

CLAIMS

1. A catheter assembly comprising:
 - a catheter carried by a catheter adapter;
 - a needle having a distal tip and disposed in the catheter such that in a first needle position, the needle extends beyond the catheter;
 - a needle hub fixed adjacent to a proximal end of the needle;
 - a clip disposed in the catheter adapter and cooperating with the needle; and
 - a barrel assembly including an inner diameter; whereinwhen the needle is in a second needle position, the clip encloses the distal tip of the needle; and
 - when the needle moves to a third needle position, the clip, the needle hub and the needle are disposed in the inner diameter of the barrel assembly.
2. The catheter assembly of claim 1, wherein
 - the catheter adapter includes a retention feature; and
 - the clip is retained in the catheter adapter by the retention feature until the needle is in the second needle position.
3. The catheter assembly of claim 1, wherein
 - a rear wall of the clip includes a tapered outer surface, said rear wall is substantially perpendicular to an axis of the needle;
 - said barrel assembly includes a tapered inner surface disposed at a distal end of the inner diameter of the barrel assembly; and
 - the clip is guided by an engagement between the tapered outer surface of the clip and the tapered inner surface of the barrel assembly to dispose the clip and the needle in the barrel assembly.
4. The catheter assembly of claim 1, wherein
 - the clip includes an opening for the needle to travel through.

5. The catheter assembly of claim 1, wherein
the clip includes one or more flexible arms;
the one or more flexible arms bias against the needle before the needle moves to the second needle position; and
the flexible arms bias against each other to enclose the distal tip of the needle when the needle is in the second needle position.
6. The catheter assembly of claim 1, wherein
the needle manually moves from the first needle position to the second needle position.
7. The catheter assembly of claim 1, further comprising:
a spring disposed about the needle and extending between the needle hub and the proximal end of the barrel assembly; and
an activation button movably mounted adjacent to the distal end of the barrel assembly and adapted for selective engagement with the needle hub to hold the needle hub adjacent to the distal end of the barrel assembly against the bias of the spring in the first needle position; wherein
when the activation button is depressed, the spring is released to move the needle and the needle hub from the second needle position to the third needle position.
8. The catheter assembly of claim 1, wherein
the clip cooperates with a clip housing;
a proximal end of the clip housing includes a tapered outer surface; and
when the needle moves to the third needle position, the clip housing is guided by an engagement between the tapered outer surface of the clip housing and a tapered inner surface of the barrel assembly to dispose the clip and the clip housing into the barrel assembly.

9. A catheter assembly comprising:
a catheter carried by a catheter adapter;
a needle having a distal tip and disposed in the catheter such that in a first needle position, the needle extends beyond the catheter;
a needle hub fixed adjacent to a proximal end of the needle and fixed to a damping mechanism;
a clip being disposed in the catheter adapter, the clip cooperating with the needle; and
a barrel assembly surrounding the needle hub, the barrel assembly including first, second and third inner diameters; wherein
when the needle is in a second needle position, the clip encloses the distal tip of the needle; and
when the needle moves to a third needle position, the needle is retracted into the barrel assembly via spring force from a spring, friction between the damping mechanism and the first inner diameter slows initial movement of the needle hub in the barrel assembly, clearance between the damping mechanism and the second inner diameter provides faster movement of the needle hub in the barrel assembly, and friction between the damping mechanism and the third inner diameter slows movement of the needle hub to a resting position at a proximal end of the barrel assembly.
10. The catheter assembly of claim 9, wherein
the first and third inner diameters are substantially similar; and
the second inner diameter is larger than the first inner diameter and the third inner diameter, respectively.
11. The catheter assembly of claim 9, wherein
the damping mechanism comprises a silicon washer.
12. A catheter assembly comprising:
a catheter carried by a catheter adapter;

a needle having a distal tip and disposed in the catheter such that in a first needle position, the needle extending beyond the catheter;

a needle hub fixed adjacent to a proximal end of the needle and fixed to a first damping mechanism;

a clip being disposed in the catheter adapter, the clip cooperating with the needle;

a barrel assembly surrounding the needle hub, the barrel assembly including first and second inner diameters;

a spring disposed between the barrel assembly and the needle hub; and

a second damping mechanism disposed at a proximal end of the spring; wherein when the needle is in a second needle position, the clip encloses the distal tip of the needle; and

when the needle moves to a third needle position, the needle is retracted into the barrel assembly via spring force from the spring, friction between the second damping mechanism and the spring slows initial movement of the needle hub in the barrel assembly, clearance between the first damping mechanism and the first inner diameter provides faster movement of the needle hub in the barrel assembly, and engagement of the first damping mechanism and the second inner diameter slows movement of the needle hub to a resting position at a proximal end of the barrel assembly.

13. The catheter assembly of claim 12, wherein
the first damping mechanism comprises a silicon washer; and
the second damping mechanism comprises a silicone gel.
14. The catheter assembly of claim 12, wherein
the second inner diameter is smaller than the first inner diameter.
15. A catheter assembly comprising:
a catheter carried by a catheter adapter;
a needle having a distal tip and disposed in the catheter;
a needle hub fixed adjacent to a proximal end of the needle, a proximal end of the needle hub being fixed to a damping mechanism;

a clip disposed in the catheter adapter, the clip cooperating with the needle; and
a barrel assembly surrounding the needle hub, a proximal end of an inner surface of
the barrel assembly including the damping mechanism; wherein

when the needle is in a first needle position, the distal tip of the needle extends from
the clip;

when the needle is in a second needle position, the clip encloses the distal tip of the
needle; and

when the needle moves to a third needle position, the needle is retracted into the
barrel assembly via spring force from a spring, and the damping mechanism and the spring
slow initial movement of the needle hub in the barrel assembly, and when the needle hub
approaches an end of travel, the damping mechanism and the spring slow movement of the
needle hub to a resting position at a proximal end of the barrel assembly.

16. The catheter assembly of claim 15, wherein
the damping mechanism comprises a silicone gel.

17. A method for shielding and enclosing a needle of a catheter assembly, the method
comprising:

pulling back a needle, via a needle hub fixed to the needle, into a catheter and a
catheter adapter from a first needle position to a second needle position;

shielding, via a passive system, a distal tip of the needle using a clip, the needle being
in the second needle position; and

operating an active system to move the needle, the clip and the needle hub from the
second needle position to a third needle position where the needle, the clip and the needle hub
are enclosed in a barrel assembly.

18. The method of claim 17, wherein
the clip of the passive system includes one or more flexible arms that shield the distal
tip of the needle; and

the active system includes an activation button and a spring, the needle being
triggered to move via depression of the activation button and release of the spring to apply

spring force to move and enclose the needle, the clip and the needle hub in the barrel assembly.

19. The catheter assembly of claim 1, wherein the clip cooperates with and is disposed into a clip housing.

20. The catheter assembly of claim 19, wherein a proximal end of the clip housing includes a tapered outer surface.

21. The catheter assembly of claim 20, wherein when the needle moves to the third needle position, the clip housing is guided by an engagement between the tapered outer surface of the clip housing and a tapered inner surface of the barrel assembly.

22. The catheter assembly of claim 20, wherein when the needle moves to the third needle position, the clip and the clip housing are disposed into the barrel assembly.