

Thyroid Nodules in Children and Adolescents

WHAT IS THE THYROID GLAND?

The thyroid gland is a butterfly-shaped endocrine gland that is located in the lower front of the neck, just above the collarbone. The thyroid's job is to make thyroid hormones, which are released into the blood and then carried to every tissue in the body. In children, thyroid hormone helps to ensure that growth and development occur normally and that the body's energy, metabolism, heart, muscles, and other organs are working properly.

WHAT IS A THYROID NODULE?

A thyroid nodule is an abnormal growth of thyroid cells that forms a lump within the thyroid gland. There may be one or more nodules in the thyroid gland and each one should be evaluated. Most thyroid nodules are benign (not cancer); however, a small proportion may contain thyroid cancer. In order to diagnose and treat thyroid cancer at the earliest stage, thyroid nodules need evaluation.

WHAT ARE THE SYMPTOMS OF A THYROID NODULE?

Thyroid nodules come to medical attention in a variety of ways. Most thyroid nodules do not cause symptoms and the thyroid gland usually works normally despite the nodule. Some nodules are found by the patient, a friend, or a parent noticing a lump in the neck during routine daily activities. Some are discovered during routine physical examinations including by dentists or sports physicals, and some are found on radiologic imaging (ultrasound, CT scan, or MRI) that was done for unrelated reasons. Rarely, nodules can get so large that they cause difficulty breathing or swallowing because the nodule is pressing on the windpipe or esophagus.

The important points to remember are:

- Thyroid nodules generally do not cause symptoms.
- Thyroid tests are usually normal—even if cancer is present in a nodule.
- The best way to find a thyroid nodule is to make sure your doctor checks your neck!

HOW COMMON ARE THYROID NODULES IN CHILDREN?

Thyroid nodules are common in adults, especially as they get older (they are present in up to one-half of adults by age 60 years). We know that thyroid nodules are much less common in children, but we do not have exact numbers. There is an increased risk of thyroid cancer in nodules found in children and adolescents compared to adults; however, even in children, most thyroid nodules are benign (not cancer). It is estimated that over 75% of nodules found in children and adolescents are benign.

WHAT CAUSES THYROID NODULES?

For the majority of patients, it is not known why a thyroid nodule develops. Risk factors include exposure to radiation (most commonly medical radiation used to treat another form of cancer), a family history of thyroid nodules, or thyroid cancer. Iodine deficiency also causes nodules, but this is very uncommon in the United States.

HOW IS A THYROID NODULE EVALUATED AND DIAGNOSED?

Once a nodule is discovered, the goal is to figure out whether the nodule is benign (not cancer) or malignant (cancer). The first step is to decide if the child has any increased risk of cancer by asking about their medical history, including exposure to radiation. It's important to have a thorough physical exam of the thyroid and neck, to determine the firmness of the thyroid and nodule and to feel if there are abnormal lymph nodes in the neck. The next step is to check that the thyroid gland is producing normal amounts of thyroid hormone by checking levels of thyroid hormone (T4, thyroxine) and thyroid-stimulating hormone (TSH) in the blood.

It is not possible to know whether a nodule is cancerous or not just from the physical examination and blood tests. A thyroid ultrasound is needed and used to determine if a fine needle aspiration (*FNA*) biopsy should be performed.

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THYROID ULTRASOUND:

Thyroid ultrasound (US) is the best tool to diagnose a thyroid nodule and to estimate the risk of cancer. US uses high-frequency sound waves to take a picture of the thyroid gland; it is not painful and does not use any radiation. This test tells doctors the size of the nodule and whether it is solid, fluid-filled (cystic), or a combination of both (partially solid and partially cystic). The images obtained of the thyroid gland and nodule can help identify nodules that look suspicious for cancer, but it cannot actually diagnose cancer. If a nodule looks like it could be cancerous, the next step is to perform an *FNA biopsy of the nodule* using a tiny needle (skinner than a needle used for a blood draw). Ultrasound is often used to guide the needle directly into the nodule through the skin of the neck. The cells removed from the nodule are then examined by a specialist under a microscope to see if they look like cancer (see the *FNAB nodules in children brochure* to learn more about how this procedure is performed, as well as how to prepare for it).

In children with benign thyroid nodules, ultrasound is used in follow-up visits to see whether the nodule is growing or changing.

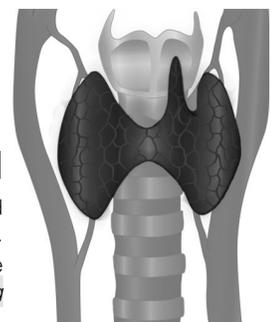
NUCLEAR THYROID SCANS:

Most children with thyroid nodules are producing normal amounts of thyroid hormone; however, if they are found to have a low TSH, the nodule itself may be making excess thyroid hormone (called an autonomously functioning thyroid nodule). The best test to see if the nodule is producing thyroid hormone is a thyroid nuclear scan. This test uses a tiny amount of radioactive iodine or technetium (also called radiocontrast): the nodule will absorb more of the radiocontrast if it is overactive (a 'warm' or 'hot' nodule). The radioactive iodine is either swallowed or the technetium is given intravenously. Most autonomous nodules are benign, but based on the US appearance, a FNA may be needed to confirm the diagnosis.

HOW ARE THYROID NODULES TREATED?

Children with any thyroid nodules found to contain thyroid cancer, or that are suspicious for cancer, should have surgery by an experienced thyroid surgeon to remove the nodule and/or all the thyroid gland. More than 90% of thyroid cancers in children are papillary thyroid cancer. Even if this cancer is advanced when it is discovered, the vast majority of children do very well and live long, healthy lives after a *thyroid cancer* diagnosis.

Thyroid nodules that are benign usually do not need to be removed, but the patient should have a follow-up ultrasound to make sure the nodule has not grown or changed 6 to 12 months later. In children and adolescents, doctors usually recommend surgical removal of nodules if they are very large (measuring more than 3 to 4 cm across) or if they are producing too much thyroid hormone ("hot nodules") or if the nodule is impacting quality of life, even if they seem benign (non-cancerous) on FNA biopsy. In about 25% of patients, the results from the FNA are not clear on whether a nodule is benign or malignant. When this occurs, the patient, family, and doctor will discuss the advantages and disadvantages of surgery versus close follow-up with repeat thyroid ultrasounds.



FURTHER INFORMATION

Further details on this and other thyroid-related topics are available in the patient thyroid information section on the American Thyroid Association® website at www.thyroid.org.

For information on thyroid patient support organizations, please visit the *Patient Support Links* section on the ATA website at www.thyroid.org