important factor in the selective oral absorption of these drugs. Other factors which may be significant are relative potency, degree of local vasoconstriction, irritation and alkalinity or acidity. It is also probable that absorption is favored by high oil solubility independent of the oil-water distribution coefficient, as is the case with nicotine.

8148 P

Peripheral Course of Pain-Fibers Supplying Coronary Arteries and the Myocardium.

ROBERT M. MOORE AND ALBERT O. SINGLETON, JR.

From the Department of Surgery, University of Texas, Medical Branch, Galveston.

In decerebrate animals intra-arterial injection of an irritating solution results in stimulation of pain-elements associated with the small blood-vessels. The stimulation is evidenced by reflex activity of a pseudoaffective nature (Moore and Porter[1]). On injection of a coronary artery the reflex effects include arching of the back, movements of the extremities, snapping of the jaws, tossing of the head, and increased respiratory excursions. Attempts to prevent such activity by surgical neurectomy have provided information regarding the course of the pain-fibers concerned.

The experiments were performed upon cats. After guillotine decerebration, etherization was discontinued, the thorax was entered under artificial respiration, the pericardium opened and a thread passed beneath the stem of one or other coronary artery proximal to its bifurcation. Injection of 0.75 cc. 20% lactic acid distal to the thread caused instantaneous and very marked reflex activity associated with a rapidly progressing, black infarction of practically the entire wall of that half of the heart (Fig. 1). The injection was followed in 5 or 10 seconds by acute dilatation of both chambers.

Injection of the left coronary artery caused immediate and marked reflex activity in each of 17 animals in which the left thoracic sympathetic trunk was intact, although these animals had been subjected to unilateral or bilateral cervical sympathectomy or vagotomy. In contrast were the results in 10 animals in which the left thoracic

[1] Moore, R. M., and Porter, E. L., *Am. J. Physiol.*, 1934, **109**, 76.

sympathetic trunk had been resected from above the stellate ganglion to the 7th rib. Although the cervical trunks and the right

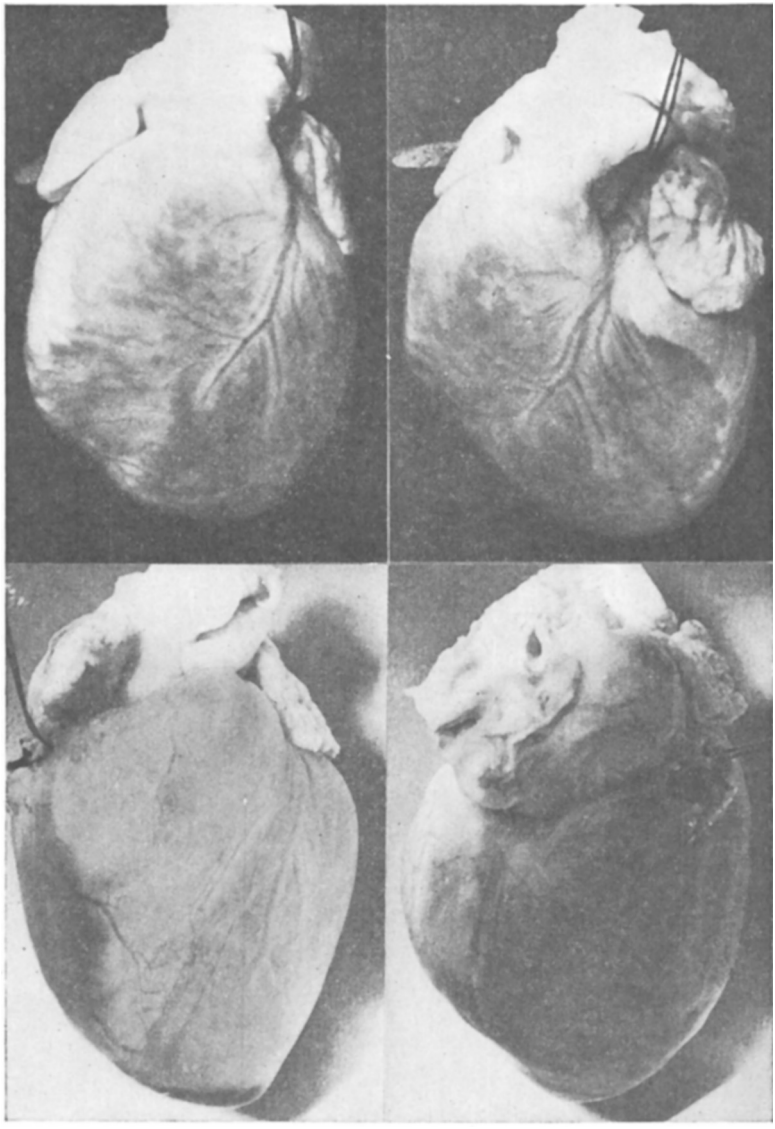

FIG. 1.

Photographs of hearts following injection of acid into the coronary artery in the decerebrate animal. The blackened areas represent the infarctions. Anterior and left lateral views after injection of the left coronary artery are shown above. Below are anterior and posterior views following injection of the right artery. In either instance stimulation of pain-elements can be prevented by resection of the *ipsilateral* upper thoracic sympathetic chain.

thoracic trunk were not disturbed, in none of these animals did visible reflex effects occur until ventricular dilatation had become extreme and there was advanced asphyxia.

Injection of the right coronary artery caused no visible reflex effects in 4 animals in which only the right cervicothoracic sympathetic trunk had been resected. Similarly, no reflex reaction was obtained in 4 of 5 animals in which the right upper thoracic trunk had been resected and the right cervical trunk left intact.

It is apparent, then, that the pain-fibers ending in the region of either coronary artery reach the spinal cord by way of the *ipsilateral* sympathetic chain. Furthermore, the great majority of these fibers must pass from the heart to the upper thoracic segments of that chain.

If this scheme of afferent innervation of the coronary arteries also applies in man, resection or injection of the upper thoracic portion of the *ipsilateral* sympathetic trunk should be the operation of choice for the relief of coronary pain. Moreover, the results suggest that reference of coronary pain to either upper extremity indicates stimulation of pain-endings associated with the coronary vessels of the corresponding side.

We wish to express indebtedness to Dr. J. F. Pilcher, who made the photographs.

8149 P

Relative Protective Value of Alkaline Duodenal Juices Against Gastrojejunal Ulceration.

MICHAEL DEBAKEY. (Introduced by A. Ochsner.)

From the Department of Surgery, Tulane University School of Medicine, New Orleans, La.

A review of the voluminous literature which has now accumulated on the relative protective value of the alkaline duodenal juices in preventing ulcer formation reveals a bewildering maze of confusion. Much of this diversity of opinions and contradictory experimental results has been due in great measure to the observations and comparisons made by different investigators under varied and diverse circumstances. Because of the existing difficulty in drawing conclusions from the confusing and contradictory experimental results, this investigation was made.