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. The microcircuit is embedded into the substantially elongate structure of the microfinger.

[~~0007A~~0008A] 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

[0020] In aspects, the system may include 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. In aspects, the feedback signals may be related to an electrode impedance, a bioimpedance, a local electrical field, or an electrophysiological response to the pulsatile and/or radio frequency signal.

[0021] In aspects, the stimulation and/or ablation electrode may be included within the microsurgical tool, coupled to a microfinger, included in a sensing tip, or the like.

[0022] In aspects, the control unit may be configured to sweep one or more of the sensing tips along the lumen wall, to use one or more of the electrophysiological signals to locate the anatomical site, to use one or more of the electrophysiological signals to exclude the anatomical site from a surgical procedure, combinations thereof, or the like.

[0023] According to aspects there is provided, a method for determining an afferent electrophysiological activity and an efferent physiological activity in the vicinity of a lumen, including 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. Monitoring the electrophysiological activity at the plurality of sites within the vicinity of the lumen includes 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. The electrophysiological signals are conditioned prior to conveying the electrophysiological signals to the extracorporeal system using one or more microcircuits embedded into one or more substantially elongate structures of one or more microfingers biased against the wall of the lumen.

[0024] In aspects, the method may include 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. In aspects, the method may include evaluating the coherence between activities measured in the proximal region and the distal region and/or using the coherence to evaluate the extent of the neural block.

[0025] In aspects, the application of energy may be sufficient to form a temporary neuroblock (i.e. just sufficient to form a temporary block, controlled so as to form a temporary block, etc.). In aspects, the method may include comparing activities from the proximal region and the distal region during the temporary neuroblock and diagnosing a

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;

wherein the microcircuit is embedded into the substantially elongate structure of the microfinger.

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~~5. 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~~6. 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~~7. 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~~8. 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~~9. 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~~10. 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~~11. 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~~12. 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~~13. 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~~14. The system in accordance with claim ~~14~~13, 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~~15. The system in accordance with claim ~~14~~13 or ~~15~~14, 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~~16. The system in accordance with claim ~~16~~15, 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~~17. The system in accordance with any one of claims ~~14~~13-~~17~~16, wherein the stimulation and/or ablation electrode is comprised within the microsurgical tool.

~~19~~18. The system in accordance with claim ~~18~~17, wherein the stimulation and/or ablation electrode is comprised within the sensing tip.

~~20~~19. 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 using one or more microcircuits embedded into one or more substantially elongate structures of one or more microfingers biased against the wall of the lumen.

~~21~~20. The method in accordance with claim ~~20~~19, 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~~21. The method in accordance with claim ~~21~~20, comprising evaluating the coherence between activities measured in the proximal region and the distal region.

~~23~~22. The method in accordance with claim ~~22~~21, comprising using the coherence to evaluate the extent of the neural block.

~~24~~23. The method in accordance with any one of claims ~~19~~18-~~22~~21, wherein the application of energy is sufficient to form a temporary neuroblock.

~~25~~24. The method in accordance with claim ~~24~~23, 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.