TRACHEOBRONCHIAL STENTING

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AIRWAY STENT

- Hollow, cylindrical prosthesis that maintains luminal patency and dimensions of tubular structure by opposing extrinsic compressive forces and providing internal support
- Stent insertion for tracheobronchial obstruction after Laser/ Electrosurgery results in immediate relief of acute respiratory distress, successful weaning from mechanical ventilation and prolonged survival

IDEAL AIRWAY STENT

- Airway patency and conform to tortuosity
- Ease of insertion and removal
- Biocompatibility
- Inexpensive cost
- Minimal mucosal injury or granulation tissue
- No interference with mucociliary clearance
- No migration

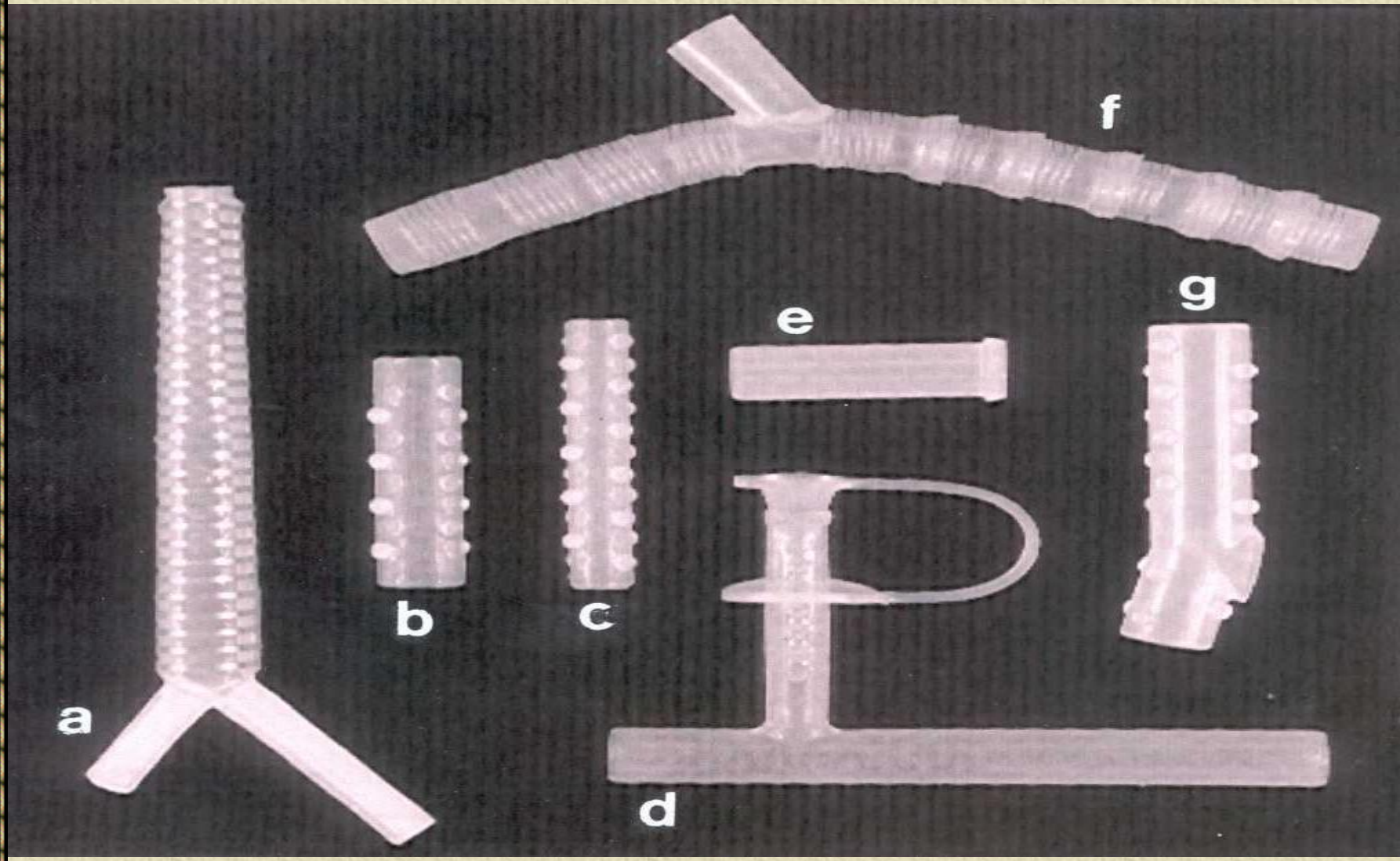
INDICATIONS

- Airway obstruction from extrinsic bronchial compression or submucosal disease
- Obstruction from endobronchial tumor when patency is <50% after laser photoresection
- Aggressive endobronchial tumor growth and recurrence despite repetitive laser treatments
- Loss of cartilaginous support from tumor destruction
- Sequential insertion of airway and esophageal stents for tracheoesophageal fistulas
- Subglottic stenosis after failure of dilatation
- Benign tracheobronchial stenosis: congenital/ acquired
- Tracheomalacia: congenital/ idiopathic/acquired
- Tracheobronchial compression: vascular anomalies, fibrosing mediastinitis

TUBE STENTS

- Montgomery T-tube — Subglottic and midtracheal stenosis
- **Dumon** — Silicone tube with external studs
  Most widely used silicone stent
  Y shaped and right main bronchus design
- Hood — Smooth silicone tube with flanges
  L- or Y-shape design
- Reynders — Screw-thread cylindrical silicone prosthesis
  Needs a special introducer.
- Dynamic — Silicone Y-stent with the anterior and lateral wall steel struts to simulate the tracheal wall.
  Requires special forceps with rigid laryngoscope
- Polyflex — Self-expandable stent made of polyester wire mesh with a thin layer of silicone.
- Novastent — Silicone stent with small metallic hoop of nitinol alloy and bands on the ends.

Silicone and Hybrid Stents



A: Rusch stent, B,C: Dumon stent, D: Montgomery T-tube,
E, G: Hood stents, F: Orlowski stent

Characteristics of Metallic Stents

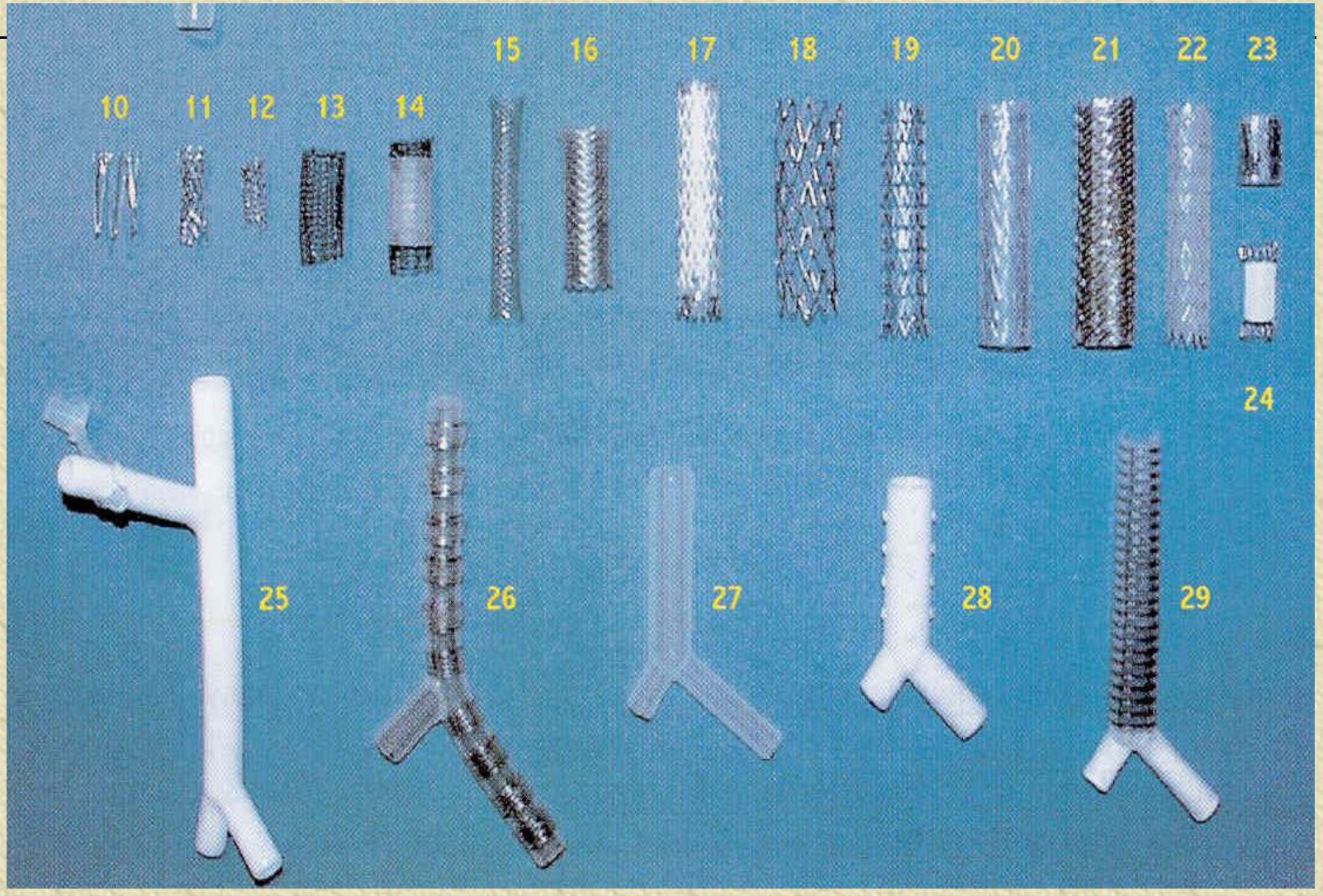
Ballon-expandable

- Strecker: Tantalum monofilament knitted into a wire-mesh. Most useful in narrow stenoses.
- Palmaz: Stainless-steel tube with rectangular slots along the long axis. May collapse with strong external pressure such as a vigorous cough

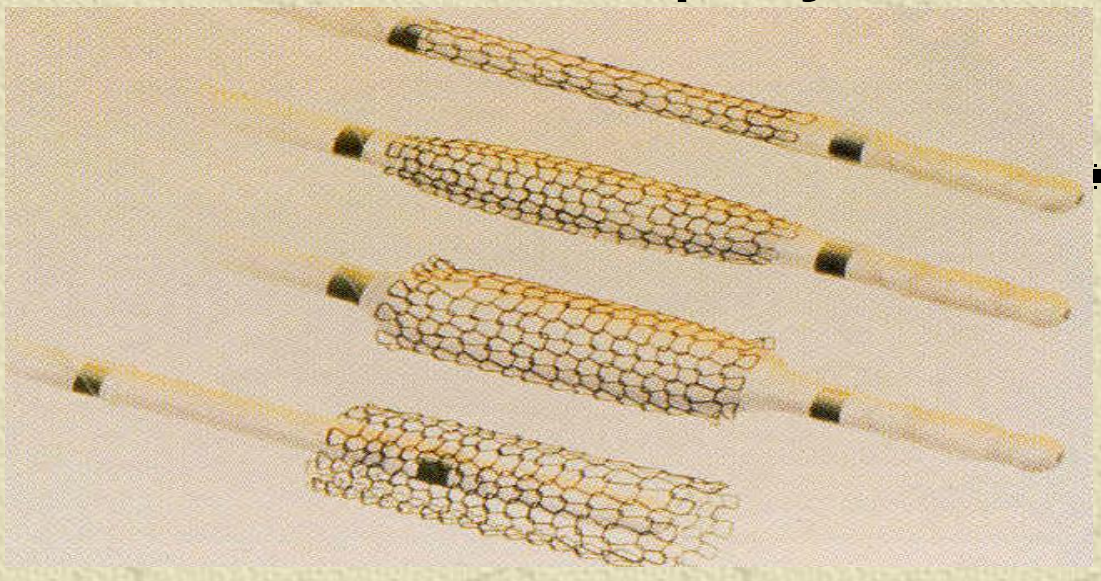
Self-expandable

- Gianturco Z: Stainless-steel monofilament bent into a zigzag configuration to form a cylinder. Fixation achieved by small hooks. Serious reported complications include bronchial wall perforation, stent fractures and granuloma formation.
- Ultraflex: Cylindrical wire mesh of nitinol. Available in covered and uncovered form. Limited experience.
- Wallstent: Wire mesh made of cobalt-based alloy filaments and coated with silicone. Uncovered metallic ends prevent migration.

METAL AND HYBRID STENTS

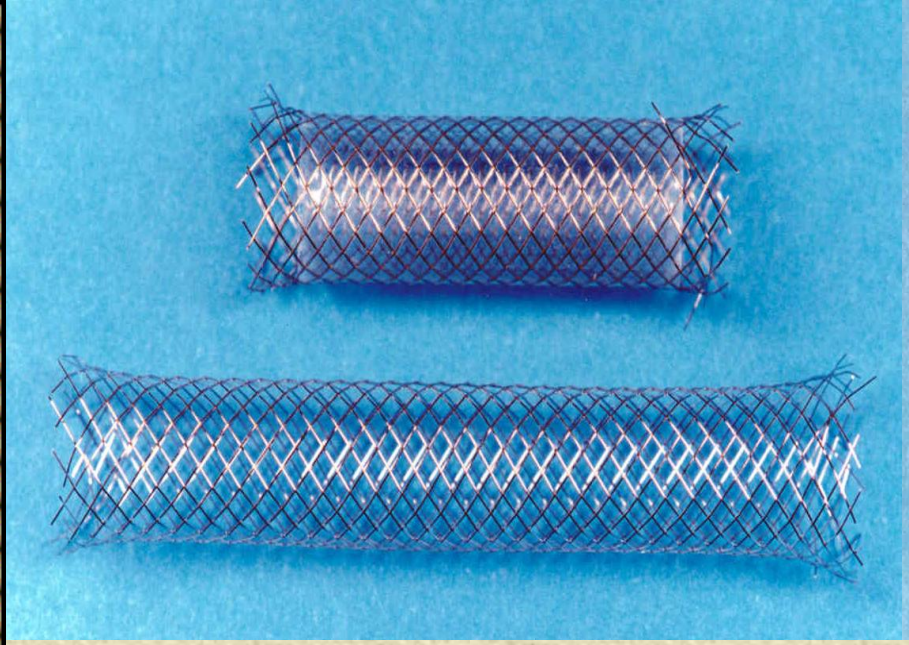


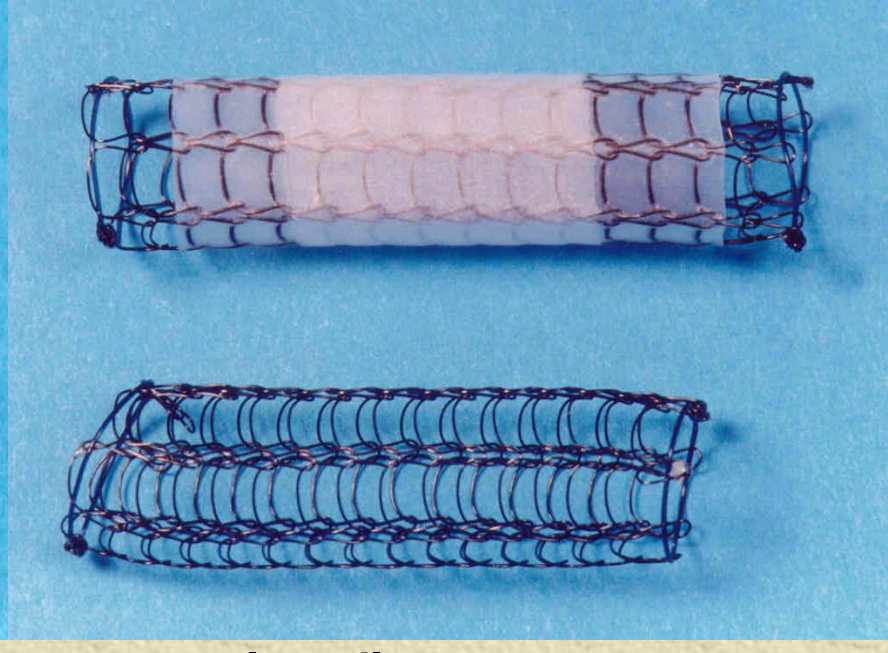
Stent Deployment Systems



Strecker stent: different phases of deployment

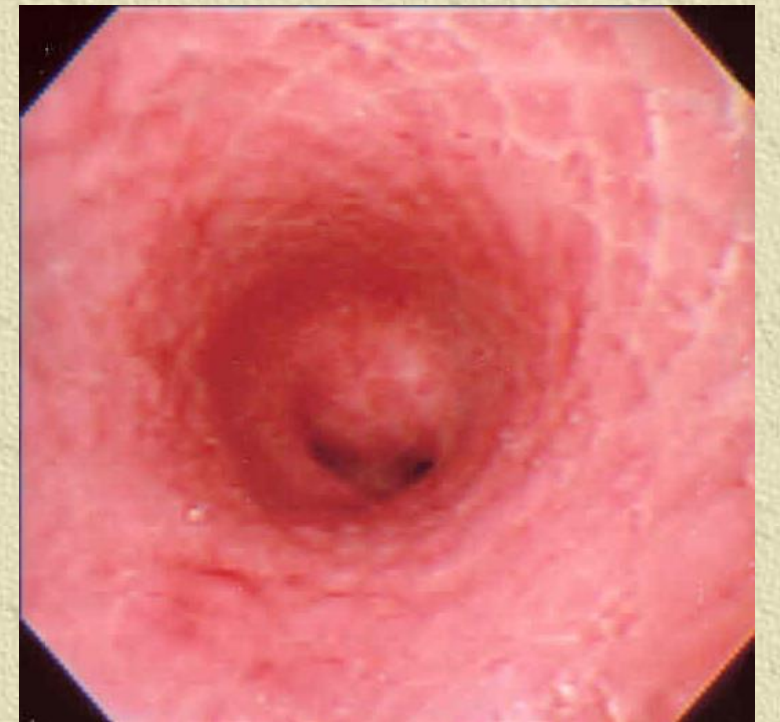
Wallstent

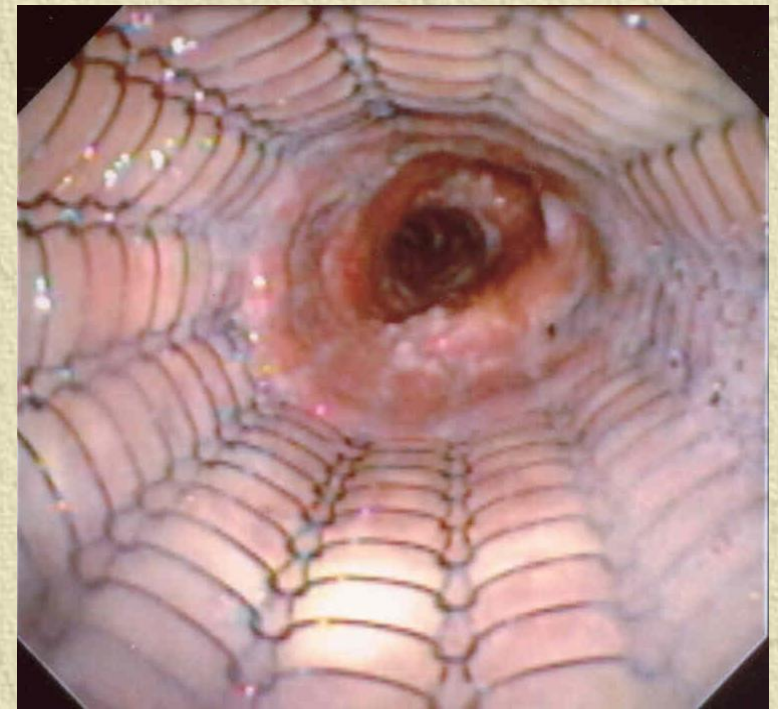




Wallstent

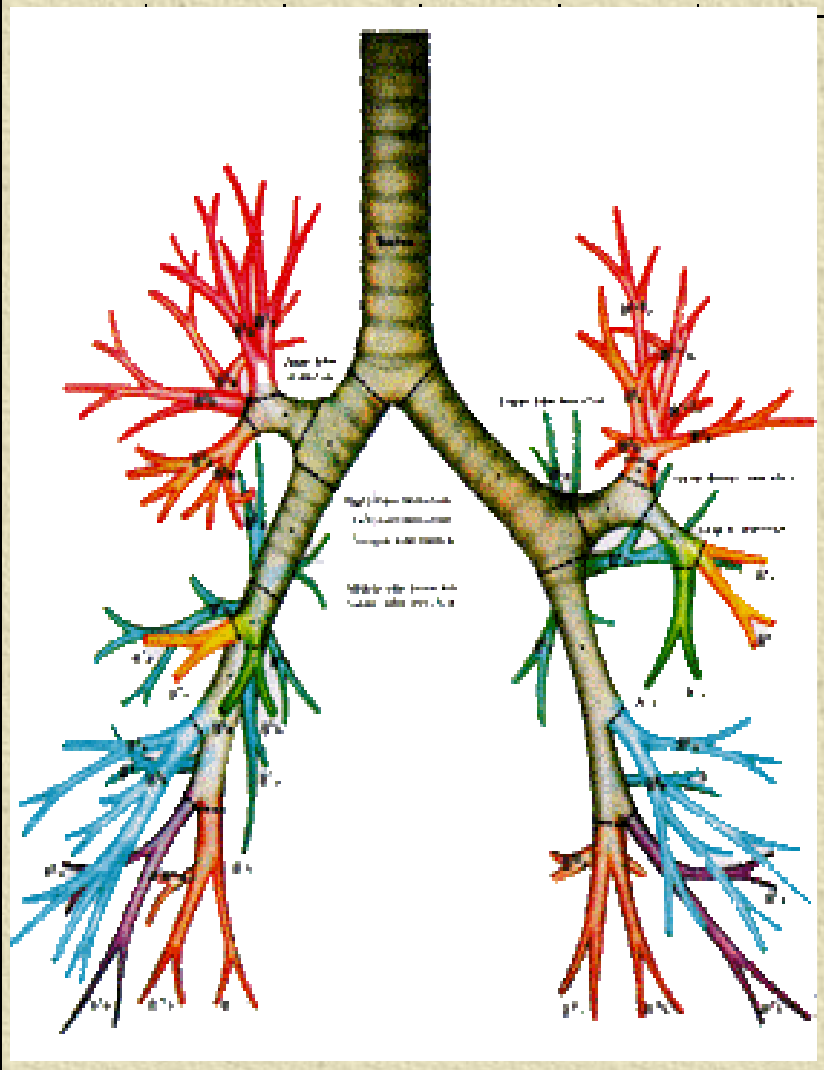
Ultraflex stent





Characteristics	Dumon Stent	Covered Wallstent
Mechanical considerations		
High internal to external diameter ratio	-	+++
Resistant to recompression when deployed	+	++
Radial force exerted uniformly across stent	+	++
Absence of migration	-	++
Flexible for use in tortuous airways	-	+++
Removable	+++	-
Dynamic expansion	-	++
Can be customized	+++	-
Tissue-stent interaction		
Biologically inert	++	++
Devoid of granulation tissue	+	-
Tumor ingrowth	++	+
Ease of use		
Can be deployed with FB	-	+++
Deployed under local anesthesia	-	++
Radiopaque for position evaluation	-	+++
Can be easily repositioned	++	-
Cost		
Inexpensive	+	-

Tracheobrobronchial Anatomy



- Sizing is important
- Length of Stent should over-extend stenosis 0.5cm proximally and distally
- Trachea
  - Length 9 -15cm
  - Diameter 1.3-2.2cm
- Right Mainstem Bronchus
  - Length 1.5cm
  - Diameter 1-1.2cm
- Left Mainstem Bronchus
  - Length 4-4.5cm
  - Diameter 0.8-1mm