

tions of Ca^{++} in undiluted hypercalcemic serum, observations upon these sera were made upon diluted serum only. Diluted hypercalcemic serum from the cat was found to conform to the mass-law Equation 1, as is also the case with diluted normal serum from the cat and from man.

In summary, the hypo-calcemia following thyro-parathyroidectomy results in a correspondingly diminished concentration of Ca^{++} and the hyper-calcemia following administration of the parathyroid hormone results in a correspondingly increased concentration of Ca^{++} . No evidence of any effect of removal of the parathyroid glands, or of administration of the parathyroid hormone, upon the qualitative state of calcium in the serum has been found, the changes observed being simply the quantitative changes predicted by the mass-law Equation 1.

Symptoms of tetany have usually appeared at a Ca^{++} concentration of approximately 0.6 mM per kg. H_2O , have increased in severity at still lower levels, and have disappeared as the Ca^{++} concentration rose again above the 0.6 mM level. Of 7 cats operated upon, 6 have developed tetany, the lowest Ca^{++} concentration observed being 0.40 mM per kg. H_2O (0.43 calculated), accompanying severe tetany, with a total calcium concentration of 1.04 mM per liter. The normal Ca^{++} range in the serum of the cat may be put tentatively at from 1.05 to 1.25 mM per kg. H_2O , and the level at which death from hyper-parathyroidism may occur at from 1.7 to 2.0 mM per kg. H_2O .

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Peristaltic Effect of Stimulation of the Chorda Tympani.*

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Dixon,¹ Dale² and Loewi³ originally established acetylcholine as the humoral agent that produces motility of the gastro-intestinal tract. Later research, recently summarised by Cannon⁴ and Dale⁵

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¹ Dixon, W. E., *Brit. Med. J.*, 1906, **2**, 1807.

² Dale, H. H., *J. Pharm.*, 1914, **6**, 147.

³ Loewi, O., *Pflüger's Arch.*, 1921, **193**, 201.

⁴ Cannon, W. B., *Am. J. Med. Sciences*, 1934, **188**, II:145.

⁵ Dale, H. H., *Brit. Med. J.*, 1934, **1**, 835.

has shown that acetylcholine is liberated by stimulation not only of parasympathetic nerves and sympathetic ganglia, but probably even with stimulation of striated muscle. Fröhner⁶ reported that eserine was commonly used to produce increased peristaltic activity of the gastro-intestinal tract in animals; and since the work of Hunt,⁷ Fühner⁸ and Simonart,⁹ it has been known that eserine added to acetylcholine greatly fortifies the action of acetylcholine. Matthes¹⁰ and Loewi and Engelhart¹¹ have added to our knowledge that eserine prevents the hydrolysis of acetylcholine by blood and tissues through inhibiting an esterase. In the light of this knowledge, the authors investigated the effect of eserine and acetylcholine on ileus following peritonitis (to be published). In this research it was found that in peritonitis acetylcholine given intramuscularly in small doses produced either no effect or a very small one, but it was always effective when given with eserine. The present research was undertaken to investigate whether or not the stimulation of salivary secretion would produce motility of the intestine through liberation of acetylcholine from the stimulated salivary glands. Babkin, Alley and Stavratsky¹² have demonstrated that acetylcholine is liberated into the venous blood when the chorda tympani was stimulated.

Healthy dogs under light ether anesthesia were used. Both chordae tympani were prepared and stimulated with weak faradic currents from a Harvard inductorium. Balloons were placed in the stomach, ileum and upper part of the colon, and connected with water manometers. Blood pressure was recorded in the usual way. The effect of stimulation of the chordae tympani was checked by observing or recording the salivary flow from cannulas inserted in Wharton's ducts. Eserine salicylate was used, 1 mg. per 10 kg. of body weight being injected intramuscularly or intravenously.

In normal animals it was found that eserine (0.5-1.0 mg. intravenously or intramuscularly) had a powerful effect on gastro-intestinal motility, but that this action was inconstant in occurrence and in magnitude. Thus in 2 animals there was no effect, while in 3 animals there was increased motility. Stimulation of the

⁶ Fröhner, E., *Lehrbuch der Allgemeinen Therapie fuer Tieraerzte* ed. Stuttgart, Ferd. Enke, 1900.

⁷ Hunt, R., and Renshaw, R. R., *J. Pharmacology exp. Therap.*, 1934, **51**, 231.

⁸ Fühner, H., *Arch. Exp. Path. u. Pharmac.*, 1918, **82**, 51, 205.

⁹ Simonart, A., *J. Pharm.*, 1932, **46**, 157.

¹⁰ Matthes, K., *J. Physiol.*, 1930, **70**, 338.

¹¹ Loewi, O., and Engelhart, E., *Arch. f. exp. Path. u. Pharmac.*, 1930, **150**, 1.

¹² Babkin, B. P., Alley, A., and Stavratsky, G. W., *Trans. Roy. Soc. Can.*, 1932, **26**, 89.

chordae tympani after the administration of eserine regularly produced gastro-intestinal motility. Mere stimulation of the chordae tympani likewise produced motility of the small intestine and the colon. In all 4 dogs in which stimulation of the chordae tympani was performed without previous injection of eserine, motility of the ileum and colon was obtained (Fig. 1). It appears that factors are

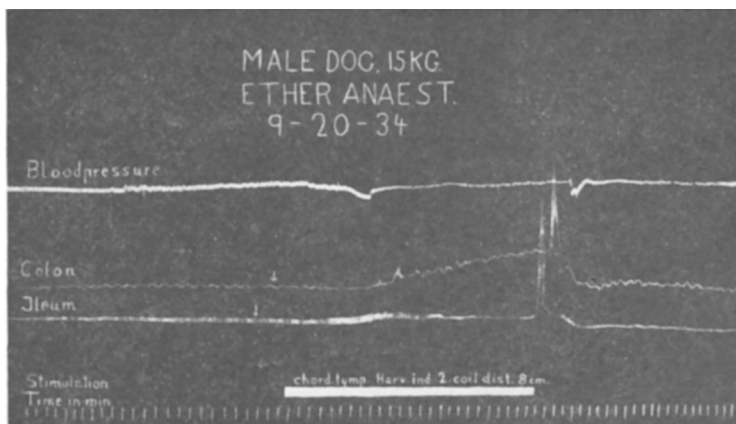


FIG. 1.

The sudden elevation of the curves of the ileum and colon at the end of stimulation of the chorda is due to panting of the dog.

present in the blood which alter the activity of the esterase allowing the acetylcholine liberated by stimulation of the chordae tympani to affect more or less the gastro-intestinal tract and to produce varying degrees of motility. This phase of the investigation is being continued.

7637 C

Total Versus Extra Oxygen Consumption in Muscle Activity in Relation to Fiber Length.

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It appeared to the author that it would be of considerable importance if the fundamental behavior of cardiac and skeletal muscle could be more closely correlated by the explanation of an apparent