Thyroid hormones are primarily eliminated by the kidney. Approximately 90% of circulating thyroid hormones are bound to plasma proteins, including thyroxine-binding globulin (TBG), albumin, and corticosteroid-binding globulin (CBG). The remaining portion of thyroid hormones is excreted in the urine as free hormones or as conjugates. Approximately 70% of circulating T4 is converted to T3 in the liver and other tissues, where T4 is deiodinated to T3 by monodeiodinases. This process is mediated by Type I and Type II iodothyronine 5’-deiodinase (D3). T3 is subsequently deiodinated to reverse T3 (rT3) by monodeiodinase Type II. The metabolic clearance of T4 is approximately 1.5 times higher than that of T3. As a result, T3 has a shorter half-life than T4. The metabolic clearance of T3 is approximately 2.4 times higher than that of T4. The half-life of T3 is approximately 1.4 days, while the half-life of T4 is approximately 7 days.

Thyroid hormones are involved in a wide range of physiological processes. They are essential for the development and function of the central nervous system, particularly in the brain. They also play a critical role in the regulation of metabolism, growth, and development. Thyroid hormones are involved in the regulation of energy expenditure, body temperature, and the rate of metabolism. They also influence the function of the immune system, the cardiovascular system, and the reproductive system.

Inadequate thyroid hormone levels can result in hypothyroidism, while excess thyroid hormone levels can result in hyperthyroidism. These conditions can be managed with appropriate treatment, such as thyroid hormone replacement therapy or anti-thyroid drugs, respectively. Thyroid function can be monitored through laboratory tests, such as measurement of thyroid-stimulating hormone (TSH) and thyroid hormone levels (T4, T3).

Abbreviations: TBG = thyroxine-binding globulin, CBG = corticosteroid-binding globulin, D3 = Type I iodothyronine 5’-deiodinase, D2 = Type II iodothyronine 5’-deiodinase, rT3 = reverse T3.
decrease and serum TSH levels increase to values outside the normal range. Since elevations in serum TSH have been associated with increased cardiovascular morbidity and mortality, it is important to be aware of the possibility of TSH to indicate the need for treatment. Hypothyroidism therapy, usually in the form of levothyroxine sodium, is recommended when TSH levels are high, the diagnosis of permanent hypothyroidism is established, and levothyroxine therapy should be reinstituted. The signs and symptoms of hypothyroidism are common, and the diagnosis can be made based on the clinical presentation and laboratory findings. However, it is important to note that hypothyroidism can present with nonspecific symptoms and signs, which can make it difficult to diagnose. Therefore, clinicians should be alert to the possibility of hypothyroidism and consider the diagnosis in patients who exhibit symptoms suggestive of the condition.

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