of the region, configured to interface with the wall of the lumen, the sensing tip configured to measure electrophysiological activity within the vicinity of the lumen and to convey, to an extracorporeal system, one or more electrophysiological signals associated with the measured physiological activity within the vicinity of the lumen; and

a microcircuit electrically coupled to the sensing tip and positioned so as to provide conditioning of the electrophysiological signals sensed by the sensing tip prior to conveying the electrophysiological signals to the extracorporeal system.

[0007A] In a second aspect there is provided a system for neuromodulating an anatomical site in the vicinity of a lumen, comprising:

- a subsystem configured to perform a surgical procedure on the anatomical site;

- a microsurgical tool in accordance with any preceding claim, configured to monitor electrophysiological activity in the vicinity of the site; and

- a control unit configured to accept signals from the microsurgical tool, and to adjust the surgical procedure dependent upon the signals, to display the signals, to evaluate the surgical procedure dependent upon the signals, to plan a surgical path dependent upon the signals, and/or to determine the extent of the procedure dependent upon the signals.

[0009] In aspects, one or more of the electrophysiological signals may be related to one or more of water concentration, tone, evoked potential, remote stimulation of nervous activity, an electromyographic signal [EMG], a mechanomyographic signal [MMG], a local field potential, an electroacoustic event, vasodialation, vessel wall stiffness, muscle sympathetic nerve activity (MSNA), central sympathetic drive (e.g. bursts per minute, bursts per heartbeat, etc.), tissue tone, nerve traffic (e.g. post ganglionic nerve traffic in the peroneal nerve, celiac ganglion, superior mesenteric ganglion, aorticorenal ganglion, renal ganglion, and/or related nervous system structures), combinations thereof, or the like.

[0010] In aspects, one or more of the sensing tips may include one or more electrodes, a needle electrode, a force sensor, mechanomyographic (MMG) sensing element, a strain sensor, a compliance sensor, a temperature sensor, combinations thereof, or the like each in accordance with the present disclosure. In aspects, one or more

sensing tips may be electrically coupled with a microcircuit, the microcircuit configured to condition the signal.

[0011] In aspects, one or more of the microfingers may be configured so as to substantially embed the sensing tip into the wall of the lumen, to substantially maintain contact with the wall of the lumen while it is swept longitudinally down the lumen and/or circumferentially around the lumen, to substantially maintain a constant force against the wall of the lumen during relative movement there between, to substantially electrically isolate the sensing tip from a cavity of the lumen, to plunge the electrode (particularly a needle electrode) into the wall of the lumen upon deployment, combinations thereof, and the like.

[0012] In aspects, the microfinger may include an active material element in accordance with the present disclosure, configured to alter the contact force between the region or the sensing tip, and the wall upon receipt of a control signal.

~~WHAT IS CLAIMED IS:~~

~~1. A microsurgical tool for monitoring electrophysiological activity within the vicinity of a lumen, the microsurgical tool comprising:~~

~~a microfinger having a substantially elongate structure configured so as to bias a region thereof against a wall of the lumen upon deployment within the lumen; and~~

~~a sensing tip electrically and mechanically coupled to the microfinger in the vicinity of the region, configured to interface with the wall of the lumen, the sensing tip configured to convey one or more electrophysiological signals associated with the activity.~~

~~2. The microsurgical tool in accordance with claim 1, wherein the electrophysiological signals are related to one or more of water concentration, tone, evoked potential, remote stimulation of nervous activity, an electromyographic signal [EMG], a mechanomyographic signal [MMG], a local field potential, an electroacoustic event, vasodialation, vessel wall stiffness, muscle sympathetic nerve activity [MSNA], central sympathetic drive, tissue tone, nerve traffic~~

~~3. The microsurgical tool in accordance with claim 1 or 2, wherein the sensing tip comprises one or more electrodes.~~

~~4. The microsurgical tool in accordance with any preceding claim, wherein the sensing tip is electrically coupled with a microcircuit, the microcircuit configured to condition the signal.~~

~~5. The microsurgical tool in accordance with claim 4, wherein the microcircuit is embedded into the microsurgical tool and at least a portion of the electrical coupling is provided via the microfinger.~~

~~6. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially embed the sensing tip into the wall of the lumen.~~

~~7. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially maintain contact with the wall of the lumen while it is swept longitudinally down the lumen and/or circumferentially around the lumen.~~

~~8. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially maintain a constant force against the wall of the lumen during relative movement there between.~~

~~9. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially electrically isolate the sensing tip from a cavity of the lumen.~~

~~10. The microsurgical tool in accordance with any preceding claim, wherein the microfinger has a characteristic width of less than 150um, less than 100um, less than 75um, less than 50um, less than 25um, less than 10um, less than 5um.~~

~~11. The microsurgical tool in accordance with any preceding claim comprising a plurality of microfingers, each microfinger configured so as to substantially independently bias against the wall of the lumen upon deployment.~~

~~12. The microsurgical tool in accordance with claim 11, wherein a plurality of microfingers are configured to form a cage, a mesh, or a stent-like structure.~~

~~13. The microsurgical tool in accordance with any preceding claim, wherein the sensing tip comprises a needle electrode, the microfinger configured to plunge the needle electrode into the wall of the lumen upon deployment.~~

~~14. A system for neuromodulating an anatomical site in the vicinity of a lumen, comprising:~~

~~a subsystem configured to perform a surgical procedure on the anatomical site;~~

~~a microsurgical tool in accordance with any preceding claim , configured to monitor electrophysiological activity in the vicinity of the site; and~~

~~a control unit configured to accept signals from the microsurgical tool, and to adjust the surgical procedure dependent upon the signals, to display the signals, to evaluate the surgical procedure dependent upon the signals, to plan a surgical path dependent upon the signals, and/or to determine the extent of the procedure dependent upon the signals.~~

~~15. The system in accordance with claim 14, wherein the surgical procedure is selected from the group consisting of an ablation, an excision, a cut, a burn, a radio frequency ablation, radiosurgery, an ultrasonic ablation, an abrasion, a biopsy, and delivery of a substance.~~

~~16. The system in accordance with claim 14 or 15, comprising a stimulation and/or ablation electrode configured so as to convey a pulsatile and/or radio frequency signal to the anatomical site from the control unit, the microsurgical tool configured to convey one or more feedback signals related to the pulsatile and/or radio frequency signals back to the control unit.~~

~~17. The system in accordance with claim 16, wherein the feedback signals are related to an electrode impedance, a bioimpedance, a local electrical field, or an electrophysiological response to the pulsatile and/or radio frequency signal.~~

~~18. The system in accordance with any one of claims 14-17, wherein the stimulation and/or ablation electrode is comprised within the microsurgical tool.~~

~~19. The system in accordance with claim 18, wherein the stimulation and/or ablation electrode is comprised within the sensing tip.~~

~~20. A method for determining an afferent electrophysiological activity and an efferent physiological activity in the vicinity of a lumen, comprising:~~

~~monitoring electrophysiological activity at a plurality of sites within the vicinity of the lumen in regions proximal and distal to a target region as measured along a length of the lumen;~~

~~applying energy to a site within the target region to form a neurological block thereby; and~~

~~extracting an afferent signal from activity in the distal region and an efferent signal from activity in the proximal region.~~

~~21. The method in accordance with claim 20, comprising comparing activity measured in the proximal region and the distal region to determine if the energy application affected the electrophysiological activity in the vicinity of the target region.~~

~~22. The method in accordance with claim 21, comprising evaluating the coherence between activities measured in the proximal region and the distal region.~~

~~23. The method in accordance with claim 22, comprising using the coherence to evaluate the extent of the neural block.~~

~~24. The method in accordance with any one of claims 20 – 23, wherein the application of energy is sufficient to form a temporary neuroblock.~~

~~25. The method in accordance with claim 24, comprising comparing activities from the proximal region and the distal region during the temporary neuroblock and diagnosing a neurological condition, evaluating a neurological state, or determining if a permanent surgical procedure is required.~~

WHAT IS CLAIMED IS:

1. A microsurgical tool for monitoring electrophysiological activity within the vicinity of a lumen, the microsurgical tool comprising:

- a microfinger having a substantially elongate structure configured so as to bias a region thereof against a wall of the lumen upon deployment within the lumen;

- a sensing tip electrically and mechanically coupled to the microfinger in the vicinity of the region, configured to interface with the wall of the lumen, the sensing tip being configured:

to measure electrophysiological activity within the vicinity of the lumen; and

to convey, to an extracorporeal system, one or more electrophysiological signals associated with the measured physiological activity within the vicinity of the lumen; and

a microcircuit electrically coupled to the sensing tip and positioned so as to provide conditioning of the electrophysiological signals sensed by the sensing tip prior to conveying the electrophysiological signals to the extracorporeal system.

2. The microsurgical tool in accordance with claim 1, wherein the electrophysiological signals are related to one or more of water concentration, tone, evoked potential, remote stimulation of nervous activity, an electromyographic signal [EMG], a mechanomyographic signal [MMG], a local field potential, an electroacoustic event, vasodialation, vessel wall stiffness, muscle sympathetic nerve activity [MSNA], central sympathetic drive, tissue tone, nerve traffic.

3. The microsurgical tool in accordance with claim 1 or 2, wherein the sensing tip comprises one or more electrodes.

4. The microsurgical tool in accordance with any preceding claim, wherein the microcircuit is configured to condition the electrophysiological signals conveyed to the

extracorporeal system, wherein conditioning the electrophysiological signals comprises at least one of:

converting the electrophysiological signals into digital forms; and

amplifying the electrophysiological signals.

5. The microsurgical tool in accordance with claim 4, wherein the microcircuit is embedded into the substantially elongate structure of the microfinger.

6. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially embed the sensing tip into the wall of the lumen.

7. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially maintain contact with the wall of the lumen while it is swept longitudinally down the lumen and/or circumferentially around the lumen.

8. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially maintain a constant force against the wall of the lumen during relative movement there between.

9. The microsurgical tool in accordance with any preceding claim, wherein the microfinger is configured so as to substantially electrically isolate the sensing tip from a cavity of the lumen.

10. The microsurgical tool in accordance with any preceding claim, wherein the microfinger has a characteristic width of less than 150um, less than 100um, less than 75um, less than 50um, less than 25um, less than 10um, less than 5um.

11. The microsurgical tool in accordance with any preceding claim comprising a plurality of microfingers, each microfinger configured so as to substantially independently bias against the wall of the lumen upon deployment.

12. The microsurgical tool in accordance with claim 1, wherein a plurality of microfingers are configured to form a cage, a mesh, or a stent-like structure.

13. The microsurgical tool in accordance with any preceding claim, wherein the sensing tip comprises a needle electrode, the microfinger configured to plunge the needle electrode into the wall of the lumen upon deployment.

14. A system for neuromodulating an anatomical site in the vicinity of a lumen, comprising:

- a subsystem configured to perform a surgical procedure on the anatomical site;

- a microsurgical tool in accordance with any preceding claim, configured to monitor electrophysiological activity in the vicinity of the site; and

- a control unit configured to accept signals from the microsurgical tool, and to adjust the surgical procedure dependent upon the signals, to display the signals, to evaluate the surgical procedure dependent upon the signals, to plan a surgical path dependent upon the signals, and/or to determine the extent of the procedure dependent upon the signals.

15. The system in accordance with claim 14, wherein the surgical procedure is selected from the group consisting of an ablation, an excision, a cut, a burn, a radio frequency ablation, radiosurgery, an ultrasonic ablation, an abrasion, a biopsy, and delivery of a substance.

16. The system in accordance with claim 14 or 15, comprising a stimulation and/or ablation electrode configured so as to convey a pulsatile and/or radio frequency signal to the anatomical site from the control unit, the microsurgical tool configured to

convey one or more feedback signals related to the pulsatile and/or radio frequency signals back to the control unit.

17. The system in accordance with claim 16, wherein the feedback signals are related to an electrode impedance, a bioimpedance, a local electrical field, or an electrophysiological response to the pulsatile and/or radio frequency signal.

18. The system in accordance with any one of claims 14-17, wherein the stimulation and/or ablation electrode is comprised within the microsurgical tool.

19. The system in accordance with claim 18, wherein the stimulation and/or ablation electrode is comprised within the sensing tip.

20. A method for determining an afferent electrophysiological activity and an efferent physiological activity in the vicinity of a lumen, comprising:

- monitoring electrophysiological activity at a plurality of sites within the vicinity of the lumen in regions proximal and distal to a target region as measured along a length of the lumen;

- applying energy to a site within the target region to form a neurological block thereby; and

- extracting an afferent signal from activity in the distal region and an efferent signal from activity in the proximal region;

wherein monitoring the electrophysiological activity at the plurality of sites within the vicinity of the lumen comprises:

measuring the electrophysiological activity at the plurality of sites within the vicinity of the lumen; and

conveying, to an extracorporeal system, one or more electrophysiological signals associated with the measured physiological activity at the plurality of sites within the vicinity of the lumen; and

wherein the electrophysiological signals are conditioned prior to conveying the electrophysiological signals to the extracorporeal system.

21. The method in accordance with claim 20, comprising comparing activity measured in the proximal region and the distal region to determine if the energy application affected the electrophysiological activity in the vicinity of the target region.

22. The method in accordance with claim 21, comprising evaluating the coherence between activities measured in the proximal region and the distal region.

23. The method in accordance with claim 22, comprising using the coherence to evaluate the extent of the neural block.

24. The method in accordance with any one of claims 19-22, wherein the application of energy is sufficient to form a temporary neuroblock.

25. The method in accordance with claim 24, comprising comparing activities from the proximal region and the distal region during the temporary neuroblock and diagnosing a neurological condition, evaluating a neurological state, or determining if a permanent surgical procedure is required.