

Stimulation of Sensory Somatic Nerves in Relation to the Viscero-Pannicular Reflex.*

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It has been demonstrated that the visceropanicular reflex (Ashkenaz and Spiegel¹) is an objective, observable, constant criterion of the intactness of certain centripetal visceral pathways from the gall bladder of the cat. This reflex, which consists of a contraction of the panniculus carnosus muscle of the cat following adequate stimulation (distention) of a hollow viscus, such as the gall bladder, has been utilized in an analysis of centripetal conduction from the abdominal viscera of the cat (Ashkenaz²). Since this reflex is associated with the type of visceral stimulation (distention of a hollow viscus and stretching of smooth muscle) which ordinarily results in the sensation of pain in man, it has seemed interesting to determine whether stimulation of sensory nerves, other than visceral, known to conduct pain sensation, would also evoke a pannicular response.

The sciatic and phrenic nerves of decerebrate cats and cats under ether and dial anesthesia were stimulated by faradic stimuli from an inductorium as well as by repetitive stimulation with a thyatron stimulator but no indication of a contraction of the panniculus carnosus muscle was observed during such stimulation. If, during stimulation of the phrenic nerve, the splanchnic nerve were stimulated mechanically or the gall bladder were stretched or pulled, a contraction of the panniculus carnosus was observed, and this contraction ceased immediately upon cessation of the splanchnic or gall bladder stimulation, even though the phrenic stimulation were continued.

From these observations, it seems that a pannicular response is not usually and easily elicited by painful stimulation of afferent somatic nerves far removed from the segmental region supplying the panniculus carnosus.

Summary. Stimulation of the sciatic and phrenic nerves in de-

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¹ Ashkenaz, D. M., and Spiegel, E. A., *Am. J. Physiol.*, 1935, **112**, 573.

² Ashkenaz, David M., *Ibid.*, 1937, **120**, 587.

cerebrate cats and in cats under ether and dial anesthesia by faradic stimulation with an inductorium or repetitive stimulation with a thyatron stimulator does not elicit a contraction of the panniculus carnosus muscle, but simultaneous or independent stimulation of the gall bladder or the splanchnic nerve (right) does evoke a contraction of the panniculus carnosus muscle.

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Measurement of the Heart Size with the Roentgenkymograph.

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The estimation of heart size in the living subject by the usual X-ray methods is generally inadequate in one or more respects: (1) the phase of the heart cycle is neglected—the total stroke output of the heart varies from 6% to 40% of the systolic heart volume, (2) it is assumed that simple linear measurements (*e. g.*, transverse diameter) accurately reflect true heart size (volume), (3) proper correction is not made for body size, (4) correction for distortion in the teleroentgenogram is disregarded, (5) accuracy is not proved by controls and duplicate measurement, (6) pendulum motion of the heart is included.

The roentgenkymograph, in which the film is moved during exposure behind a lead grid (Roesler;¹ Stumpf, Weber and Weltz;² Keys and Friedell³) registers the systolic and diastolic excursions of the heart contour, eliminates the effect of pendulum motion, and gives better visualization of the upper and lower borders.

We consider heart volume to be the ultimate reference measurement. Except with cadavers we have used frontal roentgenkymographs made at 66 to 72 inches with 2.5 second exposure, and have obtained the correction factors for distortion from lateral plates. All measurements were made on tracings of the X-ray plates and independently checked. Areas were measured with the planimeter.

¹ Roesler, H., *Clinical Roentgenology of the Cardiovascular System*, Charles C. Thomas, Baltimore, Md., 1937.

² Stumpf, P., Weber, H. H., and Weltz, G. A., *Röntgenkymographische Bewegungslehre innere Organe*, George Thieme, Leipzig, 1936.

³ Keys, A., and Friedell, H. L., *Science*, 1938, **88**, 456.