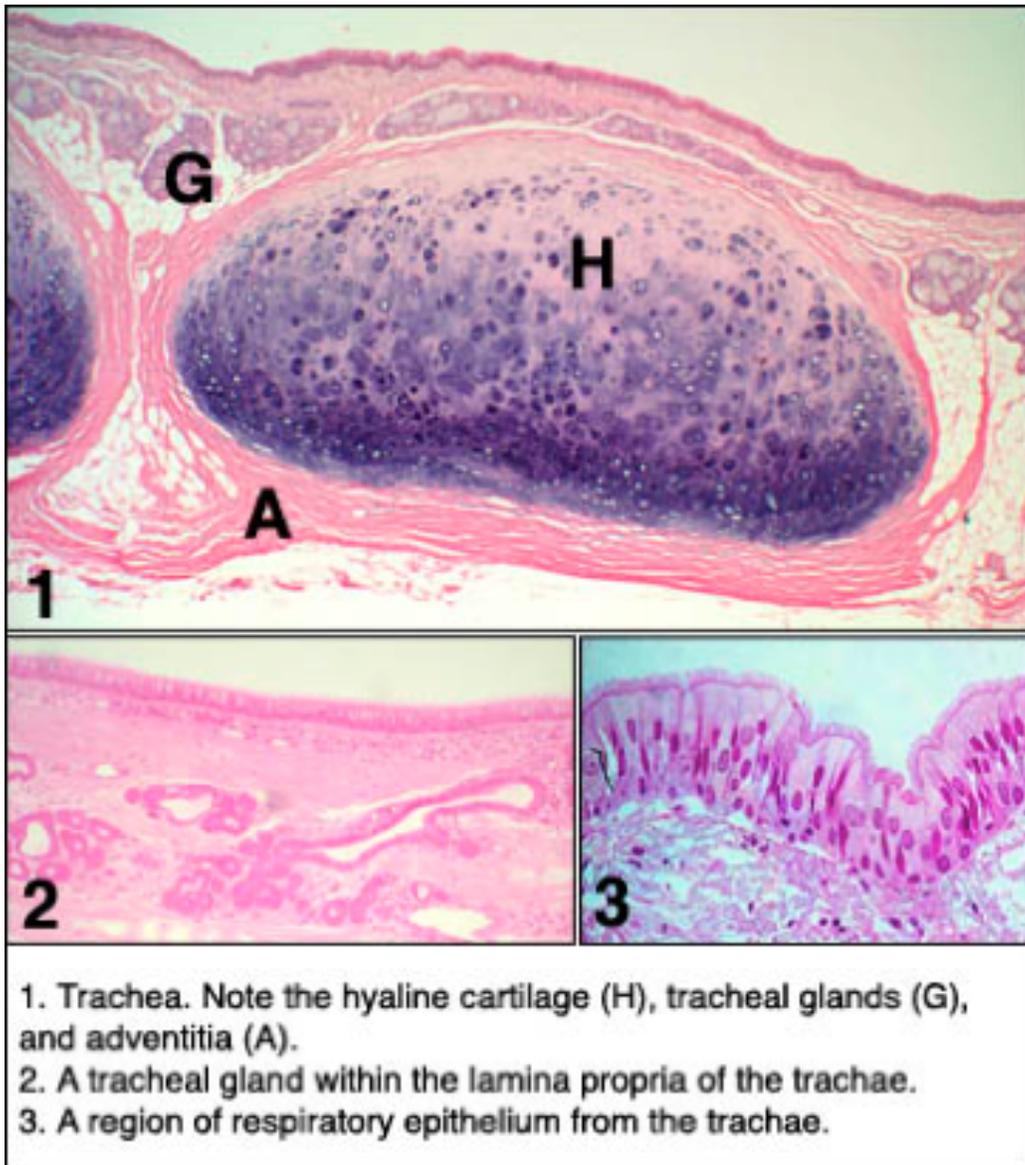


Trachea & Extrapulmonary Bronchi



The walls of the trachea and its terminal branches (the primary bronchi) are characterized by the presence of 15 to 20 C-shaped rings of hyaline cartilage that maintain patency of the airway. The spaces between successive rings are filled with dense fibroelastic connective tissue, and the gaps between the arms of the cartilages are filled with bundles of smooth muscle referred to as the trachealis muscle. The gaps are directed posteriorly, and in section, the trachea and extrapulmonary bronchi appear flattened. The lining epithelium consists of a ciliated pseudostratified columnar epithelium with numerous goblet cells that rests on a thick basal lamina. Cilia beat toward the pharynx. In addition to the ciliated and goblet cells, several other cell types have been described in the tracheobronchial epithelium. Brush cells contain glycogen granules, show long, straight microvilli on their apical surfaces, and basally, make contact with nerve processes. They are rare in humans and their function is unknown, but they may be sensory cells, exhausted goblet cells, or intermediates between short cells and mature

ciliated cells. Small granulated cells known as pulmonary neuroendocrine cells are few in number and scattered. They are part of a pulmonary neuroendocrine system that extends throughout the respiratory tree. These cells are part of a diffuse system of cells that contain amines (serotonin (5-HT)) and amine precursors as well as a number of peptides that are thought to act locally on adjacent cells and on tracheal and bronchial smooth muscle cells. The diffuse pulmonary neuroendocrine cells in the epithelium lining the trachea and bronchi are thought to be excitable cells capable of detecting hypoxia and can release powerful relaxing and contracting factors in response to different oxygen concentrations to modulate the contraction of adjacent airway smooth muscle cells. Short cells occur in the depths of the epithelium between the bases of the other cell types and are undifferentiated cells that give rise to goblet and ciliated cells. A network of dendritic cells lies along the base of the tracheal epithelium. They function as antigen-presenting cells capable of binding and presenting antigens to T-lymphocytes. The lamina propria contains many small seromucous tracheal glands and occasional accumulations of lymphatic tissue. The serous units of these compound tubuloacinar glands produce a thin, watery secretion rich in glycoproteins, lysozyme and IgA acquired from adjacent lymphoid cells. Myoepithelial cells are associated with the secretory units of the tracheal glands and aid in expression of secretory product. External to the cartilage is a fibroconnective tissue coat, the adventitia, which contains elastic, collagenous and reticular fibers, blood vessels, and nerves.

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