

CLAIMS

1. A catheter system, comprising:
 - a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end and the proximal end;
 - a catheter extending distally from the distal end of the catheter adapter;
 - a needle hub, comprising a distal end and a proximal end, wherein the distal end of the needle hub is coupled to the proximal end of the catheter adapter, wherein the needle hub is transparent;
 - a needle, comprising a distal end and a proximal end, wherein the proximal end of the needle comprises a portion secured within the needle hub and a remaining portion not contacting the needle hub;
 - a flow control plug coupled to the proximal end of the needle hub, wherein a distal end of the flow control plug comprises a male luer, wherein the male luer is a slip male or a threaded male luer; and
 - a flashback pathway disposed between an outer surface of the flow control plug and an inner surface of the needle hub, wherein the outer surface of the flow control plug comprises a channel, wherein the flashback pathway extends through the channel between the channel and the inner surface of the needle hub, wherein the outer surface of the flow control plug further comprises a pocket proximate and distal to the channel, wherein the remaining portion of the needle is within the pocket, wherein the pocket is deeper than the channel.

2. The catheter system of claim 1, wherein the channel is formed by a plurality of side walls that extend from a bottom of the channel to the inner surface of the needle hub and contact the inner surface of the needle hub.

3. The catheter system of claim 1, further comprising a vent disposed proximate the channel and at an interface between the proximal end of the needle hub and the flow control plug.

4. The catheter system of claim 1, wherein the outer surface of the flow control plug comprises a plurality of other channels, further comprising a plurality of other flashback pathways extending through the plurality of other channels between the plurality of other channels and the inner surface of the needle hub.

5. The catheter system of claim 4, wherein the outer surface of the flow control plug further comprises a plurality of grooves extending from the plurality of channels inwardly towards a longitudinal axis of the flow control plug.

6. The catheter system of claim 4, wherein a proximal end of the channel is formed by a proximal wall, wherein the proximal wall comprises a vent configured to allow air but not blood to pass, wherein the proximal wall interferes with an inner surface of the needle hub.

7. A catheter system, comprising:

a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end and the proximal end; and

a catheter extending distally from the distal end of the catheter adapter;

a needle hub, comprising a distal end and a proximal end, wherein the distal end of the needle hub is coupled to the proximal end of the catheter adapter, wherein the needle hub is transparent;

a needle, comprising a distal end and a proximal end, wherein the needle is secured within the needle hub; and

a flow control plug (34) that inserts into the proximal end (26) of the needle hub, wherein an outer surface of the flow control plug includes side walls (48) that form a channel (44) within the proximal end (26) of the needle hub (22), the channel (44) forming a flashback pathway (40) between the outer surface of the flow control plug and an inner surface of the needle hub;

characterized in that

the outer surface of the flow control plug includes a pocket (46) that is positioned within the channel (44) and extends through a distal end of the flow control plug, the proximal end (32) of the needle is disposed within the pocket (46) such that blood inside the needle flows into the pocket (46) and then into the channel (44), and a proximal end of the channel (44) includes one or more vents (38) for venting air from the channel (44) to thereby allow the blood to flow proximally within the channel (44).

8. The catheter system of claim 7, wherein the one or more vents (38) are disposed at an interface between the proximal end (26) of the needle hub (22) and the flow control plug.

9. The catheter system of claim 8, wherein the outer surface of the flow control plug comprises a plurality of other channels (44).

10. The catheter system of claim 7, wherein the pocket (46) extends inwardly to a longitudinal axis of the flow control plug (34).

11. The catheter system of claim 7, wherein a distal end of the flow control plug comprises a male luer, wherein the male luer is a slip male luer or a threaded male luer.

12. The catheter system of claim 11, wherein a tip of the male luer comprises a generally planar surface that extends across the tip such that a shape of the flashback pathway (40) is generally semi-circular.

13. The catheter system (10) of claim 7, further comprising:
a cap (35) that is coupled to a proximal end of the flow control plug (34).

14. The catheter system (10) of claim 7, wherein a height of the side walls (48) increases from a distal end of the channel (44) towards the proximal end of the channel (44).

15. The catheter system (10) of claim 7, wherein the needle hub (22) includes a lens (42) and the channel (44) is positioned below the lens (42).

16. The catheter system (10) of claim 15, wherein the lens (42) is convex.

17. The catheter system (10) of claim 15, wherein a size of the channel (44) is configured to cause the blood to flow within the channel (44) at a velocity between 1 mm/s and 2 mm/s.

18. The catheter system (10) of claim 7, wherein the proximal end of the channel (44) is formed by a proximal wall (52).

19. The catheter system (10) of claim 18, wherein the one or more vents (38) are formed in the proximal wall (52).

20. A catheter system, comprising:
a catheter assembly, comprising:

a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end and the proximal end; and

a catheter extending distally from the distal end of the catheter adapter; and
a needle assembly, comprising:

a needle hub;

a needle, comprising a distal end and a proximal end, wherein the needle is secured within the needle hub;

an inner barrel surrounding the needle hub, wherein the needle hub is secured within the inner barrel, wherein the inner barrel comprises a first hole;

a middle barrel surrounding the inner barrel, wherein the middle barrel comprises a second hole aligned with the first hole;

an outer barrel surrounding the middle barrel; and

a flashback pathway comprising the first hole and the second hole and extending between an outer surface of the middle barrel and an inner surface of the outer barrel.

21. The catheter system of claim 20, wherein the needle hub further comprises a pocket, wherein the proximal end of the needle is disposed within the pocket, wherein the pocket is proximate the first hole.

22. The catheter system of claim 20, wherein the middle barrel comprises a channel, wherein the channel is formed by a plurality of side walls that extend from a bottom of the channel to the inner surface of the outer barrel and contact the inner surface of the outer barrel.

23. The catheter system of claim 20, wherein the inner barrel and the needle hub are configured to move proximally within the middle barrel to retract the needle.

24. The catheter system of claim 23, wherein the needle assembly comprises a button and a spring, wherein the inner barrel and the needle hub move proximally in response to depression of the button and actuation of the spring.