Unit II - Problem 6

Respiratory System Physiology: Neural & Chemical Control of Respiration

Dr. Amer AlAnsari Slides + Dr. Najeeb's Video Notes

❖ **Neural (or Central) Control of Respiration:**

Name	Location	Function
Dorsal Respiratory Group	Found in the dorsal side of the medulla oblongata, most of its neurons in nucleus of Tracrus Solitarius	Provides a *ramp* signal which causes inspiration by supplying the phrenic & intercostal nerves causing the contraction of the diaphragm & the external intercostal muscles, & when stopped expiration starts.
Ventral Respiratory Group	Found in each sides of the ventral view of the medulla oblongata in the nucleus ambiguus & retroambiguus	Excite internal intercostal muscles, abdominal muscles, ..etc resulting in forceful expiration. And it also
Pneumotaxic Centre	Found in the nucleus parabrachialis in the upper pons	Inhibiting inspiration
Apneustic Centre	Lower pons	Excite the inspiratory area / Apenusis
Cerebro-spinal Neurons	In the cerebral cortex	+ or - the dorsal inspiratory center (voluntary control)
Emotional control of Respiration	Hypothalamus & limbic system	+ or - the inspiratory center by having desending neurons that reach there.

❖ **Chemical Control of Respiration:**

Name	Location	Function
Central Chemoeceptors	Bilaterally beneath the ventral surface of the medulla oblongata	Excitation of this area is mainly done by H+ found in the cerebral ISF due to ↑ [CO_2] in blood, and this is stimulate the respiratory centers ➔ ↑ the rate & depth of breathing
Peripheral Chemoreceptors (Carotid & Aortic bodies)	Carotid & aortic bodies	Stimulate the medullary inspiratory center through the glossopharyngeal & vagus nerve when the PO_2 is ↓
Juxtacapillary receptors "J cells"	Present in the wall of the alveoli and have close contact with the pulmonary capillaries	Stimulated when there is pulomary edema, that leads to increased respiratory rate (shallow and rapid breathing) ➔ dyspnea
Irritant receptors	On the wall of the bronchi & bronchioles (between the airway epithelial cells)	Produces hyperventilation & bronchospasm
Lung stretch receptors	In smooth muscles of the bronchi & bronchioles	Ternimation of inspiration (inspiration interval ↑ & expiration interval ↓) ***Hering-Breuer Inflation Reflex***
Proprioceptors	Locomotor (joints, muscles, and tendons)	Stimualted during exercise to cause hyperventilation
Thermoreceptors	Cutaneous layer	Give response to change in the body temperature causing hyperventilation
Pain receptors	-	Give response to pain stimulus causing hyperventilation