Claims

1. A vascular access system comprising:
   a vascular access device comprising:
      a needle having a tip portion; and
      a ~~shield~~rigid sheath arranged around and at least substantially along a longitudinal axis of the needle; and
   a guiding portion configured to be placed at least at a subcutaneous tissue layer above a blood vessel and configured to receive and guide the needle to reach the blood vessel, the guiding portion comprising a channel portion comprising an inlet and an outlet;
   wherein the ~~shield~~rigid sheath is ~~more rigid than the needle so as~~configured to provide strength to the tip portion to penetrate at least one of the subcutaneous tissue layer and a skin layer over the subcutaneous tissue layer as the tip portion extends out from the ~~shield~~rigid sheath;
   wherein the needle conforms to the channel portion as the distance between the tip portion and the ~~shield~~rigid sheath increases; and
   wherein the outlet comprises a constriction which is configured to cause the needle to regain push force to penetrate the blood vessel.

2. The vascular access system of claim 1, further comprising :
   an actuating portion coupled to a portion of the needle.

3. The vascular access system of claim 2, wherein the ~~shield~~rigid sheath is configured to be slidable relative to the tip portion.

4. The vascular access system of any one of claims 1 to 3, wherein the ~~shield~~rigid sheath comprises a sealing portion arranged adjacent to the tip portion so as to seal the needle within the ~~shield~~rigid sheath.

5. The vascular access system of any one of claims 1 to 4, wherein the needle further comprises a flexible portion, the flexible portion coupled to the tip portion.

6. The vascular access system of claim 5, wherein the flexible portion comprises a same or different material from the tip portion.

7. The vascular access system of any one of claims 1 to 6, wherein the needle comprises a single material or a combination of materials with varying flexibility.

8. The vascular access system of claim 7, wherein the material is selected from a group consisting of metal, polymer and shape-memory alloys.

9. The vascular access system of any one of claims 2 to 8, wherein the needle extends out from the ~~shield~~rigid sheath as the ~~shield~~rigid sheath retracts into the actuating portion.

10. The vascular access system of any of claims 1 to 9, wherein the channel portion is biodegradable.

11. The vascular access system of any of claims 1 to 10, wherein the channel portion comprises a porous sidewall with a plurality of holes.

12. The vascular access system of any one of claims 1 to 11, wherein the channel portion comprises at least one helical screw.

13. The vascular access system of any one of claims 1 to 12, wherein the channel portion comprises at least a frusto-conical portion.

14. The vascular access system of any one of claims 1 to 12, wherein the channel portion further comprises at least a tubular portion.

15. The vascular access system of any one of claims 1 to 14, wherein the guiding portion further comprises ~~an~~ unidirectional valve positioned adjacent to the outlet of the channel portion.

16. The vascular access system of any one of claims 1 to 15, wherein the guiding portion further comprises an anchor portion positioned adjacent to the outlet of the channel

portion and configured to ~~substantially~~noninvasively anchor the channel portion ~~onto~~over the blood vessel.

17. The vascular access system of claim 16, wherein the anchor portion comprises a dog-bone shaped portion.

18. The vascular access system of any one of claims 1 to 17, wherein the channel portion is configured to be filled with an anti-bacteria or anti-microbial gel.

19. The vascular access system of any one of claims 1 to 18, wherein the channel portion is positioned at an angle relative to a plane of the skin layer.

~~20. The vascular access system of claim 19, wherein the angle varies between 0 and 90 degrees.~~

~~21~~20. The vascular access system of any one of claims 1 to ~~20~~19, wherein the guiding portion is configured to be resorbed over time, thereby forming a scarred tissue track configured to serve as a guide for subsequent access of the vascular access device.

~~22~~21. The vascular access system of any one of claims 1 to ~~21~~20, wherein the needle is configured to conform to an orientation of the blood vessel after penetration of the blood vessel.

Claims

1. A vascular access system comprising:
   a vascular access device comprising:
      a needle having a tip portion; and
      a rigid sheath arranged around and at least substantially along a longitudinal axis of the needle; and
   a guiding portion configured to be placed at least at a subcutaneous tissue layer above a blood vessel and configured to receive and guide the needle to reach the blood vessel, the guiding portion comprising a channel portion comprising an inlet and an outlet;
   wherein the rigid sheath is configured to provide strength to the tip portion to penetrate at least one of the subcutaneous tissue layer and a skin layer over the subcutaneous tissue layer as the tip portion extends out from the rigid sheath;
   wherein the needle conforms to the channel portion as the distance between the tip portion and the rigid sheath increases; and
   wherein the outlet comprises a constriction which is configured to cause the needle to regain push force to penetrate the blood vessel.

2. The vascular access system of claim 1, further comprising :
   an actuating portion coupled to a portion of the needle.

3. The vascular access system of claim 2, wherein the rigid sheath is configured to be slidable relative to the tip portion.

4. The vascular access system of any one of claims 1 to 3, wherein the rigid sheath comprises a sealing portion arranged adjacent to the tip portion so as to seal the needle within the rigid sheath.

5. The vascular access system of any one of claims 1 to 4, wherein the needle further comprises a flexible portion, the flexible portion coupled to the tip portion.

6. The vascular access system of claim 5, wherein the flexible portion comprises a same or different material from the tip portion.

7. The vascular access system of any one of claims 1 to 6, wherein the needle comprises a single material or a combination of materials with varying flexibility.

8. The vascular access system of claim 7, wherein the material is selected from a group consisting of metal, polymer and shape-memory alloys.

9. The vascular access system of any one of claims 2 to 8, wherein the needle extends out from the rigid sheath as the rigid sheath retracts into the actuating portion.

10. The vascular access system of any of claims 1 to 9, wherein the channel portion is biodegradable.

11. The vascular access system of any of claims 1 to 10, wherein the channel portion comprises a porous sidewall with a plurality of holes.

12. The vascular access system of any one of claims 1 to 11, wherein the channel portion comprises at least one helical screw.

13. The vascular access system of any one of claims 1 to 12, wherein the channel portion comprises at least a frusto-conical portion.

14. The vascular access system of any one of claims 1 to 12, wherein the channel portion further comprises at least a tubular portion.

15. The vascular access system of any one of claims 1 to 14, wherein the guiding portion further comprises a unidirectional valve positioned adjacent to the outlet of the channel portion.

16. The vascular access system of any one of claims 1 to 15, wherein the guiding portion further comprises an anchor portion positioned adjacent to the outlet of the channel portion and configured to noninvasively anchor the channel portion over the blood vessel.

17. The vascular access system of claim 16, wherein the anchor portion comprises a dog-bone shaped portion.

18. The vascular access system of any one of claims 1 to 17, wherein the channel portion is configured to be filled with an anti-bacteria or anti-microbial gel.

19. The vascular access system of any one of claims 1 to 18, wherein the channel portion is positioned at an angle relative to a plane of the skin layer.

20. The vascular access system of any one of claims 1 to 19, wherein the guiding portion is configured to be resorbed over time, thereby forming a scarred tissue track configured to serve as a guide for subsequent access of the vascular access device.

21. The vascular access system of any one of claims 1 to 20, wherein the needle is configured to conform to an orientation of the blood vessel after penetration of the blood vessel.