undesirable feelings of restricted movement, impinged comfort and/or tube drag due to the medical tube's weight may be beneficially reduced.

A medical tube of reduced mass may further be beneficial due to the reduced use of material resulting in a more cost-effective medical tube per unit length. This is particularly beneficial in hospital environments where the majority of medical tubes are disposed after single patient use and/or a set period of time.

It is desirable to provide a medical tube that for a given pitch, diameter, geometry of the bead, film thickness and film inward bias, has a reduced use of material and therefore a reduced mass per unit length.

Alternatively, or additionally, it is desirable to provide a medical tube that for a given: pitch, diameter, geometry of the bead, film thickness and film inward bias, has a reduced use of material and therefore a reduced cost of material per unit length.

Summary of Invention

Various embodiments of the present disclosure will now be described by way of the following embodiments. However, it will also be appreciated that the features described herein can be combined in other embodiments.

According to one aspect, there is provided a medical tube comprises a conduit, the conduit formed from a spirally wound bead and a spirally wound film, wherein the spirally wound bead forms a plurality of successive coils, each of the plurality of successive coils having an internal diameter and an external diameter; and the spirally wound film extends between adjacent coils of the bead, wherein the film is bonded at a first location on a surface of a first coil of the bead and at a second location on a surface of a second coil of the bead, wherein the first coil is adjacent to the second coil, wherein the first location and the second location are located between the internal diameters and external diameters on opposed sides of respective first and second adjacent coils such that the spirally wound film extending between the first and second coils of the bead does not overlap any sections of the spirally wound film extending between further adjacent coils of the bead, wherein the spirally wound film is inwardly biased between

the first and second coils of the bead such that the film extends inwards by an inward bias distance towards a longitudinal axis of the medical tube when the medical tube is at rest, and such that the inner surface of the film facing the longitudinal axis is convex and the outer surface of the film facing radially outwardly from the longitudinal axis is concave when the medical tube is at rest, the inward bias distance being: the distance between the internal diameter and the point of the film located closest to the longitudinal axis when the medical tube is at rest, and between 0.1mm and 0.3mm when the medical tube is at rest.

Claims

1. A medical tube comprising a conduit, the conduit formed from a spirally wound bead and a spirally wound film, wherein:

the spirally wound bead forms a plurality of successive coils, each of the plurality of successive coils having an internal diameter and an external diameter; and

the spirally wound film extends between adjacent coils of the bead, wherein the film is bonded at a first location on a surface of a first coil of the bead and at a second location on a surface of a second coil of the bead, wherein the first coil is adjacent to the second coil,

wherein the first location and the second location are located between the internal diameters and external diameters on opposed sides of respective first and second adjacent coils such that the spirally wound film extending between the first and second coils of the bead does not overlap any sections of the spirally wound film extending between further adjacent coils of the bead,

wherein the spirally wound film is inwardly biased between the first and second coils of the bead such that the film extends inwards by an inward bias distance towards a longitudinal axis of the medical tube when the medical tube is at rest, and such that the inner surface of the film facing the longitudinal axis is convex and the outer surface of the film facing radially outwardly from the longitudinal axis is concave when the medical tube is at rest, the inward bias distance being:

the distance between the internal diameter and the point of the film located closest to the longitudinal axis when the medical tube is at rest, and

between 0.1mm and 0.3mm when the medical tube is at rest.

2. The medical tube of claim 1, wherein each of the plurality of successive coils has a substantially uniform internal diameter and a substantially uniform external diameter when the medical tube is at rest.

3. The medical tube of claim 1 or claim 2, wherein the spirally wound bead comprises a thermoplastic polyurethane or a thermoplastic elastomer and/or, wherein the spirally wound film comprises a thermoplastic polyurethane or a thermoplastic elastomer.

4. The medical tube of any one of claims 1 to 3, wherein a length of the conduit is between 100mm to 1000mm when the medical tube is at rest, or wherein the length of the conduit is approximately 300mm when the medical tube is at rest.

5. The medical tube of any one of claims 1 to 4, wherein the plurality of successive coils comprises a pitch, and the pitch is between 1.5mm to 3.5mm when the medical tube is at rest.

6. The medical tube of any one of claims 1 to 5, wherein the conduit has a minimum internal diameter between 10mm to 16.8mm when the medical tube is at rest, and/or wherein the plurality of successive coils have an internal diameter between 10mm to 17mm when the medical tube is at rest, and/or wherein the plurality of successive coils have an external diameter between 11mm to 18mm when the medical tube is at rest, and/or wherein the plurality of successive coils have an external diameter between 16mm to 20mm when the medical tube is at rest.

7. The medical tube of any one of claims 1 to 6, wherein the spirally wound bead has a cross-sectional shape that is substantially D-shaped, or wherein the spirally wound bead has a cross-sectional shape that is substantially elliptical, or wherein the spirally wound bead has a cross-sectional shape comprising a flattened elliptical shape.

8. The medical tube of any one of claims 1 to 7, wherein the spirally wound bead has a cross-sectional width of approximately 1mm in a direction parallel to the longitudinal axis of the medical tube and a cross-sectional height of approximately 1mm in a direction perpendicular to the longitudinal axis of the medical tube, and/or wherein the spirally wound film has a thickness of 0.05mm to 1mm.

9. The medical tube of any one of claims 1 to 8, wherein the conduit has a ratio of thickness of the spirally wound bead to the spirally wound film of 1:0.05 to 1:1, and/or wherein the medical tube has a resistance to flow of less than or equal to 1.5mm/H_2O when in a straightened nonextended position at 30L/Min, and/or wherein the plurality of successive coils have a coil angle between 3 degrees and 6 degrees, and/or wherein the conduit has a strength in tension greater than 40N when extended at 60mm/min, and/or wherein the conduit has a strength in tension of at least 120N when extended at 60mm/min, and/or wherein the conduit can elongate from 100% of its resting length up to at least 210% of its resting length without substantial plastic deformation

occurring, and/or wherein the conduit has a weight between 20 grams per meter and 100 grams per meter.

10. The medical tube of any one of claims 1 to 9, wherein the first and/or second locations comprise a portion of the bead adjacent the external diameter of the bead, and/or wherein opposing edges of adjacent windings of the film are disposed on the bead adjacent each other and/or in a facing relationship, and/or wherein the first location and the second location are asymmetric.

11. The medical tube of any one of claims 1 to 10, wherein the film, in cross-section, forms an angle of between 170 degrees and 190 degrees, or wherein the film, in cross-section, forms an angle of 180 degrees at a point of inflection, and/or wherein the film, in cross-section, forms a substantially sinusoidal shape about the bead.

12. The medical tube of any one of claims 1 to 10, wherein the film, in cross-section, forms an angle of between 45 degrees and 135 degrees, or between 80 degrees and 100 degrees, or 90 degrees, at a point of inflection.

13. The medical tube of any one of claims 1 to 10 or claim 12, wherein the first location and/or the second location, in cross-section, extends inwardly beyond a parallel axis and/or a widest point of the bead.

14. The medical tube of any one of claims 1 to 10, claim 12 or claim 13, wherein the film forms an Omega (Ω)-shape about each of the coils.

15. The medical tube of any one of claims 1 to 14, further comprising a first connector at a first end configured for connection with a patient interface, and a second connector at a second end configured for connection with a respiratory device.