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## Product Information

### 3,3',5-Triiodo-L-thyronine sodium salt

Product Number **T 2752**

Storage Temperature -0 °C

#### Product Description

Molecular Formula:  $C_{15}H_{11}I_3NO_4Na$

Molecular Weight: 673.0

CAS Number: 55-06-1

Melting Point: 236-237 °C

Specific Rotation: + 18° to + 22°

(20 mg/ml, ethanol:1M HCl (2:1), 29.5 °C)

Extinction coefficient:  $E^{mM} = 4.09$  (295 nm, 40 mM HCl), 49.2 (244 nm), 4.66 (320 nm, 0.1 M NaOH)<sup>1</sup>

Synonym:  $T_3$

3,3',5-triiodo-L-thyronine ( $T_3$ ) is one of two iodinated hormones secreted by the thyroid gland. This product is formed by the intracellular proteolysis of thyroglobulin and is secreted immediately into the circulating blood.  $T_3$  has been shown to cause accelerated rates of oxygen consumption and heat production in various body tissues excluding the spleen, brain, and sex glands.<sup>2</sup> It also stimulates metabolic breakdown of glucose, fats, and proteins by stimulating the increase in levels of various metabolic enzymes, including liver glucose 6-phosphatase, hexokinase, and mitochondrial enzymes for oxidative phosphorylation. It is vital for central nervous system maturation in fetuses and is required for normal body growth in children. It also maintains alertness and normal body reflexes. Once in the cell,  $T_3$  asserts its influence on function at the cytological or nuclear level, accordingly. One mechanism of action involves binding of the hormone to its receptor, followed by translocation of the complex into the nucleus where it binds to its DNA recognition sequence. It appears that the regulation of the pathways above also occurs through binding of  $T_3$  to its receptor. When high levels of  $T_3$ /receptor complexes exist, binding of additional  $T_3$  molecules to its receptor induces rapid degradation of the receptor via a ubiquitin-proteasome degradation pathway, indicating  $T_3$  modulates its own function by regulating its receptor level.<sup>3</sup>

The two most important thyroid hormones consist of thyroxine ( $T_4$ ) and 3,3',5-triiodo L-thyronine ( $T_3$ ). These compounds contain iodine bound to one or more carbons in the complex ring backbone structure of the hormones. During metabolism,  $T_4$  is converted to  $T_3$  via removal of an iodine atom from one of the hormonal rings. Activation of  $T_4$  is catalyzed by two enzymes, iodothyronine-5'-deiodinases type I and type II.<sup>4</sup>  $T_3$  is the biologically active thyroid hormone. The primary hormone synthesized in the thyroid is  $T_4$  and only about 20% of the  $T_3$  that is produced from  $T_4$  is produced in the thyroid gland itself. Most  $T_3$  is produced in the target tissues themselves by conversion of circulating free  $T_4$  that diffuses into the cells or binds to tissue-specific receptors. (There are other pathways of metabolism of thyroid hormones in target tissues not involving iodine removal or addition and these are essential to the functional influence of the thyroid upon those specific tissues.) Most (99.9%) of the  $T_4$  in the circulation is bound to protein. It is only the free  $T_4$  that can be converted to  $T_3$  at the target tissue level. However, as free  $T_4$  is consumed, more  $T_4$  is released from bound protein to replace it, maintaining the low circulating levels at a relatively constant value.

This product is synthetically derived.

#### Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

#### Preparation Instructions

This product is soluble in 4 M  $NH_4OH$  in methanol (5 mg/ml). It is also soluble in NaOH. For use in cell culture, a 20  $\mu g/ml$  stock solution can be prepared in the following manner: add 1.0 ml of 1.0 N NaOH to 1 mg, gently swirl to dissolve the powder and add 49 ml of sterile medium. The general working range is 0.02 - 50 ng/ml.<sup>5</sup>

### Storage/Stability

Solutions are stable for 30 days at 2-8 °C. Stock solutions should be frozen in working aliquots. Avoid repeated freeze-thaw cycles. Dilute solutions will tend to adsorb to glass.<sup>1</sup>

### References

1. Data for Biochemical Research, 3rd ed., Dawson, R. M. C., et al., Oxford University Press (New York, NY: 1986), p. 29.
2. Molecular Cell Biology, Darnell, J., et al., Scientific American Books (New York, NY: 1986), pp. 702-703.
3. Dace, A., et al., Hormone binding induces rapid proteasome-mediated degradation of thyroid hormone receptors. Proc. Natl. Acad. Sci. USA, **97(16)**, 8985-8990 (2000).
4. Köhrle, J., The deiodinase family: selenoenzymes regulating thyroid hormone availability and action. Cellular and Molecular Life Sciences, **57(13-14)**, 1853-1863 (2000).
5. Bottenstein, J., et al., The growth of cells in serum-free hormone-supplemented media. Methods Enzymol. **58** 94-109 (1979).

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