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ROLE OF BROWN ADIPOSE TISSUE IN COLD ACCLIMATION*

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(Summary of Masters thesis written under direction of Dr. K. HONMA)

The cold tolerance of hibernectomized mice and the functional relationship between thyroxine and interscapular brown adipose tissue of this species with respect to cold exposure were studied.

1) The cold tolerance was found to be reduced significantly by hibernectomy; the survival time of the sham-operated group at −20°C was 60.5±1.1 min, while that of the hibernectomized group 48.0±0.8 min.

2) Cold exposure produced a significant increase in fat-free dry matter of interscapular brown adipose tissue and a concurrent rise in oxygen consumption was found. The rate of increase at 10 days of exposure was 2.9 times that of the control group total interscapular gland. But this increase was not significant when compared with that of 5 days of exposure. Oxygen consumption of epididymal white adipose tissue remained unchanged.

3) Following a single injection of thyroxine both fat-free dry matter and oxygen consumption increased gradually and showed each peak at 96 hours.

4) The stimulatory effect of epinephrine on the oxygen consumption of brown adipose tissue was transient. This effect of norepinephrine and cold exposure on brown adipose tissue was abolished by methylthiouracil administration. But the hypothyroid animals showed a significant hypertrophy of brown adipose tissue when exposed to cold. Thyroxine treatment of the hypothyroid animals restored the response to norepinephrine.

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* The original report of this work will appear in "Jap. J. Physiol." **17** (1967).