

Claims

1. A docking station comprising:
 - an expandable frame configured to conform to an interior shape of blood vessel when expanded inside the blood vessel;
 - at least one sealing portion configured to contact an interior surface of the blood vessel; and
 - a valve seat, wherein the valve seat is configured to support an expandable transcatheter valve.
2. The docking station of claim 1, wherein the valve seat comprises a first portion of the expandable frame, and wherein links connect the first portion of the expandable frame to a second portion of the expandable frame, the second portion comprising an annular outer wall.
3. The docking station of claim 2 wherein the links are curved in a semi-circular shape
4. The docking station of any one of claims 2-3, wherein the outer wall of the expandable frame comprises a plurality of struts, and wherein a thickness of the links is less than a thickness of the struts.
5. The docking station of any one of claims 2-4, wherein the valve seat is located radially inside the outer wall of the frame.
6. The docking station of any one of claims 2-5, wherein an apex of the links is bent such that portions of the links on opposite sides of the apex extend away from each other at an acute angle.
7. The docking station of any one of claims 2 to 6, wherein the links extend from the first portion of the expandable frame to the second portion at an angle with respect to a radial direction and/or the links are twisted as they extend from the valve seat to the annular wall.

8. The docking station of any one of claims 1 to 7, further comprising a tubular graft coupled to the expandable frame that extends axially beyond an end of the expandable frame.
9. The docking station of any one of claims 1 to 8, wherein the frame has a plurality of stent segments connected to a plurality of spring elements, wherein the spring elements preferably consist of spring wires, compression springs, torsion springs, tension springs, and combinations thereof.
10. The docking station of any one of claims 1 to 9, wherein the sealing portion and/or the valve seat is integrally formed with the frame.
11. The docking station of any one of claims 1 to 10, wherein the expandable frame includes a first leg that extends proximally beyond the remainder of the frame, wherein the docking station further comprises an elongated second leg that extends proximally further beyond an end of the leg.
12. The docking station of claim 11, wherein the elongated second leg is configured to be releasably connectable to a retention device such that the retention device can inhibit the docking station from jumping distally out of the catheter after the rest of the docking station has expanded.
13. The docking station of any one of claims 1-12, wherein the expandable frame is configured to conform to the interior shape of the blood vessel, when expanded inside the blood vessel, such that the expandable frame can expand in multiple locations to conform to multiple bulges of the blood vessel and can contract in multiple locations to conform to multiple narrowed regions of the blood vessel.
14. The docking station of any one of claims 1-13, wherein the frame is configured such that, when expanded inside the blood vessel, more than 50% of the docking station contacts an interior surface of the blood vessel and distributes the pressure on the blood vessel from the docking station over the more than 50% of the docking station.

15. A docking station deployment system, comprising:
 - a catheter defining a delivery passage and having a distal opening;
 - a self-expandable docking station according to any one of claims 1 to 14, the docking station being capable of being radially compressed and expanded, wherein the docking station can be held in a compressed configuration inside the delivery passage of the catheter; and
 - a retention device releasably connectable to the docking station such that the retention device inhibits the docking station from jumping distally out of the catheter.
16. The system of claim 15, wherein the retention device is a pusher having a distal end connectable to a proximal end of the docking station, wherein the retention device preferably is configured to maintain the axial position of the docking station until the docking station is fully expanded at an implantation site.
17. The system of claim 15 or 16, wherein the docking station includes at least one leg that extends proximally at a proximal end of the docking station and is releasably connectable to the retention device.
18. The system of claim 17, wherein the retention device comprises a lock and release connector having a body and a door, wherein the door is moveable from a first position to a second position, wherein the lock and release connector preferably has a second door moveable from a third position to a fourth position, and the lock and release connector preferably is configured such that it can hold a first leg of the docking station between the door and the body in the first position and can hold a second leg of the docking station between the second door and the body in the third position.
19. The system of claim 17, wherein the retention device comprises a lock and release connector having a body and a door, wherein the door is moveable from a first position to a second position, and wherein the retention device is connected to the docking station when the leg is between the door and the body and the door is in the first position.

20. The system of claim 19, wherein the retention device is configured to release the leg when the door is moved to the second position.