

is removed or intact. On the other hand iodine will restore the hypertrophic pituitary of parenchymatous goiter to normal as quickly and as effectively as desiccated thyroid, but it has no detectable effect on the pituitary after thyroidectomy. Evans and Simpson⁵ have found that fresh beef thyroid fed to normal rats for 5 weeks caused an appreciable decrease in the weight of the pituitary and Loeser⁶ showed that the pituitaries of iodine fed normal rats contained more thyrotropic substance than those of controls.

These facts suggest that only thyroxine is capable of preventing the hypertrophy of the pituitary after thyroidectomy and in parenchymatous goiter, and of restoring such glands to normal, and that iodine is effective only when the animal is capable of utilizing it in the elaboration of thyroxine. The thyroid secretion affects the anterior pituitary as strikingly as the anterior pituitary hormone affects the thyroid. From these results it would appear certain that the acidophilic granules are true secretion granules, decreasing with increased functional activity of the cells and increasing with physiologically decreased functional activity. This evidence could be further interpreted as indicating that the acidophilic granules contain the thyrotropic factor, although direct tests by several investigators have failed to demonstrate that there is a significant decrease in thyrotropic potency of the pituitary after thyroidectomy.

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Anti-Anemia Potency of Liver After Gastrectomy in Swine.*

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(Introduced by H. G. Barbour.)

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The introduction by Minot and Murphy¹ of liver therapy for pernicious anemia, and the subsequent discovery by Sturgis and Isaacs² of the efficacy of desiccated stomach have stimulated interest in the interrelationship between liver and stomach in the etiology

⁵ Evans, H. M., and Simpson, M. E., *Anat. Rec.*, 1930, **45**, 215.

⁶ Loeser, A., *Klin. Wchschr.*, 1934, **13**, 533.

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of the anemia and in the production of the anti-anemia principle. Castle's demonstration^{3, 4} of an "intrinsic factor" present in normal gastric juice but absent from the stomach of the patient with pernicious anemia, and his experiments^{5, 6} showing the interaction of this factor with an unknown food factor to form a product that is effective in the treatment of the disease crystallized the view that the liver serves chiefly to store and elaborate the substance prepared by the stomach. The many lines of collateral evidence converging on this conclusion were recently reviewed by Klumpp and Koletsky.⁷ However, no direct, irrefutable experiment had yet been reported proving whether or not in the absence of the stomach the liver can elaborate the anti-anemia principle effective in the therapy of pernicious anemia. We undertook to answer this question and a number of its important corollaries.

An important step in the program involved the estimation of the anti-anemia potency of livers obtained from totally gastrectomized animals. It is desired here to report briefly a few preliminary observations.

Seven healthy young swine were successfully gastrectomized. The animals were fed an adequate diet lacking only in the main sources of the anti-anemia principle. Growth and development apparently proceeded normally. The complete blood pictures were closely followed and, with one possible exception, no striking changes were observed. Animals were sacrificed at intervals between the second and sixth month after gastrectomy. The spinal cord and bone marrow appeared normal on histopathological examination. The livers were extracted by the method used in making Lilly's Solution Liver Extract No. 343. The adequacy of our extraction technic was proved by clinical comparison of commercial preparations with our control extracts made from normal liver. The assay of the experimental extracts is being performed on severe, untreated cases of classical pernicious anemia, following the method recently described by Dameshek and Castle.⁸

†National Research Council Fellow in Medicine, 1934.

¹ Minot, George R., and Murphy, Wm. P., *J. Am. Med. Assn.*, 1926, **87**, 470

² Sturgis, Cyrus C., and Isaacs, Raphael, *J. Am. Med. Assn.*, 1929, **93**, 747.

³ Castle, Wm. B., Townsend, W. C., and Heath, C. W., *Am. J. Med. Sci.*, 1930, **180**, 305.

⁴ Castle, Wm. B., Heath, C. W., and Strauss, M. B., *Am. J. Med. Sci.*, 1931, **182**, 741.

⁵ Castle, Wm. B., *Am. J. Med. Sci.*, 1929, **178**, 748.

⁶ Castle, Wm. B., and Townsend, W. C., *Ibid.*, 764.

⁷ Klumpp, T. G., and Koletsky, S., *Ann. Int. Med.*, 1935, in press.

⁸ Dameshek, Wm., and Castle, Wm. B., *J. Am. Med. Assn.*, 1934, **103**, 802.

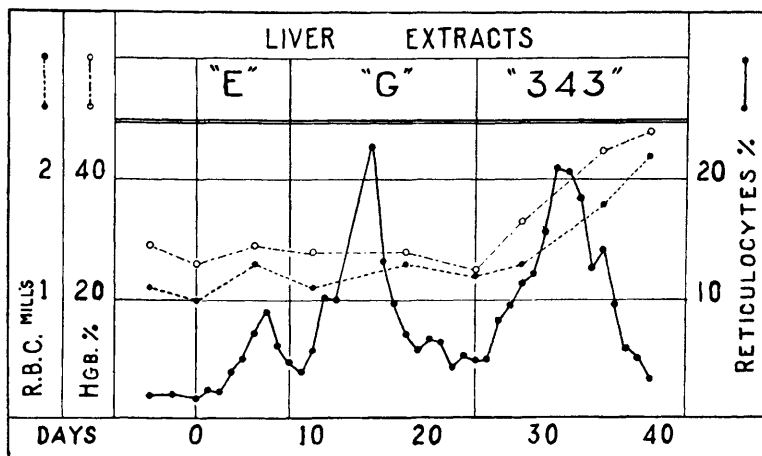


FIG. 1.

A typical result is shown in the accompanying chart which depicts the hematological response of a patient with pernicious anemia to the administration of liver extracts obtained from 2 pigs, "G" and "E", sacrificed at 2 and 4 months, respectively, following gastrectomy. In this particular experiment Lilly's Solution Liver Extract No. 343 served as control. During the period of assay the patient received daily intramuscular injections of 2 cc. of extract, each cc. being derived from 5 gm. of original liver. It is clearly evident that extract "G" is less potent than normal pig liver, and that extract "E" is considerably weaker than "G". In general, our results confirm and amplify those recently reported by Bence.⁹

Summary. The results show definitely that after total gastrectomy in the pig the anti-anemia potency of the liver becomes progressively depleted, and that a significant loss is already detectable as early as the third month.

⁹ Bence, J., *Z. für klin. Med.*, 1933, **126**, 127.