

Innervation of the Respiratory Organs

Lecture Note: Anatomy

Introduction:

Innervation refers to the distribution of nerves to various parts of the body. The respiratory organs, including the lungs, diaphragm, and bronchial tree, are innervated by the autonomic nervous system and somatic motor neurons. This lecture will provide an overview of the innervation of the respiratory organs and the role of the nervous system in regulating respiratory function.

Autonomic Innervation:

The autonomic nervous system, specifically the parasympathetic and sympathetic divisions, plays a crucial role in regulating the respiratory system.

Parasympathetic innervation, mediated by the vagus nerve (cranial nerve X), leads to bronchoconstriction, increased glandular secretion, and stimulation of respiratory muscles. In contrast, sympathetic innervation, originating from the thoracic and upper lumbar spinal cord, causes bronchodilation and decreased glandular secretion.

Somatic Motor Innervation:

The diaphragm, the primary muscle of respiration, is innervated by the phrenic nerve, arising from the cervical spinal nerves C3-C5. The intercostal nerves, derived from the thoracic spinal nerves, innervate the intercostal muscles, which play a role in the expansion and contraction of the ribcage during breathing.

Role of Nervous System in Respiratory Control:

The nervous system also plays a vital role in respiratory control, regulating the rhythm and depth of breathing. The respiratory centers in the brainstem receive input from various receptors, including chemoreceptors sensitive to carbon dioxide and oxygen levels, and adjust the rate and depth of breathing to maintain optimal gas exchange.