

THE ACTION OF SALINE CATHARTICS.—By N. B. DREYER, B. A.
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(Presented 29 March, 1926)

Compounds, like sodium sulphate, magnesium sulphate and sodium phosphate (Na_2HPO_4), are used extensively for mild purging. They are given in hypertonic solutions, so that on their entry into the gut, water is withdrawn from the tissues into the lumen of the gut. This increases the volume of the intestinal contents, and results in strong peristaltic movements. The increased activity of the alimentary canal, combined with non-absorption of the salts and water, gives rise to a fluid stool.

In the experiments described below, observations were made not only on peristaltic, but also on segmental movements. At the same time the amount of fluid injected into the gut lumen was compared with that recovered at the end of any given period. This was done to determine if any increase in intestinal content occurred under the action of these salines.

The method adopted was described by Babkin¹ some years ago. It has the advantage over others commonly in use that the muscle of the intestinal wall is only slightly injured locally when inserting the cannulae, and further it does not interfere with the blood supply.

In all cases decerebrate cats were used, the vagi and splanchnic nerves were cut, and the bile and pancreatic ducts were ligated. These ducts were tied so that no secretion from liver or pancreas could enter the duodenum, as this was the portion of gut selected for the experiment. When all the operative technique was completed the cat was immersed in a bath of saline kept at 37° C. The intestines were by this means kept covered and were at constant temperature. Movements were recorded with a fairly large piston recorder. In addition naked eye appearances were noted. Movements recorded under the influence of 0.9% sodium chloride for periods of five to ten minutes served as the normal. Small quantities varying from

(1) B. P. Babkin. *Bulletin de l'Academie Imperiale des Sciences*, 1916

2.5 to 5 cc. of saline were introduced into a length of gut about four inches long. The movements remained fairly uniform in character. This was confirmed on inspection; segmental and peristaltic movements were easily discerned. The amount of fluid recovered at the end of a ten minute period was never increased above that put in; in some cases evidence of absorption of the sodium chloride was obtained. In the case of hypertonic NaCl of 1.8% and 2.7% concentration, changes in the movements soon became apparent. A gradual rise in tone occurred together with more marked contractions. In both cases the fluid increased in amount in the gut lumen. With sodium sulphate the picture was slightly different and it seemed to depend on the tone of the intestinal muscle. If the tone was high, Na₂SO₄, isotonic with 0.9% NaCl, sometimes caused depression. In the majority of cases where initial tone was low isotonic Na₂SO₄ caused marked increase both of tone and movements, but in no case was there a withdrawal of water from tissues to the solution. With hypertonic solutions, Na₂SO₄ exerted a very strong action. Almost from its introduction segmental and peristaltic movements became marked, and in some cases spasm of the gut was seen. The effect on the contents was even more marked than with NaCl in hypertonic solutions. This was probably due to the fact that NaCl is easily absorbed while Na₂SO₄ is not.

The Na₂SO₄, if left too long, may eventually produce fatigue and finally a condition not unlike paralysis of the gut.

On removing the hypertonic Na₂SO₄, and introducing normal saline the movements diminished markedly and sometimes only segmental ones were present. On renewing the 0.9% NaCl repeatedly the gut eventually recovered.

With magnesium sulphate in isotonic and hypertonic concentrations, movements disappeared completely. This is peculiar since MgSO₄ has a marked purgative action in man. Since the bile and pancreatic secretions were excluded from the gut, and all connections with the central nervous system were severed

one can only surmise that some other agent is responsible for this salt to exert its action. The secretion was not markedly affected.

Sodium carbonate was also tested. In isotonic or hypertonic solutions the contractions were greatly increased in rate and force, especially in 10% solution spasm was produced. Unfortunately strong Na_2CO_3 solution corroded the mucous membrane of the gut, and caused it to separate completely, leaving the musculature bare, and exposed to the action of alkali. Intravenously the same action was exerted on the gut. The contents increased in amount even with the mucous membrane gone, showing that a transudate still occurred.