

The results of Ruth's TSH (Thyrotropin Stimulating Hormone) was high at 5.01 mIU/L. The reference range is 0.40-4.00 mIU/L. Her doctor recommended a high dose of vitamin D -50,000 IU as treatment. This resulted in extreme night sweats and has no effect on thyroid function.

Within a few weeks of taking potassium iodine, the thyroid function tests returned normal results.

Function

Iodine is a major component of the thyroid hormones, thyroxine (T4), and triiodothyronine (T3). They are based on the amino acid tyrosine. T4 contains four iodine atoms and T3 three iodine atoms. The only known function of iodine is for the production of the thyroid hormones. Excess iodine is secreted in the urine.

Thyroid hormones are required for normal growth and development of the brain and central nervous system. It is required for energy production and oxygen consumption in cells and the maintenance of the metabolic rate.

The regulation of thyroid hormone synthesis, release, and action is a complex process involving the thyroid, the pituitary, the brain, and peripheral tissues.

The hypothalamus regulates the plasma concentrations of the thyroid hormones by controlling the release from the pituitary of the thyroid-stimulating hormone (TSH). If blood T4 falls, the secretion of TSH is increased, which enhances the activity of the thyroid and consequently the output of T4 into the circulation. T4 is converted to T3 which is the more potent form. ¹

Risks of Deficiency

Risks of deficiency include: ²

- Places where the soil is deficient in iodine

- Pregnancy and lactation
- Foods that inhibit thyroid function such as cassava, millet, brassicas (cabbage family).

Signs of Deficiency

Signs of deficiency of iodine include: ³

- During pregnancy: increased risk of abortion and congenital defects
- Infants: increased mortality, psychomotor and intellectual development, low activity of thyroid
- Childhood: goitre, low activity of thyroid, impaired mental function and physical growth
- Adulthood: goitre, low activity of thyroid, impaired mental function
- Weight gain, fatigue, lack of energy, a slow heart rate, low blood pressure, hair loss, and dry skin

Normal Values

Normal values of iodine are listed below. ^{4 5}

Measure	Values	Comment
TSH, Thyrotropin	Clinical: 0.4 – 4.0 mIU/L Optimal: 1.0 – 1.5 mIU/L	High TSH indicates low thyroid function and possible iodine deficiency
Free thyroxin, Free T4	Clinical: 9 – 19 pmol/L Optimal: 15 – 18 pmol/L	Free T4 is a more direct measure of thyroxin concentration. Low T4 indicates elevated TSH.
Free triiodothyronine, Free T3	Clinical: 2.6 – 6.0 pmol/L Optimal: 4.9 – 6.0 pmol/L	T3 is the active form of thyroid hormone. Low T3 indicates elevated TSH

Recommended Daily Intake

The recommended daily intake for adults is 150 µg/day. For those pregnant, it is 220 µg/day and 270 µg/day for those lactating. The upper limit is 1,100 µg/day which can be easily exceeded for those consuming seaweed or sausages containing thyroid extracts.⁶ It is very easy to have an excess of selenium which is detrimental. One or two Brazil nuts a week are sufficient.

Sources

Marine foods such as seaweed, fish and shellfish contain the most iodine. Iodised salt is another source. In Australia, bread has been made with ionised salt since 2009. Most salt in food comes from processed foods which are usually non-iodised.⁷

Footnotes

1. Samman, S. et al. (2017) 'Trace Elements', in Jim Mann & A. Stewart Truswell (eds.) *Essentials of Human Nutrition*. Fifth Edition London: Oxford University Press. p.177-184
2. Pocket Guide to Micronutrients in Health and Disease Michael Zimmermann, MD Thieme Stuttgart New York 2001
3. Pocket Guide to Micronutrients in Health and Disease Michael Zimmermann, MD Thieme Stuttgart New York 2001
4. Pocket Guide to Micronutrients in Health and Disease Michael Zimmermann, MD Thieme Stuttgart New York 2001
5. Williams, J. E. & Gianni, K. (n.d.) The Complete Blood Test Blueprint Program.
6. Pocket Guide to Micronutrients in Health and Disease Michael Zimmermann, MD Thieme Stuttgart New York 2001
7. U.S. Department of Agriculture (n.d.) *USDA Food Composition Databases*