Studies on Respiration*

EFFECT ON RESPIRATION OF AFFERENT IMPULSES FROM THE UPPER RESPIRATORY PASSAGES

Dr. H. D. SINGH & PARESH REDDY,

Department of Physiology, Madras Medical College, Madras.

Respiratory reflexes from the upper respiratory passages are protective reflexes which guard the respiratory tract and depths of the lungs from harmful agents. Though in the clinics and hospitals many procedures are adopted, which somehow or other provoke reflexes from the upper respiratory passages, very little attention seems to have been paid to the origin, and function of these reflexes in human subjects.

These reflexes have been extensively investigated in dogs, cats and rabbits. It is well known that in the unanaesthetized animal stimulation of the nasal mucous membrane frequently induces sneezing - (Dukes 1947). Luciani (1911) states that chemical stimulation of the nasal mucosa induces sneezing while electrical excitation produces expiratory arrest. Stimulation of the mucous membrane of the pharynx, larynx and trachea, or of the nerves which supply these regions (the glosso-pharyngeal, the superior and the inferior (recurrent) laryngeal nerves) leads to inhibition of respiration in the expiratory position, and the well known inhibition of respiration during the second stage of the act of swallowing is due to afferent impulses arising in the pharyngeal mucosa (Ranson 1921).

Titelbaum and his co-workers (1934, 35, 36) found, in the anaesthetized cat that mechanical stimulation of the pharyngeal or pharyngo-palatine mucosa, by a cotton swab inserted through the mouth, usually causes acceleration of respiration, and in some

*A Paper read before the Physiology Section of Indian Science Congress, Agra, January 1956.
instance inhibition of respiration, and that cocainisation of the mucosa first abolishes the hyperpnoeic and then the inhibitory response. They showed that the pharyngeal accelerator response is mediated by the glossopharyngeal nerve, while the inhibitory reflex is initiated by the pharyngeal branches of the vagus nerve. They also observed that while stimulation of the central end of the glossopharyngeal nerve caused inhibition of respiration in the rabbit, the response in the cat was an increase in rate and depth of respiration. They found that stimulation of the pharyngeal branch of the vagus in the cat inhibits respiration while Knoll (1882) found that this had no effect in the rabbits.

Stimulation of the mucous membrane of the larynx in the unanaesthetised animal not only causes inhibition of respiration, but also powerful expiratory efforts (coughing). (Dukes 1947). The afferent paths of this cough reflex are the superior and inferior laryngeal nerves. (Lucian 1911). Foster (1895) states that stimulation of the superior laryngeal nerve always produces slowing or respiratory standstill, inhibition of inspiration being accompanied by contractions of abdominal muscles. Hammouda and Wilson (1939) observed that continuous stimulation of the superior laryngeal nerve in the lightly anaesthetised animal frequently produced acceleration of respiration, but stimulation of the nerve in the fully anaesthetised or decerebrate animal always resulted in the arrest of respiration in the expiratory position. Gesell and Hamilton (1941) report that faradic stimulation of the superior laryngeal nerve produces an expiratory response varying in degree with the strength of the stimulus and with the individual. The reflexes from the upper respiratory passages are considerably modified during anaesthesia, and probably when the individual is unconscious due to other reasons. (Schmidt 1938).

Present Investigation.--In this investigation, the reflexes from the nasal, pharyngeal and laryngeal mucosa were studied in dogs anaesthetized with chloralose, administered intravenously in doses of 10 c.c. of a 1% solution per Kg.m. of body weight.