

We Claim:

1. A vascular access sleeve comprising: a tubular sleeve body extending along a longitudinal axis of the access sleeve, the sleeve body having first and second open ends; a hub attached to the second open end of the tubular sleeve body, the hub having third and fourth open ends, and further including a hemostasis valve; a first lumen extending along the longitudinal axis between the first and second open ends of the sleeve body, and further extending between the third and fourth open ends of the hub; a second lumen extending along the longitudinal axis between the first and second open ends of the sleeve body, the second lumen being sized and shaped for passage of a guidewire; a first lateral opening in the sleeve body, the hub and the hemostasis valve, the first lateral opening extending from the first open end to the second open end of the sleeve body, and from the third open end to the fourth open end of the hub; and a second lateral opening between the first lumen and the second lumen, the second lateral opening extending from the first open end to the second open end of the sleeve body, wherein the first lateral opening is configured to be expanded to attach the access sleeve to a medical device between a first end and a second end of the medical device such that the medical device is housed within the first lumen, and wherein the first lateral opening and the second lateral opening are configured to allow the access sleeve to be attached to the guidewire between a first end and a second end of the guidewire such that the guidewire is housed within the second lumen.

2. The access sleeve of claim 1, wherein at least one edge of the first lateral opening is rounded.

3. The access sleeve of claim 1, wherein the first lateral opening extends linearly between the first and second open ends of the sleeve body and is parallel to the longitudinal axis of the first lumen of the sleeve body.

4. The access sleeve of claim 1, wherein the first lateral opening extends in a helical spiral

between the first and second open ends of the sleeve body.

5. The access sleeve of claim 1, wherein the sleeve body comprises an inner surface fabricated with an irregular geometry to minimize contact between the sleeve body and the medical device.

6. The access sleeve of claim 5, wherein the inner surface comprises at least one recess extending between the first and second open ends of the tubular sleeve body, the recess being different than the second lumen.

7. The access sleeve of claim 1, wherein the hub further comprises wings or suture holes configured to allow the hub to be secured to a patient.

8. The access sleeve of claim 7, wherein the hub comprises at least one of: a high-density polyethylene (HDPE) material, a medium-density polyethylene (MDPE) material, a low-density polyethylene (LDPE) material, polyether ether ketone (PEEK), or a polyether block amide (PEBA).

9. The access sleeve of claim 1, further comprising a tip at the first open end of the tubular sleeve body, the tip having an inner surface defining a tip lumen that extends between proximal and distal ends of the tip, the tip lumen being in fluid communication with the first lumen of the sleeve body.

10. The access sleeve of claim 9, wherein an outer diameter of the proximal end of the tip is larger than an outer diameter of the distal end of the tip such that the tip is tapered along its proximal-to-distal length.

11. The access sleeve of claim 9, wherein a diameter of the inner surface at the proximal end of the tip is larger than a diameter of the inner surface of the tip at the distal end.

12. The access sleeve of claim 9, wherein a diameter of the inner surface at the proximal end of the tip is equal to a diameter of the inner surface at the distal end of the tip.

13. The access sleeve of claim 9, wherein the sleeve body comprises a first material and the tip comprises a second material.

14. The access sleeve of claim 13, wherein the first material is substantially stiffer than the second material, and the second material is substantially more elastic than the first material.

15. The access sleeve of claim 13, wherein the first material comprises at least one of: high-density polyethylene (HDPE) material, a medium-density polyethylene (MDPE) material, a low-density polyethylene (LDPE) material, a polyether block amide (PEBA), a material with an elastic modulus of about 81-307 MPa, or a material with a yield strain of 20-30%.

16. The access sleeve of claim 13, wherein the second material comprises at least one of: ethylene-vinyl acetate (EVA), styrene-butadiene copolymer (SBC), synthetic rubber, an elastomer, an elastic material, a material with an elastic modulus of about 1.6 ksi, or a material with a yield strain in excess of 200%.

17. An access system comprising: a medical device configured for insertion into an arteriotomy of a patient, the medical device having a first end and a second end; and an access sleeve having a tubular sleeve body extending along a longitudinal axis, the sleeve body having first and second open ends; a hub attached to the second open end of the tubular sleeve body, the hub having third and fourth open ends, and further including a hemostasis valve; a first lumen extending along the longitudinal axis between the first and second open ends of the sleeve body, and further extending between the third and fourth open ends of the hub; a second lumen extending along the longitudinal axis between the first and second open ends of the sleeve body, the second lumen being sized and shaped for passage of a guidewire; a first lateral opening in the sleeve body, the hub, and the hemostasis valve, the first lateral opening comprising a slit that extends from the first open end to the second open end of the sleeve body, and from the third open end to the fourth open end of the hub; and a second lateral opening between the first lumen and the second lumen, the second lateral opening

extending from the first open end to the second open end of the sleeve body, wherein the first lateral opening of the access sleeve is configured to be expanded to attach the access sleeve to the medical device between the first end and the second end of the medical device such that the medical device is positioned in the first lumen and the first lumen allows for the passage of at least the medical device, and wherein the first lateral opening and the second lateral opening are configured to allow the access sleeve to be attached to the guidewire between a first end and a second end of the guidewire such that the guidewire is positioned in the second lumen.

18. The access system of claim 17, wherein the sleeve body has a cross-sectional shape that is substantially C-shaped.

19. The access system of claim 17, wherein the medical device includes a catheter onto which the access sleeve attaches.

20. The access system of claim 19, wherein the access sleeve is configured to slide distally along the catheter and be advanced into the arteriotomy while still attached to the catheter.

21. The access system of claim 17, wherein at least one edge of the first lateral opening is rounded.

22. The access system of claim 17, wherein the sleeve body comprises an inner surface having an irregular geometry to minimize contact between the sleeve body and the medical device.

23. The access system of claim 22, wherein the inner surface comprises at least one recess extending between the first and second open ends of the tubular sleeve body, the recess being different than the second lumen.

24. The access system of claim 17, wherein the hub further comprises wings or suture holes configured to allow the hub to be secured to a patient.