

Iodine and Normal Thyroid Physiology

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Iodine is one of the richest (0.014%) trace elements containing in the human body to maintain normal function of breast, ovary, pulmonary and many other organ systems as well as the integrity of skin and immunity. Nevertheless, the most well-known function of iodine is the involvement in the synthesis of thyroid hormones. Iodine is absorbed from the gastrointestinal tract in the form of monovalent anion, iodide; through active transport by the sodium iodide symporter (NIS), iodide was taken-up by the thyroid gland and organized to iodine. After transport to the lumen, iodine was then condensed onto tyrosine residues which reside along the polypeptide backbone of a protein molecule called thyroglobulin. This reaction results in the formation of either a mono-iodinated tyrosine (MIT) or di-iodinated tyrosine (DIT). The newly formed iodotyrosines forms one of the most important constituents of the colloid material and couples to each other to form triiodothyronine (T3) or tetraiodothyronine (T4). In response to the thyroid stimulating hormone (TSH), T3 and T4 were released into the circulation to regulate the metabolism of an individual.

The daily dietary reference intake of iodine was recommended to be 150 μg for adults, 220 μg for pregnant women and 290 μg for lactating mothers. Iodine is rich in foods such as seaweeds, haddock, cod, yogurt, cow-milk and eggs. However, insufficient intake of iodine may lead to endemic goiter, impaired mental function, hypothyroidism, cretinism, and even stillbirth in severely deficient areas. Daily intake of iodine may be monitored by urinary iodine measurements and a 100-199 $\mu\text{g}/\text{l}$ median urinary iodine concentration in school-age children is considered adequate by the international council for control of iodine deficiency disorders (ICCIDD). Accordingly, a 35%, 14% and 1% of residence in Taiwan showed mild, moderate and severe insufficient of iodine intake by the Taiwan Food and Drug Administration (TFDA), primarily using urine samples collected by the Nutrition and Health Survey in Taiwan. In contrast, iodine excess that may trigger autoimmune thyroid disease, hyperthyroidism as well as hypothyroidism and thyroid cancers is another public health issue.