

SYSTEM AND METHOD FOR TREATING A GASTROINTESTINAL TRACT OF A
SUBJECT

BACKGROUND

5 Wounds in the gastrointestinal tract such as perforations and post-surgical leaks, and particularly in the esophagus, are common in endoscopic and open surgical procedures. The endoluminal location of these wounds and natural wet environment surrounding the wounds make these wounds particularly difficult to treat. Limited treatment options exist for these wounds which have significant morbidity and mortality rates or involve extensive hospital stay.

10 Vacuum assisted closure (VAC) therapy can increase the rate of wound closure. Negative pressure wound therapy (NPWT) or VAC therapy is the application of sub-atmospheric pressure to acute or chronic wounds to promote the healing of a wound. In theory, creating a negative-pressure in the local wound environment, draws away bacteria, exudate, fluid, and debris tissue from the wound site, increases the rate of healing by promoting blood flow and facilitates localized
15 cell migration and proliferation.

 There is a need for improved techniques and devices for assisting in healing of wounds in the GI tract, and particularly in the esophagus, by applying negative pressure to the vicinity of the wounds.

20 **SUMMARY**

 Various applications herein relate to medical systems and methods for removal of liquid from a target area in the GI tract, for example to assist in healing of an extraluminal or endoluminal wounds.

 There is provided in accordance with an embodiment of the disclosed technology a medical
25 system for applying negative pressure within a gastrointestinal tract of a subject, the system including:

 an elongate tube defining:

 at least one interior channel along at least a longitudinal portion of the elongate
tube;

30 a plurality of orifices in fluid communication with the at least one interior channel;
and

at least one exterior channel extending longitudinally along an exterior surface of the elongate tube, at least one of the at least one exterior channel being in fluid communication with the at least one interior channel via at least one of the plurality of orifices,

5 the elongate tube having a delivery state, and a first operative state in which the elongate tube forms a coil including a plurality of loops; and

a fluid-tight lumen in fluid communication with an end of the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the elongate tube,

10 wherein, in the first operative state of the elongate tube, a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.

In some embodiments, the at least one interior channel includes a first interior channel adapted for drainage of a fluid from the gastrointestinal tract, via the at least one exterior channel and the plurality of orifices, when negative pressure is applied to the elongate tube.

15 In some embodiments, the elongate tube includes a shape memory material, an elastic material, or a super-elastic material adapted to form the coil in the first operative state.

In some embodiments, the elongate tube has a textured exterior surface adapted to frictionally engage an interior surface of the gastrointestinal tract.

In some embodiments, the at least one exterior channel includes a plurality of exterior
20 channels forming troughs on the exterior surface of the elongate tube and extending longitudinally therealong.

In some embodiments, the plurality of orifices are disposed about a single circumference of the elongate tube.

In some embodiments, the at least one exterior channel extends longitudinally along the
25 exterior surface of the elongate tube between the orifices and a distal end of the elongate tube.

In some embodiments, the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

In some embodiments, orifices in a first subset of the plurality of orifices have a first diameter, and orifices in a second subset of the plurality of orifices have a second diameter, the
30 second diameter being different from the first diameter.

In some embodiments, in the first operative state, at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.

In some embodiments, in the first operative state, at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.

5 In some embodiments, in the first operative state of the elongate tube, at least one of the plurality of loops has a sinusoidal structure.

10 In some embodiments, the medical system further includes a linearizing element. In some embodiments, the elongate tube has the delivery state, which is a linear state, when associated with the linearizing element, and the first operative state, in which the elongate tube forms the coil, when dissociated from the linearizing element.

In some embodiments, the fluid-tight lumen, and the elongate tube in the delivery state, are sized and configured to pass through a working channel of a delivery device, wherein the working channel has a diameter smaller than 5 mm.

15 In some embodiments, the delivery state of the elongate tube is a coiled state, and the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject disposed about the exterior of a delivery device.

There is provided in accordance with an embodiment of the disclosed technology a medical system for applying negative pressure within a gastrointestinal tract of a subject, the system including:

20 an elongate tube defining at least one channel along at least a longitudinal portion thereof and including a plurality of orifices in fluid communication with the at least one channel the elongate tube having a delivery state and a first operative state in which the elongate tube forms a coil including a plurality of loops, at least some of the plurality of loops having a sinusoidal structure; and

25 a fluid-tight lumen in fluid communication with an end of the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the at least one channel via the end of the elongate tube,

wherein in the first operative state of the elongate tube, a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.

In some embodiments, the at least one channel is adapted for drainage of a fluid from the gastrointestinal tract, via the plurality of orifices, when negative pressure is applied to the elongate tube.

5 In some embodiments, the elongate tube includes a shape memory material, an elastic material, or a super-elastic material adapted to form the coil in the first operative state.

In some embodiments, the elongate tube has a textured exterior surface adapted to frictionally engage an interior surface of the gastrointestinal tract.

In some embodiments, the plurality of orifices are disposed about a single circumference of the elongate tube.

10 In some embodiments, the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

In some embodiments, orifices in a first subset of the plurality of orifices have a first diameter, and orifices in a second subset of the plurality of orifices have a second diameter, the second diameter being different from the first diameter.

15 In some embodiments, in the first operative state, at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.

In some embodiments, in the first operative state, at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.

20 In some embodiments, the medical system further includes a linearizing element. In some embodiments, the elongate tube has the delivery state, which is a linear state, when associated with the linearizing element, and the first operative state, in which the elongate tube forms the coil, when dissociated from the linearizing element.

25 In some embodiments, the fluid-tight lumen, and the elongate tube in the delivery state, are sized and configured to pass through a working channel of a delivery device, wherein the working channel has a diameter smaller than 5 mm.

In some embodiments, the delivery state of the elongate tube is a coiled state, and the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject disposed about the exterior of a delivery device.

30 There is provided in accordance with an embodiment of the disclosed technology a medical system for applying negative pressure within a gastrointestinal tract of a subject, the medical system including:

an elongate tube defining at least one channel along at least a longitudinal portion thereof and including a plurality of orifices in fluid communication with the at least one channel, the elongate tube including:

a coil portion forming a coil having a plurality of loops; and

5 a linear portion extending through a longitudinal center of the coil portion; and

a fluid-tight lumen in fluid communication with the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the coil portion of the elongate tube,

10 wherein the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject with the coil portion disposed about the exterior of a delivery device and the linear portion extending through the interior of the delivery device,

wherein a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.

15 In some embodiments, the fluid tight lumen is in fluid communication with an end of the linear portion of the elongate tube, and is adapted to deliver the negative pressure to the coil portion of the elongate tube via the linear portion of the elongate tube.

In some embodiments, the at least one channel of the elongate tube includes:

at least one interior channel along at least a longitudinal portion of the elongate tube; and

20 at least one exterior channel extending longitudinally along an exterior surface of the elongate tube, at least one of the at least one exterior channel being in fluid communication with the at least one interior channel via at least one of the plurality of orifices.

In some embodiments, the at least channel is adapted for drainage of a fluid from the gastrointestinal tract via the plurality of orifices, when negative pressure is applied to the elongate tube.

25 In some embodiments, at least the coil portion of the elongate tube has a textured exterior surface, adapted to frictionally engage an interior surface of the gastrointestinal tract.

In some embodiments, the plurality of orifices are disposed about a single circumference of the elongate tube.

30 In some embodiments, the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

In some embodiments, orifices in a first subset of the plurality of orifices have a first diameter, and orifices in a second subset of the plurality of orifices have a second diameter, the second diameter being different from the first diameter.

In some embodiments, at least some of the plurality of orifices are oriented outwardly,
5 away from a center of the coil.

In some embodiments, at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.

In some embodiments, in the first operative state of the elongate tube, each of the plurality of loops has an at least partially sinusoidal structure.

10 There is provided, in accordance with some applications, a medical system for applying negative pressure within a gastrointestinal tract of a subject. The system includes an elongate tube defining at least one channel along at least a longitudinal portion thereof. The elongate tube includes a plurality of orifices, in fluid communication with the at least one channel. The elongate tube has a delivery state and a first operative state in which the elongate tube forms a coil including
15 a plurality of loops. The medical system further includes a fluid-tight lumen in fluid communication with an end of the elongate tube. The fluid-tight lumen is adapted to couple to a source of negative pressure and to deliver negative pressure to the elongate tube, via the end of the elongate tube. In the first operative state of the elongate tube, a length of the coil is at least 15mm or the plurality of loops includes at least 3 loops.

20 In some embodiments, the at least one channel extends longitudinally along an exterior surface of the elongate tube, for example between the orifices and/or between the orifices an end of the elongate tube. In some embodiments, the end may be the distal end of the tube, and in some embodiments the end may be the proximal end of the tube.

In some embodiments, the at least one channel extends longitudinally through the interior
25 of the elongate tube. In some embodiments, the at least one channel extends longitudinally through the interior of the entire elongate tube.

In some embodiments, the elongate tube is formed of a porous material.

In some embodiments, the elongate tube has antimicrobial or anti-inflammatory properties. In some embodiments, the elongate tube includes an antimicrobial or anti-inflammatory material.

30 In some embodiments, the elongate tube is pretreated or coated with at least one antimicrobial or anti-inflammatory agent.

In some embodiments, the gastrointestinal tract of the subject has an endoluminal wound, and the elongate tube is adapted to deliver to the vicinity of the endoluminal wound an antimicrobial or anti-inflammatory medicament for treatment of the endoluminal wound.

5 In some embodiments, the elongate tube has a textured exterior surface. In some embodiments, the textured exterior surface is adapted to frictionally engage an interior surface of the gastrointestinal tract.

In some embodiments, at least a portion of the elongate tube is detachable from the fluid-tight lumen. In some embodiments, the at least a portion of the elongate tube is formed from a biocompatible material and is adapted to be naturally excreted from the body of the subject
10 following detachment from the fluid-tight lumen. In some other embodiments, the at least a portion of the elongate tube is formed from a biodegradable material, and is adapted to be degraded or decomposed, within the body of the subject, following detachment from the fluid-tight lumen.

In some embodiments, the at least one channel includes a first channel adapted for drainage of a fluid from the gastrointestinal tract, via the plurality of orifices, when negative pressure is
15 applied to the elongate tube. In some embodiments, the first channel adapted for drainage of a fluid from the gastrointestinal tract, is further adapted to delivery fluid (e.g., flushing fluid containing a contrast material) to the gastrointestinal tract via the plurality of orifices.

In some embodiments, the at least one channel includes a second channel adapted for flushing a portion of the gastrointestinal tract, by supplying a flushing fluid into the gastrointestinal
20 tract via the elongate tube and via at least some of the orifices.

In some embodiments, the fluid-tight lumen and the elongate tube are substantially concentric.

In some embodiments, the elongate tube includes a shape memory material, an elastic material, or a super-elastic material adapted to form the coil in the first operative state. Examples
25 of the elastic material, super elastic material or shape memory material include for example a shape memory alloy, a spring alloy, a polymer or nitinol. In some embodiments, the elongate tube consists essentially of an elastic material, super elastic material or shape memory material.

In some embodiments, the elongate tube further includes a plurality of channels forming troughs on an exterior surface of the elongate tube and extending longitudinally therealong, each
30 of the plurality of troughs being in fluid communication with the at least one channel via at least one of the orifices. In some embodiments, negative pressure delivered to the orifices via the fluid-

tight lumen results in negative pressure in the plurality of troughs draining fluid from the plurality of troughs, via the orifices, into the at least one channel of the elongate tube.

In some embodiments, the plurality of orifices are disposed about a single circumference of the elongate tube.

5 In some embodiments, the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

In some embodiments, the plurality of orifices are equidistantly distributed along or about the elongate tube. In some other embodiments, the orifices are heterogeneously distributed along or about the elongate tube.

10 In some embodiments, each of the plurality of orifices has substantially the same diameter. In some other embodiments, orifices in a first subset of said plurality of orifices have a first diameter, and orifices in a second subset of said plurality of orifices have a second diameter, the second diameter being different from the first diameter.

In some embodiments, in the first operative state, at least some of the plurality of orifices
15 are oriented inwardly, toward a center of the coil. In some embodiments, in the first operative state, at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.

In some embodiments, in the first operative state, the coil is substantially devoid of orifices oriented outwardly, away from a center of the coil.

In some embodiments, the plurality of loops includes at least two loops having substantially
20 the same diameter. In some embodiments, the at least two loops include a proximal-most loop and a distal-most loop of the plurality of loops.

In some embodiments, the diameter of one of the plurality of loops other than the proximal-most loop and the distal-most loop is not greater than the diameter of the proximal-most loop. In some embodiments, the diameter of one of the plurality of loops other than the proximal-most loop
25 and the distal-most loop is not smaller than the diameter of the proximal-most loop.

In some embodiments, the at least two loops having substantially the same diameter includes a first loop and a second loop, and wherein a distance between the first loop and the second loop, along a longitudinal axis of the coil, is greater than 10mm.

In some embodiments, in the first operative state of the elongate tube, the plurality of loops
30 includes at least 4 loops. In some embodiments, in the first operative state of the elongate tube, the plurality of loops includes at least 5 loops. In some embodiments, in the first operative state of the

elongate tube, the plurality of loops includes at least 8 loops. In some embodiments, in the first operative state of the elongate tube, the plurality of loops includes at least 10 loops.

In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 4 to 25. In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 5 to 25. In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 4 to 15. In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 5 to 15. In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 5 to 12. In some embodiments, in the first operative state of the elongate tube, a number of loops in the plurality of loops is within a range of 8 to 12.

In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 0.5cm to 5cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 1cm to 5cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 0.5cm to 4cm. In some embodiments, in the first operative state of the elongate tube, a diameter of coil is in a range of 1cm to 4cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 2.0 cm to 4.0cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 0.5cm to 3cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 1cm to 3cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 0.5cm to 3cm. In some embodiments, in the first operative state of the elongate tube, a diameter of coil is in a range of 1cm to 3cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 2 cm to 3cm. In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is in a range of 2.5cm to 3.5cm.

In some embodiments, in the first operative state of the elongate tube, a diameter of the coil is not greater than 1.5cm.

In some embodiments, in the first operative state of the elongate tube, each of the plurality of loops has an at least partially sinusoidal structure.

In some embodiments, when the elongate tube is in the first operative state and negative pressure is applied to the elongate tube, the plurality of loops form a stack.

In some embodiments, in the first operative state of the elongate tube, a length of the coil is at least 15mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at least 20mm.

5 In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 200mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 150mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 100mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 80mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 70mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 60mm. In some embodiments, in the first operative state of the elongate tube, a length of the coil is at most 50mm.

15 In some embodiments, in the first operative state, a pitch of the coil is in a range of 2.5mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 5mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 40mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 30mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 20mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 3mm to 15mm.

In some embodiments, at least one characteristic of the coil is configurable by making a change to a condition in an environment surrounding the coil. In some embodiments, the at least one characteristic includes a chemical characteristic or a mechanical characteristic of the coil. In some embodiments, the condition includes a temperature.

25 In some embodiments, the medical system further includes a linearizing element, wherein the elongate tube is in the delivery state when associated with the linearizing element and obtains the first operative state when dissociated from the linearizing element. In some embodiments, the linearizing element is adapted to be removed from the gastrointestinal tract of the subject following delivery of the elongate tube.

30 In some embodiments, in the delivery state, the elongate tube is substantially linear.

In some embodiments, the linearizing element is a tubular sheath defining a lumen, and wherein the elongate tube is adapted to be delivered into the gastrointestinal tract within the lumen of the tubular sheath. In some embodiments, the elongate tube is adapted to be removed from the gastrointestinal tract via the lumen of the tubular sheath, and to assume the delivery state during the removal.

In some embodiments, the elongate tube is adapted to form the coil sequentially as segments of the elongate tube are pushed distally out of the tubular sheath, from the distal loop to the proximal loop.

In some embodiments, during removal of the elongate tube from the gastrointestinal tract, each of the loops of the coil is adapted to transform into a substantially linear segment, sequentially, from the proximal loop to the distal loop.

In some embodiments, a distal end of the tubular sheath includes a pointed shape.

In some embodiments, the linearizing element is a first wire, and the elongate tube is adapted to be delivered into the gastrointestinal tract with the first wire extended internally therethrough. In some embodiments, the first wire is a guidewire. In some embodiments, the medical system further includes a second wire, the second wire being a guidewire.

In some embodiments, the elongate tube includes a first channel in fluid communication with the fluid-tight lumen and a second channel.

In some embodiments, the elongate tube is adapted to form the coil sequentially, as the wire is retracted proximally out of the elongate tube, from the distal loop to the proximal loop.

In some embodiments, the linearizing element terminates in a shoulder at an end thereof, the shoulder adapted to control a direction of the longitudinal axis of the coil.

In some embodiments, the medical system further includes a handle portion mechanically couplable to a second end of the fluid tight lumen, far from the elongate tube, such that manipulation of the handle portion results in distal motion of the elongate tube. In some embodiments, the manipulation includes pushing or turning of the handle portion.

In some embodiments, the handle portion is adapted to be detached from the fluid tight lumen following delivery of the elongate tube into the gastrointestinal tract.

In some embodiments, the manipulation of the handle portion causes the elongate tube to transition from the delivery state to the first operative state. In some embodiments, the transition

is sequential, such that each of the plurality of loops is adapted to form as the elongate tube is delivered into the gastrointestinal tract, sequentially from the distal loop to the proximal loop.

In some embodiments, the fluid-tight lumen, and the elongate tube in the delivery state, are sized and configured to pass through a working channel of a delivery device. In some
5 embodiments, a working channel has a largest cross-sectional diameter of less than 5 mm. In some embodiments, a working channel has a largest cross-sectional diameter of 4 mm. In some embodiments, a working channel has a largest cross-sectional diameter of 3.5 mm. In some embodiments, an external delivery sheath, adapted to be disposed above the elongate tube during delivery thereof, is sized and configured to pass through the working channel of the delivery
10 device.

In some embodiments, the elongate tube and the fluid tight lumen are adapted to be mechanically attached to an exterior of a delivery device during delivery into the gastrointestinal tract, and to be detached from the delivery device when the elongate tube is positioned within the gastrointestinal tract. In some embodiments, in the delivery state, the elongate tube is coiled about
15 the exterior of the delivery device.

In some embodiments, the delivery device includes a catheter or an endoscope.

In some embodiments, the delivery device further includes an image capturing element, adapted to provide images of the elongate tube during delivery thereof into the gastrointestinal tract.

20 In some embodiments, the medical system further includes the delivery device.

In some embodiments, the medical system further includes the source of negative pressure functionally associated with the fluid-tight lumen, the source of negative pressure being adapted to apply a negative pressure to the elongate tube.

In some embodiments, the source of negative pressure includes a controller adapted to
25 regulate the negative pressure provided by the source of negative pressure, within a pressure range, to remove fluid from the vicinity of at least a portion of the internal surface of the gastrointestinal tract.

In some embodiments, the elongate tube is adapted to deliver negative pressure to a portion of the gastrointestinal tract including an internal wound including, for example, a fistula, and
30 wherein the controller is adapted to regulate the negative pressure for removal of fluid from the

vicinity of an internal surface of the body conduit including the internal wound including for example, a fistula.

In some embodiments, the medical system further includes at least one sensor adapted to sense at least one characteristic of the fluid removed from the vicinity of the at least a portion of the gastrointestinal tract, and wherein the controller is adapted to adjust one or more operating parameters of the source of negative pressure in response to input received from the at least one sensor, the information relating to the at least one characteristic of the fluid.

In some embodiments, the medical system further includes a fluid source functionally associated with the fluid-tight lumen, and adapted to provide fluid to the elongate tube, via the fluid tight lumen, for flushing the vicinity of the orifices.

There is provided, in accordance with some applications, a method of applying negative pressure to a portion of the gastrointestinal tract of a subject, the method including: (a) placing within the gastrointestinal tract of the subject an elongate tube defining at least one channel along at least a longitudinal portion thereof and having a plurality of orifices in fluid communication with the at least one channel, the elongate tube forming a coil including a plurality of loops, an end of the elongate tube being in fluid communication with a first end of a fluid-tight lumen, wherein, within the gastrointestinal tract; (b) coupling a second end of the fluid-tight lumen to a source of negative pressure; and (c) while the elongate tube is in the form of the coil within the gastrointestinal tract, applying negative pressure to the gastrointestinal tract via the elongate tube and the fluid-tight lumen.

In some embodiments, a length of the coil is at least 15mm or the plurality of loops includes at least four loops.

In some embodiments, placing includes delivering the elongate tube into the gastrointestinal tract of the subject in a delivery state.

In some embodiments, delivering includes delivering the elongate tube when the elongate tube is substantially linear, and wherein the placing further includes forming the coil within the gastrointestinal tract of the subject.

In some embodiments, the elongate tube includes a shape memory material, delivering includes delivering the elongate tube in association with a linearizing element, the linearizing element maintaining the substantially linear state of the elongate tube during the delivery, and forming includes dissociating the linearizing element from the elongate tube.

In some embodiments, delivering includes delivering the elongate tube within a tubular sheath, and the forming includes advancing the elongate element distally out of the tubular sheath.

In some embodiments, delivering includes advancing a linearizing wire into the elongate tube and delivering the elongate tube together with the linearizing wire, and the forming includes
5 retracting the linearizing wire proximally relative to the elongate tube.

In some embodiments, forming includes forming the plurality of loops sequentially, from the distal loop to the proximal loop.

In some embodiments, delivering and forming include manipulating a handle portion mechanically coupled to the second end of the fluid tight lumen, which manipulation of the handle
10 portion results in distal motion of the elongate tube. In some embodiments, manipulating includes pushing or turning of the handle portion.

In some embodiments, the method further includes detaching the handle portion from the fluid tight lumen following the delivering and prior to the coupling of the fluid-tight lumen to the source of negative pressure.

15 In some embodiments, manipulating of the handle portion causes the elongate tube to transition from a linear configuration into the coil.

In some embodiments, delivering includes advancing the elongate tube through a working channel of a delivery device.

In some embodiments, placing includes mechanically attaching the elongate tube to an exterior of a delivery device, advancing the delivery device, together with the elongate tube, into
20 the lumen of the human body, and when the elongate tube is positioned in the vicinity of the wound (for example, a fistula) within the lumen, detaching the elongate tube from the delivery device. In some embodiments, mechanically attaching includes forming the coil about the exterior of the delivery device, the method further including retracting the delivery device from the
25 gastrointestinal tract, thereby to leave the coil placed in the gastrointestinal tract.

In some embodiments, during the delivering, the elongate tube is mechanically associated with an imaging device, the method further including imaging the elongate tube during advancing of the elongate tube into the gastrointestinal tract.

In some embodiments, applying negative pressure includes using a controller, regulating
30 the negative pressure applied to the portion of the gastrointestinal tract for removal of fluid from the portion of the gastrointestinal tract.

In some embodiments, the method further includes receiving from at least one sensor input relating to at least one characteristic of the fluid removed from the gastrointestinal tract and in response to the received input, using the controller, adjusting one or more operating parameters of the source of negative pressure.

5 In some embodiments, the portion of the gastrointestinal tract includes an endoluminal wound for example a fistula in the gastrointestinal tract, and the applying negative pressure removes fluid from the vicinity of the endoluminal wound for example a fistula.

In some embodiments, the method further includes following the applying of the negative pressure, removing the elongate tube from the gastrointestinal tract. In some embodiments,
10 removing includes pulling the second end of the fluid tight lumen in a proximal direction. In some embodiments, removing includes transforming the elongate tube from the coil into a substantially linear state, such that each loop forms a substantially linear segment, from the proximal loop to the distal loop.

In some embodiments, the method further includes flushing a flushing-fluid into the
15 gastrointestinal tract via the fluid-tight lumen, the elongate tube, and the orifices.

In some embodiments, the method further includes, prior to the flushing, connecting a fluid source containing the flushing-fluid to the second end of the fluid tight lumen.

In some embodiments, the method further includes, prior to the placing, forming the elongate tube out of a shape memory material.

20 In some embodiments, the method further includes, prior to the placing of the elongate tube, pretreating the elongate tube with at least one antimicrobial or anti-inflammatory agent.

In some embodiments, the method further includes delivering to the portion of the gastrointestinal tract, via the elongate tube, an antimicrobial or anti-inflammatory medicament for treatment of an endoluminal wound in the portion of the gastrointestinal tract.

25 In some embodiments, the method further includes, following the applying of the negative pressure and while the elongate tube is within the gastrointestinal tract, detaching at least a portion of the elongate tube from the fluid-tight lumen, wherein (a) the at least a portion is formed from a biocompatible material and is naturally excreted from the body of the subject following the detaching and/or (b) the at least a portion is formed from a biodegradable material, and is degraded
30 or decomposed, within the body of the subject, following the detaching.

In some embodiments, the method further includes changing a condition in an environment surrounding the coil, thereby configuring at least one characteristic of the coil. In some embodiments, changing includes changing a temperature in the vicinity of the coil.

5 **BRIEF DESCRIPTION OF THE FIGURES**

The foregoing discussion will be understood more readily from the following detailed description when taken in conjunction with the accompanying Figures, in which:

Fig. 1 is a schematic illustration of a medical system according to embodiments of the disclosed technology, deployed in the esophagus;

10 Figs. 2A, 2B, and 2C are, respectively, side view illustrations and an end view illustration of an exemplary structure of an elongate tube forming part of the medical system of Fig. 1, according to embodiments of the disclosed technology;

 Figs. 3A, 3B, and 3C are schematic illustrations of exemplary structures of a coil formed of an elongate tube forming part of the medical system of Fig. 1, according to embodiments of the disclosed technology;

15 Figs. 4A, 4B and 4C are schematic illustrations of steps of deploying the medical system of Fig. 1 into the esophagus according to an embodiment of the disclosed technology;

 Figs. 5A and 5B are schematic illustrations of steps of deploying the medical system of Fig. 1 into the esophagus according to an embodiment of the disclosed technology;

20 Figs. 6A and 6B are schematic illustrations of steps of deploying the medical system of Fig. 1 into the esophagus according to an embodiment of the disclosed technology;

 Figs. 7A and 7B are schematic illustrations of steps of deploying the medical system of Fig. 1 into the esophagus according to an embodiment of the disclosed technology;

 Figs. 8A and 8B are schematic illustrations of a method of deploying the medical system of Fig. 1 into the esophagus, using a delivery device, according to an embodiment of the disclosed technology;

25 Figs. 9A and 9B are schematic illustrations of a procedure of deploying a medical system, similar to that of Fig. 1, into the body of a subject, according to embodiments of the disclosed technology; and

30 Figs. 10A, 10B, 10C, 10D, and 10E are schematic illustrations of steps of a procedure for maintaining the medical system of Fig. 1 in the body of the subject via a nasal wire or tube.

DETAILED DESCRIPTION

The principles of the medical systems and methods may be better understood with reference to the drawings and the following description.

5 In the following description, various aspects of the disclosure will be described. For the purpose of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the different aspects of the disclosure. However, it will also be apparent to one skilled in the art that the disclosure may be practiced without specific details being presented herein. Furthermore, well-known features can be omitted or simplified in order not to obscure the
10 disclosure. Additionally, in order to avoid undue clutter from having too many reference numbers and lead lines on a particular drawing, some elements may not be explicitly identified in every drawing that contains that element.

It is to be understood that the scope of the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description
15 or illustrated in the drawings. The invention is capable of other implementations or of being practiced or carried out in various ways. Furthermore, it is to be understood that the phraseology and terminology employed in the disclosure is for the purpose of description and should not be regarded as limiting.

For the purposes of this application, the term “subject” relates to any mammal, particularly
20 humans.

In the context of the present description and claims, the terms “proximal” and “distal” are defined relative to a direction in which the system is deployed into the body of the subject. As such, an element is said to be “proximal” if it is closer to the point at which the system enters the body of the subject than other elements, and is said to be “distal” if it is further from the point at
25 which the system enters the body of the subject than other elements.

In the context of the present description and claims, the term “wound” relates to any form of damage to the tissue, including, but not limited to, a leak, a perforation, a rupture, a tear, a cut, or a fistula in the tissue, for example in the wall of the GI tract.

In the context of the present description and claims, the term “negative pressure” relates to
30 sub-atmospheric pressure, which may be applied, for example, to remove fluid or debris from a bodily lumen.

In the context of the present description and claims, the term “elongate tube” relates to an elongate structure having at least a portion which is tubular, i.e. at least a portion that includes an internal channel. The internal channel need not extend through the entire elongate structure for the structure to be considered an “elongate tube”.

5 Referring now to the drawings, Fig. 1 is a schematic illustration of a medical system **100** according to embodiments of the disclosed technology, deployed in the vicinity of an endoluminal or extraluminal wound, for example in an esophagus **10** of a subject. Typically, system **100** is configured to remove fluid from the vicinity of wound **12**, and/or to assist in healing thereof.

System **100** includes an elongate tube **102** defining at least one channel (see for example
10 interior channel **125** in Fig. 2A) along at least a longitudinal portion thereof. In some embodiments, the at least one channel may extend along the entire longitudinal length of the elongate tube. In other embodiments, the at least one channel may extend only within a proximal portion of the elongate tube. The elongate tube **102** is shaped and sized for delivery to a human esophagus, or to another portion of the human GI tract. The elongate tube **102** includes a plurality of orifices **104**,
15 in fluid communication with channel(s). In some embodiments, such as that shown in Fig. 1, the orifices **104** may be distributed longitudinally along at least a portion of elongate tube **102**. In other embodiments, such as that shown in Figure 2A, the orifices may be distributed about a single circumference of elongate tube **102**.

Elongate tube **102** has a delivery state, and a first operative state, also termed a resting
20 operative state, as seen in Fig. 1, for example. The resting operative state occurs when the elongate tube is deployed in the body of the subject. In the resting state, the elongate tube forms a coil including a plurality of loops **106**, arranged around a longitudinal coil axis **107**. In the following description, the terms “first operative state” and “resting operative state” are used interchangeably.

A fluid-tight lumen **108** is in fluid communication with an end of elongate tube **102**,
25 typically with the channel(s) thereof. Fluid-tight lumen **108** is adapted to couple, or couples, elongate tube **102** to a source of negative pressure (e.g., negative pressure system) **110**, for delivery of negative pressure to orifices **104** via elongate tube **102** and its channel(s). Negative pressure delivered to the orifices results in removal or drainage of fluid and/or debris from the vicinity of wound **12**, thus assisting in healing of the wound.

30 In some embodiments, and as illustrated in Fig. 1, fluid-tight lumen **108** is in fluid communication with a proximal end **102a** of elongate tube **102**. Additionally, the fluid-tight lumen

108 is adapted to couple to a source of negative pressure **110**, and to deliver negative pressure to the elongate tube **102** via the proximal end **102a**. However, depending on the direction of deployment, fluid-tight lumen **108** may alternately be coupled to a distal end of the elongate tube, provided that it is coupled to source of negative pressure **110**.

5 In some embodiments, the system includes the source of negative pressure **110**, for example in the form of a vacuum generator, which may be fixed or portable. In other embodiments, the system does not include the source of negative pressure, and merely interacts or is adapted to connect with the source of negative pressure such as a vacuum system.

10 In some embodiments, source of negative pressure **110** includes a controller **112** adapted to regulate the negative pressure provided by source **110**, within a predefined pressure range, to remove fluid at least from a vicinity of the extraluminal or endoluminal wound, a portion of the internal surface of esophagus **10**, or of the gastrointestinal tract. For example, controller **112** may be adapted to regulate the negative pressure for removal of fluid from an area of esophagus **10** including the extraluminal or endoluminal wound.

15 In some embodiments, source of negative pressure **110** may further include, or be associated with, least one sensor **114** adapted to sense at least one characteristic of the fluid removed from the gastrointestinal tract such as pressure or flow rate. Sensor(s) **114** is functionally associated with controller **112**, such that the controller is adapted to adjust one or more operating parameters of the source of negative pressure **110** in response to input received from the sensor(s),
20 which input relates to the at least one characteristic of the fluid. Sensor(s) **114** may be positioned in proximity to controller **112**, or in proximity to elongate tube **102**.

 In some embodiments, the channel spans a longitudinal portion of elongate tube **102** between orifices **104** and the proximal end of the elongate tube, coupled to fluid-tight lumen **108**, but may not span the entire longitudinal length of the elongate tube. In some embodiments, the
25 channel spans the entire length of elongate tube **102**. In some embodiments, the channel is an inner channel, such as channel **125** shown in Figure 2A.

 In some embodiments, elongate tube **102** and fluid-tight lumen **108** are substantially concentric, such that elongate axes thereof are substantially coincidental. However, the coil axis **107** is typically not coincidental with the elongate axis of fluid-tight lumen **108**.

30 In some embodiments, or at certain times, elongate tube **102** may be dissociated from the source of negative pressure **110**, and may be coupled instead to a source of fluid, indicated by

reference numeral **116** in Fig. 1. Source **116** includes fluid **118**, which may be a flushing fluid or a treatment fluid. In some embodiments, fluid **118** may be supplied, via the channel(s) and orifices **104**, into the gastrointestinal tract. For example, the fluid may be supplied to dislodge debris caught in the orifices or in the channel. As another example, the fluid may include an irrigation or
5 cleansing fluid, a medicament (e.g., anti-inflammatory agent), and/or an antimicrobial (e.g., antibiotic or antibacterial), to assist in healing of wound **12**.

In some embodiments, the fluid may be a flushing fluid. In some embodiments, the fluid may be a medicament fluid, such as an antimicrobial fluid or a tissue-growth promoting fluid. In some embodiments, the fluid may be a contrast fluid. In some embodiments, the fluid may be
10 ionized gas. In some embodiments, the fluid may be carbon dioxide. In some embodiments, the fluid may be a fluid configured to modify a characteristic of the coil, such as a low temperature fluid.

In other embodiments, the source of fluid **116** as well as the source of negative pressure **110** may both be connected to elongate tube **102**. For example, the at least one channel includes
15 multiple channels, a first (e.g., **125** in Fig. 2A) connected to source of negative pressure **110** and another (not explicitly shown) connected to source of fluid **116**, such that negative pressure and fluid may be provided to the vicinity of elongate tube **102**, via different channels or orifices, substantially simultaneously, or at different times via different channels.

In some embodiments, upon completion of treatment, the entirety of elongate tube **102**, as
20 well as the fluid-tight lumen **108** are removed from the body of the subject.

In some embodiments, at least a portion of elongate tube **102**, or the entirety of elongate tube **102**, may be detachable from fluid-tight lumen **108**. In some embodiments, the detachable portion (or entirety) of elongate tube **102** is formed of material which may be naturally excreted from the body of the subject following detachment from fluid tight lumen **108**. In other
25 embodiments, the detachable portion (or entirety) of elongate tube **102** may be formed of a biodegradable material, and may be degraded or decomposed, within the body of the subject, following detachment from fluid tight lumen **108**.

In some embodiments, at least a portion of elongate tube **102**, or the entirety thereof, is further covered by an additional layer of material such as a netting configured to add friction to
30 the surface of the elongate tube.

Reference is now additionally made to Figs. 2A, 2B, and 2C, which are, respectively, side view illustrations and an end view illustration of an exemplary structure of an elongate tube forming part of the medical system of Fig. 1, according to embodiments of the disclosed technology.

5 Figs. 2A to 2C show an elongate tube **122**, which has a similar function to elongate tube of Fig. 1, but differs therefrom in several aspects. Like elongate tube **102**, which includes orifices **104** and forms a coil including a plurality of loops **106**, elongate tube **122** includes orifices **124** and forms a coil including a plurality of loops **126**.

Elongate tube **122** includes an internal channel **125**, and in addition includes one or more
10 exterior channels **127**, here shown as a plurality of troughs extending longitudinally along an exterior surface of the elongate tube. Orifices **124**, which, in the embodiment of Figs. 2A to 2C, are disposed about a single circumference of the elongate tube adjacent the distal end of the elongate tube, are in fluid communication with interior channel **125** as well as with at least one of exterior channels **127**, and facilitate fluid flow between the internal channel and at least one of
15 exterior channels. However, in some embodiments, orifices **124** may be longitudinally distributed along a portion of the elongate tube or along the entirety of the elongate tube, for example as shown in Fig. 1. In the illustrated embodiment, fluid-tight lumen **128** has a similar structure to elongate tube **122**, and also includes exterior channels.

As seen in Fig. 2B, in some embodiments, each of orifices **124** spans the width of multiple
20 troughs, or exterior channels, **127**. Stated differently, the cross section or diameter of troughs **127** is smaller than the diameter of orifices **124**.

Channel **125** is in fluid communication with source **110** of negative pressure, via fluid tight lumen **128**, and functions substantially as described hereinabove with respect to Fig. 1. The negative pressure is applied to the vicinity of the elongate tube **122** via orifices **124** and troughs
25 **127**, and drains fluid and debris from the vicinity of the tube, via troughs **127** and orifices **124**, into channel **125**.

It is to be appreciated that in some embodiments, orifices **124** may be disposed about a single circumference of elongate tube **122**, adjacent the proximal end of the elongate tube. In some such embodiments, internal channel **125** must extend along a proximal longitudinal portion of the
30 elongate tube leading up to, or slightly past, orifices **124**, but need not necessarily extend beyond orifices **124**. In such embodiments, negative pressure would be delivered from fluid-tight lumen,

via the portion of internal channel **125** and the orifices **124** to a proximal end of troughs **127**, such that fluid and debris from the vicinity of the coil is drawn longitudinally along troughs **127** from the distal end toward the proximal end, and from there through orifices **124** into internal channel **125**.

5 Troughs **127** fulfill multiple purposes in the treatment using the system of the disclosed technology. The presence of troughs **127** assists in maintaining orifices **124** open, particularly when loops **126** of the elongate tube are disposed directly one over the other, with no gaps. In such conditions, troughs **127** may form a channel through which the negative pressure can be applied to the vicinity, even if the coils engage one another. Additionally, troughs **127**, which have a
10 narrow cross section, are delineated by ridges **129**. These ridges provide a texture to the exterior surface of elongate tube **122**, and can engage the surrounding tissue, such as tissue of esophagus **12**, to promote tissue growth, thereby to accelerate healing. Furthermore, in some embodiments, fluid may be drained via troughs **127** into orifices **124**, thus facilitating drainage from a larger area using fewer orifices, and the orifices are less likely to be blocked or occluded by debris.

15 In some embodiments, elongate tube **122** may optionally further include a second channel associated with fluid delivery orifices (not explicitly shown) for delivery of fluid to the vicinity of the elongate tube **122**, substantially as described hereinabove with respect to Fig. 1.

Reference is now made to Figs. 3A, 3B, and 3C, which are schematic illustrations of exemplary structures of a coil formed of an elongate tube forming part of the medical system of
20 Fig. 1, according to embodiments of the disclosed technology.

Fig. 3A shows a coil formed of an elongate tube **132**, which is similar in structure to elongate tube **102** of Fig. 1. Specifically, elongate tube **132** includes an internal channel (not explicitly shown), a plurality of orifices **104** distributed longitudinally along the tube, and forms a coil including a plurality of loops **106**.

25 However, the coil formed by elongate tube **132** differs from the coil formed by elongate tube **102**, in which all the loops have the same internal and external diameters (see Fig. 1). In the embodiment illustrated in Fig. 3A, loops **106** have multiple different diameters. Additionally, some loops having the same diameter, are not adjacent one another. For example, Fig. 3A shows a first pair of loops **106a** have a first, and largest, diameter, disposed at a distance d1 from one another.
30 A second pair of loops **106b** have a second diameter, smaller than the first diameter of loops **106a**, and are disposed at a second distance d2 from one another.

Varying loop diameters can form many different configurations, all of which are considered within the scope of the disclosed technology. For example, in some embodiments, and as shown in Fig. 3A, loops having different diameters may cause the coil to have an exterior shape similar to that of a spindle or an hourglass. In other embodiments, loops having varying diameters may form a coil having a generally conical or frusto-conical structure. In yet other embodiments, the loops of the coil may alternate between loops having a first, larger, diameter and loops having a second, smaller, diameter.

Fig. 3B shows a coil formed of an elongate tube **142**, which is similar in structure to elongate tube **102** of Fig. 1. Specifically, elongate tube **142** includes an internal channel (not explicitly shown), a plurality of orifices (not explicitly shown) distributed longitudinally along the tube, and forms a coil including a plurality of loops **146**. However, each of loops **146** has an at least partially sinusoidal structure. As such, space may be created between each adjacent pair of loops **146**. The at least partially sinusoidal structure shown in Fig. 3B may be adapted to maintain the space between pairs of adjacent loops **146** when negative pressure is applied to elongate tube **142**, and consequently to maintain the length of the coil when negative pressure is applied thereto.

In the context of the present application, a loop has a “sinusoidal structure” if the loop is not flat and is undulating (in the theta direction when revolving around the center of the loop). Stated differently, a loop has a “sinusoidal structure” if in the loop (i.e. 360 degree trip in the theta direction), there are multiple longitudinal direction changes in the loop (e.g., from going up to going down to going back up) or multiple changes in the sign of the slope of the loop. As such, if an ant were to walk along the loop, it would change from walking “uphill” to walking “downhill” multiple times along the loop.

Fig. 3C shows a coil formed of an elongate tube **152**, which is similar in structure to elongate tube **102** of Fig. 1. Specifically, elongate tube **152** includes an internal channel (not explicitly shown), a plurality of orifices **154** distributed longitudinally along the tube, and includes a coil portion **155** forming a coil including a plurality of loops **156**. However, elongate tube **152** further includes a linear portion **157**, extending from an end **158** of coil portion **155** toward the fluid-tight lumen **108** (see Fig. 1) as indicated by arrow **159**. Linear portion **157** extends through a longitudinal center of the coil. When linear portion **157** is coupled to fluid-tight lumen **108** and to the source of negative pressure, negative pressure delivered to the elongate tube **152** from fluid-tight lumen **108** traverses linear portion **157** of the elongate tube before reaching coil portion **155**

and being delivered to the vicinity of the coil via orifices **154**. Linear portion **157** extending from the distal end of the coil, through the center of coil portion **155**, and being connected to fluid tight lumen **108**, may be advantageous in maintaining the length of the coil from extending down the gastrointestinal tract, or from extending the pitch between loops **156** of the coil, when the coil is
5 deployed in the gastrointestinal tract and negative pressure is applied thereto.

The following description relates to elongate tubes **102**, **122**, **132**, **142**, and **152** shown in Figs. 1-3C. While the description uses the reference numerals provided with respect to Fig. 1, it is to be appreciated that it is similarly applicable to the same elements of Figs. 2A to 3C, even if those elements are designated by different reference numerals.

10 In some embodiments, elongate tube **102** has a diameter d , shown in Fig. 1, in the range of 1mm to 8mm, 1mm to 5mm, or 2mm to 4mm.

In some embodiments, elongate tube **102** may be formed of a porous material, such as ePTFE, PTFE-foam, EVA, PU-foam, and PP-foam. In some embodiments, the orifices **104** may be or may include pores in the porous material.

15 some embodiments, elongate tube **102** may comprise, or may consist of, a radiopaque marker, radioactive marker, magnetic marker, and/or magnetic resonance marker. In some embodiments, elongate tube **102** may comprise, or may consist of, a metal, a natural or elastic polymer, a plastic, a shape memory alloy, a super elastic alloy, a biocompatible material, a biodegradable material, a bioresorbable material, and/or a bioabsorbable material.

20 In some embodiments, elongate tube **102** may be formed of a material relatively unlikely to irritate the gastrointestinal tract.

In some embodiments, elongate tube **102** may configured for an antimicrobial or anti-inflammatory effect. In some embodiments, elongate tube **102** comprises an antimicrobial or anti-inflammatory material. In some embodiments, elongate tube **102** is pretreated or coated with an
25 antimicrobial or anti-inflammatory agent.

In some embodiments, elongate tube **102** is adapted to deliver to the vicinity of wound **12** an antimicrobial or anti-inflammatory medicament for treatment of the wound. For example, this may be accomplished by delivery of a medicament fluid via the channel and orifices of the elongate tube, as described hereinabove.

In some embodiments, elongate tube **102** has a textured exterior surface adapted to frictionally engage an interior surface of the gastrointestinal tract. An example of such a textured exterior surface is illustrated in Figs. 2A to 2C, and its advantages are described hereinabove.

In some embodiments, elongate tube **102** may comprise, or may consist of, a shape memory material, an elastic material, a super-elastic material, or another polymeric material, adapted to
5 direct or result in formation of a predetermined coil shape.

In some embodiments, the elongate tube **102** may have any suitable cross-sectional shape, including a circular cross section, an oval cross section, a D-shaped cross section, or a rectangular cross section.

10 In some embodiments, orifices **104** are disposed about a single circumference of the elongate tube, for example as shown in Figs. 2A and 2B. In some embodiments, orifices **104** can be disposed along a single longitudinal position along the longitudinal axis of elongate tube **102** (as shown in Fig. 1), such that when the elongate tube is uncoiled, the orifices form a straight line along the length of the tube. In some embodiments, orifices **102** may be disposed along multiple
15 longitudinal positions along the longitudinal axis of the elongate tube, or along the entirety of the elongate tube.

In some embodiments, at least one longitudinal channel extends along an external longitudinal portion of the elongate tube, as shown in Figs. 2A and 2B.

In other embodiments, orifices **104** are disposed longitudinally, along a longitudinal length
20 of elongate tube **102**, or at different longitudinal positions along the longitudinal axis.

In some embodiments, and as shown in Fig. 1, orifices **104** may be equidistantly distributed along or about elongate tube **102**. In other embodiments, orifices **104** may be heterogeneously distributed along or about elongate tube **102**. For example, a first pair of adjacent orifices **104** may have a first longitudinal distance therebetween, and a second pair of adjacent orifices **104** may
25 have a second longitudinal distance therebetween, the second longitudinal distance being different from the first longitudinal distance. As another example, a first pair of adjacent orifices **104** may have a first circumferential distance therebetween, and a second pair of adjacent orifices **104** may have a second circumferential distance therebetween, the second circumferential distance being different from the first circumferential distance.

30 In some embodiments, each of orifices **104** has substantially the same diameter. In some other embodiments, orifices **104** in a first subset of the orifices have a first diameter, and orifices

104 in a second subset of the orifices have a second diameter, the second diameter being different from the first diameter.

In some embodiments, and as shown in Fig. 1, each of orifices **104** has substantially the same cross-sectional area. In some embodiments, orifices **104** in a first subset of the orifices have a first cross-sectional area, and orifices **104** in a second subset of the orifices have a second cross-sectional area, the second cross-sectional area being different from the first cross-sectional area. For example, the cross-sectional area of orifices **104** may increase along the length of the elongate tube, or of the coil, from the proximal end towards the distal end. In some such embodiments, the cross-sectional area of the distal-most orifice is at least 50% greater than the cross-sectional area of the proximal-most orifice.

In some embodiments, a greatest dimension of each of orifices **104** is within the range of 0.5mm to 10mm, 0.5mm to 8mm, 0.5mm to 5mm, 0.5mm to 3mm, or 1mm to 2mm.

In some embodiments, in the resting operative state of elongate tube **102**, at least some of orifices **104** are oriented inwardly, toward a center of the coil, for example as shown in Fig. 2A. In some embodiments, in the resting state of elongate tube **102**, at least some of orifices **104** are oriented outwardly, away from the center of the coil, for example as shown in Fig. 1.

In some embodiments, in the resting operative state, elongate tube **102** is substantially devoid of orifices **104** oriented outwardly, away from a center of the coil, such that all of orifices **104** are oriented toward the center of the coil.

In some embodiments, in the first, resting operative state of elongate tube **102**, a length of the coil, indicated in Fig. 1 by L, is at least 10mm, at least 15mm, at least 20mm, at least 25mm, at least 30mm at least 35mm or at least 40mm, at least 50mm, at least 60mm, or at least 80mm.

In some embodiments, in the first, resting operative state of elongate tube **102**, length L of the coil is at most 200mm, at most 150mm, at most 100mm, at most 80mm, at most 70mm, at most 60mm, or at most 50mm.

In some embodiments, in the first, resting operative state of elongate tube **102**, length L of the coil is in the range of 10mm to 200mm, 10mm to 150mm, 10mm to 120mm, 10mm to 100mm, 10mm to 80mm, 10mm to 70mm, 10mm to 60mm, 10mm to 50mm, 20mm to 50mm, 30mm to 50mm, 40mm to 50mm, 10mm to 40mm, 15mm to 40mm, 10mm to 35mm, or 15mm to 35mm.

In some embodiments, elongate tube **102** has a second, draining operative state, when negative pressure is applied to the elongate tube.

In some embodiments, in the first, resting, operative state of elongate tube **102**, the coil has a uniform pitch between each pair of adjacent loops, for example as seen in Figs. 1 to 2B.

In some embodiments, in the first operative state, a pitch of the coil is in a range of 2.5mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 5mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 40mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 30mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 25mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 2mm to 20mm. In some embodiments, in the first operative state, a pitch of the coil is in a range of 3mm to 15mm

In some embodiments, at least one characteristic of the coil is configurable by making a change to a condition in an environment surrounding the coil. In some embodiments, the characteristic may be, or may include, a chemical characteristic or a mechanical characteristic of the coil.

For example, the changed condition may be a temperature of the coil, or a temperature in the vicinity of the coil during the deployment.

In some embodiments, in the first, resting state of elongate tube **102**, a number of loops **106** in the coil formed from the elongate tube is at least 3, at least 4, at least 5, at least 8, or at least 10.

In some embodiments, in the first, resting operative state of elongate tube **102**, the number of loops **106** in the coil is within the range of 3 to 15, 5 to 15, 5 to 12, 8 to 12, 3 to 30, 5 to 30, 5 to 30, or 8 to 30.

In some embodiments, in the first, resting operative state of elongate tube **102**, the diameter of each loop **106** in the coil or the diameter of the coil as a whole, indicated by D in Fig. 1, is in a range of 0.5cm to 5cm, 1cm to 5cm, 0.5cm to 4cm, 1cm to 4cm, 2cm to 4cm, 0.5cm to 3cm, 1cm to 3cm, 1cm to 2.5cm, 1cm to 2cm or 2cm to 3.5cm.

In some embodiments, in the first, resting operative state of elongate tube **102**, the diameter of at least one of loops **106**, and in some embodiments of each loop **106**, in the coil is not greater than 1.5cm.

In some embodiments, and as shown in Fig. 1, all of loops **106** have substantially the same external diameter.

In some embodiments, at least two loops **106** have substantially the same diameter. In some embodiments, the two loops having substantially the same diameter are a proximal-most loop, and a distal-most loop of the coil. In some embodiments, the diameter of loops **106** other than the proximal-most loop and the distal-most loop is not greater than the diameter of the proximal-most loop. In some embodiments, the diameter of loops **106** other than the proximal-most loop and the distal-most loop is not smaller than the diameter of the proximal-most loop.

In some embodiments, when negative pressure is applied to elongate tube **102**, loops **106** form a stack, which provides mechanical strength to the coil during application of the negative pressure.

Reference is now made to Figs. 4A, 4B and 4C, which are schematic illustrations of steps of deploying the medical system **100** into the gastrointestinal tract, or into esophagus **10** according to an embodiment of the disclosed technology, and to Figs. 5A and 5B, which are schematic illustrations of a modification of the steps of Figs. 4A to 4C.

As seen in Fig. 4A, elongate tube **102** is disposed within a lumen of a tubular sheath **200**, which functions as a delivery mechanism for delivering elongate tube **102** into the gastrointestinal tract. As such, in the embodiment of Figs. 4A to 5B, elongate tube **102** is delivered into the gastrointestinal tract of the subject within the lumen of tubular sheath **200**.

Elongate tube **102** is in a delivery state when associated with the tubular sheath **200** and obtains the resting operative state, in which the elongate tube is coiled, when dissociated from the sheath. Tubular sheath **200** is adapted to be removed from the gastrointestinal tract following delivery of elongate tube **102**.

Tubular sheath **200** functions as a linearizing element for elongate tube **102**, such that, in the delivery state, when the elongate tube is within sheath **200**, elongate tube **102** is substantially linear and adapted for delivery, for example via a lumen of a working channel.

In some embodiments, elongate tube **102** is adapted to be removed from the gastrointestinal tract via the lumen of tubular sheath **200**. In such embodiments, elongate tube **102** is pulled into the tubular sheath from the proximal end of the tube, and assumes the delivery state during removal thereof from the gastrointestinal tract.

In some embodiments, during deployment of the elongate tube, elongate tube **102** is adapted to form the coil sequentially as segments of the elongate tube are pushed distally out of tubular sheath **200**, in the direction of arrow **201**, as clearly seen by comparison of Figs. 4B and

4C. As seen in Figs. 4B and 4C, elongate tube **102** is pushed distally out of sheath **200**, such that the distal end of the elongate tube forms the first, distal loop **106'**, shown in Fig 4B. Subsequently, as additional portions of elongate tube **102** are pushed out the sheath, they form additional loops **106**, as shown in Fig. 4C.

5 In an inverse manner, during removal of elongate tube **102** from the gastrointestinal tract via sheath **200**, each of loops **106** is adapted to transform into a substantially linear segment upon entry into the sheath, sequentially, from the proximal loop to the distal loop.

 In some embodiments, a distal end of tubular sheath **200** includes a pointed shape. For example, the pointed shape may be desirable in order to pass through debris or through a wound
10 scab on the way to a target destination of the elongate tube.

 As seen in Fig. 4C, in some embodiments, a longitudinal axis **202** of the coil is angled (e.g. at a 90-degree angle) with respect to a longitudinal axis **204** of a remainder of elongate tube **102**, for example disposed within sheath **200**, or coupled (e.g., via the fluid-tight lumen) to the source of negative pressure **110** (Fig. 1). In some embodiments it is desirable for the longitudinal axes
15 **202** and **204** to be parallel.

 In some embodiments, and as shown in Figs. 5A and 5B, tubular sheath **200** may have a shoulder **206** disposed at a distal end thereof. Shoulder **206** is adapted to redirect elongate tube **102** prior to coiling thereof. As such, and as shown in Fig. 5B, when the coil is formed, longitudinal axis **202'** of the coil is parallel to longitudinal axis **204** of the linear portion of sheath **200**, which
20 houses the linear remainder of elongate tube **102**.

 Reference is now made to Figs. 6A and 6B, which are schematic illustrations of steps of deploying the medical system **100** into the gastrointestinal tract, or into esophagus **10** according to an embodiment of the disclosed technology, and to Figs. 7A and 7B, which are schematic illustrations of a modification of the steps of Figs. 6A to 6B.

25 As seen in Fig. 6A, a wire **210**, which may be a guidewire, is disposed within a channel of elongate tube **102**, such as channel **125** (Fig. 2A). Wire **210** is adapted to be delivered into the gastrointestinal tract together with elongate tube. As such, in the embodiment of Figs. 6A to 7B, elongate tube **102** is delivered into the gastrointestinal tract of the subject with wire **210** extending longitudinally and internally therethrough. In some embodiments, wire **210** may extend through a
30 channel within elongate tube, distinct from the channel used for connection to the source of

negative pressure **110** (Fig. 1). For example, wire **210** may extend through a flushing channel or through a dedicated channel.

In some embodiments, elongate tube **102** is in a delivery state when associated with wire **210** and obtains the resting operative state, in which the elongate tube is coiled, when dissociated from the wire. Wire **210** is adapted to be removed from the gastrointestinal tract following delivery of elongate tube **102**, by pulling the wire in the direction of arrow **211**, shown in Fig. 6A. In this case, wire **210** functions as a linearizing element for elongate tube **102**, such that, in the delivery state, when wire **210** is within the elongate tube, elongate tube **102** is substantially linear. In some embodiments, elongate tube **102** is adapted to form the coil sequentially as segments of wire **210** are extracted proximally out of the elongate tube in the direction of arrow **211**, as clearly seen by comparison of Figs. 6A and 6B. As seen in Figs. 6A and 6B, wire **210** is pulled proximally out of elongate tube **102**, such that the distal end of the elongate tube forms the first, distal loop **106'**, shown in Fig 6A. Subsequently, as additional portions of elongate tube **102** are dissociated from wire **210** which is pulled out of those portions, they form additional loops **106**, as shown in Fig. 6B.

As seen in Fig. 6B, in some embodiments, a longitudinal axis **212** of the coil is angled (e.g. at a 90-degree angle) with respect to a longitudinal axis **214** of a remainder of elongate tube **102**, for example having wire **210** disposed therein, or connected to the source of negative pressure **110** (Fig. 1). In some embodiments it is desirable for the longitudinal axes **212** and **214** to be parallel.

In some embodiments, and as shown in Figs. 7A and 7B, wire **210** may have a shoulder **216** at a distal end thereof. Shoulder **216** is adapted to redirect elongate tube **102** prior to coiling thereof. As such, and as shown in Fig. 7B, when the coil is formed, longitudinal axis **212'** of the coil is parallel to longitudinal axis **214** of the linear portion elongate tube **102**.

It is to be appreciated that, in some embodiments, elongate tube may be delivered into the gastrointestinal tract within a working channel of a delivery device. In some such embodiments, elongate tube **102** may be delivered within the working channel together with a linearizing element, such as sheath **200** (Figs. 4A to 5B) or guidewire **210** (Figs. 6A to 7B). In such embodiments, elongate tube **102** (and the associated linearizing element) is sized and configured to pass through the working channel of the delivery device.

In some embodiments, the delivery device may be a catheter or an endoscope.

In some embodiments, the delivery device may include an image capturing element, adapted to provide images of elongate tube **102** during delivery thereof into the gastrointestinal tract.

Reference is now made to Figs. 8A and 8B, which are schematic illustrations of a method of deploying medical system **100** into the gastrointestinal tract or into esophagus **10**, using a delivery device **220**, according to an embodiment of the disclosed technology. The method illustrated in Figs. 8A and 8B results in the coil shape shown in Fig. 3C and described hereinabove. As such, the description below relates to the reference numerals shown in Fig. 3C.

As seen in Fig. 8A, elongate tube **152** is mechanically attached to an exterior of delivery device **220**, during delivery thereof into the gastrointestinal tract. In some embodiments, and as shown in Fig. 8A, during delivery of the elongate tube into the gastrointestinal tract, coil portion **155** of elongate tube **152** is coiled about an exterior of delivery device **220**, while linear portion **157** of the elongate tube extends through a working channel **221** of delivery device **220**. As such, in the embodiment of Figs. 8A and 8B, the delivery state of elongate tube **102** may be a coiled state or a partially coiled state. The end **157'** of linear portion **157** is adapted to be coupled to the fluid tight lumen **108**.

In some embodiments, linear portion **157** extending through delivery device **220** may be used to modify the tension of the coil portion **155** about the exterior of the delivery device, or to modify the diameter of the loops of the coil portion about the exterior of the delivery device, prior to introduction of the delivery device into a bodily lumen.

As a result, following disconnection of the elongate tube **152**, and specifically of coil portion **155**, from delivery device **220**, a diameter of the loops of coil portion **155** may change relative to a diameter maintained while the coil was wrapped around the exterior of the delivery device. For example, the diameter of loops **156** may increase following removal of coil portion **155** from delivery device **220**.

As seen in Fig. 8B, once elongate tube **152** is delivered to the gastrointestinal tract and the coil is positioned at a desired location within the gastrointestinal tract (e.g., in the vicinity of a wound), the elongate tube is adapted to be disassociated from delivery device **220**. As shown in Fig. 3C, following dissociation of elongate tube **152** from delivery device **220**, linear portion **157** of the elongate tube extends through the coil formed by coil portion **155**, typically through its center.

In some embodiments, delivery device **220** may be a catheter or an endoscope.

In some embodiments, delivery device **220** may include an image capturing element **222**, adapted to provide images of the elongate tube during delivery thereof into the gastrointestinal tract. For example, image capturing element **222** may be a video camera adapted to capture images
5 of the interior of the gastrointestinal tract during placement of the elongate tube therein.

In some embodiments, system **100** includes a handle portion (not explicitly shown) mechanically couplable to an end of fluid-tight lumen **108**, which is far from elongate tube **102**, and which typically remains extracorporeal during deployment of the elongate tube into the gastrointestinal tract. Manipulation of the handle portion, for example by pushing or turning
10 thereof, results in distal motion of elongate tube **102**. In some embodiments, the handle portion is adapted to be detached from fluid-tight lumen **108** following delivery of elongate tube **102** into the gastrointestinal tract.

In some embodiments, manipulation of the handle portion causes elongate tube **102** to transition from the delivery state to the coiled, resting operative state. In some embodiments, the
15 transition of elongate tube **102** into the coil is sequential, such that each of loops **106** is adapted to form as the handle portion delivers elongate tube **102** into the gastrointestinal tract, sequentially from the distal loop to the proximal loop, in a similar manner to that shown in Figs. 4A to 7B.

Reference is now made to Figs. 9A and 9B, which are schematic illustrations of a procedure of deploying medical system **730**, similar to medical system **100** including any one of elongate
20 tubes **102**, **122**, **132**, **142**, or **152**, into the body of a subject, according to embodiments of the disclosed technology.

As seen in Fig. 9A, system **730**, and specifically the elongate tube thereof, may be fed into the gastrointestinal tract of the subject, via the subject's mouth. For example, in the illustrated
25 embodiment, an endoscope is used to deliver the elongate tube into the esophagus of the subject, via the subject's mouth.

In Fig. 9B, the elongate tube of system **730** is delivered into the esophagus surgically. Specifically, a hole is punctured in the abdominal wall of the subject, and the elongate tube is delivered to the gastrointestinal tract, and specifically to the esophagus of the subject, via the
30 stomach. Alternatively, a hole is punctured in the submental triangle (not shown) of the subject, and the elongate tube is delivered to the gastrointestinal tract and specifically to the esophagus of the subject via the punctured hole. In some such applications, a distal end of the elongate tube may

be sharp, or may include a needle, suitable for puncturing the required hole in the abdominal wall. In some other embodiments, the process may be similar to that of placing a percutaneous endoscopic gastronomy (PEG) device, with the distinction that the elongate tube could be delivered further than the stomach, into the esophagus.

5 Reference is now made to Figs. 10A, 10B, 10C, 10D, and 10E, which are schematic illustrations of steps of a procedure for maintaining medical system **730**, such as medical system 100 including any one of elongate tubes **102**, **122**, **132**, **142**, or **152**, in the body of the subject via a nasal wire or tube, following its introduction as shown in Fig. 9A. For brevity, the description relates to elongate tube **102** of medical system **730**, relating to the elongate tube of Fig. 1. However,
10 any of the other elongate tubes described hereinabove can replace elongate tube **102**.

 As seen, in Fig. 10A a delivery device **720** is deployed into the esophagus of the subject, via the subject's mouth **740**. For example, the delivery device may be delivery device 220 described hereinabove with respect to Fig. 8A. In Fig. 10B, at least part of fluid-tight lumen **108**, as well as elongate tube **102**, are delivered to the esophagus of the user using delivery device **720**
15 (not shown). Elongate tube **102** obtains the coil of its resting operative orientation, and the delivery device is removed from the mouth of the subject, leaving elongate tube **102** and fluid-tight lumen **108**, in place. Following placement of medical system **730** within the esophagus of the subject, delivery device **720** is removed from the body, as seen in Fig. 10C.

 In Fig. 10D, a wire **750** is inserted into the nose of the subject, and through the sinuses of
20 the subject into, and out of, the subject's mouth. A proximal end of fluid-tight lumen **108** is then associated with end **752** of wire **750** extending out of the subject's mouth. In Fig. 10E, wire **750** is pulled out of the subject's nose. As wire **750** is pulled out of the subject's nose, end **752** of the wire, together with the proximal end of fluid tight lumen **108**, are pulled into the subject's nose. When wire **750** is fully removed from the subject's nose, fluid tight lumen **108** continues to extend
25 through the subject's nose, connecting elongate tube **102** to the exterior of the subject's body, for connection to the source of negative pressure **110**. Fluid tight lumen **108** can additionally be associated with a nasal retaining element which is configured to maintain the longitudinal position of the coil within the subject.

 It should be understood that the use of "and/or" is defined inclusively such that the term "a
30 and/or b" should be read to include the sets: "a and b," "a or b," "a," "b."

The various systems, devices, apparatuses, etc. in this disclosure can be sterilized (e.g., with heat, radiation, ethylene oxide, hydrogen peroxide, etc.) to ensure they are safe for use with patients, and the methods herein can comprise such sterilization of the associated system, device, apparatus, etc. Furthermore, the scope of the present disclosure includes, for some applications, sterilizing one or more of any of the various systems, devices, apparatuses, etc. in this disclosure.

The present invention is not limited to what has been particularly shown and described hereinabove. Rather, the scope of the present invention includes both combinations and subcombinations of the various features described hereinabove, as well as variations and modifications thereof that are not in the prior art, which would occur to persons skilled in the art upon reading the foregoing description. Further, the techniques, methods, operations, steps, etc. described or suggested herein can be performed on a living animal or on a non-living simulation, such as on a cadaver, cadaver gastrointestinal tract, simulator (e.g., with the body parts, tissue, etc. being simulated), etc.

Although the operations of some of the disclosed examples are described in a particular, sequential order for convenient presentation, it should be understood that this manner of description encompasses rearrangement, unless a particular ordering is required by specific language set forth above. For example, operations or steps described sequentially can in some cases be rearranged or performed concurrently. Moreover, for the sake of simplicity, the attached figures may not show the various ways in which the disclosed methods can be used in conjunction with other methods. Additionally, the description sometimes uses terms like “provide” or “achieve” to describe the disclosed methods. These terms are high-level abstractions of the actual operations that are performed. The actual operations that correspond to these terms can vary depending on the particular implementation and are discernible by one of ordinary skill in the art.

CLAIMS

1. A medical system for applying negative pressure within a gastrointestinal tract of a subject, the system comprising:
 - an elongate tube defining:
 - at least one interior channel along at least a longitudinal portion of the elongate tube;
 - a plurality of orifices in fluid communication with the at least one interior channel;
 - and
 - at least one exterior channel extending longitudinally along an exterior surface of the elongate tube, at least one of the at least one exterior channel being in fluid communication with the at least one interior channel via at least one of the plurality of orifices,
 - the elongate tube having a delivery state, and a first operative state in which the elongate tube forms a coil including a plurality of loops; and
 - a fluid-tight lumen in fluid communication with an end of the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the elongate tube,
 - wherein, in the first operative state of the elongate tube, a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.
2. The medical system of claim 1, wherein the at least one interior channel comprises a first interior channel adapted for drainage of a fluid from the gastrointestinal tract, via the at least one exterior channel and the plurality of orifices, when negative pressure is applied to the elongate tube.
3. The medical system of any one of claims 1 to 2, wherein the elongate tube comprises a shape memory material, an elastic material, or a super-elastic material adapted to form the coil in the first operative state.
4. The medical system of any one of claims 1 to 3, wherein the elongate tube has a textured exterior surface adapted to frictionally engage an interior surface of the gastrointestinal tract.

5. The medical system of any one of claims 1 to 4, wherein the at least one exterior channel comprises a plurality of exterior channels forming troughs on the exterior surface of the elongate tube and extending longitudinally therealong.
6. The medical system of any one of claims 1 to 5, wherein the plurality of orifices are disposed about a single circumference of the elongate tube.
7. The medical system of claim 6, wherein the at least one exterior channel extends longitudinally along the exterior surface of the elongate tube between the orifices and a distal end of the elongate tube.
8. The medical system of any one of claims 1 to 5, wherein the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.
9. The medical system of any one of claims 1 to 8, wherein orifices in a first subset of said plurality of orifices have a first diameter, and orifices in a second subset of said plurality of orifices have a second diameter, the second diameter being different from the first diameter.
10. The medical system of any one of claims 1 to 9, wherein, in the first operative state, at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.
11. The medical system of any one of claims 1 to 9, wherein, in the first operative state, at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.
12. The medical system of any one of claims 1 to 11, wherein, in the first operative state of the elongate tube, at least one of the plurality of loops has a sinusoidal structure.
13. The medical system of any one of claims 1 to 12, further comprising a linearizing element, wherein the elongate tube has the delivery state, which is a linear state, when associated with the linearizing element, and the first operative state, in which the elongate tube forms the coil, when dissociated from the linearizing element.
14. The medical system of any one of claims 1 to 12, wherein the fluid-tight lumen, and the elongate tube in the delivery state, are sized and configured to pass through a working channel of a delivery device, wherein the working channel has a diameter smaller than 5 mm.

15. The medical system of any one of claims 1 to 12, wherein the delivery state of the elongate tube is a coiled state, and the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject disposed about the exterior of a delivery device.
16. A medical system for applying negative pressure within a gastrointestinal tract of a subject, the system comprising:
- an elongate tube defining at least one channel along at least a longitudinal portion thereof and including a plurality of orifices in fluid communication with the at least one channel the elongate tube having a delivery state and a first operative state in which the elongate tube forms a coil including a plurality of loops, at least some of the plurality of loops having a sinusoidal structure; and
 - a fluid-tight lumen in fluid communication with an end of the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the at least one channel via the end of the elongate tube,
- wherein in the first operative state of the elongate tube, a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.
17. The medical system of claim 16, wherein the at least one channel is adapted for drainage of a fluid from the gastrointestinal tract, via the plurality of orifices, when negative pressure is applied to the elongate tube.
18. The medical system of any one of claims 16 to 17, wherein the elongate tube comprises a shape memory material, an elastic material, or a super-elastic material adapted to form the coil in the first operative state.
19. The medical system of any one of claims 16 to 18, wherein the elongate tube has a textured exterior surface adapted to frictionally engage an interior surface of the gastrointestinal tract.
20. The medical system of any one of claims 16 to 19, wherein the plurality of orifices are disposed about a single circumference of the elongate tube.
21. The medical system of any one of claims 16 to 19, wherein the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

22. The medical system of any one of claims 16 to 21, wherein orifices in a first subset of said plurality of orifices have a first diameter, and orifices in a second subset of said plurality of orifices have a second diameter, the second diameter being different from the first diameter.
23. The medical system of any one of claims 16 to 22, wherein, in the first operative state, at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.
24. The medical system of any one of claims 16 to 22, wherein, in the first operative state, at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.
25. The medical system of any one of claims 16 to 24, further comprising a linearizing element wherein the elongate tube has the delivery state, which is a linear state, when associated with the linearizing element, and the first operative state, in which the elongate tube forms the coil, when dissociated from the linearizing element.
26. The medical system of any one of claims 16 to 24, wherein the fluid-tight lumen, and the elongate tube in the delivery state, are sized and configured to pass through a working channel of a delivery device, wherein the working channel has a diameter smaller than 5 mm.
27. The medical system of any one of claims 16 to 24, wherein the delivery state of the elongate tube is a coiled state, and the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject disposed about the exterior of a delivery device.
28. A medical system for applying negative pressure within a gastrointestinal tract of a subject, the medical system comprising:
- an elongate tube defining at least one channel along at least a longitudinal portion thereof and including a plurality of orifices in fluid communication with the at least one channel, the elongate tube including:
 - a coil portion forming a coil having a plurality of loops; and
 - a linear portion extending through a longitudinal center of the coil portion; and
 - a fluid-tight lumen in fluid communication with the elongate tube, the fluid-tight lumen adapted to couple to a source of negative pressure and to deliver negative pressure to the coil portion of the elongate tube,

wherein the elongate tube is adapted to be delivered into the gastrointestinal tract of the subject with the coil portion disposed about the exterior of a delivery device and the linear portion extending through the interior of the delivery device,

wherein a length of the coil is at least 15mm and the plurality of loops includes at least 4 loops.

29. The medical system of claim 28, wherein the fluid tight lumen is in fluid communication with an end of the linear portion of the elongate tube, and is adapted to deliver the negative pressure to the coil portion of the elongate tube via the linear portion of the elongate tube.

30. The medical system of claim 28 or 29, wherein the at least one channel of the elongate tube includes:

at least one interior channel along at least a longitudinal portion of the elongate tube; and

at least one exterior channel extending longitudinally along an exterior surface of the elongate tube, at least one of the at least one exterior channel being in fluid communication with the at least one interior channel via at least one of the plurality of orifices.

31. The medical system of claim 28 to 30, wherein the at least channel is adapted for drainage of a fluid from the gastrointestinal tract via the plurality of orifices, when negative pressure is applied to the elongate tube.

32. The medical system of any one of claims 28 to 31, wherein at least the coil portion of the elongate tube has a textured exterior surface, adapted to frictionally engage an interior surface of the gastrointestinal tract.

33. The medical system of any one of claims 28 to 32, wherein the plurality of orifices are disposed about a single circumference of the elongate tube.

34. The medical system of any one of claims 28 to 32, wherein the plurality of orifices are disposed longitudinally along a longitudinal length of the elongate tube.

35. The medical system of any one of claims 28 to 34, wherein orifices in a first subset of said plurality of orifices have a first diameter, and orifices in a second subset of said plurality of orifices have a second diameter, the second diameter being different from the first diameter.

36. The medical system of any one of claims 28 to 35, wherein at least some of the plurality of orifices are oriented outwardly, away from a center of the coil.
37. The medical system of any one of claims 28 to 36, wherein at least some of the plurality of orifices are oriented inwardly, toward a center of the coil.
38. The medical system of any one of claims 28 to 37, wherein, in the first operative state of the elongate tube, each of the plurality of loops has an at least partially sinusoidal structure.