Triiodothyronine

Triiodothyronine, also known as T3, is a thyroid hormone. It affects almost every physiological process in the body, including growth and development, metabolism, body temperature, and heart rate.

Production of T3 and its prohormone thyroxine (T4) is activated by thyroid-stimulating hormone (TSH), which is released from the anterior pituitary gland. This pathway is part of a closed-loop feedback process: Elevated concentrations of T3, and T4 in the blood plasma inhibit the production of TSH in the anterior pituitary gland. As concentrations of these hormones decrease, the anterior pituitary gland increases production of TSH, and by these processes, a feedback control system stabilizes the amount of thyroid hormones that are in the bloodstream.

T3 is the true hormone. Its effects on target tissues are roughly four times more potent than those of T4.

Of the thyroid hormone that is produced, just about 20% is T3, whereas 80% is produced as T4. Roughly 85% of the circulating T3 is later formed in the liver and anterior pituitary by removal of the iodine atom from the carbon atom number five of the outer ring of T4. In any case, the concentration of T3 in the human blood plasma is about one-fortieth that of T4. This is observed in fact because of the short half-life of T3, which is only 2.5 days.[3] This compares with the half-life of T4, which is about 6.5 days.

Findings suggest that systemic advanced hypoxia/ischemia may cause a rapid and TSH-independent release of T3 and T4 thyroid hormones in autopsy cases. These findings demonstrate that increased thyroid-related hormone (T3 and T4) levels in the pathophysiological field may indicate systemic hypoxia/ischemia [1)].

The Low tri-iodothyronine syndrome is common in brain tumor patients and is associated with poor functional and cognitive status, and with worse discharge outcomes. The Low tri-iodothyronine syndrome is associated with shorter survival of glioma patients [2)].

1)
Tani N, Ishikawa M, Watanabe M, Ikeda T, Ishikawa T. Thyroid-related hormones as potential markers of hypoxia/ischemia. Hum Cell. 2020 Mar 7. doi: 10.1007/s13577-020-00341-x. [Epub ahead of print] PubMed PMID: 32146707.
2)
Bunevicius A, Deltuva VP, Tamasauskas S, Smith T, Laws ER, Bunevicius R, Iervasi G, Tamasauskas A. Preoperative low tri-iodothyronine concentration is associated with worse health status and shorter five year survival of primary brain tumor patients. Oncotarget. 2016 Dec 30. doi: 10.18632/oncotarget.14376. [Epub ahead of print] PubMed PMID: 28055959.