

CLAIMS

We claim:

1. A vascular access device, comprising:
a catheter for insertion into a biological site; and
a catheter adapter having a catheter hub and a side port, the catheter hub having a first end operably coupled to the catheter, a second end opposite the first end, and an internal wall defining an internal fluid passageway therebetween, the side port in fluid communication with the internal fluid passageway;
wherein the contact angle of a probe entering the catheter hub from the side port is greater than 90 degrees.
2. The vascular access device of claim 1, wherein the contact angle is greater than 90 degrees along the length of the internal fluid passageway and to the first end.
3. The vascular access device of claim 1 or 2, wherein the contact angle is greater than 120 degrees.
4. The vascular access device of claim 1, 2, or 3, further comprising a component configured to direct the path of a probe entering the catheter hub from the side port towards the first end, the component comprising: a) a protrusion extending into the lumen of the side port, internal fluid passageway, and/or extension tube; b) a septum at least partially within the catheter hub; or c) a combination of a protrusion and a septum.
5. The vascular access device of claim 4, wherein the entrance angle of a probe entering the catheter hub from the side port is less than 45 degrees.
6. The vascular access device of claim 1, 2, 3, or 4, further comprising a catheter wedge, the catheter wedge defining at least a portion of the internal wall.
7. The vascular access device of claim 1, 2, 3, 4, or 6, further comprising an extension tube connected to and fluidly coupled with the side port.

8. The vascular access device of claim 1, 2, 3, 4, 6, or 7, further comprising an access adapter in fluid communication with the side port and permitting insertion of a probe into the catheter through the side port with or without a separate luer adapter.

9. The vascular access device of claim 8, wherein the access adapter is selected from the group consisting of a luer adapter, a needle-less connector, a fluid control valve, and a non-luer proprietary access valve.

10. An integrated catheter, comprising:
a catheter for insertion into a biological site;
a catheter adapter having a catheter hub and a side port, the catheter hub having a first end operably coupled to the catheter, a second end opposite the first end, and an internal wall defining an internal fluid passageway therebetween, the side port in fluid communication with the internal fluid passageway,
wherein the angle between the internal wall and the longitudinal axis of the side port is greater than 90 degrees.

11. The integrated catheter of claim 10, wherein the entrance angle of the longitudinal axis of the side port is less than 45 degrees with respect to the major axis of the catheter hub.

12. The integrated device of claim 10 or 11, further comprising a catheter wedge, the catheter wedge defining at least a portion of the internal wall.

13. The integrated catheter of claim 10, 11, or 12, wherein the internal wall opposite the side port has a tapered surface.

14. The integrated catheter of claim 10, 11, or 12, wherein the internal wall opposite the side port has a convex surface or a concave surface.

15. An integrated catheter comprising:
a catheter for insertion into a biological site;
a catheter adapter having a catheter hub and a side port, the catheter hub having a first end operably coupled to the catheter, a second end opposite the first end, and an internal wall

defining an internal fluid passageway therebetween, the side port in fluid communication with the internal fluid passageway; and

the internal wall further defining a transition step between a larger diameter portion of the internal fluid passageway proximal to the second end and a smaller diameter portion of the internal fluid passageway at the first end;

wherein a contact angle of a probe entering the catheter hub from the side port, with respect to the transition step, is greater than 90 degrees.

16. The integrated catheter of claim 15, further comprising a probe at least partially within the side port.

17. The integrated catheter of claim 15 or 16, wherein the transition step is configured to facilitate passage of a probe from the side port into the lumen of the catheter through the internal fluid passageway.

18. A method of using the vascular access device of claim 7, the method comprising:

inserting a probe into the extension tube;

advancing the probe through the extension tube and into the side port;

advancing the probe from the side port through the internal fluid passageway and into the catheter; and

advancing the probe through the catheter and into the peripheral vasculature of the subject.

19. The method of claim 18, wherein the probe maintains a contact angle with the internal wall of greater than 90 degrees along the length of the internal fluid passageway.

20. The method of claim 18 or 19, wherein the probe is passed through an access adapter before being inserted into the extension tube, the access adapter in fluid communication with the extension tube and permitting insertion of the probe into the catheter through the side port with or without a separate luer adapter.