

We claim:

1. A perfusion sheath assembly for insertion into a blood vessel of a patient, the sheath
5 assembly comprising:
 - a sheath body having a longitudinal axis, and first and second ends;
 - first and second lumens, each extending along the longitudinal axis between the first
and second ends of the sheath body, the first lumen configured for the passage of a medical
device, and the second lumen configured to allow a flow of fluid from the blood vessel in the
10 second lumen; and
 - a stylet configured to selectively open and close the second lumen along the
longitudinal axis when the first end of the sheath body is positioned within the blood vessel
and the second end of the sheath is external to the patient.
- 15 2. The perfusion sheath assembly of claim 1, wherein the stylet is configured to move along
the second lumen in order to open and close the second lumen.
3. The perfusion sheath assembly of claim 2, wherein the sheath body comprises at least one
aperture that enables fluid communication between the second lumen and the blood vessel.
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4. The perfusion sheath assembly of claim 3, wherein each aperture has a cross sectional area
that is similar to that of the second lumen.
5. The perfusion sheath assembly of claim 3, wherein the at least one aperture comprises a
25 single continuous channel.
6. The perfusion sheath assembly of claim 3, wherein each aperture is configured to prevent
the stylet from passing through it into the vessel as it moves along the second lumen.
- 30 7. The perfusion sheath assembly of claim 1, wherein the stylet comprises an inner lumen that
extends along the longitudinal axis between first and second ends of the stylet.
8. The perfusion sheath assembly of claim 7, wherein the first end of the stylet comprises a
skive.

9. The perfusion sheath assembly of claim 7, wherein the inner lumen is exposed at the second end of the stylet.
- 5 10. The perfusion sheath assembly of claim 7, further comprising an internal stylet for plugging the inner lumen of the stylet when the stylet is not in use.
11. The perfusion sheath assembly of claim 7, further comprising a valve at a second end of the stylet for sealing the inner lumen when the stylet is not in use.
- 10 12. The perfusion sheath assembly of claim 7, further comprising a guidewire that is configured to move along the inner lumen of the stylet.
13. The perfusion sheath assembly of claim 2, wherein the stylet comprises markings to
15 indicate the position of the stylet relative to the second end of the sheath body.
14. The perfusion sheath assembly of claim 1, further comprising a ratcheting mechanism to retract the stylet towards the second end of the sheath body in standard increments.
- 20 15. The perfusion sheath assembly of claim 14, wherein the increments are sized relative to a spacing between adjacent apertures.
16. The perfusion sheath assembly of claim 1, further comprising a hub coupled to the second end of the sheath body, the hub being in fluid communication with the first lumen.
- 25 17. The perfusion sheath assembly of claim 16, wherein the hub is also in communication with the second lumen, the hub being configured to receive the stylet.
18. The perfusion sheath assembly of claim 1, wherein the sheath body comprises an
30 atraumatic tip attached to the first end of the sheath body.
19. The perfusion sheath assembly of claim 18 wherein the tip comprises 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 and second lumens of the sheath body.

20. The perfusion sheath assembly of claim 19, 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.
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21. The perfusion sheath assembly of claim 19, 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.
22. The perfusion sheath assembly of claim 18, wherein the tip comprises at least one of:
- 10 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, and a material with a yield strain in excess of 200%.
23. The perfusion sheath assembly of claim 1, wherein the sheath body comprises a first
- 15 material.
24. The perfusion sheath assembly of claim 22, wherein the stylet comprises a second material.
- 20 25. The perfusion sheath assembly of claim 24, wherein the second material is substantially stiffer than the first material, and the first material is substantially more elastic than the second material.
26. The perfusion sheath assembly of claim 23, wherein the first material comprises at least
- 25 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, and a material with a yield strain in excess of 200%.
27. The perfusion sheath assembly of claim 24, wherein the second material comprises
- 30 polyether ether ketone (PEEK), a polyether block amide (such as PEBAX), a polyethylene material, a high-density polyethylene (HDPE) material, a medium-density polyethylene (MDPE) material, a low-density polyethylene (LDPE) material, a crack-resistant material, a material with a low coefficient of friction, and a material with an elastic modulus of about 40 ksi.