

17124. Serum Cholinesterase in Hyperthyroidism.

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Conflicting reports have appeared in the literature concerning serum cholinesterase levels in hyperthyroidism. Antopol *et al.*,¹ reported an increased serum cholinesterase level in twenty-two cases of untreated hyperthyroidism and a return toward normal values in 13 cases treated by iodine or operation. Milhorat,² Butt³ and Faber⁴ reported normal values in several cases of hyperthyroidism. During preparation of this manuscript an abstract of a paper by Ambrus *et al.*⁵ came to our attention. They recorded significant changes in the serum cholinesterase in diseases of the thyroid gland as observed clinically and experimentally. They found that thiourea derivatives lowered the high values in clinical and experimental hyperthyroidism.

It is the purpose of this communication to present our findings in normal and hyperthyroid patients.

Methods. The serum cholinesterase was determined in cases of euthyroidism, hyperthyroidism, and non-toxic adenoma. The diagnosis was made by clinical appraisal, laboratory findings, response to 6N-propylthiouracil and/or microscopic examination of the surgically excised thyroid glands.

Venous blood was allowed to clot, the serum separated and a few drops of chloroform added to the latter for preservation. The method of determining serum cholinesterase was a modification of Stedman's procedure⁶ where the serum and substrate were titrated

at a temperature between 36-37°C using m-cresol purple as the indicator. The titration was discontinuous, and was carried out at two 10 minute intervals. The average value obtained was used as the final figure.

Results. The range based on determinations in 33 normal adults, was 0.30-0.52 unit with the exception of 3 values (3 cases), 0.62, 0.62, and 0.22 unit. Of this series 23 were males in whom the range was 0.22 - 0.52 unit with an average of 0.42 unit. In the 10 females the comparative values were 0.39-0.62 with an average of 0.51 unit.

In Fig. 1 a summary of the findings is presented. Of the 18 cases of hyperthyroidism that were investigated 11 came under our observation before therapy was instituted or during therapy insufficient to produce an adequate clinical response. In this group the values ranged from 0.68 to 1.45 units and all but one case was higher than 0.70 unit. In 4 of these patients only an initial cholinesterase value was obtained. The remaining seven cases in this group were followed by subse-

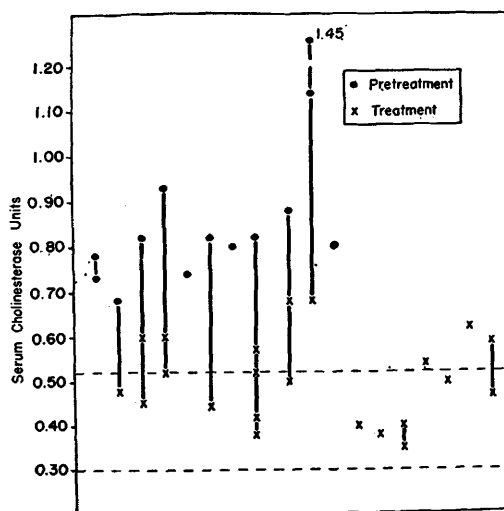


FIG. 1.

Summary of findings in 18 cases of hyperthyroidism, showing changes in serum cholinesterase with treatment.

¹ Antopol, W., Tuchman, L., and Schifrin, A., *Proc. Soc. Exp. Biol. and Med.*, 1937, **36**, 46.

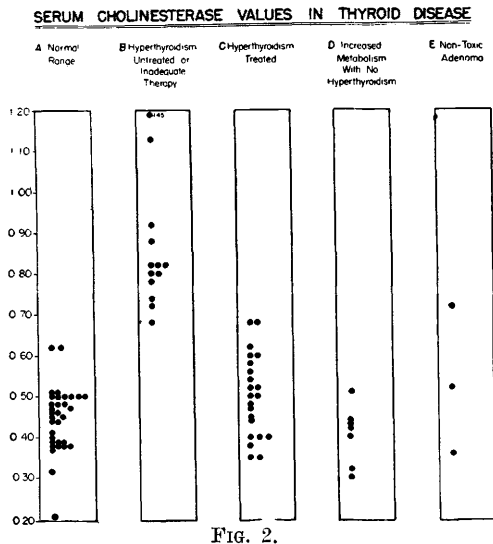
² Milhorat, A. T., *J. Clin. Invest.*, 1938, **17**, 649.

³ Butt, H. R., Comfort, M. W., Dry, T. J., and Osterberg, A. E., *J. Lab. and Clin. Med.*, 1942, **27**, 649.

⁴ Faber, M., *Acta Med. Scand.*, 1943, **114**, 59.

⁵ Ambrus, K., and Ambrus, G., *Orvosok Lapja*, 1947, **3**, 865 (cited in *Excerpta Medica*, 1947, **1**, Abst. No. 473, p. 169).

⁶ Stedman, E., Stedman, E., and Easson, L. H., *Biochem. J.*, 1932, **26**, 2056.



quent cholinesterase levels during adequate therapy. There appeared to be no correlation between the severity of the hyperthyroidism and the level of serum cholinesterase.

In 7 additional cases determinations were made only after adequate therapy had been instituted, so that a total of 14 cases was observed after good clinical response to antithyroid treatment. The values of this group of 14 cases were uniformly below 0.70 unit and varied from 0.35 to 0.68 unit. There were 3 types of cases in this category, 1) iodine and thyroidectomy (3 cases), 2) 6N-propyl-thiouracil, iodine and thyroidectomy (6 cases), 3) 6N-propyl-thiouracil alone (5 cases). All cases regardless of the type of therapy reacted in the same manner. In Fig. 2 is presented a summary of the results obtained in all cases.

Three cases of non-toxic adenoma were observed. In 2, normal values were obtained; a definitely high value was found in the third case. This finding is at present unexplained.

Of interest were the following 3 cases with increased basal metabolic rate in whom a clinical diagnosis of hyperthyroidism was initially entertained but subsequently ruled out.

1. Female, age 55; severe psychoneurosis, BMR plus 67%

2. Female, age 67: metastatic carcinoma of cervical lymphnodes with tracheal pressure symptoms; BMR plus 63, 66%.

3. Female, age 49; dyspnea, palpitation, fibrillation and pedal edema; BMR plus 52%, plus 63%; no response to 6N-propyl-thiouracil. Normal values for serum cholinesterase were found in each case.

No relationship was found between the serum cholinesterase level and BMR, cephalin cholesterol flocculation test, total serum protein or albumin and globulin. In this respect, our findings conflict with those of Faber,⁷ who found a direct relationship between the cholinesterase activity and serum albumin. A tendency to an inverse relationship existed between the levels of the enzyme and serum total cholesterol.

Discussion. The data presented demonstrates an increase in the cholinesterase of the serum of hyperthyroid patients. Its significance is at present uncertain. In those cases in which 6N-propyl-thiouracil was used preoperatively, the serum cholinesterase returned to normal values concomitant with the improvement in clinical state and subsequent thyroidectomy did not cause a further decrease.

Summary. Observations on 18 cases of hyperthyroidism are presented. This condition is characterized by significantly increased levels of serum cholinesterase. These values returned toward the normal range with adequate antithyroid therapy. Of 3 patients with non-toxic adenoma of the thyroid, 2 were in the normal range and one showed a high value. No definite relationship was found between serum cholinesterase and basal metabolic rate, total serum protein, albumin, globulin or cephalin-cholesterol flocculation test. Due to the comparatively small series no conclusion can be drawn concerning sex differences in serum cholinesterase.

⁷ Faber, M., *Acta Med. Scand.*, 1943, **114**, 72.