

CLAIMS

1. An extension set to provide access to a patient's vascular system, comprising:
a tube, comprising a proximal end, a distal end, and an outer surface;
an instrument disposed within the tube, the instrument comprising a proximal end and a distal end, wherein fluid is configured to flow through the tube between an outer surface of the instrument and an inner surface of the tube; and
a translation handle coupled to the outer surface of the tube, wherein the translation handle is configured to move along the outer surface of the tube between a proximal position and a distal position to translate the distal end of the instrument between a retracted position and an advanced position, wherein in response to the distal end of the instrument being in the advanced position, the distal end of the instrument extends beyond the distal end of the tube.
2. The extension set of claim 1, wherein the instrument comprises one or more of a tubing, a spring, and a guidewire.
3. The extension set of claim 1, further comprising a fluid path assembly comprising the instrument, a proximal end, and a distal end, wherein an extension tube is coupled to the proximal end of the instrument and wherein the proximal end of the fluid path assembly comprises a proximal connector configured to connect to a blood collection device.
4. The extension set of claim 1, wherein the distal end of the tube comprises a distal connector.
5. The extension set of claim 1, wherein the instrument comprises a coupler element, wherein the translation handle compresses a portion of the tube in between the coupler element and the translation handle, wherein the portion of the tube engages with the coupler element such that movement of the translation handle along the outer surface of the tube translates the distal end of the instrument between the retracted position and the advanced position.

6. The extension set of claim 5, wherein at least one of the coupler element and the tube comprises a lubricant to facilitate translation of the instrument within the tube.
7. The extension set of claim 6, wherein the translation handle comprises a plurality of ball bearings, wheels, or low-friction sliders to provide localized compression of the tube to engage the coupler element through the tube.
8. An extension set to provide access to a patient's vascular system, comprising:
 - a fluid path assembly comprising an instrument, an extension tube, and a proximal connector configured to couple to a blood collection set;
 - a tube comprising a proximal end, a distal end, and an outer surface, wherein a translation handle is coupled to the outer surface and configured to move between the proximal end and the distal end, wherein fluid is configured to flow through the tube between an outer surface of the instrument and an inner surface of the tube; and
 - the instrument disposed within the tube and comprising a proximal end and a distal end, wherein the proximal end of the instrument is engaged with the translation handle and configured to move between a proximal position and a distal position, wherein in response to the translation handle moving to the distal end of the tube, the distal end of the instrument extends beyond the distal end of the tube.
9. The extension set of claim 8, wherein the instrument comprises a tubing.
10. The extension set of claim 8, wherein the fluid path assembly extends through the tube, wherein the instrument is configured to move with respect to the tube between a retracted position and an advanced position.
11. The extension set of claim 8, wherein the distal end of the tube comprises a distal connector.

12. The extension set of claim 11, wherein the distal end of the tube or the distal connector comprises a fluid seal to seal the tube.
13. The extension set of claim 8, wherein the proximal end of the instrument comprises a coupler element, wherein the translation handle compresses a portion of the tube in between the coupler element and the translation handle, wherein the portion of the tube engages with the coupler element such that movement of the translation handle along the outer surface of the tube translates the distal end of the instrument between the retracted position and the advanced position.
14. The extension set of claim 13, wherein at least one of the coupler element and the tube comprises a lubricant to facilitate translation of the instrument within the tube.
15. The extension set of claim 13, wherein the translation handle comprises a plurality of ball bearings, wheels, or low-friction sliders to provide localized compression of the tube to engage the coupler element through the tube.
16. A method to provide access to a patient's vascular system, comprising:
 - coupling an extension set to a catheter assembly, wherein the extension set comprises:
 - a tube, comprising a proximal end, a distal end, and an outer surface;
 - an instrument disposed within the tube, the instrument comprising a proximal end and a distal end, wherein fluid is configured to flow through the tube between an outer surface of the instrument and an inner surface of the tube; and
 - a translation handle coupled to the outer surface of the tube, wherein the translation handle is configured to move along the outer surface of the tube between a proximal position and a distal position to translate the distal end of the instrument between a retracted position and an advanced position, wherein in response to the distal end of the instrument

being in the advanced position, the distal end of the instrument extends beyond the distal end of the tube;

wherein coupling the extension set to the catheter assembly comprises coupling the distal end of the tube to the catheter assembly;

moving the translation handle along the tube from a proximal position to a distal position, wherein in response to the translation handle moving to the distal position, the distal end of the instrument extends beyond the distal end of the tube into the catheter assembly.

17. The method of claim 16, wherein coupling the distal end of the tube to the catheter assembly comprises coupling a distal connector of the tube to one of a proximal end of the catheter assembly, a side port of the catheter assembly, and an adapter of the catheter assembly.

18. The method of claim 17, wherein the catheter assembly comprises a catheter extending from a distal end thereof, wherein in response to the translation handle moving to the distal position, the instrument extends through a distal end of the catheter.

19. The method of claim 18, wherein the extension set further comprises a blood collection device, further comprising after blood collection within the blood collection device, moving the translation handle from the distal position to the proximal position, wherein in response to moving the translation handle from the distal position to the proximal position, the distal end of the instrument is retracted into the tube.