Title	Basics of Thyroid Disorders
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Purpose

The goal of this course is to help health care professionals understand, and educate their patients regarding thyroid disorders.

Objectives

1. State how the thyroid functions.
2. Identify four common thyroid problems.
3. Identify four common tests to examine thyroid gland function.
4. State four signs and symptoms of both hypothyroidism and hyperthyroidism.

Thyroid Disorders

The thyroid gland is the biggest gland in the neck. It is situated in the anterior (front) neck below the skin and muscle layers. The thyroid gland takes the shape of a butterfly with the two wings being represented by the left and right thyroid lobes, which wrap around the trachea. The sole function of the thyroid is to make thyroid hormone. This hormone has an effect on nearly all tissues of the body where it increases cellular activity. The function of the thyroid is to regulate the body's metabolism.

The thyroid gland is prone to several very distinct problems, some of which are extremely common. These problems can be broken down into:

- Those concerning the production of hormone (too much, too little)
- Those due to increased growth of the thyroid causing compression of important neck structures or simply appearing as a mass in the neck
- The formation of nodules or lumps within the thyroid which are worrisome for the presence of thyroid cancer
- Those which are cancerous (1)

Common Problems

- Goiters – A thyroid goiter is a dramatic enlargement of the thyroid gland. Goiters are often removed because of cosmetic reasons or because they compress other vital structures of the neck including the trachea and the esophagus making breathing and swallowing difficult. Sometimes goiters will actually grow into the chest where they can cause trouble as well. Several x-rays will help explain all types of thyroid goiter problems.
- Thyroid Cancer – Thyroid cancer is a fairly common malignancy. The vast majority have excellent long-term survival.
- Solitary Thyroid Nodules – There are several characteristics of solitary nodules of the

thyroid, which make them suspicious for malignancy. Although as many as 50% of the population will have a nodule somewhere in their thyroid, the overwhelming majority of these are benign. Occasionally, thyroid nodules can take on characteristics of malignancy and require either a needle biopsy or surgical excision.

- Hyperthyroidism – Hyperthyroidism means too much thyroid hormone. Current methods used for treating a hyperthyroid patient are radioactive iodine, anti-thyroid drugs, or surgery. Each method has advantages and disadvantages and is selected for individual patients. Many times the situation will suggest that all three methods are appropriate, while other circumstances will dictate a single best therapeutic option. Surgery is the least common treatment selected for hyperthyroidism.
- Hypothyroidism – Hypothyroidism means too little thyroid hormone and is a common problem. Hypothyroidism is often present for a number of years before it is recognized and treated. There are several common causes. Hypothyroidism can even be associated with pregnancy. Treatment for all types of hypothyroidism is usually straightforward.
- Thyroiditis – Thyroiditis is an inflammatory process ongoing within the thyroid gland. Thyroiditis can present with a number of symptoms such as fever and pain, but it can also present as subtle findings of hypo or hyper- thyroidism. There are a number of causes, some more common than others. (2)

How the Thyroid Works

The thyroid gland is a small gland, normally weighing less than one ounce. The two lobes lie along the windpipe (trachea) and are joined together by a narrow band of thyroid tissue, known as the isthmus. The thyroid is situated just below your "Adams apple" or larynx. During development (inside the womb) the thyroid gland originates in the back of the tongue, but it normally migrates to the front of the neck before birth. Sometimes it fails to migrate properly and is located high in the neck or even in the back of the tongue (lingual thyroid). This is very rare. At other times it may migrate too far and end up in the chest (this is also rare).

The function of the thyroid gland is to take iodine, found in many foods, and convert it into thyroid hormones: thyroxine (T4) and triiodothyronine (T3). Thyroid cells are the only cells in the body, which can absorb iodine. These cells combine iodine and the amino acid tyrosine to make T3 and T4. T3 and T4 are then released into the blood stream and are transported throughout the body where they control metabolism (conversion of oxygen and calories to energy). Every cell in the body depends upon thyroid hormones for regulation of their metabolism. The normal thyroid gland produces about 80% T4 and about 20% T3, however, T3 possesses about four times the hormone "strength" as T4.

The thyroid gland is under the control of the pituitary gland, a small gland the size of a peanut at the base of the brain. When the level of thyroid hormones (T3 & T4) drops too low, the pituitary gland produces Thyroid Stimulating Hormone (TSH) which stimulates the thyroid gland to produce more hormones. Under the influence of TSH, the thyroid will manufacture and secrete T3 and T4 thereby raising their blood levels. The pituitary senses this and responds by decreasing its TSH production. One can imagine the thyroid gland as a furnace and the pituitary gland as the thermostat. Thyroid hormones are like heat. When the heat gets back to the thermostat, it turns the thermostat off. As the room cools (the thyroid hormone levels drop), the thermostat turns back on (TSH increases) and the furnace produces more heat (thyroid hormones).

The pituitary gland itself is regulated by another gland, known as the hypothalamus. The hypothalamus is part of the brain and produces TSH Releasing Hormone (TRH) which tells the pituitary gland to stimulate the thyroid gland (release TSH). One might imagine the hypothalamus as the person who regulates the thermostat since it tells the pituitary gland at what level the thyroid should be set. (3)

Tests for Thyroid Function

With radioimmunoassay techniques it is possible to measure circulating hormones in the blood very accurately. Knowledge of thyroid physiology is important in knowing what thyroid test or tests are needed to diagnose different diseases. No one single laboratory test is 100% accurate in diagnosing all types of thyroid disease. A combination of two or more tests can usually detect even the slightest abnormality of thyroid function.

A low T4 level could mean a diseased thyroid gland or a non-functioning pituitary gland, which is not stimulating the thyroid to produce T4. Since the pituitary gland would normally release TSH if the T4 were low, a high TSH level would confirm that the thyroid gland (not the pituitary gland) is responsible for the hypothyroidism.

If the T4 level is low and TSH is not elevated, the pituitary gland is more likely to be the cause for the hypothyroidism. This would drastically effect the treatment since the pituitary gland also regulates the body's other glands (adrenals, ovaries, and testicles) as well as controlling growth in children and normal kidney function. Pituitary gland failure means that the other glands may also be failing and other treatment than just thyroid may be necessary. The most common cause for the pituitary gland failure is a tumor of the pituitary and this might also require surgery to remove.

Tests

- Measurement of Serum Thyroid Hormones: T4 by RIA. T4 by RIA (radioimmunoassay) is the most used thyroid test of all. It is frequently referred to as a T7, which means that a resin T3 uptake (RT3u) has been done to correct for certain medications such as birth control pills, other hormones, seizure medication, cardiac drugs, or even aspirin that may alter the routine T4 test. The T4 reflects the amount thyroxine in the blood. If the patient does not take any type of thyroid medication, this test is usually a good measure of thyroid function.
- Measurement of Serum Thyroid Hormones: T3 by RIA. Thyroxine (T4) represents 80% of the thyroid hormone produced by the normal gland and generally represents the overall function of the gland. The other 20% is triiodothyronine measured as T3 by RIA. Sometimes the diseased thyroid gland will start producing very high levels of T3 but still produce normal levels of T4. Therefore measurement of both hormones provides an even more accurate evaluation of thyroid function.
- Thyroid Binding Globulin (TBG). Most of the thyroid hormones in the blood are attached to a protein called thyroid binding globulin (TBG). If there is an excess or deficiency of this protein it alters the T4 or T3 measurement but does not affect the action of the hormone. If a patient appears to have normal thyroid function, but an unexplained high or low T4 or T3, it may be due to an increase or decrease of TBG. Direct measurement of TBG can be done and will explain the abnormal value. Excess TBG or low levels of TBG are found in some families as a hereditary trait. It causes no problem except falsely elevating or lowering the T4 level. These people are frequently misdiagnosed as being hyperthyroid or hypothyroid, but they have no thyroid problem and need no treatment.
- Measurement of Pituitary Production of TSH. Pituitary production of TSH is measured by a method referred to as IRMA (immunoradiometric assay). Normally, low levels (less than 5 units) of TSH are sufficient to keep the normal thyroid gland functioning properly. When the thyroid gland becomes inefficient such as in early hypothyroidism, the TSH becomes elevated even though the T4 and T3 may still be within the "normal" range. This rise in TSH represents the pituitary gland's response to a drop in circulating thyroid hormone. It is usually the first indication of thyroid gland failure. Since TSH is normally low when the thyroid gland is functioning properly, the failure of TSH to rise when circulating thyroid hormones are low is an indication of impaired pituitary function. The new "Sensitive" TSH

test will show very low levels of TSH when the thyroid is overactive (as a normal response of the pituitary to try to decrease thyroid stimulation). Interpretations of the TSH level depend upon the level of thyroid hormone. The TSH is usually used in combination with other thyroid tests such as the T4 RIA and T3 RIA.

- TRH Test. In normal people TSH secretion from the pituitary can be increased by giving a shot containing TSH Releasing Hormone (TRH – the hormone released by the hypothalamus, which tells the pituitary to produce TSH). A baseline TSH of 5 or less usually goes up to 10-20 after giving an injection of TRH. Patients with too much thyroid hormone (thyroxine or triiodothyronine) will not show a rise in TSH when given TRH. This "TRH test" is presently the most sensitive test in detecting early hyperthyroidism. Patients who show too much response to TRH (TSH rises greater than 40) may be hypothyroid. This test is also used in cancer patients who are taking thyroid replacement to see if they are on sufficient medication. It is sometimes used to measure if the pituitary gland is functioning. The new "sensitive" TSH test has eliminated the necessity of performing a TRH test in most clinical situations.
- Iodine Uptake Scan. A means of measuring thyroid function is to measure how much iodine is taken up by the thyroid gland (RAI uptake). Cells of the thyroid normally absorb iodine from our blood stream (obtained from foods we eat) and use it to make thyroid hormone. Hypothyroid patients usually take up too little iodine and hyperthyroid patients take up too much iodine. The test is performed by giving a dose of radioactive iodine on an empty stomach. The iodine is concentrated in the thyroid gland or excreted in the urine over the next few hours. The amount of iodine that goes into the thyroid gland can be measure by a "Thyroid Uptake". Patients who are taking thyroid medication will not take up as much iodine in their thyroid gland because their own thyroid gland is turned off and is not functioning. At other times the gland will concentrate iodine normally but will be unable to convert the iodine into thyroid hormone. Interpretation of the iodine uptake is usually done in conjunction with blood tests.
- Thyroid Scan. Taking a "picture" of how well the thyroid gland is functioning requires giving a radioisotope to the patient and letting the thyroid gland concentrate the isotope. It is usually done at the same time that the iodine uptake test is performed. Although other isotopes, such as technetium, will be concentrated by the thyroid gland, these isotopes will not measure iodine uptake, which is what we really want to know because the production of thyroid hormone is dependent upon absorbing iodine. It has also been found that thyroid nodules that concentrate iodine are rarely cancerous. This is not true if the scan is done with technetium. Therefore, all scans are now done with radioactive iodine. Pregnant women should not have thyroid scans performed because the iodine can cause development troubles within the baby's thyroid gland. Thyroid scans are used for the following reasons: identifying nodules and determining if they are 'not' or 'cold', measuring the size of the goiter prior to treatment, follow-up of thyroid cancer patients after surgery, and locating thyroid tissue outside the neck, i.e. base of the tongue or in the chest.
- Thyroid Ultrasound. Thyroid ultrasound refers to the use of high frequency sound waves to obtain an image of the thyroid gland and identify nodules. It tells if a nodule is "solid" or a fluid-filled cyst, but it will not tell if a nodule is benign or malignant. Ultrasound allows accurate measurement of a nodule's size and can determine if a nodule is getting smaller or is growing larger during treatment. Ultrasound aids in performing thyroid needle biopsy by improving accuracy if the nodule cannot be felt easily on examination.
- Thyroid Antibodies. The body normally produces antibodies to foreign substances such as bacteria. Some people are found to have antibodies against their own thyroid tissue. A condition known as Hashimoto's Thyroiditis is associated with a high level of these thyroid antibodies in the blood. Whether the antibodies cause the disease or whether the disease causes the antibodies is not known. The finding of a high level of thyroid antibodies is strong evidence of this disease. Occasionally, low levels of thyroid antibodies are found with other types of thyroid disease. When Hashimoto's thyroiditis presents as a thyroid nodule rather than a diffuse goiter, the thyroid antibodies may not be present.

- Thyroid Needle Biopsy. This has become the most reliable test to differentiate the "cold" nodule that is cancer from the "cold" nodule that is benign ("hot" nodules are rarely cancerous). It provides information that no other thyroid test will provide. While not perfect, it will provide definitive information in 75% of the nodules biopsied.

Since Euthyrox or Synthroid (most other thyroid pills) behave exactly as normal human thyroid hormone, they are not rapidly cleared from the body as other medications are. Most thyroid pills have a half-life of 6-7 days which means they must be stopped for four to five weeks before accurate thyroid testing is possible. An exception to the long half-life of thyroid medication is Cytomel – a thyroid pill with a half-life of only 48 hours. Therefore it is possible to change a person's thyroid replacement to Cytomel for one month to allow time for his regular pills to clear the body. Cytomel is then stopped for ten days and the appropriate test can then be done. Usually patients, even those who have no remaining thyroid function, tolerate being off thyroid replacement only 10 days quite well. (4)

Hyperthyroidism

In healthy people, the thyroid makes just the right amounts of two hormones, T3 and T4. Hyperthyroidism is a condition caused by the effects of too much thyroid hormone on tissues of the body. Although there are several different causes of hyperthyroidism, most of the symptoms that patients experience are the same regardless of the cause. Because the body's metabolism is increased, patients often feel hotter than those around them and can slowly lose weight even though they may be eating more. The weight issue is confusing sometimes since some patients actually gain weight because of an increase in their appetite. Patients with hyperthyroidism usually experience fatigue at the end of the day, but have trouble sleeping. Trembling of the hands and a hard or irregular heartbeat (called palpitations) may develop. These individuals may become irritable and easily upset. When hyperthyroidism is severe, patients can suffer shortness of breath, chest pain, and muscle weakness. Usually the symptoms of hyperthyroidism are gradual in their onset. In older people, some or all of the typical symptoms of hyperthyroidism may be absent, and the patient may just lost weight or become depressed.

Signs and Symptoms of Hyperthyroidism

- Palpitations
- Heat intolerance
- Nervousness
- Insomnia
- Breathlessness
- Increased bowel movements
- Light or absent menstrual periods
- Fatigue
- Fast heart rate
- Trembling hands
- Weight loss
- Muscle weakness
- Warm moist skin
- Hair loss
- Staring gaze

Causes of Hyperthyroidism

There are several causes of hyperthyroidism. Most often, the entire gland is overproducing thyroid hormone. Less commonly, a single nodule is responsible for the excess hormone

secretion. The most common underlying cause of hyperthyroidism is Graves' Disease, a condition named for an Irish doctor who first described the condition. This condition can be summarized by noting that an enlarged thyroid (enlarged thyroids are called goiters) is producing way too much thyroid hormone. Graves' Disease is classified as an autoimmune disease, a condition caused by the patient's own immune system turning against the patient's own thyroid gland. There are three distinct parts of Graves' Disease:

1. overactivity of the thyroid gland (hyperthyroidism)
2. inflammation of the tissues around the eyes causing swelling
3. thickening of the skin over the lower legs (pretibial myxedema)

Most patients with Graves' Disease have no obvious eye involvement.

Characteristics of Graves' Disease

- Affects women much more often than men (about 8:1)
- Often called diffuse toxic goiter because the entire gland is enlarged
- Uncommon over the age of 50 (more common in the 30s and 40s)

Other less common causes of hyperthyroidism can be inflammation of the thyroid gland called thyroiditis, which can lead to the release of excess amounts of thyroid hormones that are normally stored in the gland. Hyperthyroidism can also occur in patients who take excessive doses of any of the available forms of thyroid hormone.

The actual diagnosis of hyperthyroidism is easy to make once its possibility is entertained. Accurate and widely available blood tests can confirm or rule out the diagnosis quite easily within a day or two.

There are readily available and effective treatments for all common types of hyperthyroidism. For patients with sustained forms of hyperthyroidism, such as Graves' Disease or toxic nodular goiter, antithyroid medications are often used. The goal with this form of drug therapy is to prevent the thyroid from producing hormones. Radioactive iodine is the most widely recommended permanent treatment of hyperthyroidism. The treatment takes advantage of the fact that thyroid cells are the only cells in the body, which have the ability to absorb iodine. There is no evidence that radioactive iodine treatment of hyperthyroidism causes cancer of the thyroid gland or other parts of the body, or that it interferes with a woman's chances of becoming pregnant and delivering a healthy baby in the future. It is also important to realize that there are different types of radioactive iodine (isotopes).

Another permanent cure for hyperthyroidism is to surgically remove all or part of the gland or nodule. Surgery is not used as frequently as the other treatments for this disease. The biggest reason for this is that the most common forms of hyperthyroidism are a result of overproduction from the entire gland (Graves' Disease) and the other methods of treatment work quite well in the vast majority of cases. A potential down side of the surgical approach is that there is a small risk of injury to structures near the thyroid gland in the neck including the nerve to the voice box (laryngeal nerve). Like radioactive iodine treatment, surgery often results in hypothyroidism. When this occurs, it can be easily diagnosed and effectively treated with levothyroxine. (5)

Hypothyroidism

Hypothyroidism is a condition in which the body lacks sufficient thyroid hormone. Over 5 million Americans have this common medical condition. There are two fairly common causes of

hypothyroidism. The first is a result of previous (currently ongoing) inflammation of the thyroid gland which leaves a large percentage of the cells of the thyroid damaged (or dead) and incapable of producing sufficient hormone. The most common cause of thyroid gland failure is called autoimmune thyroiditis (also called Hashimoto'' thyroiditis), a form of thyroid inflammation caused by the patient'' own immune system. The second major cause is the broad category of "medical treatments". The treatment of many thyroid conditions warrants surgical removal of a portion or all of the thyroid gland. If the total mass of thyroid producing cells left within the body is not enough to meet the need of the body, the patient will develop hypothyroidism. There are several other rare causes of hypothyroidism, one of them being a completely "normal" thyroid gland, which is not making enough hormone because of a problem in the pituitary gland. If the pituitary does not produce enough TSH then the thyroid simply does not have the "signal" to make hormone, so it doesn't.

Symptoms of Hypothyroidism

- Fatigue
- Weakness
- Weight gain or increased difficulty losing weight
- Coarse, dry hair
- Dry, rough pale skin
- Hair loss
- Cold intolerance (can't tolerate the cold like those around you)
- Muscle cramps and frequent muscle aches
- Constipation
- Depression
- Irritability
- Memory loss
- Abnormal menstrual cycles
- Decreased libido

Each individual patient will have any number of these symptoms, which will vary with the severity of the thyroid hormone deficiency and the length of time the body has been deprived of the proper amount of the hormone. Because the body is expecting a certain amount of thyroid hormone the pituitary will make additional TSH in an attempt to entice the thyroid to produce more hormone. This constant bombardment with high levels of TSH may cause the thyroid gland to become enlarged and form a goiter (called a "compensatory goiter?. Left untreated, the symptoms of hypothyroidism will usually progress. Rarely, complications can result in severe life-threatening depression, heart failure or coma. Hypothyroidism is completely treatable in many patients simply by taking a small pill once a day. There are several types of thyroid hormone preparations and one type of medicine will not be the best therapy for all patients. Many factors will go into the treatment of hypothyroidism and it is different for everybody. Some patients will notice a slight reduction in symptoms within 1-2 weeks, but the full metabolic response to thyroid hormone therapy is often delayed for a month or two before the patient feels completely normal. It is important that the correct amount of thyroid hormone is used. Not enough and the patient may have continued fatigue or some of the other symptoms. Too high a dose could cause symptoms of nervousness, palpitations or insomnia typical of hyperthyroidism. After about one month of treatment, hormone levels are measured in the blood to establish whether the dose of thyroid hormone that the patient is taking is appropriate. Synthetic T4 can be safely taken with most other medications. Patients taking cholestyramine (a compound used to lower blood cholesterol) or certain medications for seizures should check with their physician about potential interactions. Women taking T4 who become pregnant should feel confident that the medication is exactly what their own thyroid gland would otherwise make. (6)

Thyroid Nodules

Thyroid nodules are lumps that commonly arise within an otherwise normal thyroid gland. Often these abnormal growths of thyroid tissue are located at the edge of the thyroid gland so they can be felt as a lump in the throat.

Facts about Thyroid Nodules

- One in 12-15 women has a thyroid nodule.
- One in 40-50 men has a thyroid nodule.
- More than 90% of al thyroid nodules are benign (non-cancerous growths)
- Some are actually cysts that are filled with fluid rather than thyroid tissue.

Features Favoring a Benign Thyroid Nodule

- Family history of Hashimoto's thyroiditis.
- Family history of benign thyroid nodule or goiter.
- Symptoms of hyperthyroidism or hypothyroidism.
- Pain or tenderness associated with a nodule.
- A soft, smooth, mobile nodule.
- Multinodular goiter without a predominant nodule (lots of nodules, not one main nodule).
- "Warm" nodule on thyroid scan (produces normal amount of hormone).
- Simple cyst on ultrasound.

Features Increasing the Suspicion of a Malignant Nodule

- Age less than 20.
- Age greater than 70.
- Male gender.
- New onset of swallowing difficulties.
- New onset of hoarseness.
- History of external neck irradiation during childhood.
- Firm, irregular and fixed nodule.
- Presence of cervical lymphadenopathy (swollen hard lymph nodes in the neck).
- Previous history of thyroid cancer.
- Nodule that is "cold" on scan (meaning the nodule does not make hormone).
- Solid or complex on ultrasound.

Thyroid hormone levels are usually normal in the presence of a nodule, and normal thyroid hormone levels do not differentiate benign from cancerous nodules. Nodules detected by thyroid scans are classified as cold, hot or warm. 85% of thyroid nodules are cold, 10% are warm, and 5% are hot. 85% of the cold nodules are benign, 90% of warm nodules are benign, and 95% of hot nodules are benign. (7)

Thyroid Goiter

The term nontoxic goiter refers to enlargement of the thyroid that is not associated with overproduction of thyroid hormone or malignancy. The thyroid can become very large so that is can easily be seen as a mass in the neck. Most small to moderate sized goiters can be treated by providing thyroid hormone in the form of a pill. Patients who do not respond to thyroid hormone therapy are often referred for surgery if it continued to grow. A more common indication for surgical removal of an enlarged thyroid goiter is to remove those glands that are enlarged enough to cause compression on other structures in the neck such as the trachea and esophagus. Suspicion of malignancy in an enlarged thyroid is an indication for removal of the thyroid. Another reason (although not a very common one) to remove a goiter is for cosmetic reasons. (8)

Thyroid Cancer

There are over 11,000 new cases of thyroid cancer each year in the United States. Females are more likely to have thyroid cancer at a ratio of 3:1. Thyroid cancer can occur in any age group, although it is most common after age 30 and its aggressiveness increases significantly in older patients. The majority of patients present with a nodule on their thyroid that typically does not cause symptoms. Occasionally, symptoms such as hoarseness, neck, and enlarged lymph nodes do occur. Although as much as 10% of the population will have thyroid nodules, the vast majority are benign. Only approximately 5% of all thyroid nodules are malignant.

Types and Incidence of Thyroid Cancer

- Papillary and mixed papillary/follicular - 75%
- Follicular and Hurthle cell - 15%
- Medullary -7%
- Anaplastic -3%

Most thyroid cancers are very curable. In fact, the most common types of thyroid cancer are the most curable. They have better than a 95% cure rate if treated appropriately. Both papillary and follicular cancers are typically treated with complete removal of the lobe of the thyroid that harbors the cancer, plus removal of most or all of the other side. Medullary cancer of the thyroid is significantly less common, but has a worse prognosis. They tend to spread to large numbers of lymph nodes very early on. The least common type of thyroid cancer is anaplastic which has a very poor prognosis. It tends to be found after it has spread and is not cured in most cases. Often an operation cannot remove all the tumor. (9)

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Course Exam

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1. Most of the thyroid hormones in the blood are attached to a protein called thyroid binding

globulin (TBG).

○ True ○ False

2. Hypothalamus production of TSH is measured by a method referred to as IRMA (immunoradiometric assay).

○ True ○ False

3. When the level of thyroid hormones drops too low, the pituitary gland produces thyroid stimulating hormone (TSH).

○ True ○ False

4. Hypothyroidism is often present for a number of years before it is recognized and treated.

○ True ○ False

5. Thyroiditis is an inflammatory process ongoing within the thyroid gland.

○ True ○ False

6. The thyroid gland is the smallest gland in the neck.

○ True ○ False

7. The thyroid gland is situated in the anterior (front) neck blow the skin and muscle layers.

○ True ○ False

8. The thyroid makes three hormones: T3, T4 and T5.

○ True ○ False

9. The thyroid needle biopsy is the most reliable test to differentiate a cancerous nodule from a benign nodule.

○ True ○ False

10. There is really only one main cause of hyperthyroidism.

○ True ○ False

11. Most thyroid pills have a half life of 6-7 days.

○ True ○ False

12. Graves' Disease is more common in the 50-60 year olds.

○ True ○ False

13. Signs/symptoms of hyperthyroidism include palpitations, heat intolerance and nervousness.

○ True ○ False

14. Characteristics of Graves' Disease include: it affects women much more often than men.

○ True ○ False

15. Over 5 million Americans have hypothyroidism.

○ True ○ False

16. The thyroid gland is under the control of the hypothalamus.

    ○ True ○ False

17. Symptoms of hypothyroidism include fatigue, weakness and weight gain.

    ○ True ○ False

18. Thyroid cells and hypothalamus cells absorb iodine.

    ○ True ○ False

19. There are over 11,000 new cases of thyroid cancer each year in the United States.

    ○ True ○ False

20. Thyroid cancer is most common after age 50.

    ○ True ○ False