

CLAIMS

We claim:

1. A blood collection system, comprising:
a needle configured to receive an evacuated blood collection tube;
an adapter configured to couple to a catheter assembly; and
a flow regulator disposed between the needle and the adapter and configured to regulate flow through a fluid pathway extending between the needle and the adapter.
2. The blood collection system of claim 1, wherein the flow regulator comprises a rotary element, wherein in response to the rotary element being in a first position, a portion of the fluid pathway of the blood collection system extends through the rotary element, wherein in response to rotation of the rotary element from the first position to a second position, a diameter of the portion of the fluid pathway extending through the rotary element changes.
3. The blood collection system of claim 2, wherein the rotary element comprises a plurality of holes configured to align with the fluid pathway of the blood collection system, wherein each of the plurality of holes has a different diameter.
4. The blood collection system of claim 2, wherein the rotary element comprises a curved slot extending through the rotary element, wherein an entirety of the curved slot is configured to align with the fluid pathway of the blood collection system, wherein a width of the curved slot continuously increases such that fluid flow through the rotary element continuously changes as the rotary element is rotated.

5. The blood collection system of claim 1, further comprising tubing extending between the adapter and the needle, wherein the flow regulator comprises a clamp disposed on the tubing.
6. The blood collection system of claim 5, wherein an inner surface of the tubing comprises a plurality of ribs extending generally parallel to a longitudinal axis of the tubing.
7. The blood collection system of claim 5, wherein the clamp comprises a roller clamp.
8. The blood collection system of claim 5, wherein the clamp comprises a slide clamp.
9. The blood collection system of claim 8, wherein the slide clamp comprises:
 - a housing, comprising a slot;
 - a body extending through the slot and slidable with respect to the housing between a first position and a second position, wherein a bottom of the body comprises a first surface, a second surface, and a third surface disposed between the first surface and the second surface, wherein the first surface and the second surface are generally parallel to a longitudinal axis of the tubing, wherein the third surface is angled with respect to the longitudinal axis of the tubing, wherein the second surface is closer to the tubing than the first surface; and
 - a roller pin disposed between the body and the tubing, wherein in response to the body being in the first position, the roller pin contacts the first surface and the tubing, wherein in response to the body sliding from the first position to the second position, the roller pin moves from the first surface along the third surface to the second surface and decreases fluid flow through the tubing.

10. The blood collection system of claim 1, wherein the flow regulator comprises a slide valve, wherein the slide valve comprises a housing and a body slidable with respect to the housing between a first position and a second position, wherein the housing comprises a first end, a second end, and a lumen extending through the first end and the second end, wherein the first end of the housing comprises an opening, wherein an outer surface of the body comprises a plurality of channels, wherein in response to the body being in the first position, fluid is configured to flow through a gap between an outer surface of the body and the housing and through the opening, wherein in response to the housing being in the second position, fluid is configured to flow through at least one of the plurality of channels and through the opening but does not flow through the gap.
11. The blood collection system of claim 1, wherein the flow regulator comprises a stopcock.
12. The blood collection system of claim 1, wherein the flow regulator comprises a squeeze valve.
13. The blood collection system of claim 1, further comprising a blood collection tube receptacle, wherein the blood collection tube receptacle surrounds the needle.
14. The blood collection system of claim 1, further comprising the catheter assembly, wherein the catheter assembly comprises:
 - a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end of the catheter adapter and the proximal end of the catheter adapter;
 - and
 - a catheter extending distally from the distal end of the catheter adapter.

15. A method of blood collection, comprising:
- coupling an adapter to a catheter assembly, wherein the catheter assembly comprises a catheter adapter and a catheter extending distally from the catheter adapter;
- adjusting a flow regulator to reduce an inner diameter of a fluid pathway extending through the flow regulator to be less than an inner diameter of the catheter, wherein the flow regulator is disposed between the adapter and a needle configured to receive an evacuated blood collection tube; and
- after adjusting the flow regulator to reduce the inner diameter of the fluid pathway, inserting the needle into the evacuated blood collection tube.
16. The method of claim 15, further comprising adjusting the flow regulator to increase the inner diameter of the fluid pathway extending through the flow regulator to be equal to or greater than the inner diameter of the catheter in response to the evacuated blood collection tube partially filling with blood.
17. The method of claim 15, wherein the flow regulator comprises a rotary element, wherein the rotary element comprises a plurality of holes, wherein each of the plurality of holes is a different size, wherein adjusting the flow regulator to reduce the inner diameter of the fluid pathway comprises rotating the rotary element such that a hole of the plurality of holes is aligned with the fluid pathway, wherein the hole has a diameter that is less than the inner diameter of the catheter.
18. The method of claim 15, wherein the flow regulator comprises a rotary element, wherein the rotary element comprises a curved slot extending through the rotary element, wherein a width of the curved slot continuously increases such that fluid

flow through the rotary element continuously changes as the rotary element is rotated.

19. The method of claim 15, wherein the flow regulator comprises a roller clamp, a slide valve, a stop cock, or a squeeze valve.
20. A blood collection tube holder, comprising:
 - a needle configured to receive an evacuated collection tube;
 - a cavity;
 - a tubing disposed within the cavity and in fluid communication with the needle;
 - a button disposed within the cavity, wherein the button comprises an opening extending through the button and a rib proximate the opening, wherein the tubing extends through the opening; and
 - a spring disposed between the button and a wall of the cavity, wherein the spring biases the rib against the tubing to compress the tubing, wherein in response to the button being depressed and the spring being compressed, the tubing is uncompressed.