

when blood sugar levels are lowered also suggests that hyperglycemic factors may have greater functional significance than in most higher vertebrates.

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EFFECTS OF THYROXINE ON TISSUE RESPIRATION IN DOGFISH AND POLLOCK

Jack Harclerode, Robert Vidingshoff, and Diana Schain, Bucknell University, Lewisburg, Pa., and Hahnemann Medical College, Philadelphia, Pa.

The role of the thyroid gland of teleosts and elasmobranchs in regulating the consumption of oxygen by the tissues is unclear at this time. Many investigators have found that thyroid hormones are not effective in stimulating oxygen consumption, while others produced effects with the acetic acid derivatives of thyroid hormones (Biol. Bull. 119:109, 1960).

In the present experiment a group of dogfish (Squalus acanthias) and pollock (Pollachius viriens) were injected daily for six days with thyroxine (dogfish, 1.8×10^{-7} g; pollock, 6×10^{-7} g). The same number of pollock and dogfish were kept as saline injected controls. After treatment, the animals were killed and the kidneys, liver, and a portion of the longitudinal bundle of the hypaxial musculature were excised and homogenized in iced homogenization medium consisting of 75 mM sucrose, 225 mM mannitol and 1mM EDTA, pH 7.1. The oxygen consumption of a sample of each homogenate was determined in a reaction medium consisting of 15 mM sucrose, 45mM mannitol, 40mM KCl, 20mM MgCl, 2μ M EDTA, and 20mM phosphate buffer, pH 7.4. Respiration was determined polarographically using a YSI model 53 oxygen electrode.

The following measurements were made on all homogenates: (1) endogenous respiration rate; (2) respiration rate in the presence of excess substrate, succinate, beta-hydroxybutyrate, and alpha-ketoglutarate, separately; (3) respiration rate after adding an excess of ATP in the presence of excess substrate; and (4) respiration rate after adding an excess of ADP in the presence of excess substrate. Microkjeldahl determinations of each homogenate were made and respiration rates were expressed as μ M O₂ consumed/second/mg N₂.

Generally, the levels of thyroxin used produced the following results:

- 1) No differences were found in the rates of either the control or thyroxin treated liver homogenates in both pollock and dogfish.
- 2) No differences were found in the rates of either the control or thyroxin treated kidney homogenates in both pollock and dogfish.
- 3) Thyroxin depressed respiration in muscle tissue of both pollock and dogfish.

There seems to be a difference in sensitivity of the various tissues to thyroxin, since muscle was the only one which responded to treatment, and then it responded with a decreased oxygen utilization. The reason for this is unclear at this time; however, it could be that there are metabolic alterations in the muscle of the starved dogfish which are enhanced by thyroxine treatment, such as an increased dependence on glycolysis. Others have found increased lactate in the blood of captive dogfish which indicates that this may be the case (Bull. M.D.I.B.L. (5-2): 30-31.

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