

THE RELATION OF THE TUBER CINEREUM TO GASTRIC
AND CARDIAC FUNCTIONS

(A PRELIMINARY NOTE)

BY J. BEATTIE,

Department of Anatomy, McGill University, Montreal

BEATTIE, Brow and Long¹ (1930) demonstrated the relation of the posterior hypothalamus to the sympathetic nervous system. They showed that stimulation of this part of the hypothalamus gave rise to adrenalin secretion, increased heart rate and diminished A-V conduction time. They noted also that destruction of the same region abolished an extrasystolic arrhythmia induced by chloroform anaesthesia. This abnormal rhythm was dependent on an intact sympathetic nervous system. The A-V conduction time (P-R interval) was increased when the posterior hypothalamus was destroyed or its efferent pathways severed.

Cushing³ (1931) in a series of papers produced evidence to show that increased salivation, lachrymation, hypermotility, and hypersecretion of the stomach followed by vomiting could be produced by the introduction of the extract of the posterior lobe of the pituitary gland into the cerebral ventricular system. He postulated a "parasympathetic" centre which could be excited by such an injection. On the basis of Poppa and Fielding's⁵ (1930) findings that a system of channels existed between the posterior lobe and the nuclei of the hypothalamus within the tuber cinereum, Cushing believed that the secretion of the posterior lobe of the pituitary gland, by passing along such channels, could induce activity of the nuclei around which the channels terminated. All his observed effects were noted in human patients without anaesthesia. Avertin anaesthesia abolished the effects. He noted that in the vomitus of such patients blood could be detected by the guaiac test.

Using animals anaesthetized either by "Dial" or "Nembutal," an attempt was made in this laboratory to reproduce such effects, without success. The failure is attributable to the anaesthetic, as E. and J. Keese⁴ (1927) have shown that all the barbituric acid derivatives act upon the hypothalamic and thalamic nuclei. If, however, the animals were allowed to remain under the anaesthetic from 12 to 18 hours, the effects of the anaesthetic had disappeared sufficiently to allow of stimulation experiments on the hypothalamic nuclei.

Under these conditions, the third ventricle of the brain was exposed to bring into view the infundibular recess, bipolar electrodes were used with a current just subminimal for contraction of the fibres of the temporal muscle. The abdominal cavity was opened and the stomach and bladder exposed. In other animals, electrodes were sewn into the animal and electrocardiographic tracings taken. The stimulating electrodes were placed on the lateral margin of the infundibulum.

The stomach showed marked increased peristalsis and secretion during stimulation. The secretion was watery and contained free hydrochloric acid, pepsin and a trace of mucin. The bladder showed signs of increased tonus with well marked peristaltic waves moving over its surface. After stimulation for half an hour small patches of hyperæmic mucous membrane were seen near the lesser curvature of the stomach. Section of the vagi abolished the gastric effects. When the vagus below the inferior laryngeal nerve was sectioned and its central end sutured into the peripheral end of the cut phrenic and regeneration allowed to proceed for at least 180 days, stimulation of the tuber cinereum caused contraction of the diaphragm.

Electrocardiographic tracings after tuber stimulation demonstrated a slowing of the heart and either an increased A-V conduction time or if the conduction time was 0.08 second no change was seen. None of the phenomena noted by Beattie, Brow and Long in stimulation of the posterior hypothalamus were observed.

Further work is being carried out on the above phenomena. It is suggested here that Cushing's hypothesis of a "parasympathetic" centre within the hypothalamus receives some support.

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