

Pacinian Corpuscles in the Mesentery and Their Relation to the Vascular System.*

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The question has frequently been raised^{1, 2} as to whether there are vascular zones other than the carotid sinus and the aorta that make an afferent contribution to cardiovascular reflexes. A region that might well be suspect is the mesenteric area and we have accordingly investigated the problem of the afferent nerve discharge therefrom especially with relation to blood pressure.

As a means of approach impulses were recorded in the peripheral end of the splanchnic nerve or in its terminal branches which run along the mesenteric arteries. Characteristically there is a discharge of impulses synchronous with each pulse as in Fig. 1, although in certain cases there is a considerable amount of activity in the intervals between succeeding systoles. The general picture of this afferent discharge is similar to that observed³ in the carotid sinus and aortic nerves.

The modifications effected in the discharge by variations in intravascular pressure are likewise similar to those found in the case of the carotid sinus and aorta although less constant and predictable.

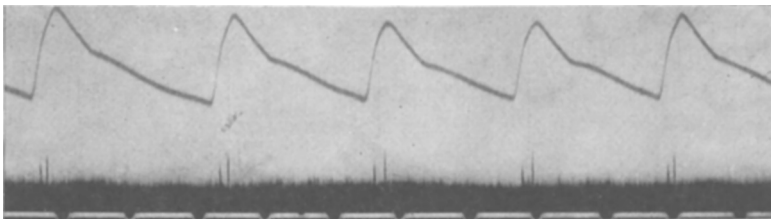


FIG. 1.

Afferent impulses in several fibers of splanchnic nerve. Upper record: carotid pulse; middle: action potentials; bottom: time in 1/5 secs.

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¹ Heymans, C., Bouckaert, J. J., and Regniers, P., *Le Sinus Carotidien*, Paris, G. Doin, 1933.

² Katz, L. N., and Saphir, O., *Am. J. Physiol.*, 1933, **104**, 1.

³ Bronk, D. W., and Stella, G., *J. Cell. and Comp. Physiol.*, 1932, **1**, 1.

When a portion of the mesenteric artery is perfused at steady pressures it is found that the end organs begin to discharge at a certain minimal pressure, the impulse frequency and number of active end organs increasing with further increases in pressure. In the intact preparation the degree of discharge is largely influenced by the magnitude of the pulse pressure, its rate of change, and especially by the blood volume. An increase in the latter increases the frequency of the afferent impulses. An increase in mean blood pressure, especially if the previous pressure is not too high, also produces an increase in the discharge although in some cases an increase in blood pressure resulting from an injection of adrenalin gave an initial decrease in the number of impulses. This may be due to a change in the relation of the vessels to the end organs.

In considering the question as to what type of end organ is responsible for this activity we were impressed by the proximity of many Pacinian corpuscles to the mesenteric arteries. It has been found⁴ that such sense organs when associated with tendons are receptors for mechanical stimuli and it occurred to us that some of these in the mesentery might therefore be stimulated by movement of the vessel walls. This is the case, for in a number of experiments it has been possible to eliminate the pulsatile discharge in a small mesenteric nerve by removing one after another of the corpuscles in the field supplied by that nerve. It may be that some of the afferent impulses in the splanchnic nerve synchronous with the pulse originate in end organs other than Pacinian corpuscles, but certainly the latter are chiefly responsible.

Thus far we have no satisfactory evidence as to the reflex effects of these afferent impulses from the Pacinian corpuscles, but it is reasonable to assume that such an afferent discharge modified as it is by blood volume, mean blood pressure and pulse pressure may influence the activity of the cardiovascular centers.

⁴ Adrian, E. D., and Umrath, K., *J. Physiol.*, 1929, **68**, 2.