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THE EFFECT OF THYROTROPIN ON THYROID
PROTEIN METABOLISM IN VITRO*

by

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however, that the effect of iodide on thyroid proteolysis may be a highly complex phenomenon.

SUMMARY

1. The effect of thyrotropin (TSH) on various phases of protein metabolism in the thyroid gland was studied in vitro in thyroid slices incubated in Krebs-Ringer bicarbonate buffer at pH 7.4. Increases in free α -amino nitrogen (FAN), tyrosine, and inorganic iodide¹²⁷ were measured as indices of proteolysis and the uptake and incorporation of C^{14} -amino acids and iodine¹³¹ into particulate and soluble proteins of the thyroid were used as indices of protein synthesis.

2. TSH produced a highly specific stimulatory effect on the lysis of thyroid protein that could only be demonstrated in an aerobic environment. Dose response studies of this phenomenon indicated that beef thyroid slices were more sensitive to this TSH-induced proteolysis than were sheep. This effect of TSH has not been previously demonstrated in vitro but is compatible with the prompt hydrolytic release of thyroid hormone observed in vivo following TSH administration.

3. TSH had no observable stimulatory effect on the uptake of C^{14} -amino acids or I¹³¹ into sheep thyroid slices, but a decreased incorporation into thyroid protein was observed in the TSH supplemented flasks. Since TSH produced an increase in the FAN of these slices, the decreased C^{14} -labeling of protein was accounted for by the intrathyroidal dilution of radioactive amino acids with non-radioactive amino acids released from the lysis of thyroid protein.

4. Electrophoretic evaluation of C^{14} - and I^{131} -labeled proteins from these thyroid slices revealed that TSH stimulated labeling of thyroglobulin. Radioactive thyroglobulin was not found in control slices.

5. The effect of some antithyroid agents on thyroid proteolysis was also evaluated. While these agents had little effect on control proteolysis, thiourea and methimazole in high concentrations completely inhibited TSH-induced proteolysis. NaI augmented both control and TSH-induced proteolysis in this in vitro system.

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