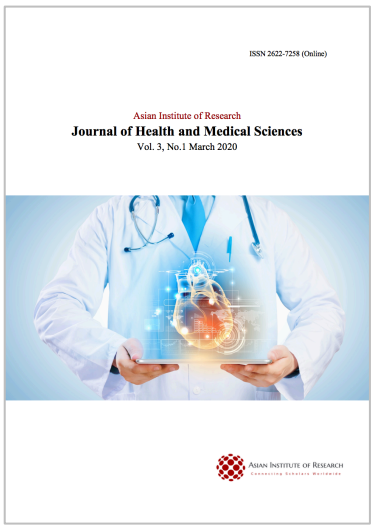

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The Relationship Between Thyroid Hormones (Thyroxin, Triiodothyronine) and Metabolic Activities of Body: Reviewed

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Abstract
The thyroid gland is located in front of the neck, within the thyroid are small, spherical chambers called follicles. Cells line the walls of the follicles and produce thyroglobulin, the substance from which thyroxine (T4) and triiodothyronine (T3) are made. Thyroxine is usually produced in greater quantity than triiodothyronine, and most thyroxine is eventually converted to triiodothyronine. TH regulates the body's metabolic rate and production of heat. It also maintains blood pressure and promotes normal development and functioning of several organ systems. TH affects cellular metabolism by stimulating protein synthesis, the breakdown of lipids, and the use of glucose for production of ATP. Library Methodology used in this article is Library research, Directly and indirectly Researcher views are discussed. In addition; Research Instruments used in this research are: Fiche card, updated and authentic academic text-books, Journals and articles. answers were sought for the questions from various academic resources. Recent development in basic and clinical investigations has augmented our grasp of the information and science. This review discusses and recognition the thyroid hormones, meanwhile described its relationship with metabolic activities state and some orders.

Keywords: Hormone, Thyroxine, Triiodothyronine, Metabolism

Introduction

Structure of thyroid gland

The thyroid gland located inferior to the larynx, it is composed of two lobes (right, left). Microscopic spherical sacs called thyroid follicles, abasement membrane surrounds each follicle when the follicular cells are inactive, their shape is low cuboidal to squamous, but under the influence, it becomes active in secretion and range from cuboidal to low columnar in shape (Hadad, 2020). Two lobes of thyroid gland secreted hormones such as: thyroxin, which also called tetraiodothyronine (T4), because it contains four atoms of iodine, Triiodothyronine (T3) it contains three atoms of iodine, both them which helps regulated metabolic rate, used oxygen, growth and development cell (Brent, 2000).

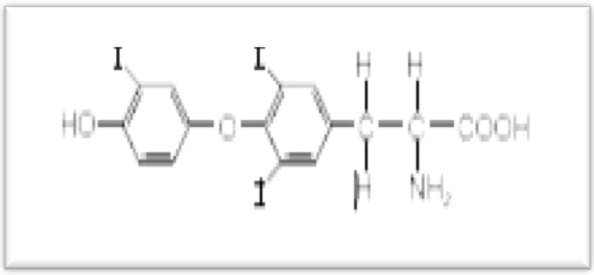


Figure (1:1) : seen triidothronin moelechol . (Tortora Et.al; 2014)

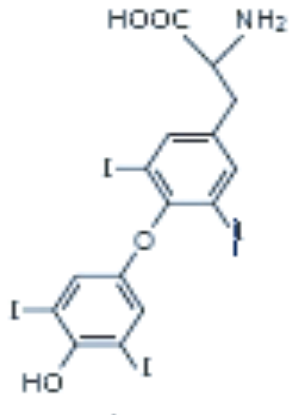


Figure (1 :2) seen thyroxine. (Lodish Et.al; 2016)

Increase of cellular metabolic and thyroid hormones secrete

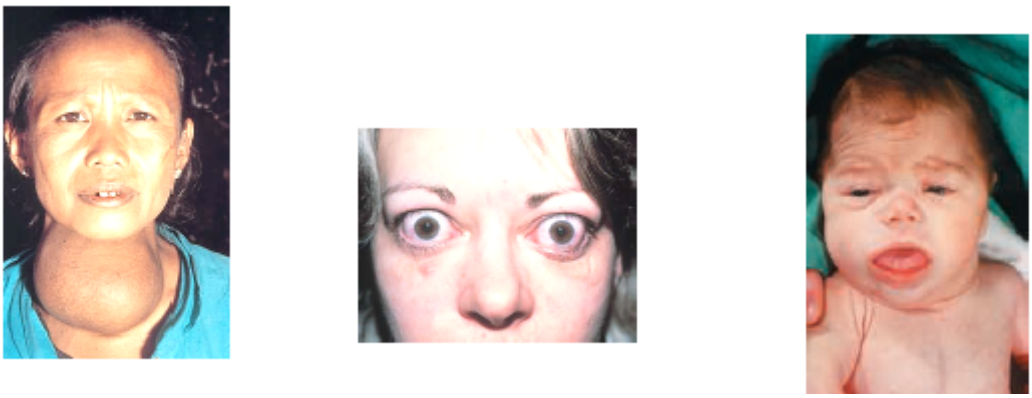
Most parts of body cells have receptors for thyroid hormones (T3, T4), also their effects throughout the organism. While thyroid hormones increase basal metabolic rate (BMR), The rate of oxygen consumption under the standard, rate of nutrition used increase about to produced energy and also increase some of endocrine glands hormones, in addition, mental activities partially motivate and increase hormonic activities in thyroid gland as follow (Reece, et, al,2014).

1. **Increase performance of some mitochondria:** while the rate of thyroxin and triiodothyronine inject the animal, amount mitochondria increase in organism. It increases ATP production in cells, therefore there is a positive strong correlation between mitochondria and cell activities (Harper, 4008).
2. **Thyroid hormones accession and transition of active ions:** a second major effect of thyroid hormones is to stimulus synthesis additional sodium, potassium pumps which used a large amount of ATP to continually sodium ions from the systole into the extracellular fluid and potassium from the extracellular fluid into the systole (Rowland, 2020).
3. **Growth hormones and its relationship with thyroid hormones:** most animals need thyroid hormones for the competition of their life cycle. For instance: humane especially children need thyroid hormones in their growth phase. In hypothyroid patients, the growth speed is very low. Meanwhile, hyperthyroid children gave a high speed of growth and long skeleton than normal ones. In embryonic period disfunction of thyroid hormones can cause lifetime mental deficiency. The most severe impairment of fetal mental and skeletal development known as cretinism, occurs when both mother and fetus have thyroid deficiency (Tortora, et, al, 2014). This tends to occur more often in regions of the world where severe iodine deficiency is a problem. Cretinism also occurs in infants who have little or no thyroid tissue, especially if the hypothyroidism is not recognized very soon after birth. The ability to prevent cretinism by prompt treatment has led to routine screening for hypothyroidism in newborns (Lars, et, al, 1998).
4. **The thyroid hormones effect to mechanism of body:**

- the carbohydrate metabolic instigation: while thyroid hormones are particular stimulus of humans about to metabolic actions, so increase the product of glucose with cells, meanwhile increase the rate of metabolic action about to (glycolysis, insulin secretion, and absorption) (Bernal, 2011).
- The motivation of lipids metabolic by an increase to thyroid hormones: the fatty acid density in cell plasma increase with thyroid hormones, against decrease triglyceride, phospholipid, and cholesterol in plasma. This function becomes fat sediment in the liver. They also increase lipolysis and enhance cholesterol excretion, thus reducing blood cholesterol levels (Johsotne, et, al, 2005).
- thyroid hormones, blood, and kidney correlation: The thyroid hormones enhance some actions of the catecholamines (norepinephrine and epinephrine) because they upregulate beta (*{3*) receptors. For this reason, symptoms of hyperthyroidism include increased heart rate, more forceful heartbeats, and increased blood pressure (Klein and Sara, 2007).

Thyroid Gland Disorders

Thyroid gland disorders affect all major body systems and are among the most common endocrine disorders. Genetic hypothyroidism, hyposecretion of thyroid hormones that is present at birth, has devastating consequences if not treated promptly. Previously termed cretinism, this condition causes severe mental retardation and stunted bone growth (Brent, 2000). At birth, the baby typically is normal because lipid-soluble maternal thyroid hormones crossed the placenta during pregnancy and allowed normal development. Most states require testing of all newborns to ensure adequate thyroid function. If congenital hypothyroidism exists, oral thyroid hormone treatment must be started soon after birth and continued for life. If a pregnant woman produces sufficient TH, many of the symptoms of cretinism do not appear until after birth, when the deficient infant begins to rely solely on her own malfunctioning thyroid gland to supply the needed hormones [31]. Oral doses of TH can prevent cretinism, so most infants in industrialized nations are now tested for proper thyroid function shortly after birth. In the United States, such testing reveals that incomplete development of the thyroid gland occurs in about 1 in every 3000 births (Tortora et, al, 2018). Hypothyroidism during the adult years produces myxedema, which occurs about five times more often in females than in males. A hallmark of this disorder is edema (accumulation of interstitial fluid) that causes the facial tissues to swell and look puffy. A person with myxedema has a slow heart rate, low body temperature, sensitivity to cold, dry hair and skin, muscular weakness, general lethargy, and a tendency to gain weight easily. Because the brain has already reached maturity, mental retardation does not occur, but the person may be less alert (Lars, et, al, 2005).



a: Goiter b: Exothalamous c: cretinsim

Figure (1.3). (Martini; 2018)

Thyroid hormones reduce the symptoms. The most common form of hyperthyroidism is Grave disease, which also occurs seven to ten times more often in females than in males, usually before age 40 (Brent, 2008). Grave disease is an autoimmune disorder in which the person produces antibodies that mimic the action of thyroid-stimulating hormone (TSH). The antibodies continually stimulate the thyroid gland to grow and produce thyroid

hormones. A primary sign is an enlarged thyroid, which may be two to three times its normal size (Flament and Karein, 2013). Graves patients often have a peculiar edema behind the eyes, called exophthalmos, which causes the eyes to protrude Treatment may include surgical removal of part or all of the thyroid gland (thyroidectomy), the use of radioactive iodine (131I) to selectively destroy thyroid tissue, and the use of antithyroid drugs to block synthesis of thyroid hormones hypothyroidism, which means normal secretion of thyroid hormone (Brent, 2008).

Research Methods: Library Methodology used in this article is Library research, Directly and indirectly Researcher views are discussed. In addition; answers were sought for the questions (how is the secretion of T3 and T4 regulated? And what are the physiological effects of thyroid hormones?) from various academic resources Research Instruments used in this research are: Fiche card, updated and authentic academic text-books, Journals and articles.

Results

To consider that thyroxine and triiodothyronine increase almost the majority of body cells, over secretion of hormone increase (BMR) between (60-100). Vis versa as the secretion of hormone stops, BMR decrease in half of its normal. It is shown in the figure of (1:5).

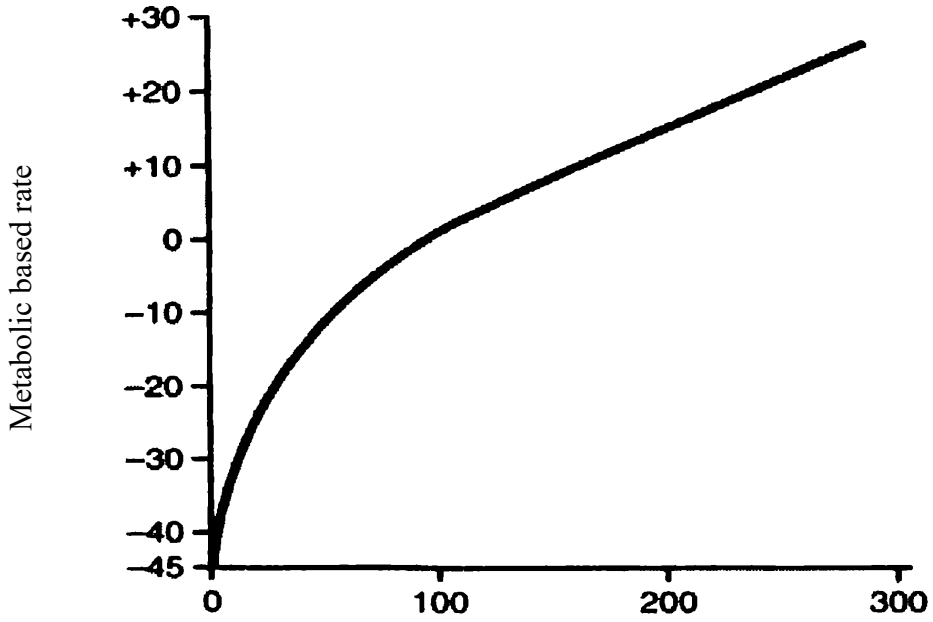


Figure (1:5). (Guyton et al 2011)

To precisely regulate secretion thyroid hormone in every moment it is vital to deep the normal level for body metabolism. To get this goal their ore feedback mechanisms through hypothalamus and hypophysis that they act to set out secretion of thyroid hormones (Huang and Hedely, 2008).

In “Principle of Anatomy and Physiology” author wrote about the summarize the hormones by the thyroid gland control of their secretion, and their principle actions, seen table (1:1).

Table (1:1): Summary of gland thyroid hormones

Hormones sources	Control of sectation	Principle actions
T3 (tridothyronine and T4 (thyroxin or thyroid hormones from follicular cells	Secration is increased by thyrotropin-releasing hormone (TRH), which stimulates the release of thyroid-stimulating hormone (TSH) in response to low thyroid hormone levels, low metabolic rate, cold, pregnancy, and high altitudes; TRH and TSH secration are ingibited in	Increase basal metabolic rate; stimulate the synthesis of protein; increase use of glucose and fatty acids for ATP production; increase lopolysis; enhance cholesterol excretion; accelerate body growth; contribute to the development of the nervous system.

	response to high thyroid hormone levels; high iodine level suppresses T3/T4 secretion.	

Disruption of thyroid hormone production and regulation can result in serious orders. One such disorder reflects the unusual chemical makeup of thyroid hormone, the only tiodine containing molecule synthesized in the body (Jansen, et, al, 2005). hThyroid hormone is actually a pair of very similar molecules derived from the amino acid tyrosine. Triiodothyronine contains three iodine atoms, whereas tetraiodothyronine, or thyroxine (T4), contains four (see figure 1:2).

Conclusion

In human thyroid hormones regulates bioenergetics; helps maintain normal blood pressure, heart rate e deand muscle tone; and regulates digestive and reproductive function. Meanwhile, Thyroid hormones increase **basal metabolic rate (BMR)**, the rate of oxygen consumption under standard or basal conditions (awake, at rest, and fasting), by stimulating the use of cellular oxygen to produce ATP (Braulke, et, al, 2008). When the basal metabolic rate increases, cellular metabolism of carbohydrates, lipids, and proteins increases.

Together with human growth hormone and thyroid hormones accelerate body growth, particularly the growth of the nervous and skeletal systems. Deficiency of thyroid hormones during fetal development, infancy, or childhood causes severe mental retardation and stunted bone growth. A goiter is simply an enlarged thyroid gland. It may be associated with hyperthyroidism (Harvey, et, al, 2002).

Under secretion of TH in adulthood causes myxedema. In some places in the world, dietary iodine intake is inadequate; the resultant low level of thyroid hormone in the blood stimulates secretion of TSH, which causes thyroid gland enlargement (Silva, 2008).

Like other endocrine glands, the thyroid releases these hormones directly into the bloodstream. Each follicle is surrounded by a basket-like network of capillaries, these are supplied by the superior and inferior thyroid arteries The thyroid receives one of the body's highest rates of blood flow per gram of tissue and consequently has a dark reddish-brown color. Thyroid hormone is secreted or inhibited in response to fluctuations in metabolic rate. The brain monitors the body's metabolic rate and stimulates. To ensure adequate blood and oxygen supply to meet this increased metabolic demand, thyroid hormone also raises the respiratory rate, heart rate, and strength of the heartbeat (Bernal, 2011). It stimulates the appetite and accelerates the breakdown of carbohydrates, fats, and protein for fuel. Thyroid hormone also promotes alertness and quicker reflexes; growth hormone secretion; growth of the bones, skin, hair, nails, and teeth; and development of the fetal nervous system (Bernal, 2011).

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