What is claimed is:

1. A catheter for fluid delivery through at least two injection needles into tissue outside of the interior wall of a target vessel of a human body, the catheter comprising:

a catheter body having a central axis extending in a longitudinal direction and also having a fluid injection lumen;

at least two needle guiding elements adapted to advance distally and expand outwardly toward the interior wall of the target vessel;

a mechanical support structure in between the expanded needle guiding elements and the central axis, the mechanical support structure adapted to support each expanded needle guiding element in a direction selected from the group consisting of a) radial, in which the mechanical support structure supports each needle guiding element in a radial direction, and b) lateral, in which the mechanical support structure supports each needle guiding element in a lateral direction, wherein the mechanical support structure is a central buttress support located internal to a distal portion of the catheter body, wherein the central buttress support comprises a deflection surface; and

at least two injection needles each having an injection lumen in fluid communication with the fluid injection lumen of the catheter body, the at least two injection needles adapted to be advanced outwardly, guided by the at least two needle guiding elements to penetrate the interior wall of the target vessel, the at least two injection needles having a distal opening for fluid delivery into the tissue outside of the interior wall of the target vessel.

2. The catheter of claim 1, wherein at least one of the needle guiding elements is a guide tube.

3. The catheter of claim 1, wherein the central buttress support is adapted to support outward expansion of the needle guiding elements.

4. The catheter of claim 1, wherein the mechanical support structure is located within a distal portion of the catheter body, the mechanical support structure having a distal opening through which at least one of the needle guiding elements is advanced during outward expansion of the at least two needle guiding elements.

5. The catheter of claim 1, comprising at least three needle guiding elements, at least three injection needles, and at least three injector tubes, with the distal end of each injector tube coupled to one of the injection needles.

6. The catheter of claim 1, wherein the needle guiding elements have a curved distal portion with a first radius of curvature and the injection needles have a curved distal portion with a second radius of curvature, the first radius of curvature and second radius of curvature being preset to within 25 percent of each other.

7. The catheter of claim 1, further comprising a fixed distal guide wire.

8. The catheter of claim 1, wherein the total internal volume or dead space from a proximal part to a distal end of an infusion flow path of the catheter is less than 0.3 ml.

9. The catheter of claim 1, further comprising a radiopaque marker attached to or within a portion of one or more of the structures selected from the group consisting of: a) the injection needle, b) the needle guiding element, c) the catheter body, and d) the mechanical support structure.

10. The catheter of claim 1, wherein the mechanical support structure provides both radial and lateral support for the needle guiding elements as they expand outward.

11. The catheter of claim 1, further comprising a fluid injection port located near a proximal end of the catheter, the fluid injection port having a non-standard connector that is different from any other fitting on a handle of the catheter.

12. The catheter of claim 11, further comprising a custom syringe having a distal end configured to mate with the non-standard connector.

13. The catheter of claim 1, further comprising a control mechanism adapted to control the movement and outward expansion of the at least two needle guiding elements.

14. The catheter of claim 1, further comprising an injection needle control mechanism adapted to control the movement and outward expansion of the at least two injection needles.

15. The catheter of claim 1, wherein the target vessel is a renal artery.

16. The catheter of claim 1, wherein the target vessel is a urethra.

17. The catheter of claim 1, wherein at least one injection needle is a cutting needle.

18. The catheter of claim 1, wherein the deflection surface is a curved ramp.

19. The catheter of claim 18, wherein the deflection surface is a curved ramp which corresponds to the radius of curvature of the distal surface of at least one needle guiding element.

20. The catheter of claim 1, wherein the deflection surface is a linear ramp.