vasomotor reflexes. A repetition of their observations with currents of the strength and with the dosages used by them has failed to confirm this statement, in that we have found variable vasomotor responses, either pressor or depressor to sciatic stimulation.

6224

Attempts to Produce Hyperplasia in Thyroid by Destruction of Part of the Adrenals and by Infection.

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Several methods may produce retrogression in the hyperplastic thyroid, *viz.*, resection of the thyroid, administration of iodine, x-ray, but it is more difficult to produce the hyperplasia characteristic of exophthalmic goiter at will.

The purpose of these experiments was to note the microscopic changes occurring in the thyroid after injury to and destruction of part of the adrenals or in the organism suffering from an infection. In these experiments dogs were used. Dogs in this locality apparently very rarely have goiter. The thyroid of a 6 to 10 kg. dog is usually about 2.2 x 1.2 cm. in size.

To have a section of thyroid to compare the result by, from each of the dogs a piece of thyroid about 2 x 2 mm. was removed at a preliminary operation. Sections removed from the same dog at subsequent operations or at necropsy were compared with this first section. Sections removed subsequently from control dogs in whom no other procedure but this preliminary operation was done did not show any hyperplasia, as has been proven to occur when larger pieces of the thyroid gland are removed.

Two dogs were fed 3 grains of thyroid extract a day for 46 and 47 days, respectively. These dogs became extremely restless, nervous, excitable, and had even a stare but no exophthalmos. Sections removed from the thyroids of these dogs after feeding the animals thyroid extract for 46 and 47 days showed retrogressive changes in the thyroid; smaller epithelial cells with more colloid in the vesicles. This response to thyroid extract has been described before.[1]

[1] Mosser, W. B., *Am. J. Surg.*, 1929, **7**, 338.

Cole and Womack[2] found that infection in dogs resulted in hyperplasia of the thyroid gland. I implanted a small coil of wire contaminated by a pure culture of staphylococci into the sternocleidomastoid muscle of dogs. The dogs were sacrificed after 4, 9, 17, and 24 days. The thyroid in 2 showed hyperplasia but the thyroid of the other 2 showed no change. Moreover, thyroid glands removed from 2 other dogs that died of pneumonia showed hyperplasia. One of these had part of the adrenals destroyed. A dog dying of peritonitis following intestinal obstruction showed no change in the microscopic appearance of the thyroid. Another dog having a periadrenal abscess showed no hyperplasia. Thus, 50% of 8 dogs with infections showed hyperplasia in the thyroid.

Golyakowski[3] and Marine and Baumann[4] found that ligating the vessels and removal or injury of the cortex of the adrenal glands was followed by an increase in the metabolic rate in a certain percentage of animals. After preliminary operation to obtain a section of the thyroid for comparison at a second operation, I crushed one or both adrenals, macerating them with an Ochsner forceps. I attempted to destroy a large portion of the glands and yet not both glands entirely. I can report subsequent examinations of the thyroids of 10 animals at various periods from 5 to 38 days. Seven of these showed no change, one showed retrogression, and 2 showed slight hyperplasia. One of these dogs showing hyperplasia in the thyroid died of pneumonia; thus, infection may have played a part.

The thyroid was measured at the first and at subsequent examinations in some of these dogs. No gross changes were noted in size or appearance of the gland.

The dogs in whom the adrenals had been injured moved slowly, seemed pepless, became thin and emaciated, disinterested, and looked just the opposite from the dogs that had thyroid extract.

The changes in these thyroids are very meager indeed. Whenever there was an apparent decrease in the amount of colloid and heaping up of epithelial cells, I called it hyperplasia. It is certainly not the striking change found in thyroids in exophthalmic goiter in the human. These changes are in reality only suggestive; they are not constant. As Webster,[5] McCarrison[6] and others have shown, goiter may be produced by goiterogenic diet, but I am not aware

[2] Cole, W. H., and Womack, N. A., *J. Am. Med. Assn.*, 1929, **92**, 453.

[3] Golyakowski, quoted by Marine and Baumann (Ref. 4).

[4] Marine, D., and Baumann, E. J., *Am. J. Physiol.*, 1921, **57**, 135.

[5] Webster, B., Marine, D., and Cipra, A., *J. Exp. Med.*, 1931, **58**, 81.

[6] McCarrison, R., *Brit. Med. J.*, 1929, **1**, 5.

of a typical exophthalmic goiter having ever been produced or ever existed of itself in the lower animals. There is something else in man, the emotional side or some other factor, that makes goiter sometimes different from the goiter occurring in animals.

6225

Peritoneal Lavage. Effective Elimination of Nitrogenous Wastes in the Absence of Kidney Function.

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The experiments of one of us have demonstrated that nephrectomized dogs eliminate considerable amounts of ammonia in vomiting. These results have been amply confirmed and extended by others. Martin has studied the elimination of ammonia, urea and other nitrogenous wastes lost in this manner.

During a similar study on elimination of both urea and ammonia in the vomitus, we have demonstrated that really considerable quantities of urea and ammonia are thus eliminated. However, the prospect of this method of elimination serving as a therapeutic measure to tide patients over temporary periods of deficiency in kidney function is not bright. Elimination by way of the stomach becomes quantitatively important only when nitrogen retention has reached a very serious stage, and in our hands this mode of excretion has always failed to keep pace with nitrogen accumulation.

During the course of these experiments we encountered edema of massive proportions. The ascitic fluid in these cases was found to be rich in urea and practically in equilibrium with the concentration of that substance in blood.

We have been able to accomplish the elimination of nitrogen wastes by the introduction of a solution of balanced salts into the peritoneal cavity of a nephrectomized dog, allowing time (10 minutes) for diffusion of nitrogenous wastes into this fluid, and then drawing off the fluid through the trocar which remains in position throughout. We introduce on the average 750 cc. of solution, allow it to remain in the peritoneal cavity for 10 minutes and then allow it to flow out by gravity. Varying numbers of such washings are made at a single insertion of the trocar. Depending upon the severity of the retention at the time, we have done as few as 5 and as