancing the maneuver guidewire into the blood-vessel lumen.

29. The method of claim 28, further comprising advancing the distal-end portion of the first section of catheter tube farther into the blood-vessel lumen over the maneuver guidewire and concomitantly sliding the distal coupler proximally toward a proximal-end portion of the catheter tube to uncover the catheter tube, the catheter tube covered by a collapsible sterile barrier between the proximal-end portion of the catheter tube and the distal coupler in at least the ready-to-deploy state of the RICC assembly.

30. The method of claim 29, further comprising removing the sterile barrier and the distal coupler from the RICC by pulling a sterile-barrier pull tab of the sterile barrier opposite the distal coupler away from the catheter tube to split the sterile barrier apart, then pulling the distal coupler from the catheter tube by the sterile barrier to which the distal coupler is slidably attached.

31. The method of either claim 29 or claim 30, further comprising removing the distal coupler and the sterile barrier from the RICC by pulling the distal coupler away from the catheter tube to split the sterile barrier apart, then pulling the distal coupler further proximally toward the proximal-end portion of the catheter tube to completely remove the sterile barrier.