diameter of the steel tubing (0·085 inch). These dimensions are selected to assure against the accidental creation of a large pneumothorax during cannulation. Indeed, we sometimes find it necessary to inject a small volume of air through the cannula and into the intrapleural space before pressure recording can be initiated.

The lightness and flexibility of the polyethylene cannula permit it to ride along easily with thoracic movements and once properly positioned within the pleura it continues to transmit pressures faithfully for long periods of time. At the conclusion of our experiments we routinely perform a thoracotomy to confirm location of the cannula. Gross examination of the lungs at this time reveals little or no damage to pulmonary tissue resulting from the cannulation procedure.

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Effect of temperature changes on the tone of perfused mesenteric arteries of rat and on the perfusion pressure responses to sympathetic nerve stimulation and injected noradrenaline

Exposure of cat cutaneous vessels to cold reduces the vasoconstrictor response to nerve stimulation and injected catecholamines (Folkow, Fox & others, 1963). Rogers, Atkinson & Long (1965), using the perfused mesenteric arteries of dog, found that a decrease in temperature of the perfusion fluid from 37° to 27° increased the basal-line perfusion pressure and the responses to nerve stimulation and injected catecholamines. They suggested that it might be due to the decreased luminar diameter at lower temperatures which may have resulted in increased physical efficiency of the vascular smooth muscle and this in turn increased the perfusion pressure responses to nerve stimulation and intra-arterially injected catecholamines.

The present study on the mesenteric arteries of rat perfused with Tyrode solution indicate that responses to sympathetic nerve stimulation and injected noradrenaline are affected differently with change of temperature of the perfusion fluid.

Female albino rats, weighing 250–300 g were used. The superior mesenteric artery was isolated, cannulated and removed together with its small resistance vessels as described by McGregor (1965). A Harvard peristaltic pump (Harvard Apparatus Co., Model 1210) was used to perfuse the cannulated artery with Tyrode solution at a constant flow of 25 ml/min. The solution was gassed with 5% carbon dioxide in oxygen. The temperature of the solution was changed by cooling or heating the water circulating around the perfusion coil. The responses were recorded manometrically using a frontal writing lever. Before cannulation of the artery, when the pump was operating and the flow was 25 ml/min, the pressure was 60 mm Hg. When the vessels were being perfused at the same rate the pressure was 85 mm Hg. Thus the average basal perfusion pressure during an experiment was 25 mm Hg.

The perivascular nerves were stimulated using a bipolar platinum electrode with a Grass stimulator (biphasic rectangular pulses of 20 V; 1 ms; at 7/s). Noradrenaline was injected directly into the cannula leading to superior mesenteric artery over a period of 5 s by Palmer pump (F-30).

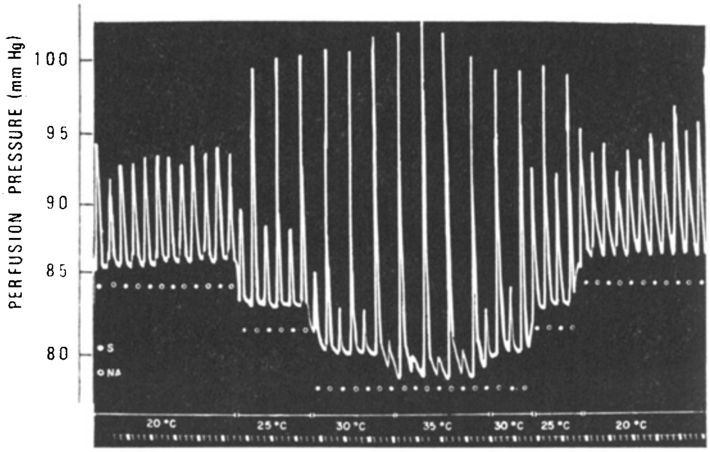

FIG. 1. Effect of temperature changes on the tone of perfused mesenteric arteries of rat and on the perfusion pressure responses to sympathetic nerve stimulation and injected noradrenaline. The mesenteric arteries were perfused with Tyrode solution at a constant flow of 25 ml/min at different temperatures. The perivascular sympathetic nerves (S) were stimulated using biphasic rectangular pulses (20 V; 1 ms; at 7/s) every 4 min for 20 s. Noradrenaline (NA 3 μg) was injected directly into the cannula leading to superior mesenteric artery by Palmer pump (F-30). The increase in temperature of the perfusion fluid from 20° to 35° decreased the tone. The response to nerve stimulation was reduced and that to injected NA enhanced. Lowering the temperature of the perfusion fluid from 35° to 20° increased the tone, and the response to nerve stimulation enhanced while that to injected NA reduced.

The perfusion pressure responses to both sympathetic nerve stimulation and injected noradrenaline in all experiments were submaximal. An amount of noradrenaline (3–5 μg) was injected which produced a vasoconstrictor response of equal magnitude to that produced by sympathetic nerve stimulation (20°). After recording a few control responses to nerve stimulation and injected amine at a fixed temperature of 20° or 35°, the temperature of the perfusion fluid was gradually changed and further responses recorded. Fig. 1 illustrates an example. The increase in temperature from 20° to 35° decreased the tone. The response to nerve stimulation was reduced while that to injected noradrenaline was enhanced. When the temperature was lowered again from 35° to 20° the tone was increased, and the response to nerve stimulation was potentiated while that to injected noradrenaline was reduced. From these experiments it is evident that the response of mesenteric arteries of rat to sympathetic nerve stimulation and injected noradrenaline are affected differently with the change of temperature of the perfusion fluid and thus cannot be explained simply by the change in tone produced by varying the temperature of the perfusion fluid.

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