Iodine Pump and Trapping Encyclopedia Article

Iodine Pump and Trapping

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Iodine Pump and Trapping

Iodine is one of the essential metabolic oligoelements (i.e., trace-elements with a high degree of activity), and is usually utilized in the form of iodide for the synthesis of **hormones** by the thyroid gland. These thyroid hormones include thyroxin, also termed tetraiodothyroxine (T_4), and triiodothyronine (T_3), as well as thyroglobulin, an iodine-containing glycoprotein. Iodide (or iodine) is a nonmetallic oligoelement usually present in the diet and transported through intestinal membranes into the **blood** circulation. One-fifth of the circulating iodide is taken by the thyroidal cells and the remaining is eliminated in the urine.

The thyroid structure shows a great amount of follicles formed by cubical epithelial cells that contain a substance secreted by the gland cells termed colloid. The colloid is formed mainly by thyroglobulin and stores the synthesized thyroidal hormones before they are delivered into the blood circulation. Iodide ions are selectively trapped and pumped into thyroidal cells by active transport through specific ion channels in the membranes of the cells, a process termed iodide trapping. In the thyroidal cells, the iodine concentrations may be from 30 up to 250 times higher than in the blood **plasma**. The rate of iodide trapping by thyroidal cells is controlled by the pituitary gland that secretes the TSH (i.e., thyroid-stimulating hormone or thyrotrophic hormone). Deficiency in dietary iodine (or in TSH) leads to a decrease in thyroid function and low levels of thyroxin that may cause obesity, abnormally high blood cholesterol levels, and **arteriosclerosis**. Normal levels of thyroxin synthesis require the ingestion of approximately 1mg of iodine per week in the diet.