

# Larynx, trachea and bronchi - structure and function

## Larynx (*larynx*)

 For more information see *Larynx (histological slide)*.

The larynx is the first compartment of the lower respiratory tract and is lined with airway mucosa. The skeleton is composed of a series of **cartilages**. The large cartilages are hyaline, which ossify in adulthood. The small cartilages are elastic.

The laryngeal cavity arches in 2 lobes:

- **upper lash: plica vocalis**
- **lower lash: plica vestibularis**

Between them runs a fold, the *ventriculus laryngis*.

The entire mucosa of the larynx, except for the *plica vocalis*, is covered by a *multi-rowed cylindrical epithelium with cilia and goblet cells*. The **lamina propria mucosae** of the *plica vestibularis* is composed of sparse collagenous connective tissue containing collagen fibres and fibroblasts, and also contains small **seromucinous glands** that often extend to the cartilaginous submucosa.

The vocalis lung is covered by a **layered squamous epithelium that does not thicken**. **Beneath the epithelium on the plica vocalis, glands are absent; there is very sparse connective tissue into which elastic fibers run from the ligamentum vocale (elastic ligament)**. Laterally, bundles of striated muscle run **musculus vocalis**.

In the fold of the larynx (*ventriculus laryngis*), **seromucinous glands are abundant in the lamina propria mucosae** and there is an accumulation of elements of the lymphatic lineage, sometimes organized into **lymphatic follicles** (*tonsilla laryngea*).

## Trachea (*trachea*)

 For more information see *Trachea (histology)*.

Trachea and bronchi are the continuation of the lower airway. The trachea is a tube reinforced by **ring-shaped hyaline cartilages** (15-20). The cartilages are open posteriorly, connected by a **connective membrane** (*pars membranacea tracheae*) connected by ligaments and circularly arranged **bundles of smooth muscle** (*tunica fibro-musculo-cartilaginea*).

The trachea is divided into **pars cervicalis**, which is located in the anterior part of the visceral space. It further contains dorsally - oesophagus, ventrally - *isthmus glandulae thyroideae*, infrahyoid muscles, vv. thyroideae inferiores (mouth to plexus thyroideus impar - mouth to v. brachicephalica), laterally - lobi glandulae thyroideae, n. **Pars thoracica** in the upper mediastinum, also contains dorsally - oesophagus, ventrally - *arcus aortae*, from which branches to *plexus brachiocephalicus* (dx.), *a. carotis communis sin.*, *a. subclavia sin.*, thymus. Laterally - v. *cava inferior* (dx.), v. *azygos*, n. *laryngeus recurrens*, n. *vagus dx. i sin.* The trachea also touches the pulmo dx. separated by the mediastinal pleura. The boundary of the pars cervicalis and pars thoracica is defined by the upper margin of the *manubrium sterni*, *apertura thoracis superior*.

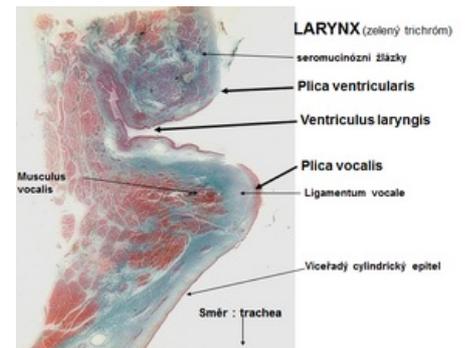
The syntopia of the beginning of the trachea is projected at the level of the C6 vertebrae, as a continuation of the larynx (C5 in infants and C4 in neonates) and ends as the **bifurcatio tracheae** at the level of the **Th4-5 vertebrae**.

**Arterial supply: rr. tracheales** (a. thyroidea inferior), *rr. bronchiales* (aorta abdominalis)

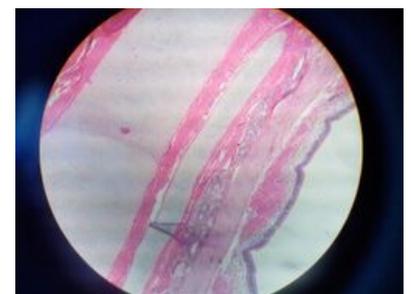
**Venous supply: vv. tracheales**

**Lymphatic supply: nodi lymphoidei paratracheales, nodi lymphoidei tracheobronchiales**

**Nerve supply: PS - n. laryngeus recurrens (n. vagus)**



Histological slide of larynx



Trachea

The wall of the trachea is composed of 3 layers. **Tunica mucosa** - covered by **multilayered cylindrical epithelium**, except for the bifurcation, which contains mostly **layered squamous nonconfluent** epithelium. On the mucosal surface there are small seromucinous glands **glandulae tracheales** that extend into the submucosa. In the *lamina propria mucosae* there are islands of lymphoid tissue. In contrast to the alimentary canal, where the muscularis mucosae forms a boundary, a layer of longitudinal elastic fibres (*conus elasticus*) separates the lamina propria mucosae from the tunica submucosa. The submucosa attaches either directly to the perichondrium of the hyaline cartilage or to the *tunica muscularis*. **Tunica fibro-musculo-cartilaginea** is composed of 15-20 cartilagineae tracheales, which are connected by *ligg. anularia*. The trachea with the cartilago cricoidea is connected by *lig. cricotracheale*. The posterior side of the trachea is formed by the *pars membranacea* and bundles of smooth muscle oriented longitudinally and transversally form the *m. trachealis*. *Tunica adventitia* continues into the interstitial ligament into the mediastinum. It connects the trachea to the environment and also allows its movements during respiration. It contains sparse collagenous connective tissue.

## Bronchi (*bronchi*)

 For more information see *Bronchi (histology)*.

Bronchioles (histology)

*Bronchi* branch and the cartilage gradually shrinks until only small fragments remain at the bifurcation points. The main supporting component of the wall consists of **circularly or spirally arranged bundles of smooth muscle, supplemented by elastic and reticular fibres**. The epithelium also gradually decreases from multilayered cylindrical epithelium with cilia to **single-layered cylindrical** in the terminal bronchiole, which lacks kinocilia, and to **cuboidal to squamous epithelium** in the respiratory bronchioles. There are neither goblet cells nor glands, but *Clara cells* appear. The apical part of the cells of the Clara cells is convex and contains secretory granules and a smooth endoplasmic reticulum, which is massively developed here. The Golgi complex, the granular endoplasmic reticulum, which in contrast is not very well developed, and the mitochondria are in the basal part and near the nucleus. These cells produce surfactants (lipoproteins and CC16 protein) that prevent luminal adhesion during expiration. At the sites of bronchial bifurcation, cells of the neuroendocrine system DNES or chemoreceptors are found.



Bronchus

## References

### Related articles

- Mucosa of the airways
- Larynx
- Trachea
- Trachea (histological preparation)
- Portal:Respiratory system

### Literature

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