

## **WHAT IS THE THYROID?**

The thyroid is a butterfly shaped gland located at the base of the front of the neck. The thyroid gland regulates the thyroid hormone and plays an important role in regulating body metabolism.

## **WHAT ARE EUTHYROID, HYPERTHYROID, AND HYPOTHYROID?**

Normal thyroid hormone level in the blood is considered euthyroid. When the thyroid gland malfunctions, it can produce either too much hormone (hyperthyroid) or too little (hypothyroid). Either imbalance can cause a variety of symptoms. When abnormal hormone production is associated with an abnormal antibody, eye symptoms can develop (Graves' disease). In some cases, hyperthyroidism (high hormone production) can occur without eye disease.

## **WHAT ARE THE SYMPTOMS OF HYPERTHYROIDISM?**

Typical symptoms of hyperthyroid include fatigue, fast heartbeat, weight loss, heat intolerance, thinning hair and diarrhea. Hypothyroid may also cause fatigue, but with slow heartbeat, constipation and weight gain.

## **WHO GETS THYROID EYE DISEASE?**

Although thyroid eye disorders occur at any age, the average age at onset is 45 years. There are three times as many females with thyroid eye disorders. Graves' disease is an autoimmune disease, and can be more likely to occur in patients with other autoimmune diseases (ex. Type I Diabetes, rheumatoid arthritis)

Thyroid eye disease is mainly associated with hyperthyroidism from Graves' disease, although it does sometimes occur in patients who are hypothyroid or euthyroid.

## **WHAT CAUSES THYROID EYE DISEASE?**

Normal body immune systems distinguish clearly between body tissue and foreign tissue or substances. Autoimmune disorders are characterized by the production of antibodies against normal tissue. Graves' disease is caused by an abnormal antibody attack on the thyroid gland, which often results in over or under production of thyroid hormone. This same antibody can attack eye tissues and cause various eye symptoms. Cigarette smokers are at a higher

risk for thyroid eye disease, and can have a more severe and prolonged course of the disease.

### **DOES THE THYROID ABNORMALITY ITSELF CAUSE EYE DISEASE?**

No, the thyroid problems and the eye problems are independent manifestations of the underlying autoimmune abnormality and the abnormal antibodies. It is important to realize that thyroid eye disease can occur even when a patient is euthyroid.

### **WHAT ARE THE SYMPTOMS OF THYROID EYE PROBLEMS?**

Nearly all of the symptoms from thyroid eye disease arise as a result of swollen tissues around the eye. Eye watering, redness, light sensitivity (photophobia), eyelid swelling and elevation of the eyelid (creating a staring or startled appearance) are typical early symptoms [Figures 1].

Swelling of the normal fat tissue and enlargement of the eye muscles in the eye socket can push the eye forward creating variable prominence or protrusion of one or both eyes (proptosis). Proptosis can stretch and/or compress the optic nerve potentially causing blurred vision, impaired color vision and permanent vision loss. The swelling may also involve the muscles around the eyeball resulting in decreased ability to freely move the eye/eyes in various directions. This can cause eye fatigue, eye soreness and most notably double vision (diplopia).[Figure 2].



**Figure 1**



**Figure 2**

### **HOW IS THYROID EYE DISEASE TREATED?**

If a thyroid disorder is suspected, appropriate evaluation and treatment are indicated. The treatment of thyroid eye disease requires close coordination between the patient's primary care provider, endocrinologist and ophthalmologist and there must be an understanding that treating the condition may take many months and possibly years. The first priority is to

treat the thyroid levels. Eye conditions should be evaluated and treated simultaneously with the thyroid gland treatment. Laboratory testing should include both tests for thyroid hormone level and function as well as test for thyroid auto- antibodies. Sometimes the eye problems continue to progress even after the thyroid abnormality returns to normal. Eye problems should be evaluated and treated by an ophthalmologist, and most often more than one ophthalmologist is involved in the treatment; a general ophthalmologist, an ophthalmologist who specializes in treatment of the eyelids and bones around the eye socket(oculoplastic specialist) and an ophthalmologist who specializes in treatment of eye misalignment and double vision (pediatric and adult strabismus ophthalmologist).

Treatment depends on the severity and the degree of activity of the disease. It can be classified into three stages:

- **Stage 1 – acute stage:** Stabilize thyroid levels: Elevated thyroid levels will require treatment to reduce the symptoms of hyperthyroidism as well as medications to lower the production of excess thyroid hormone. Sometimes radioactive iodine will be used to treat overactive thyroid tissue and occasionally surgery is required to remove part or all of the thyroid gland..
  - **Treat Vision threatening complications:** There are two complications that can cause the patient to lose vision. These should be carefully looked for and managed quickly to save vision: 1) Compression on the optic nerve by the swollen tissues: this can be managed by oral steroids and in non- responsive cases, surgery can be done to remove the bones around the eye to relieve the compression. Orbital radiation may be used in conjunction with other treatment modalities, but can sometimes transiently worsen symptoms. There are now medications available to treat this vision threatening condition (teprotumumab) that are best administered early after the onset of Graves' disease and requires infusions by vein in eight sessions over 5 months. 2) Ulcer of the cornea due to severe dryness caused by the proptosis and difficulty closing the eyelids fully: this can be managed medically by lubricating eye drops/ointments, eye covers, taping eyelids closed at night, or even surgery to close the lids together to protect the
  - **Active disease:** The tissues of the eye and around the eye become inflamed causing swelling, redness and pain. Corneal

drying/exposure often requires frequent application of artificial tears, tear duct plugs or taping the eyelids shut at Diplopia is treated with prism in spectacles and/or patching one eye. Depending on the degree of activity the doctor may prescribe a course of steroids. This aims to control the abnormal immune reaction. Other medications that regulate immunity may be added. The active period, which may last up to several years, requires careful monitoring until this phase stabilizes.

- **Stage 2: Inactive, stable, fibrotic phase:** This phase includes proptosis, [strabismus](#) (causing double vision), and eyelid retraction. Orbital decompression surgery is sometimes performed to address disfiguring proptosis, even if vision is not compromised. Because decompression surgery can alter/create strabismus and/or change eyelid position, it is preferable to perform decompression surgery before strabismus or eyelid surgery. Stable diplopia can be improved with prism spectacles (small misalignment) and/or surgery if the strabismus misalignment is larger. Strabismus surgery involves repositioning fibrotic eye muscle(s) to better align the eyes
- **Stage 3: Eyelid surgery :** Eyelid retraction can be improved with surgery that relaxes eyelid muscles and/or inserts spacer material to reposition the eyelid. Eyelid surgery is best performed after decompression and/or strabismus surgery.

Patients with thyroid eye disease will require lifelong follow-up with an endocrinologist and ophthalmologist, as recurrences of the condition can occur many years after initial stability has been achieved.

## WHERE CAN I GET MORE INFORMATION ABOUT THYROID EYE DISEASE?

- [National Graves' Disease Foundation](#)

Dosiou C, Kossler AL. Thyroid Eye Disease: Navigating the New Treatment



American Association for Pediatric Ophthalmology and Strabismus

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