9.3.4

Thyroid Disorders

Next to diabetes, thyroid disorders are the most common endocrine problems. Most thyroid disorders fall into one of two categories, hyperthyroidism (increased thyroid activity) or hypothyroidism (decrease thyroid activity).

Hyperthyroidism

Hyperthyroidism is the result of overproduction of thyroid hormones. Listed below are possible problems associated with excess thyroid hormone levels. As you examine the list try to relate the problems with the normal actions of the hormones.

1. Increased oxygen consumption (increased metabolic rate)
2. Sweating, warm flushed skin
3. Increased heart rate and increased blood pressure
4. Heat intolerance
5. Increased appetite and weight loss
6. Insomnia
7. Increased nervous system activity, hyper-excitability, irritability, insomnia
8. Increased muscle protein catabolism resulting in muscle weakness and weight loss.

One common form of hyperthyroidism is **Graves' disease.** This condition is caused by antibodies called **thyroid-stimulating immunoglobulins** (TSI). For unknown reasons, the body produces TSIs which then circulate in the blood and bind to the TSH receptor on the follicular cells of the thyroid. The TSIs are agonists and therefore induce thyroid hormone release and enlargement of the gland (**goiter**). The TSIs are not subject to the same negative feedback mechanisms as TSH and as a result constantly stimulate the gland. Some Graves' disease sufferers exhibit a condition known as **exophthalmos.** This is an immune-mediated infiltration of the tissues behind the eye, including the extrinsic eye muscles, resulting in double vision as well as protrusion of the eyeballs from the sockets.

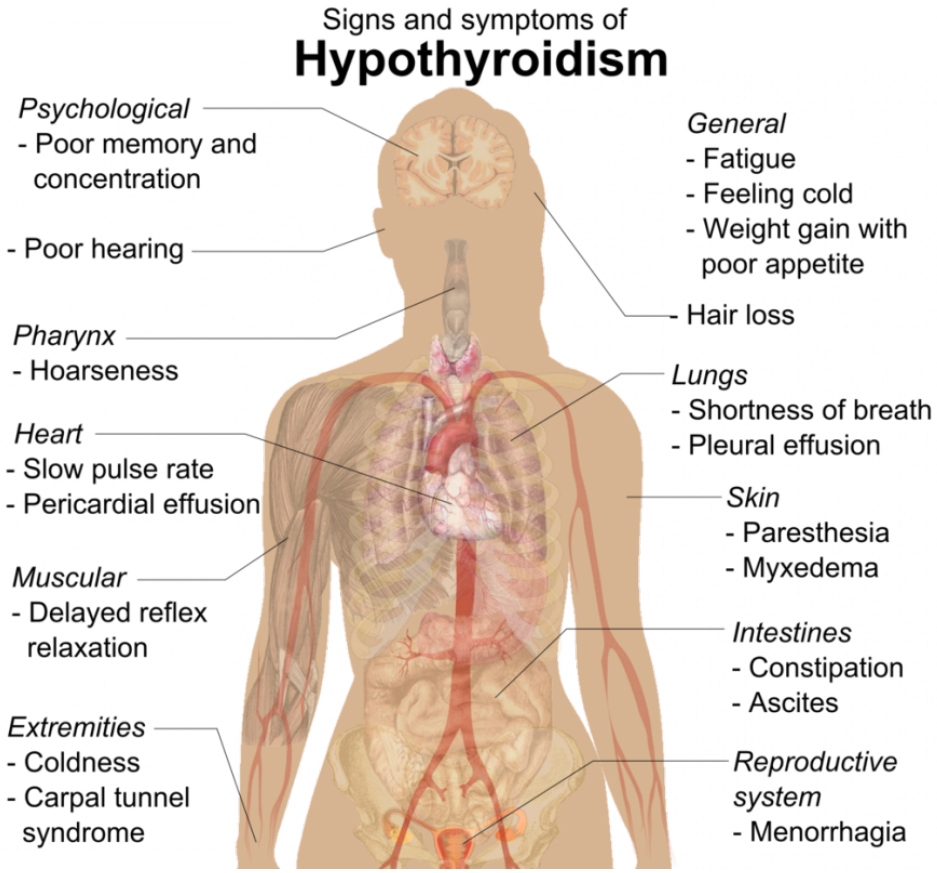
Treatments for hyperthyroidism include the use of beta blockers to decrease heart rate, **propylthiouracil** (inactivates thyroid peroxidase) to reduce the production of thyroid hormones, radioactive iodine to destroy some of the thyroid cells and thus reduce the amount of hormones produced, and surgical removal of the thyroid gland (followed by hormone replacement therapy).

Hypothyroidism

Hypothyroidism results from the underproduction of thyroid hormones. The reduction in thyroid hormones has almost the reverse effects of hyperthyroidism.

1. Decreased oxygen consumption (decreased metabolic rate)
2. Decreased heart rate and decreased blood pressure
3. Decreased sweating, cold skin
4. Intolerance to cold
5. Decreased appetite and weight gain
6. Apathy, sleepiness
7. Decreased protein synthesis causing brittle hair and nails, and dry skin.
8. Accumulation of mucoproteins in subcutaneous skin resulting puffy appearance (**myxedema**).
9. Reduced nervous system activity resulting in fatigue and slower processing.

In underdeveloped countries, the most common cause of hypothyroidism is a lack of iodine in the diet. Without iodine, thyroid hormone production is incomplete which results in a lack of negative feedback. Thus, TRH and TSH levels increase causing the gland to increase activity, which results in a goiter. In the United States, the most common cause of hypothyroidism is an autoimmune destruction of the thyroid gland (**Hashimoto's disease**). Approximately 1-2% of all adults in the U.S. will suffer from hypothyroidism at some time in their lives, with women being at a higher risk than men. The treatment for hypothyroidism is administration of Synthroid, a synthetic form of thyroxine.



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