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ENDOCRINOLOGY & INTERNAL MEDICINE

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HYPERTHYROIDISM

Overactivity of the thyroid gland is called hyperthyroidism or thyrotoxicosis. Individuals with this condition may experience a number of symptoms including fatigue, weight loss, tremor, palpitation, sweating, heat intolerance, itch, frequent bowel movements, disturbance of menstrual function, weakness, skin rash or eye symptoms such as pressure, or double vision. There are two common blood tests ordered by family doctors to confirm the presence of hyperthyroidism. The first blood test is TSH (thyroid stimulating hormone). TSH is the signal sent by the pituitary gland to stimulate the thyroid gland. The normal range for TSH is 0.3-5.5. In nearly all cases of hyperthyroidism the TSH is very low or undetectable. The second test is “free T4” (thyroxine). Free T4 is the amount of thyroid hormone (produced by your thyroid gland) that is circulating in the blood. The normal range for free T4 is 10-20. In hyperthyroidism the free T4 is elevated.

There are four main causes of hyperthyroidism.

1. Graves Disease (diffuse toxic goitre). This condition is caused by overactivity of the immune system (autoimmunity) - the body produces antibodies which stimulate the thyroid gland to produce excessive amounts of thyroid hormone. The reasons why the immune system becomes overactive are unknown, though there is a genetic susceptibility (much more common in Chinese and South Asians) and appears to be more common following traumatic life events such as immigration, divorce or bereavement. Graves Disease does not get better on its own and therefore requires treatment. These treatments are discussed below.

Graves Disease may also affect the eyes with a condition called Thyroid Orbitopathy - this is associated with prominence, swelling, double vision and tearing. Rarely the eye problem may be serious and require special treatment at the Thyroid Orbitopathy Clinic and the Vancouver General Hospital Eye Care Centre (phone 604-875-4555). The skin of the lower legs may also rarely be affected with a thickening called myxedema - this too requires special treatment by a dermatologist. Treating the overactivity of the thyroid associated with Graves Disease has no effect upon either Thyroid Orbitopathy or myxedema.

2. Sub-acute (painful, viral) thyroiditis. This condition is caused by a viral infection. Viruses known to cause this problem are the influenza virus, adenoviruses and Coxsackie B virus. These are usually transmitted by droplet in the air and not by physical contact. The inflammation caused by the virus often produces pain and swelling in the thyroid gland (discomfort in the front of the neck which may radiate to the throat or ears). This pain usually responds to anti-inflammatory medication such as ibuprofen. The inflammation releases stored thyroid hormone producing hyperthyroidism. The symptoms of overactive thyroid may last up to 3-4 weeks but settle without specific treatment. A medication to slow the heart beat and reduce tremor (propranolol) is sometimes used. In up to 40% of cases the thyroid gland may become transiently underactive (hypothyroidism) during the recovery phase and may require treatment with replacement thyroid hormone (synthroid or eltroxin) for 6 to 12 months.

3. Silent thyroiditis (painless or postpartum thyroiditis). This condition, like Graves Disease, is also caused by the immune system but instead of the antibodies stimulates the thyroid gland to increase production of thyroid hormone; the antibodies lead to inflammation of the thyroid gland which in turn leads to the release of stored thyroid hormone. The natural history of silent thyroiditis is very similar to sub-acute thyroiditis described above (individuals first have overactivity then normal activity followed occasionally by underactivity of the thyroid gland), but is not associated with pain in the neck. This condition gets better without specific treatment. Silent thyroiditis occurs in up to 20% of women in the first year after childbirth and may recur with subsequent pregnancies.

4. Toxic multinodular goitre. This is a common cause of hyperthyroidism in older populations. The susceptibility to this condition is familial but the genetics are not clearly understood. In this condition one or more lumps in the thyroid gland grow slowly over many years and eventually produce an excessive amount

of thyroid hormone. This condition does not get better on its own and therefore requires treatment. The commonest treatment is radioactive iodine which is described below. Surgical treatment with removal of most of the thyroid gland is also a valid option.

OTHER THYROID TESTS

You may be asked to undergo a study in the Nuclear Medicine Department at Vancouver Hospital which is situated in the Laurel Pavilion, 899 W12th Avenue on the ground floor. The phone number is 604-875-4611 and the fax 604-875-5909. This test will usually involve drinking a small amount of clear fluid containing a trace amount of radioactive iodine and then returning there 4 and 24 hours later for a measurement of the radioactivity in the thyroid gland. Alternatively, you may receive an injection of a different radioactive isotope, pertechnetate, (also in trace amounts) and a picture of the thyroid gland taken within 20 minutes. Other Nuclear Medicine departments also offer these tests.

TREATMENT OF THE OVERACTIVE THYROID GLAND

The conditions of **Silent & Sub-Acute Thyroiditis**, described above, get better on their own and do not require specific treatment. Symptomatic treatment with propranolol to slow the heart beat or reduce shaking and anti-inflammatory medication (or prednisone) for pain may be required temporarily.

1. Antithyroid medication. This treatment is used almost exclusively for Graves Disease. Antithyroid medication in Canada comes in two forms: methimazole "Tapazole" and propylthiouracil "PTU". In other parts of the world carbimazole, a very close relative of methimazole, is often used. Tapazole is used in most cases except during pregnancy when PTU is preferred (PTU is generally regarded as safe in pregnancy providing doses of 300 mg per day are not exceeded). All three medications work in the same manner, by interfering with the production of thyroid hormone within the thyroid gland. These medications take 4 to 6 weeks to reach full effect and then remain effective as long as the medication is taken. The initial dose will be decided upon by the doctor and will then be adjusted periodically (usually every 1 to 3 months) based on the results of the free T4 level in the blood. Usually the aim is to bring the free T4 level between 15 and 20. Typically treatment is given for a year and in the usual case the dose is gradually reduced as the thyroid gland shrinks during treatment and therefore less medication is required. After 12 months of treatment the medication is stopped and providing the patient feels well the free T4 level is remeasured 3 months later. In 50% or more of the cases the hyperthyroidism will not recur. In a large minority however, the condition does recur. It is difficult to predict which patients will have a recurrence but those who have a big thyroid gland at the beginning of treatment or who are very overactive or have been overactive for a number of years are more likely to recur. If recurrence occurs then the doctor usually recommends the second therapy - radioactive iodine discussed below.

Antithyroid medication has three side effects - the first two common and easily treated and the third rare and potentially serious. All resolve with cessation of treatment. Excessive dosing of the thyroid hormone may cause underactivity of the thyroid gland (hypothyroidism) which may be manifest as weight gain, fatigue, puffiness around the face, cold intolerance - most are quite the opposite to the symptoms of hyperthyroidism. If you feel that your thyroid is going low you should have your free T4 tested even if this is not one of the scheduled tests. The second side effect is a skin rash. This occurs in about 10% of patients and typically appears as "hives" and may be itchy. This rash does usually not go away unless the medication is stopped. Usually radioactive iodine is recommended should this occur, although in some cases the other antithyroid medication can be tried, though the chances of recurrence of the rash are very high. The 3rd side effect is extremely rare and potentially life-threatening if it is not recognized and treated appropriately - it occurs in less than 1 in 1,000 cases. This complication is called agranulocytosis and is a very low white blood cell count. White cells are involved in preventing infection. People with agranulocytosis develop high fevers, chills and often have a sore throat. If these symptoms occur you should see your family doctor immediately who will order a complete blood count (CBC). All of these side effects will disappear with cessation of the therapy.

2. Radioactive iodine. This treatment is used for either Graves Disease or toxic multinodular goitre (or for solitary toxic adenoma, a rare condition not discussed elsewhere). Iodine is incorporated into thyroid hormone being produced in the thyroid gland. If the incorporated iodine is radioactive the released gamma rays will damage the thyroid gland and lead inevitably to the destruction of the thyroid gland. For this reason radioactive iodine therapy (in a dose 100 times that used for the thyroid test mentioned above) is highly effective and need be given only once usually. Fewer than 10% patients require a second dose.

Because it leads to the destruction of the thyroid gland, thyroid function will eventually become low and will never recover. For this reason every individual who receives radioactive iodine should assume that he or she will eventually need to take replacement thyroid hormone (thyroxine) every day for the rest of his or her life. Most patients require replacement therapy within 6 months and almost every patient within 10 years.

Radioactive iodine is taken in a small glass of water, occasionally as a tablet and rarely by injection. It will not cause an individual to glow in the dark and will have completely left their system within 3-4 days. During that time an individual should not cuddle a baby closely to the neck. Other social activities may be maintained without risk or fear of contamination. Radioactive iodine must not be used if an individual is pregnant or may be pregnant. Women breast feeding must stop for 4 to 5 days after taking the treatment before resuming nursing.

Thyroid Surgery. For individuals with hyperthyroidism, surgery is reserved for difficult cases during pregnancy, for toxic multinodular goitre or toxic solitary nodule. Most individuals spend only 1 night in hospital post-operatively.