CLAIMS

1. An invasive medical device for insertion into a patient, the device comprising:

an elongate shaft having a diameter, an outer surface, a distal tip, and a proximal end, the diameter of the elongate shaft sized to be inserted within an intravenous catheter, at least a portion of the elongate shaft comprising a magnetic feature that includes a permanent magnet, the magnetic feature including a first magnetic region having a first length, vector and a first known magnetic field strength and at a known location at a fixed distance from the distal tip prior to insertion into the patient, the elongate shaft further comprising a discontinuity in the first magnetic region such that the elongate shaft includes an increased diameter region, wherein the discontinuity is selected from the group consisting of a notch in the elongate shaft, a spot weld of magnetic metal, and a drop of magnetic adhesive, and the discontinuity is placed at a known location at a fixed distance from the distal tip such that a first magnetic field of the first magnetic region is detectable by an array of magnetometers to provide a position of the first magnetic region based upon the magnetic field strength and vector of the first magnetic region.

2. The invasive medical device of claim 1, wherein the invasive medical device is selected from a guidewire, a catheter introducer, a stylet and a hypodermic needle.

3. The invasive medical device of claim 2, further comprising intravenous catheter tubing and wherein the elongate shaft is disposed within the intravenous catheter tubing.

4. The invasive medical device of claim 3, wherein the invasive medical device comprises a hypodermic needle.

5. The invasive medical device of claim 4, wherein the discontinuity comprises the magnetic adhesive on the outer surface of the hypodermic needle.

6. The medical device according to claim 5, wherein the adhesive includes an additive selected from a paramagnetic additive, a ferromagnetic additive and combinations thereof.

7. The medical device according to claim 6, wherein the additive includes a component selected from the group consisting of powdered iron, magnetic iron oxide, magnetic titanium oxide, magnetic powdered steel, and a magnetic iron alloy, and mixtures thereof.

8. The medical device according to claim 7, wherein the magnetic iron alloy includes one or more of nickel, zinc, and copper.

9. The medical device according to claim 8, wherein the additive further comprises a component selected from chromium, magnesium, molybdenum and combinations thereof.

10. The invasive medical device of claim 4, wherein the needle comprises martensitic stainless steel.

11. The invasive medical device of claim 4, further comprising a needle subassembly further including a needle hub mounted to the proximal end of the needle, and the intravenous catheter tubing is part of a catheter adapter subassembly.

12. The invasive medical device of claim 11, the catheter adapter subassembly including catheter tubing and a catheter adapter body, wherein the elongate shaft is slidably engaged with the intravenous catheter tubing.

13. The invasive medical device of claim 12, wherein the catheter adapter subassembly further comprises a magnetic feature having north and south poles on axis with the catheter tubing and the needle and a known geometrical relationship to one or more features fixed on the catheter assembly to provide a measurement datum that is measureable by the array of magnetometers.

14. A system for determining relative position of a hypodermic needle comprising the invasive medical device of claim 13 and the array of magnetometers positioned with respect to the first magnetic region and the magnetic feature to measure a position of the distal tip of the hypodermic needle.