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A device (10) including a catheter (18) and a medical instrument (20). The catheter includes an inner portion and a catheter stop (36) within the inner portion. The medical instrument includes an outer portion and a medical instrument stop (38) on the outer portion. The medical installation is moveably supported in the inner portion of the catheter, and after the medical instrument is moved and the medical instrument stop contacts the catheter stop, further movement of the medical instrument causes the catheter to move with the medical instrument.
CATHETER ACCESS DEVICE

FIELD

{0001} The present teachings relate to a device, and more particularly to a medical device and method for introducing a catheter into the anatomy.

BACKGROUND

{0002} Needles and catheters have been considered for accessing and testing a region of interest in the anatomy. For example, a needle disposed within a catheter can be inserted into the anatomy and steered towards the region of interest. The needle can be advanced from within the catheter towards the region of interest so that the needle can penetrate, cut, core and/or shear a tissue sample therefrom. Once a sufficient tissue sample is collected, the needle and catheter can be removed from the anatomy, if the tissue sample collected is inadequate, contaminated, and/or if another tissue sample is required, the catheter and the needle may need to be reinserted into the anatomy, which may undesirably cause trauma to the patient may be cumbersome for the surgeon performing the procedure, and/or may add additional time to the procedure.

{0003} Needles and catheters have also been considered for a variety of procedures delivering medicine to the anatomy. However, a small needle cart restrict the delivery of viscous liquids into the anatomy, while a large needle may be difficult to maneuver and orientate in the anatomy. Moreover, it may be difficult to maintain a needle in the anatomy for an extended period of time.

{0004} U.S. Patent Application Publication Number 2014/0058357A1 appears to disclose a device and method for piercing a vessel in the anatomy with a needle, dilating the pierced hole with a dilator, retracting the needle, inserting a catheter into the vessel, and then withdrawing the dilator. However, inserting multiple devices into the anatomy and then dilating a pierced hole may cause undesirable trauma to the patient, may be cumbersome for the surgeon performing the procedure, and/or may add additional time to the procedure.

{0005} Another problem with current devices is that the catheter and medical instrument are held in alignment with each other at the proximal end outside the anatomy and, consequently, alignment of the features at the distal end inside the anatomy can shift relative to each other. This problem becomes much worse the longer the device is. For access into deeper anatomy with greater
lengths of catheters and medical devices, such as in the lungs, alignment becomes poor in existing design; and alignment at the distal end may become a problem.

[0096] What is needed is an improved device and method for placing a catheter into the anatomy. It would be desirable to have a device and method for placing a catheter into the anatomy that can be used for multiple instrumentation procedures, including sampling, draining, and/or delivery of medicine to the anatomy. It would be desirable to have a device and method that has -alignment features provided at a distal end. It would be desirable to have a device and method where the distal end moved in predictable unison-and the resultant positions in the target area that can be precise. it would be attractive to provide a catheter that can be maintained in the anatomy for a period of time so that multiple instrumentation procedures can be performed without removing and subsequently re-introducing a catheter into the anatomy. It would be desirable to provide a device that can be mass-produced relatively inexpensively, that has a minimal number of parts, and that is easy to operate.

SUMMARY

[0107] The present teachings meet one or more of these needs by providing a device including a medical instrument disposed within a catheter that together can be inserted into the anatomy, steered around internal vessels, airways, and organs in the anatomy, and can together pierce a region of interest in the anatomy. The present teachings provide a medical instrument can be withdrawn from the catheter of the present teachings while the catheter at least temporarily remains in the anatomy so that multiple instrumentation procedures can be completed, including sampling, draining, and/or delivery of medicine to the anatomy. The present teachings provide a catheter which can be maintained in the anatomy for a period of time so that multiple instrumentation procedures can be performed without removing and subsequently re-introducing a catheter into the anatomy. The present teachings provide a device that can be mass-produced relatively inexpensively, that has a minimal number of parts, and that is easy to operate.

[0108] The present teachings provide a device comprising a catheter and a medical instrument. The catheter includes an inner portion and a catheter stop within the inner portion. The medical instalment includes an outer portion and a medical instrument stop on the outer portion. The medical instrument is moveably supported in the inner portion of the catheter, and when the
medical instrument is moved and the medical instrument stop contacts the catheter stop, further
movement of the medical insiromeni causes the catheter to move with the medical instrument.

[0009] The present teachings also provide a method comprising inserting at least a portion of
the device of the teachings herein into the anatomy: extending the medical instrument lip beyond
the distal end of the catheter; engaging the medical Instrument stop against the catheter stop;
piercing the region of interest with the medical instrument tip; moving the medical instrument and
the catheter together so that both the medical instrument and the catheter penetrate the region of
interest; and withdrawing the medical instrument from the catheter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Fig. 1 illustrates a perspective view of a medical system including a medical device
with a medical instrument and catheter according to the teachings herein.

[0011] Fig. 2 illustrates a cross-sectional view of a medical system including a medical device,
a medical instrument and a Catheter according to the teachings herein.

[0012] Fig. 3 illustrates a cross-sectional view of a medical instrument and a catheter according
to the teachings herein.

[0013] Fig. 4 illustrates a cross-sectional view of a medical instrument and a catheter according
to the teachings herein.

[0014] Fig. 5 illustrates a cross-sectional view of a medical instrument and a catheter according
to the teachings herein.

[0015] Fig. 6 illustrates a partial cross-sectional view of a medical instrument, a catheter, and
a feature of interest of the anatomy according to the teachings herein.

[0016] Fig. 7 illustrates a partial cross-sectional view of a medical instrument, a catheter, and
a feature of interest of the anatomy according to the teachings herein.

DETAILED DESCRIPTION

[0017] This Application claims priority to U.S. Provisional Application No. 62/140,511, filed
on March 31, 2015, the entirety of which is hereby incorporated by reference herein for all
purposes.
The explanations and illustrations presented herein are intended to acquaint others skilled in the art -with the teachings, its principles, and its practical application. Those skilled in the art may adapt and apply the teachings in its numerous forms, as may he best suited to the requirements of a particular use. Accordingly, the specific embodiments of the present teachings as set forth are not intended as being exhaustive or Knitting of the teachings. The scope of the teachings should, therefore, be determined not with reference to the description herein, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. The disclosures of all articles and references, including patent applications and publications, are incorporated by reference for all purposes. Other combinations are also possible as will be gleaned from the following claims, which are also hereby incorporated by reference into this written description. The teachings herein may be used without limitation. In other words, the teachings herein may be used in any medical procedure.

The teachings herein include one or more medical systems. The one or more medical systems may comprise a medical device, a catheter and any medical instrument. The catheter may include an inner portion and a catheter stop within the inner portion. The medical instrument may include an outer portion and a medical instrument stop located on the outer portion. The medical instrument may be moveably supported in the inner portion of the catheter. Generally, when the medical instrument is in the inner portion of the catheter and the medical instrument is moved, the medical instrument stop can contact the catheter stop so that further movement of the medical instrument causes the catheter to move with the medical instrument.

The one or more medical devices may function to be used in any medical procedure. For example, the one or more medical devices may -function to introduce into any anatomy any medical instrument and/or facilitate removal from any anatomy any medical instrument, materia l(s), or objects). Exemplary medical instruments may include one or more needles, coring needles, sampling needles, transbrachial needle aspiration devices, cytology brushes, biopsy forceps, baskets, balloons, guiding devices, ultrasonic probes, illumination devices, energy devices, medicines, therapies (i.e., chemotherapy, proteonies, microspheres, etc.), materials (i.e., liquids, pastes, markers, etc.), the like, or a combination thereof. In some embodiments, the medical
device may include one or more needles, for example one or more coring needles, sampling needles, and transbronchial needle aspiration devices. Exemplary material the medical devices may obtain from the body include tissue samples, blood samples, abnormalities, foreign matter, and/or any other type of sample that may be obtained from the anatomy via the or more medical devices. The one or more medical devices may include one or more bronchoscopes, thoracoscopes, laparoscopes, rigid scopes, flexible scopes, semi-rigid scopes, navigation catheters or guide catheters.

10021] The one or more medical devices may include one or more bronchoscopes. The one or more bronchoscopes may be used in my medical procedure. For example, the one or more bronchoscopes may function to withdraw objects from the anatomy. Preferably, the one or more bronchoscopes may be used to withdraw foreign bodies, tissue samples, blood, or a combination thereof; may be used to visually inspect an internal portion of the anatomy, or both. More preferably, the one or more bronchoscopes may be used for examining, treating, and/or diagnosing lung growth, lung problems, lung cancer, lymph node(s), atelectasis, suspected interstitial lung disease, a lung rejection after a lung transplant, and/or to remove fluid or mucus plugs from the airways of a patient. The one or more bronchoscopes may provide for the insertion, manipulation, and/or operation of any medical instrument in the anatomy; delivery of one or more fluids, medicines, pastes, therapies, etc. to the anatomy, or both.

[0022] The one or more medical devices may include one or more viewing devices. The one or more viewing devices may function to view or observe an internal portion of the anatomy, view one or more medical Instruments in the anatomy, or both. The one or more viewing devices may function to provide a surgeon with the ability to observe at least a portion of a catheter and any medical instrument in the anatomy; help indicate a depth of penetration of a catheter and any medical instrument into a site of interest in the anatomy; aid in orienting or locating a catheter, a medical instrument, or both relative to a region of interest in the anatomy. The one or more viewing devices may be any device that may function to transmit and/or send one or more signals towards any medical device or medical instrument. The one or more viewing devices may be any device configured to receive echo signals reflected and/or deflected from any markings, scribes, echogenic features, devices, catheters, medical instruments, or a combination thereof. Exemplary viewing devices may include one or more ultrasounds, radiographic instruments, fluoroscopic visualizations, X-rays, transducers, transmitters, etc.
The one or more devices may include one or more catheters. The one or more catheters may function to provide a passageway into the anatomy. The one or more catheters may function to provide for introduction into the anatomy and/or removal therefrom any medical instrument. In some embodiments, the one or more catheters may function to receive and engage one or more medical instruments so that the one or more medical instruments can move the one or more catheters towards a region of interest in the anatomy. The one or more catheters may receive one or more medical instruments and form a combined catheter and medical instrument. The one or more combined catheter and medical instrument may be moved through a region of interest once any medical instrument pierces or penetrates the region of interest. Exemplary regions of interest may include any part of the anatomy, such as a tissue wall, an airway wall, a lung, a lymph node, a tumor, etc. Preferably, the one or more catheters can at least temporarily engage a portion of the anatomy so that the one or more medical instruments can be withdrawn from the one or more catheters while the one or more catheters remain in the anatomy. Preferably, the one or more catheters may remain in the anatomy for a period of time. For example, the one or more catheters may remain in the anatomy for about an hour or so, more or less, about 5 hours or more, about a day or more, about 3 days or more, or even about a week or more. The one or more catheters may remain in the anatomy so that any medical instruments, medicines, and/or objects can be inserted into, supplied to, and/or removed from the region of interest one or more times without re-inserting, re-positioning, re-orientating, replacing, etc. the one or more catheters.

The one or more catheters may be fabricated from any material suitable for use in any medical procedure. For example, the one or more catheter* may be fabricated from a material that can be inserted into the anatomy while also performing the previously recited functions. For example, the one or more catheters may be at least partially resilient, expandable, collapsible, articulable/deformable, or a combination thereof. Preferably, the one or more catheters may be at least partially flexible, bendable, articulable, or a combination thereof so that the one or more catheters can be steered around the anatomy and so that one or more regions of interest in the anatomy can be easily accessed or bypassed. For example, the one or more catheters may bend or articulate about 15 degrees or more, about 45 degrees or more, about 60 degrees or more, about 90 degrees or more, about 110 degrees or more, or even about 130 degrees or more. For example, the one or more catheters may bend or articulate about 15 degrees or less, about 45 degrees or less, about 60 degrees or less, about 90 degrees or less, about 110 degrees or less, or even about 180
degrees or less. The one or more catheters may be any elongated, tubular member extending along any axis, such as a longitudinal axis, a catheter axis, a medical instrument axis, or a combination thereof. The one or more catheters may include any cross section suitable for perforating the previously recited functions. For example, the cross section may be substantially circular, oval, or even irregular. The one or more catheters may include or define an aperture or an opening at a distal end, a proximal end, and/or at a region in between so that any medical instruments, medicine(s), object(s), or a combination thereof can pass there through the one or more catheter and/or extend there out of. The one or more catheters may be made from a single integral component, or may be made from two or more portions. Preferably, the one or more catheters include a first portion and a second portion. The first portion may be located proximal the second portion, or vice versa. The first portion may have a gauge, size, or diameter that is larger than the second portion, or vice versa. The first portion and the second portion may be connected at an intersection or transition.

The one or more transitions may function to make a temporary or permanent connection between a first portion and a second portion of the one or more catheters. The one or more transitions may function to enhance and/or provide for insertion of the catheter through the site of interest. In other words, the one or more transitions may function to provide ramped or angled surface so that a proximal portion of the needle, which may be inserted and moved through the anatomy or a region of interest. The one or more transitions may have any shape for performing the previously recited functions. For example, the one or more transitions may be generally tapered, sloped, slanted, rounded, flat, angled, stepped, or a combination thereof. The one or more transitions may be fabricated from any suitable material for use in medical procedures that may perform the aforementioned functions. The one or more transitions may be subjected to heat so that the one or more transitions form, melt, flow, and/or reflow around the first portion, the second portion, or both. The one or more transitions may be placed over at least a portion of the first portion and the second portion and heat shrunk there over or there around. The one or more transitions may begin to taper any distance from a distal end of the one or more catheters. Preferably, when measured from a distal end of the one or more catheters, the one or more transitions may begin to taper at a distance of about 1 inches or more, about 2 inches or more, about 3 inches or more, or even about 4 inches or more. When measured from a distal end of the one or more catheters, the one or more transitions may be located
at a distance of about 5 inches or less, about 4 inches or less, about 3 inches or less, about 2 inches or less, or even about 1 inch or less.

[0026] The one or more catheters may include one or more catheter stops. The one or more catheter stops may function to be engaged by any medical instrument(s) so that the one or more catheters can be moved in the anatomy. Preferably, the one or more catheter stops may be engaged by one or more medical instrument stops on a medical instrument that is nioveably supported in the one or more catheters so that the one or more combined catheter and medical instrument can move through a region of interest in the anatomy via the one or more medical instruments. The one or more catheter stops may be, or may include, any suitable feature for performing the aforementioned functions. Exemplary catheter stops may be, or may include, one or more tapered portions, edges, collars, projections, grooves, fingers, rings, ledges, nubs, dimples, extensions, filaments, members, the like, or a combination thereof. The one or more catheter stops may be keyed and engaged by a medical instrument stop including a mating keyed feature. For example, the one or more catheter stops may resemble a helical or threaded portion that is selectively engaged by a mating helical or threaded position located on any medical instrument. The one or more catheter stops may be located in an inner portion of the one or more catheters. Preferably, the one or more catheter stops may be disposed within an inner portion of the catheter near a distal end so that the medical instrument can more accurately move, control, articulate, advance, and/or retract the catheter in the anatomy. For example, when measured from a distal end of the one or more catheters, the one or more catheter stops may be located at about a half inch or more, about two inches or more, preferably about two and a half inches or more, or even four inches or more.

[0027] The one or more catheters may include one or more retaining features. The one or more retaining features may function to at least temporarily provide for the one or more catheters, combined catheter and medical instrument or both to remain in the anatomy. That is, the one or more retaining features may be any feature(s) that may function to at least temporarily connect, attach, retain, restrain, and/or stabilize the one or more catheters in or at a site of interest in the anatomy. Preferably, the one or more retaining features may be any change in shape on an outer surface of the one or more catheters. For example, the one or more retaining features may be, or may include, one or more legs, arms, feet, prongs, collars, hooks, projections, extensions, rings, abutments, undercuts, mechanical attachments, the like, or a combination thereof. The one or more retaining features may separate at least a portion of the pierced or penetrated features of interest.
until the one or more features of interest pass there through. The one or more features of interest may then close or fold around a portion of the catheter while the one or more retaining features are located in the feature of interest to at least temporarily retain the catheter therein. The one or more retaining features may hold, expand, expel, or resiliently expand after the catheter penetrates the region of interest. For example, a surgeon may activate one or more controls so that the one or more features of interest expand and attached onto the anatomy so that the one or more catheters can be secured to the anatomy. The one or more retaining features may be located at any position on the catheter so that the catheter can at least temporarily remain in the anatomy. Preferably, the one or more retaining features may be located on an outer surface at or near a distal end portion of the one or more catheters. The one or more retaining features may be adjustable so that a length of the catheter in the site of interest can vary.

The one or more catheters may include one or more markings. The one or more markings may function to enhance visibility in the anatomy of the catheter, one or more medical instruments, or both. For example, using the one or more viewing devices, the one or more markings may function to provide a surgeon with the ability to observe at least a portion of a catheter and any medical instrument in any portion of the anatomy; help indicate a depth of penetration of a catheter and any medical instrument into a site of interest in the anatomy; and/or assist in orienting or locating a catheter, a medical instrument, or both relative to a region of interest. The one or more markings may be any feature(s) that performs the aforementioned functions. For example, the one or more markings may be, or may include, one or more echogenic features, scribes, bands, slots, segments, shapes, surfaces, recesses, roughened surfaces, embedded materials, coatings, projections, serrations, or a combination thereof. Preferably, the one or more markings may be painted on at least a portion of the one or more catheters, and may be color coordinated. The one or more color coordinated markings may be any color(s) (i.e., red, green, black, blue, white, clear, etc.). More preferably, the one or more markings may be color-coordinated markings with a protective coating there over. The protective coating may be clear. The one or more markings may be color-coordinated heat shrinks. The one or more markings may be circumferential bands of about 1mm or more, about 2mm or more, about 3mm or more, or preferably about 5mm or more. The one or more markings may be circumferential bands of about 10mm or less, about 8mm or less, about 6mm or less, preferably about 5mm or less, or even about 4mm or less. The one or more markings may extend around an entire circumference of the one or
more catheters. The one or more markings may extend around a portion of the one or more catheters about 25 degrees or more, about 45 degrees or more, about 60 degrees or more, about 90 degrees or more, about 135 degrees or more, about 180 degrees more, or about 270 degrees or more. The one or more markings may extend around a circumference of the one or more catheters about 360 degrees or less, .270 degrees or less-, about 180 degrees or less, about 135 degrees or less, or even about 45 degrees or less.

[0029] The one or more medical instruments may be any medical instrument that may be used in any medical procedure. The one or more medical instruments may be any medical instrument that may be inserted into the one or more catheters. The one or more medical instruments may be inserted into the one or more catheters to form a combined catheter and medical instrument. The one or more medical instruments may function to move or steer one or more catheters, combined catheter and medical instrument, or both in the anatomy. Preferably, the one or more medical instruments may be inserted into a proximal end of the one or more catheters and moved distally within the one or more catheters until the one or more medical instrument stops engage the one or more catheter stops. By-way of the engagement between the one or more medical instrument stops and the one or more catheter stops, further movement of the medical instrument (e.g., distal movement of the medical instrument), may cause the medical instrument to move the catheter. Preferably, the one or more medical instruments may function to pierce or puncture any region of interest in the anatomy while also moving the one or more catheters through the region of interest. The one or more medical instruments may be any instrument(s) for delivering medicine or therapy to the anatomy, or may be used for obtaining any materials, sampler(s), and/or object(s) from the anatomy. Exemplary medical instruments may include one or more needles, cytology brushes, biopsy forceps, baskets, balloons, guiding devices, ultrasonic probes, illumination devices, energy devices, like or a combination thereof. Preferably, the one or more medical instruments may be any needle(s). For example, the one or more needles may be a coring needle, a sampling needle, a transbronchial aspiration needle, a puncturing needle, a guiding needle, the like, or a combination thereof.

[0030] The one or more medical instruments may include one or more medical instrument stops. The one or more medical instrument stops may function to engage the one or more catheters, or the one or more catheter stops, so that the medical instrument can move the catheter in the anatomy. Preferably, the one or more medical instrument stops may function to engage the one or
more catheter stops so that the medical instrument(s) and the catheter(s) can move together in the anatomy and subsequently penetrate a site or region of interest in the anatomy together. That is, by way of the engagement between the one or more medical instrument stops and the one or more catheter stops, any movement of the medical instrument may cause the medical instrument to move the catheter. The one or more medical instrument stops may be any feature(s) for performing the previously received functions. Exemplary medical instrument stops may include one or more tapered portions, edges, collars, projections, grooves, fingers, rings, ledges, nubs, dimples, extensions, filaments, members, the like, or a combination thereof. The one or more medical instrument stops may be keyed and configured to engage a mating keyed portion of the one or more catheter stops. For example, the one or more medical instrument stops may resemble a helical or threaded portion that may engage a mating helical or threaded position located on the one or more catheter stops. Preferably, the one or more medical instrument stops may be disposed near a distal end of the one or more medical instruments. The one or more medical instrument stops may be located at a distal end or a distal portion of the medical instrument so that the medical instrument can more accurately move, control, articulate, advance, retract the catheter in the anatomy. The one or more medical instrument stops may be located at a suitable distance from a distal end or a distal portion of the medical instrument so that the medical instrument can more accurately move, control, articulate, advance, retract the catheter in the anatomy. For example, when measured from a distal end of the medical instrument, the one or more medical instrument stops may be located at about a half inch or more, about two inches or more, preferably about two and a half inches or more, or even four inches or more. When measured from a distal end of the medical instrument, the one or more needle stops may be located at about a half inch or less, about two inches or less, preferably about two and a half inches or less, or even four inches or less. The one or more medical instrument stops may have a length or width along a length of the one or more medical instruments of a medical instrument axis, or both on the order of about 0.20 inches or more, about 0.30 inches or more, or even about 0.50 inches or more. The one or more medical instrument stops may have a length or width along a length of the medical instrument, the medical instrument axis, or both on the order of about 0.50 inches or less, 0.40 inches or less, preferably 0.30 inches or less, or even 0.10 inches or less.

[0031] The one or more medical instruments may include one or more medical instrument tips. The one or more medical instrument tips may function to pierce, puncture, and/or penetrate any
part of the anatomy. Preferably, the one or more medical instrument: tips may-function as a piercing tip so that cells, tissue, foreign matter, or a combination thereof from any site or region of interest can be obtained. The one or more medical instrument tips may be located at a distal end or a distal portion of the medical instruments. Preferably, the one or more medical instrument tips may be contained within the one or more catheters as the catheter is moved or steered through the anatomy towards the site or region of interest. More preferably, the one or more medical instrument tips may be moved, advanced and/or extended beyond a distal end of the one or more catheters—when the both the catheter and the medical instrument are near a region of interest. The one or more medical instrument tips may have any shape for performing the aforementioned functions. For example, the one or more medical instrument tips may be angled, sharply angled, beveled, flat, or a combination thereof so that the tissue samples can be cut, cored, scraped, and/or obtained from a region of interest. The one or more medical instrument tips may include a notched portion, a recessed portion, and/or a lancet feature. Preferably, the one or more medical instrument tips may be one or more needle tips. A local vacuum may be created or formed at the medical instruments tip, a distal end of the medical instruments, or both so that anatomical samples can be aspirated or moved into the medical instruments, the sample storage area, or both.

The one or more medical instrument may be one or more needles. The one or more needles may be inserted into the one or more catheters so that the one or more needles can move independently or the one or more catheters, but also move the one or more catheters. For example, the one or more needles may be inserted into a proximal end of the one or more catheters and moved distally within the one or more catheters until the one or more medical instrument stops engage the one or more catheter stops. By way of the engagement between the one or more medical instrument stops and the one or more catheter stops, further movement of the needle (e.g., distal movement of the needle) causes the needle to-move the catheter. Once the one or more needles penetrates a region of interest, movement of the one or more needles into the region of interest also moves the one or more catheters into the region of interest. Exemplary needles may include a coring needle, a sampling needle, a transbronchial aspiration needle, a puncturing needle, a guiding needle, the like, or a combination thereof.

The one or more needles may have any length suitable for use in any medical procedure. The length of the one or more needles may extend along any axis, such as a longitudinal axis, a needle axis, a catheter axis, or a combination thereof. The one or more needles may have any cross
section that is suitable for use in any medical procedure. For example, the cross section of the one 
or more needles may be constant, may vary, may taper, may be irregular, may be any shape, or a 
combination thereof. For example, the cross section of the one or more needles may be generally 
circular, oval, irregular, or any other suitable shape to perform the above recited functions. The 
one or more needles may be generally hollow. The one of more needles may be generally solid. 
The one or more needles may include one or more sections or portions that are generally solid, 
generally hollow, or both. The one or more needles may be formed from any material suitable for 
use any medical procedures. For example, the one or more needles may be fabricated from a 
material that can be inserted into the anatomy, can move a catheter in the anatomy, and can also 
bend, flex and/or articulate. The one or more needles may be any size or gauge suitable for use 
in any medical procedure, while still functioning to perform the above recited Functions. For 
example, the one or more needles may be about 25 gauge or more, about 22 gauge, about 21 gauge, 
or about 19 gauge or less, etc. The one or more needles may include a combination of two or more 
gauges. That is, for example, a proximal portion of the needle may be about 21 gauge and a distal 
portion of the needle may be about 19 gauge, or vice versa. The one or more needles may include 
one or more holes, ports, slots, the like or a combination thereof for tissue sample collection; for 
introducing one or more devices into the needle; for introducing one or more devices into the 
anatomy; for introducing medicine or therapy to the anatomy, or a combination thereof. 

[01134] The one or more medical devices, catheters, medical instruments, or a combination 
thereof may be used with one or more method steps. The method steps may be performed in 
virtually any order. At least a portion of the one or more medical instruments may be inserted into 
the one or more catheters. At least a portion of the one or more medical instruments may be 
inserted into the one or more catheters to form one or more combined catheter and medical 
instrument. A distal end of the one or more medical instruments may be inserted into a proximal 
end of the one or more catheters so that the distal end of the medical instrument or a medical 
instrument tip remains within the catheter. The one or more combined catheter and medical 
instrument may be inserted into a working channel or port of any device, for example a 
bronchoscope. A distal end of the one or more combined catheter and medical instrument may be 
inserted into a working channel of any device. A distal end of the one or more combined catheter 
and a medical instrument may be inserted into the anatomy. The one or more combined catheter 
and medical instalmn may be passed through an orifice in the anatomy. For example, the one or
more combined catheter and medical instruments may be passed through a patient’s mouth or nose, through the trachea, and into a lumen of a patient. The one or more medical devices and medical instruments may be moved through the anatomy towards a site or region of interest. The one or more medical devices, combined catheter and medical instrument, or both may be navigated, tracked and/or monitored through the anatomy with the one of more viewing devices, such as an ultrasound probe or X-ray. The one or more medical instruments may be moved in the one or more catheters. The one or more medical instruments may be distally moved in the one or more catheters until the one or more medical instrument stops engage the one or more catheter stops. A distal end of the one or more medical instruments, a medical instrument tip, or both may be advanced from the one or more catheters a predetermined distance. The one or more medical instrument tips may penetrate the site of interest. The one or more medical instruments may move the one or more catheters through the penetrated site or region of interest. The one or more catheters may follow the one or more medical instruments into the site of interest due to the engagement between the one or more medical instrument stops and the one or more catheter stops. The one or more retaining features may assist in at least temporarily securing the one or more catheters or combined catheter and medical instrument in the site of interest. The one or more retaining features may be biased, moved, folded, and or resiliently flexed to engage the site of interest. The one or more medical instruments may be completely withdrawn from the one or more catheters, anatomy, or both. The one or more catheters may remain in the anatomy for a period of time after the one or more medical instruments are removed from the catheter, the anatomy, or both.

With the one or more catheters remaining at and/or within the site of interest, one or more medical procedures may be undertaken. For example, another medical instrument, such as a sampling needle may be inserted into a proximal end of the one or more catheters and advanced to a site of interest for tissue sampling, or one or more therapies may be delivered to the site of interest via the one or more catheters. Or, one or more other devices (i.e., cytology brushes, biopsy forceps, baskets, balloons, guiding devices, ultrasonic probes, illumination devices, energy devices, etc.), materials (i.e., liquids, pastes, markers, etc.), therapies (i.e., chemotherapy, proteinomics, microspheres, etc.) or a combination thereof may be passed through the catheter and into the anatomy, or passed through the catheter and removed from the anatomy. The one or more
retaining features may be biased, moved, folded, and or resiiently moved to disengage the site of interest. The one or more catheters may then he removed from the site of interest.

[F0036] Figs. 1 and 2 generally illustrate a device 10. The device 10 includes a bronchoscope 12 and a viewing device, which may include an ultrasound viewing device 14A and an optical viewing device 14B. The device 10 includes an aperture 16 from where a medical instrument 20 sheathed in a catheter 18 extends from it. The medical instrument 20 may be a needle. The medical instrument 20 and the catheter 18 may be substantially coaxially arranged along a medical instruments axis 22, and moveable relative to one another along the medical instruments axis 22. A medical instrument tip 24 can be selectively extended beyond a distal end 26 of the catheter 18 (FIG. 1) and retracted into the catheter 18 (FIG. 2).

[F0037] Fig. 3 illustrates various markings 28 a,b,e,d on the catheter 18. One or more of the markings- 28 a,b,e,d -may be viewed with any device, such as the viewing device 14A and/or 14B. The markings may be integral or embedded within the catheter material, as in a radiopaque marker band, or an echogenic feature for ultrasound visualization. The markings may also be on the medical instrument 20. The medical instrument 20 is moveably supported within an inner portion of the catheter 18.

[F0038] Fig. 4 illustrates the catheter 18 and the medical instrument 20. The catheter 18 includes a first portion 30, a second portion 32, and a transition 34 therebetween. The catheter 18 includes a catheter stop 36 located in an inner portion thereof. The medical instrument 20 includes a medical instrument stop 38. During use, as the medical instrument 20 is moved distally so that the medical instrument tip 24 extends beyond a distal end 26 of the catheter 18, the medical instrument stop 38 eventually contacts or engages the catheter stop 36 so that the catheter 18 moves with the medical instrument 20. In other words, movement of the medical Instrument 20 causes the medical instrument stop 38 to contact and push against the catheter stop 36 so that the catheter 18 moves together with the medical instrument 20.

[F0039] Fig. 5 illustrates the catheter 18 and the medical instrument 20. The catheter 18 includes a first portion 30, a second portion 32, and a transition 34 extending therebetween.

[F0040] Fig. 6 illustrates the bronchoscope 12, the catheter 18 and the medical instrument 20 at a site of interest 40. The medical instrument tip 24 extends beyond a distal end 26 of the catheter 18 and penetrates the site of interest 40.
Fig. 7 illustrates the bronchoscope 12, the catheter 18 and the medical instrument 20 at a site of Interest 40. The medical instrument tip 24 extends beyond a distal end 26 of the catheter 18 and penetrates the site of interest 40. The medical instrument stop 38 (not shown) may be in contact with the catheter stop 36 (also not shown) so that as the medical instrument 20 is advanced through the site of Interest 40, the catheter 38 moves with the medical instrument 20 through the site of interest 40. The retaining feature 42 engages the site of interest 40 to attach the catheter 18 thereto. The markings 44 on the catheter 18 may be viewed via the viewing device 14A and/or 14B, so that the orientation, penetration depth, etc, of the catheter 18, medical instrument 20, or both can be viewed from outside the anatomy. While not shown, the medical instrument 20 can then be withdrawn from the catheter 18 and the anatomy, while the catheter 18 remains secured to the anatomy via the retaining feature 42. Accordingly, multiple instrumentation procedures including sampling, draining, and/or delivery of medicine can be performed without removing and replacing the catheter 18.

Any numerical values recited herein include all values from the lower value to the upper value in increments of one unit provided that there is a separation of at least 2 units between any lower value and any higher value. As an example, if it is stated that the amount of a component or a value of a process variable such as, for example, temperature, pressure, time and the like is, for example, from 1 to 90, preferably from 20 to 80, more preferably from 30 to 70, it is intended that values such as 15 to 85, 22 to 68, 43 to 51, 30 to 32 etc. are expressly enumerated in this specification. For values which are less than one, one unit is considered to be 0,001, 0,001, 0,01 or 0,1 as appropriate. These are only examples of what is specifically intended and all possible combinations of numerical values between the lowest value and the highest value enumerated are to be considered to be expressly stated in this application in a similar manner.

Unless otherwise stated, all ranges include both endpoints and all numbers between the endpoints. The use of "about" or "approximately" in connection with a range applies to both ends of the range. Thus, "about 20 to 30" is intended to cover "about 20 to about 30", inclusive of at least the specified endpoints.

The term "consisting essentially of" to describe a combination shall include the elements, ingredients, components or steps identified, and such other elements, ingredients, components or steps that do not materially affect the basic and novel characteristics of the combination. The use of the terms "comprising" or "including" to describe combinations of
elements, ingredients, components or steps herein also contemplates embodiments that consist essentially of the elements, ingredients components or steps. By use of the term “may” herein, it is intended that any described attributes that "may" he included are optional.

Plural elements, ingredients, components or steps can be provided by a single integrated element, ingredient, component or step. Alternatively, a single integrated element, ingredient, component or step might be divided into separate plural elements, ingredients, components or steps. The disclosure of "a" or "one" to describe an element, ingredient, component or step is not intended to foreclose additional elements, ingredients, components or steps.

The omission in the following claims of any aspect of subject matter that is disclosed herein is not a disclaimer of such subject matter, nor should it be regarded that the inventors did not consider such subject matter to be part of the disclosed inventive subject matter.
[0067] 44 markings on the catheter 18
CLAIMS

1) A device comprising:
   a catheter including:
      L an inner portion; and
   ii. a catheter stop located within the inner portion; and
   a medical instrument including:
      i. an outer portion; and
      ii. a medical instrument stop on the outer portion;
   wherein the medical instrument is moveably supported within the inner portion of the catheter, and
   wherein when the medical instrument is moved so that the medical instrument stop contacts the catheter stop, further movement of the medical instrument causes the catheter to move with the medical instrument,

2) The device of Claim 1, wherein the medical instrument stop includes a generally planar face and the catheter stop includes a generally planar face, and
   wherein when the planar face of the medical instrument stop contacts the planar face of the catheter stop, further movement of the medical instrument causes the planar face of the medical instrument stop to push the planar face of the catheter so that catheter moves with the medical instrument,

3) The device of Claim 1 or Claim 2, wherein an outer portion of the catheter includes one or more markings, and
   wherein the one or more markings are monitored with a viewing device so that a position of the catheter, the medical instrument, or both relative to a site of interest can be determined.

4) The device of Claim 3, wherein the one or more markings include one or more colored bands circumferential extending partially or completely around the outer portion of the catheter.

5) The device of Claim 3 or Claim 4, wherein the catheter includes one or more retaining features, and
wherein the one or more -retaining -features engage the site of interest so that the catheter is supported in the site of interest.

6) The device of Claim 5, wherein when the one or more retaining features engage the site of interest, the medical Instrument can be withdrawn from within the catheter while the catheter remains engaged at the site of interest.

7) The device of any of the preceding Claims, wherein the catheter includes a first portion, a second portion, and a transition,
wherein the first portion has a cross section that is larger than the second portion, and
wherein the transition connects the first portion and the second portion, and tapers from the first portion to the second portion.

8) The device of any of the preceding Claims, wherein after the medical instrument stop contacts the catheter stop, a medical instrument tip extends beyond a distal end of the catheter,

9) The device of Claim 8, wherein the medical instrument and the catheter can both penetrate the site of interest after the medical instrument distal tip pierces the site of interest and the medical instrument is moved into the site of interest.

10) The device of any of the preceding Claims, wherein the medical instrument is a needle.

11) A method comprising:
    a) inserting at least a portion of the device of any of the previous Claims into a site of interest;
    b) extending the medical instrument tip beyond the distal end of the catheter;
    c) engaging the medical instrument stop against the catheter stop;
    d) piercing the site of interest with the medical instrument tip;
    e) moving the medical instrument and the catheter together so that both the medical instrument and the catheter penetrate the site of interest; and
    f) withdrawing the medical instrument from the catheter.
12) The method of Claim 11, wherein the step of withdrawing the medical instrument from the catheter includes:

   g) maintaining the catheter in the site of interest with the one or more retaining features after the medical instrument has been withdrawn from the catheter.

13) The method of any of Claims 11-12, wherein the method includes:

   h) monitoring a position of the catheter at the site of interest with the viewing device and the one or more markings disposed on an outer portion of the catheter.

14) The method of any of Claims 11-13, wherein the method includes:

   i) inserting one or more medical devices, therapies, or medicines into the catheter after the medical instrument has been withdrawn from the catheter.

15) The method of any of Claims 11-14, wherein before the step of e) the method includes a step of engaging one or more retaining features of the catheter in the site of interest so that the catheter is at least temporarily supported in the site of interest.
1) A device comprising:
   a catheter including:
      i. an inner portion; and
      ii. a catheter stop located within the inner portion;
      iii. one or more retaining features located on the outer surface of the catheter; and
   a medical instrument including:
      i. an outer portion; and
      ii. a medical instrument stop on the outer portion;
   wherein the medical instrument is moveably supported within the inner portion of the catheter,
   wherein when the medical instrument is moved so that the medical instrument stop contacts the catheter stop, further movement of the medical instrument causes the catheter to move with the medical instrument, and
   wherein when the one or more retaining features engage a site of interest, the medical instrument can be withdrawn from within the catheter while the catheter remains engaged at the site of interest by the one or more retaining features.

2) The device of Claim 1, wherein the medical instrument stop includes a generally planar face and the catheter stop includes a generally planar face, and
   wherein when the planar face of the medical instrument stop contacts the planar face of the catheter stop, further movement of the medical instrument causes the planar face of the medical instrument stop to push the planar face of the catheter so that catheter moves with the medical instrument.

3) The device of Claim 1 or Claim 2, wherein an outer portion of the catheter includes one or more markings, and
   wherein the one or more markings are monitored with a viewing device so that a position of the catheter, the medical instrument, or both relative to a site of interest can be determined.
4) The device of Claim 3, wherein the one or more markings include one or more colored bands circumferentially extending partially or completely around the outer portion of the catheter.

5) (Cancelled)

6) (Cancelled)

7) The device of any of the preceding Claims, wherein the catheter includes a first portion, a second portion, and a transition, wherein the first portion has a cross section that is larger than the second portion, and wherein the transition connects the first portion and the second portion, and tapers from the first portion to the second portion.

8) The device of any of the preceding Claims, wherein after the medical instrument stop contacts the catheter stop, a medical instrument tip extends beyond a distal end of the catheter.

9) The device of Claim 8, wherein the medical instrument and the catheter can both penetrate the site of interest after the medical instrument distal tip pierces the site of interest and the medical instrument is moved into the site of interest.

10) The device of any of the preceding Claims, wherein the medical instrument is a needle.

11) A method comprising:

   a) inserting at least a portion of the device of any of the previous Claims into a site of interest;

   b) extending the medical instrument tip beyond the distal end of the catheter;

   c) engaging the medical instrument stop against the catheter stop;

   d) piercing the site of interest with the medical instrument tip;

   e) moving the medical instrument and the catheter together so that both the medical instrument and the catheter penetrate the site of interest; and
f) withdrawing the medical instrument from the catheter.

12) The method of Claim 11, wherein the step of withdrawing the medical instrument from the catheter includes:

   g) maintaining the catheter in the site of interest with the one or more retaining features after the medical instrument has been withdrawn from the catheter.

13) The method of any of Claims 11-12, wherein the method includes:

   h) monitoring a position of the catheter at the site of interest with the viewing device and the one or more markings disposed on an outer portion of the catheter.

14) The method of any of Claims 11-13, wherein the method includes:

   i) inserting one or more medical devices, therapies, or medicines into the catheter after the medical instrument has been withdrawn from the catheter.

15) The method of any of Claims 11-14, wherein before the step of e) the method includes a step of engaging one or more retaining features of the catheter in the site of interest so that the catheter is at least temporarily supported in the site of interest.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61B17/34
ADD. A61M25/00 A61M25/01 A61M25/09 A61B90/00

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61M A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
*A* document defining the general state of the art which is not considered to be of particular relevance
*E* earlier application or patent but published on or after the international filing date
*L* document which may throw doubts on priority claim(s) or which establishes the publication date of another citation or other special reason (as specified)
*O* document referring to an oral disclosure, use, exhibition or other means
*P* document published prior to the international filing date but later than the priority date claimed
*I* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*A* document member of the same patent family

Date of the actual completion of the international search

2 June 2016

Date of mailing of the international search report

09/06/2016

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

Authorized officer

Przykutta, Andreas
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**INTERNATIONAL SEARCH REPORT**

**Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **Claims Nos.: 11-15**
   - because they relate to subject matter not required to be searched by this Authority, namely:
     - Independent claim 11 and dependent claims 12-15 are describing methods for treatment of the human body by surgery. Therefore no search and no International preliminary examination will be carried out, regarding to Rule 39.1(iv) PCT and Rule 67(1)(iv) PCT.

2. **Claims Nos.:**
   - because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **Claims Nos.:**
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. **As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.**

2. **As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.**

3. **As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:**

4. **No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:**

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.
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