

CLAIMS

We claim:

1. A smart obturator assembly, comprising: a hub forming a central passage;
a catheter extending distally from the hub, wherein the catheter comprises an inner wall forming the lumen; and
an obturator movably positionable within the lumen of a device the catheter operatively coupled to the hub, the obturator movable within the lumen between a first position and a second position, the obturator comprising:
a distal end having a tip portion;
a opposing proximal end opposing the distal end;
a body disposed between the tip portion and the proximal end, wherein an outer diameter of the tip portion is greater than an outer diameter of the body; and
a sensor disposed on a surface of the tip portion at the distal end of the obturator, wherein the outer diameter of the tip portion is approximately equal to an inner diameter of a portion of the inner wall, wherein in response to the obturator being in the first position, the tip portion contacts the portion of the inner wall to close the lumen and the sensor either contacts the portion of the inner wall or is disposed distal to the portion of the inner wall,
wherein, with the obturator in the first position, the distal end limits fluid flow through the lumen and, wherein in response to the obturator being in the second position, the body is spaced apart from the portion of the inner wall to provide fluid flow the distal end provides fluid flow through the lumen.
2. The smart obturator assembly of claim 1, further comprising a locking collar operatively coupled to the hub, the locking collar configurable in a locked configuration to prevent movement of the obturator within the lumen and in an unlocked configuration to allow movement of the obturator within the lumen.

3. The smart obturator assembly of claim 2, wherein, in the locked configuration, the locking collar is configured to prevent movement of the obturator within the lumen with the obturator in the first position or the second position.

4. The smart obturator assembly of claim 2, wherein the locking collar comprises a tab configured to interfere with a depression formed in the obturator with the locking collar in the locked configuration.

5. The smart obturator assembly of claim 2, further comprising electronic circuitry in the locking collar, the electronic circuitry coupled in signal communication with the sensor.

6. The smart obturator assembly of claim 5, further comprising:
an electrical contact positioned within the obturator, the electrical contact electrically coupled to the sensor; and
an electrical lead wire extending through the obturator electrically coupling the electrical contact with the electronic circuitry.

7. The smart obturator assembly of claim 5, further comprising communication circuitry in the locking collar, the communication circuitry coupled in signal communication with the electronic circuitry for wireless communication with remote reception circuitry.

8. The smart obturator assembly of claim 5, wherein the electronic circuitry comprises a connection port for connecting the electronic circuitry with remote reception circuitry.

9. The smart the obturator assembly of claim 1, wherein the obturator has a central axis extending between the distal end and the proximal end of the obturator, at least a portion of the distal end having one of a symmetrical profile with respect to the central axis or an asymmetrical profile with respect to the central axis.

10. The smart obturator assembly of claim 1, wherein the sensor is configured to measure one or more of the following: a temperature within a body lumen, a blood glucose level, a sodium level, a potassium level, a drug concentration level, a white blood cell count, a blood pressure within the body lumen, or a combination thereof.

11. The smart obturator assembly of claim 1, wherein the hub comprises a small-bore connector configured to couple the hub to a tube.

12. The smart obturator assembly of claim 1, wherein the device comprises a small-bore connector and the proximal end of the obturator forms a channel in fluid communication with the lumen, the obturator assembly further comprising a seal positioned about an outer periphery of the proximal end of the obturator and contacting an inner surface of the small-bore connector at a proximal end of the device.

13. The smart obturator assembly of claim 12, wherein the seal is positioned within an annular slot formed in the inner surface of the small-bore connector.

14. A smart obturator assembly, comprising:
a hub forming a central passage;
a catheter extending distally from the hub, wherein an inner surface of the catheter comprises a first electrical contact;
a collar on the hub, the collar including electronic circuitry in signal communication with remote reception circuitry; and
an obturator movably positionable within a lumen of the catheter, wherein the hub is coupled to a proximal end of the catheter such that the central passage is in fluid communication with the lumen, the obturator movable within the lumen between a first position and a second position, the obturator comprising:
a distal end; and
a sensor at the distal end, the sensor configured to sense an environmental characteristic within a patient's blood stream, generate a signal representative of the environmental characteristic, and transmit the signal to the electronic circuitry, wherein the electronic circuitry is configured to receive the signal and transmit the signal to the remote reception circuitry;
a second electrical contact at the distal end, wherein the second electrical contact is electrically coupled to the sensor and the first electrical contact; and
an electrical lead wire extending through the obturator electrically coupling the second electrical contact with the electronic circuitry.

15. The smart obturator assembly of claim 14, wherein, with the obturator in the first position, the distal end limits fluid communication through the lumen and, with the

obturator in the second position, the distal end provides fluid communication through the lumen.

16. The smart obturator assembly of claim, wherein the collar is configurable in a locked configuration to prevent movement of the obturator within the lumen and in an unlocked configuration to allow movement of the obturator within the lumen.

17. The smart obturator assembly of claim 14, further comprising:
communication circuitry coupled in signal communication with the electronic circuitry for wireless communication with the remote reception circuitry; and
a connection port operatively coupled to the electronic circuitry for connecting the electronic circuitry with the remote reception circuitry.

18. A smart obturator assembly, comprising:
an obturator movably positionable within a lumen of a device, the obturator movable within the lumen between a first position and a second position, the obturator comprising:
a distal end, comprising a tip portion;
a proximal end opposing the distal end;
a body disposed between the tip portion and the proximal end, wherein an outer diameter of the tip portion is greater than an outer diameter of the body; and
a sensor assembly at the tip portion distal end, the sensor assembly configured to sense one or more environmental characteristics within a patient's blood vessel and to generate one or more signals representative of the one or more environmental characteristics;
an electronic circuit board electrically coupled to the sensor, wherein the electronic circuit board is disposed within the tip portion;
a hub forming a central passage, the hub coupled to the device such that the central passage is in fluid communication with the lumen; and
a collar operatively coupled to the hub, the collar comprising electronic circuitry in signal communication with the sensor, the electronic circuitry configured to receive the one or more signals and transmit the one or more signals to remote reception circuitry.

19. The smart obturator assembly of claim 18, wherein the collar further comprises:
communication circuitry coupled in signal communication with the electronic circuitry for wireless communication with remote reception circuitry; and

a connection port operatively coupled to the electronic circuitry for connecting the electronic circuitry with the remote reception circuitry.

20. The smart obturator assembly of claim 18, wherein the device comprises a catheter having a distal end and an opposing proximal end, the catheter forming the lumen extending between the distal end and the proximal end of the catheter.

21. The smart obturator of claim 1, further comprising an electronic circuit board electrically coupled to the sensor, wherein the electronic circuit board is disposed within the tip portion.