

vessels, too, may become extensively compressed without injury to the walls and without thrombosis.

## 7520 P

**Narrowing of Intestine from Contraction of Experimentally Produced, Fibrous Capsule.**

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The constrictive force of a capsule of young sterile fibrous tissue surrounding short segments of intestine was studied, as an extension of previous experiments in the contractibility of this tissue.<sup>1, 2</sup>

Twelve different segments of ileum, 3 in each of 4 dogs, were treated. Operation: The abdomen was opened under aseptic precautions, a loop of terminal ileum was delivered, and a side-to-side anastomosis was made between the limbs of the loop, so as to side-track about 40 cm. of the gut. Then the mesentery of the side-tracked portion was incised about 3 cm., parallel to and about .5 cm. from the gut, at 3 different sites about 10 cm. apart and no nearer to the anastomosis than 5 cm. No mesenteric vessels were injured. At one site, the gut with its attached bit of mesentery was wrapped once about with a strip of thin rubber dam 2.5 cm. wide and just long enough to reach loosely around. The opposed edges were sutured together. At another site, light, close-woven silk cloth was used in the same manner; and at the third, this kind of cloth, impregnated with collodion (to render it impervious to fibroblasts), was similarly used. The whole loop was wrapped in omentum, returned to the abdomen, and the abdomen was closed. Five to 20 days after operation, the dogs were killed and the loops were removed. The bowel at each enveloped site was injected, first, with water under a gradient of pressure, to determine the patency; second, with barium suspension under 20 cm. H<sub>2</sub>O pressure, to portray by X-ray the outlines of the lumen; and, third, with formalin, for fixation and section.

The reactions to the different kinds of envelop were essentially the same: All tissues in contact with the foreign material developed

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<sup>1</sup> Van Allen, C. M., and Wang, T. T., *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 812.

<sup>2</sup> Wolfe, J. J., Wang, T. T., and Van Allen, C. M., *J. Thoracic Surg.*, 1934, **3**, 300.

a heavy fibrous coating. That part of the coat against the inner aspect of the envelop came from, and completely surrounded, the intestinal segment. A considerable amount of slightly turbid, sero-fibrinous fluid bathed the envelop within these walls. The envelop was loose, much looser than at first because the gut was greatly narrowed. At 5 days (with injection), the cross-sectional area of the lumen was about 6% of normal and, from the 8th day on, the lumen was fully collapsed. At 8 days, water could trickle easily through; but at 10 days, it had to have at least 8 to 12 cm. H<sub>2</sub>O pressure to get through at all, and at 20 days, it failed entirely to pass, even with pressures as high as 60 cm. H<sub>2</sub>O. Cross-sections always showed the walls of the enveloped segments to be much compressed and the mucous and muscular layers to be thickened. The mucosa was closely and deeply folded. The muscularis was easily separable from the capsule; and neither mucosa nor muscularis presented evidence of inflammation, necrosis, or other cellular change. The capsule was sharply demarcated and was composed of young fibroblasts, loosely arranged in the earlier specimens and compactly laid in the later ones.

During the first few days, the intestinal narrowing was probably due to the pressure of the encysted surrounding fluid, perhaps assisted by local muscular spasm; but thereafter it was certainly maintained and probably also advanced considerably by the fibrous capsule.

## 7521 P

### Determination of Oxidation-Reduction Potential with Double Electrodes.

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According to the electrode equation,

$$E = E'_0 - \frac{RT}{nF} \ln \frac{[S_r]}{[S_o]}$$

the oxidation-reduction potential,  $E'_0$ , of a given oxidation-reduction system at a given pH can be calculated from the potential observed,  $E$ , when a blank noble metal electrode is placed in a mixture in which the ratio of the concentration of the total reductant,  $[S_r]$ , to