

1 **WHAT IS CLAIMED IS:**

2 1. A multidirectional balloon tipped catheter system for conducting vascular procedures upon
3 arteries in an extremity from an entry point or other branch point opposite to the extremity in the
4 arterial system, comprising:

5 a multidirectional catheter body having a proximal end and a distal end and including a
6 plurality of curls and flexion points for multidirectional deflections, wherein the catheter body
7 includes a plurality of lumens comprising:

8 at least one wire lumen including an exit port at the distal end; and

9 at least one balloon lumen including a balloon port near the distal end;

10 an anchor balloon mounted to near the distal end of the catheter body, wherein the anchor
11 balloon is in fluid communication with the balloon port and wherein the anchor balloon overhangs
12 the distal end of the catheter body by a predetermined distance when the anchor balloon is inflated;
13 and

14 a guide wire placed in the wire lumen, wherein the guide wire is configured to protrude
15 beyond the distal end of the catheter body when the guide wire is in use.

16 2. The multidirectional balloon tipped catheter system of claim 1 wherein the anchor balloon
17 is inflated with a fluid including air, saline, or contrast, and is configured to be inflated in various
18 sizes.

19 3. The multidirectional balloon tipped catheter system of claim 1 wherein the anchor balloon
20 overhangs the distal end of the catheter body by two to three millimeters when the anchor balloon
21 is inflated

22 4. The multidirectional balloon tipped catheter system of claim 1 wherein a diameter of the
23 anchor balloon is configured to occlude a vascular channel at a selected location.

24 5. The multidirectional balloon tipped catheter system of claim 1 wherein a diameter of the
25 wire lumen is equal to or greater than 0.91 mm.

26 6. The multidirectional balloon tipped catheter system of claim 1 wherein a distance of a distal
27 end of the anchor balloon from the distal end of the catheter body is in a range of 10 mm to 20 mm
28 when the anchor balloon is deflated.

29 7. The multidirectional balloon tipped catheter system of claim 1 wherein the catheter body
30 is configured to be insertable into a femoral artery or other vascular access.

1 8. The multidirectional balloon tipped catheter system of claim 1 wherein the plurality of
2 lumens further comprises one or more additional lumens for delivery of pharmaceuticals,
3 chemotherapeutics and embolization products to a selected location.

4 9. A method for conducting vascular procedures upon arteries in an extremity from an entry
5 point opposite to the extremity with a multidirectional balloon tipped catheter system, comprising:

6 inserting the multidirectional balloon tipped catheter system into the entry point in a near
7 femoral artery or other vascular access, wherein the catheter system includes a catheter body, at
8 least one anchor balloon mounted to near the distal end of the catheter body, and a guide wire
9 disposed inside the catheter body;

10 advancing the catheter system toward a branch point that is connected to the extremity;

11 inflating the anchor balloon at a first size;

12 navigating the catheter system to an ostium of the extremity;

13 inflating the anchor balloon at a second size, wherein the second size is larger than the first
14 size;

15 anchoring the catheter system at the ostial and proximal segment of the extremity by using
16 the anchor balloon inflated at the second size, wherein the extremity is occluded by the anchor
17 balloon;

18 advancing the guide wire into a distal segment of the extremity for diagnostic or therapeutic
19 procedures; and

20 deflating the anchor balloon to free the occlusion in the extremity.

21 10. The method of claim 9 further comprising inserting an entry sheath into the entry point,
22 wherein the catheter system is inserted into the entry point through the entry sheath.

23 11. The method of claim 9 further comprising performing the diagnostic or therapeutic
24 procedures while the catheter system is anchored at the ostial and proximal segment of the
25 extremity.

26 12. The method of claim 9 further comprising further advancing the catheter system into the
27 distal segment of the extremity for further diagnostic or therapeutic procedures.

28 13. The method of claim 9 further comprising administering pharmaceutical and
29 chemotherapeutic agents to local vasculature of the extremity using the catheter system while the
30 anchor balloon is inflated.

31 14. The method of claim 9 further comprising:

1 removing the catheter body with deflated anchor balloon while leaving the guide wire in
2 place; and

3 withdrawing the entry sheath over the guide wire while leaving the guide wire in place,
4 wherein the guide wire is then available to insert a long sheath or therapeutic catheter for
5 therapeutic procedures.

6 15. The method of claim 9 further comprising occluding blood vessels with embolization coils,
7 glues, plugs and other occluder devices using the catheter system while the anchor balloon is
8 inflated.

9 16. The method of claim 9 wherein the anchor balloon is inflated with a fluid including air,
10 saline, or contrast, and is configured to be inflated in various sizes.

11 17. The method of claim 9 wherein the catheter body include a plurality of curls and flexion
12 points for multidirectional deflections.

13 18. A multidirectional balloon tipped catheter system for conducting closed loop perfusion and
14 reperfusion for treatment of deep venous thrombosis, comprising:

15 a multidirectional catheter body having a proximal end and a distal end and including a
16 plurality of curls and flexion points for multidirectional deflections, wherein the catheter body
17 includes a plurality of lumens comprising:

18 a main lumen including an exit port at the distal end; and

19 at least one balloon lumen including a balloon port near the distal end;

20 an anchor balloon mounted to near the distal end of the catheter body, wherein the anchor
21 balloon is in fluid communication with the balloon port and wherein the anchor balloon overhangs
22 the distal end of the catheter body by a predetermined distance when the anchor balloon is inflated;
23 and

24 an inner catheter device disposed in the main lumen, wherein the inner catheter device
25 comprises:

26 a flexible inner catheter body including a center lumen, at least one balloon lumen,
27 and a plurality of additional lumens, wherein the inner catheter body is configured to
28 advance beyond the distal end of the multidirectional catheter body, and wherein the
29 additional lumens include exit ports open to outside of the inner catheter body; and

30 an anchor balloon mounted to near the distal end of the inner catheter body, wherein
31 the anchor balloon is in fluid communication with the balloon lumen and wherein the

1 anchor balloon overhangs the distal end of the inner catheter body by a predetermined
2 distance when the anchor balloon is inflated.

3 19. The multidirectional balloon tipped catheter system of claim 18 wherein the anchor balloon
4 and the anchor balloon of the inner catheter device are inflated with a fluid including air, saline,
5 or contrast, and are configured to be inflated in various sizes.

6 20. The multidirectional balloon tipped catheter system of claim 18 wherein the exit ports of
7 the additional lumens of the inner catheter device are formed at proximal side from the anchor
8 balloon of the inner catheter device.

9 21. The multidirectional balloon tipped catheter system of claim 18 wherein:

10 the multidirectional catheter body includes channels that are connected to the main lumen
11 and are open to outside of the multidirectional catheter body;

12 the inner catheter body includes channels that are connected to the center lumen and are
13 open to outside of the inner catheter body; and

14 the channels of the multidirectional catheter body are configured to be substantially aligned
15 with the channels of the inner catheter body to form open fluid paths, when the inner catheter
16 device advances by a predetermined distance.

17 22. The multidirectional balloon tipped catheter system of claim 21 wherein the exit ports of
18 the additional lumens of the inner catheter device are configured to be exposed outside the main
19 lumen for delivery of pharmaceuticals, chemotherapeutics and embolization products to a selected
20 location, when the inner catheter device advances by the predetermined distance.

21 23. The multidirectional balloon tipped catheter system of claim 18 wherein the
22 multidirectional catheter body is configured to be insertable into a femoral vein or other vascular
23 access.