Thyroid hormone

The thyroid hormones, triiodothyronine (T3) and its prohormone, thyroxine (T4), are tyrosine-based hormones produced by the thyroid gland that are primarily responsible for regulation of metabolism. T3 and T4 are partially composed of iodine (see molecular model). A deficiency of iodine leads to decreased production of T3 and T4, enlarges the thyroid tissue and will cause the disease known as simple goitre. The major form of thyroid hormone in the blood is thyroxine (T4), which has a longer half-life than T3.[1] In humans, the ratio of T4 to T3 released into the blood is between 14:1 and 20:1. T4 is converted to the active T3 (three to four times more potent than T4) within cells by deiodinases (5'-iodinase). These are further processed by decarboxylation and deiodination to produce iodothyronamine (T1a) and thyronamine (T0a). All three isoforms of the deiodinases are selenium-containing enzymes, thus dietary selenium is essential for T3 production. Edward Calvin Kendall was responsible for the isolation of thyroxine in 1915.

Thyroid-stimulating hormone (TSH), free T3 (fT3), and free T4 (fT4) levels were compared at 7 days (preoperatively) and at 30 and 90 days (postoperatively) after birth between 25 ventriculoperitoneal shunt-inserted hydrocephalic newborns and 20 healthy newborns.

The TSH level at 7 days was higher in the hydrocephalic patient group (6.33 µIU) compared to the control group (3.76 µIU). This value was significantly decreased at 90 days in the ventriculoperitoneal shunt-inserted newborns (2.35 µIU) compared to the control group (3.33 µIU; $p < 0.05$). There were no significant differences between time points for fT4 and fT3 values in the patient group or for TSH, fT4, and fT3 values in the control group.

Ucler et al., propose that a ventriculoperitoneal shunt inserted in the early period of life may have beneficial effects on thyroid hormones [1)].

1)
Ucler N, Erol FS, Ozturk S, Akgun B, Kaplan M, Sen Y. Does Ventriculoperitoneal Shunting Improve Thyroid Hormone Levels in Hydrocephalic Newborns? Pediatr Neurosurg. 2017;52(1):26-29. PubMed PMID: 27490332.