CLAIMS

1. A system for mapping of the functional nerves innervating the wall of a renal vessel, comprising:

a. a first set of electrodes comprising one or more electrodes connected to a first power source for delivering electrical stimulation, said first set of electrodes is adapted for insertion to a distal one-third of the renal vessel adjacent the kidney;

b. a second set of electrodes comprising one or more electrodes connected to a second power source for delivering ablation energy, said second set of electrodes is adapted for insertion to a proximal one-third of the renal vessel further from the kidney;

c. one or more measuring devices for measuring one or more physiological parameters associated with the stimulation of said renal vessel; and

d. a computing device coupled to said one or more measuring devices and is configured for computing any increase or decrease in the physiological parameters against a baseline in response to the stimulation of said renal vessel;

wherein said first set of electrodes and second set of electrodes are spaced apart so that, when said first set of electrodes is placed at the distal one-third of said renal vessel, said second set of electrodes will be located at the proximal one-third of said renal vessel.

2. The system of claim 1, wherein said first set of electrodes is arranged in a configuration to contact said distal one-third of the renal vessel wall at multiple sites, said configuration has a diameter in the range of 3.5mm to 10mm.

3. The system of claim 1, wherein said first or second set of electrodes is arranged in a configuration comprising a spiral having one or more loops.

4. The system of claim 3, wherein said configuration comprises a spiral pyramid with the loops becoming progressively smaller from a proximal end to a distal end.

5. The system of claim 1, wherein said first set of electrodes is located on a catheter comprising a distal end, wherein the distal end of said catheter comprises a tubular structure that houses one or more resilient members with pre-formed curvatures, wherein said first set of electrodes is disposed on said one or more resilient members, said one or more resilient members are attached at their proximal ends to a controlling shaft, wherein movement of said controlling shaft causes said one or more resilient members to be pushed out of said tubular structure to resume the pre-formed curvature or retracted into said tubular structure.

6. The system of claim 5, further comprises a controlling ring that sheaths said one or more resilient members, wherein movement of said controlling ring along said resilient members controls the extend said one or more resilient members resumes its pre-formed curvature.

7. The system of claim 5, further comprises a controlling rod within said controlling shaft, wherein the distal end of said controlling rod is attached to the distal ends of said one or more resilient members, wherein retracting said controlling rod after said one or more resilient members are pushed out of said tubular structure will cause said one or more resilient members to bulge out at their middle.

8. The system of claim 5, wherein said computing device is configured to receive and correlate 3D structure data of said renal vessel.

9. The system of claim 5, wherein said physiological parameters are selected from the group consisting of systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate, level of biochemicals, cardiac electrical activity, muscle activity, skeletal nerve activity, and action potential of cells.

10. The system of claim 9, wherein the physiological parameters include level of biochemicals, said biochemicals is selected from the group consisting of epinephrine, norepinephrine, renin-angiotensin II and vasopressin.

11. The system of claim 5, further comprising a display device for displaying the location or identity of a parasympathetic or sympathetic nerve innervating said renal artery.