

# Fine Needle Aspiration Biopsy of Thyroid Nodules in Children and Adolescents

## *Procedure and interpretation of results*

### WHAT IS THE THYROID GLAND?

The thyroid gland is a butterfly-shaped endocrine gland that is normally located in the lower front of the neck. The thyroid's job is to make thyroid hormones, which are secreted into the blood and then carried to every tissue in the body. Thyroid hormone helps the body use energy, stay warm and keep the brain, heart, muscles, and other organs working as they should.

### WHAT IS A FINE NEEDLE ASPIRATION BIOPSY (FNA OR FNAB) OF A THYROID NODULE?

A *thyroid nodule* is a mass or "bump" in the thyroid gland. In children and adolescents, there is an increased risk that a nodule may be a cancer; however, similar to adults, most thyroid nodules are benign (not cancer). The ultrasound appearance of the nodule and lymph nodes in the neck is used to determine if fine needle aspiration (FNA) of the nodule is necessary and the results of the FNA is used to determine if the nodule can be followed or if it should be surgically removed. Fine needle aspiration biopsy is a simple and safe procedure used to distinguish benign nodules from those that require surgery and additional treatment.

A very thin or "fine" needle is used to maximize both comfort and safety (the needle is thinner than what is used for a blood test). In children and teens, biopsies are performed under conscious sedation or distraction, and with ultrasound guidance to ensure accurate placement of the needle within the *thyroid nodule*.

### HOW CAN YOU PREPARE FOR YOUR THYROID FNA?

Most medications can be continued. However, if conscious sedation is used to comfort your son or daughter during the procedure, you may be instructed to withhold any food, liquid or medication administered by mouth for 8-12 hours prior to the FNA. You should be provided specific instructions for preparation. You should review this document and ask your doctor if you have any specific questions about medications.

### HOW IS A THYROID FNA PERFORMED?

Your child or teen will be asked to lie down on his/her back with the neck extended. Sometimes, a pillow is placed under the shoulders to help get the thyroid into the best position. If conscious sedation is used, the procedure will occur in what looks like a small operating room so that your child or teen can be safely monitored. If conscious sedation isn't used, a topical anesthetic may be applied to numb the skin before the needle is inserted. An ultrasound is performed to visualize the nodule and to choose the best site for the biopsy. Then the neck is cleaned with an antiseptic. For the biopsy, your child's doctor will use a very thin needle to withdraw cells from the thyroid nodule. The needle used is smaller in diameter than those used in most blood draws. The needle will be inserted through the skin and into the thyroid nodule to get a tissue sample. After the sampling, which only takes several seconds, the needle will be removed. New needles are used for additional samples. Several samples of cells will be obtained, by sticking a fine needle in various parts of the nodule usually between two and six times. This assures a better chance to find cancerous cells if they are present. If there is fluid in the nodule, a syringe may be used to drain it.

A local or topical anesthetic will be applied before the biopsy to prevent pain. During the procedure, patients may feel some pressure at the biopsy site or around the ear (because there is a nerve that travels between the thyroid gland and the ear). If your child or teen is awake during the procedure they will be asked to remain as still as possible and to avoid coughing, talking and swallowing during the biopsy. Once the biopsy is completed, slight pressure will be applied to the area where the needles were inserted for a few minutes to reduce bruising.



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### WHAT SHOULD YOU EXPECT AFTER THE PROCEDURE?

For most children and teenagers, performing the FNA takes about 20-30 minutes; however, the amount of time that you will spend at the hospital will be between 1 to 3 hours depending on whether conscious sedation is used. The longer period of time associated with conscious sedation is to ensure that your son or daughter is awake and eating or drinking prior to going home. Some adolescents may experience a brief reaction as they wake up from the sedation medication where they are happy, sad, silly or a combination of changes in mood. This is temporary and will go away before you go home.

There are very few, if any, restrictions on what a person can do after a thyroid biopsy. FNA is a very safe procedure with minimal complications. There is a small risk of bleeding which has been reported to be less than 1%. Some children develop soreness at the site of the biopsy after the procedure. Tylenol® (acetaminophen) and ice compresses can be used to relieve discomfort.

### WHAT HAPPENS TO THE BIOPSY MATERIAL AFTER THE PROCEDURE?

The biopsy samples will be used to make slides so that the cells can be reviewed for changes that can help determine if the nodule is benign (not cancer) or whether it needs to be surgically removed (cancer). Approximately 25-30% of patients will have cells that have an indeterminate appearance, meaning they are not definitely benign (normal = not cancer) and not definitely cancer. For these patients additional tests may be performed on the sample to try and determine the risk for cancer (described below). Even with these extra tests, some patients may need to undergo surgical removal to determine the final diagnosis.

### HOW LONG DOES IT TAKE FOR THE RESULTS TO RETURN?

Generally, it can take anywhere from a 1 to 2 weeks for the FNA results to be reported.

### WHAT ARE THE POSSIBLE RESULTS?

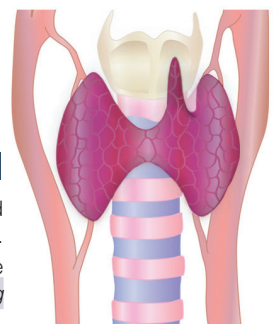
Please note that different institutions and centers will have different rates of results depending on their specific populations. Most centers use the Bethesda System (a standard method used by cytopathologists to classify thyroid nodule FNA results).

- 1. Benign** – This results suggests that the nodule has a 97-98% likelihood of being normal, not cancer. Because this is not 100%, most 'benign' nodules will be followed with repeat ultrasound. If the nodule increases in size or develops abnormal US features repeat FNA may be considered.
- 2. Malignant (Cancer)** – This result predicts a high (97-99%) likelihood of thyroid cancer, most commonly *papillary thyroid cancer* (PTC). The majority of young people with this type of nodules will go to surgery to remove the entire thyroid (*thyroidectomy*) as well as when those lymph nodes appear abnormal at the time of surgery.
- 3. Indeterminate** – This means that the cells from the biopsy were not normal (not benign) but were not fully diagnostic for cancer (the cells have some abnormal features under the microscope). There are two main categories of indeterminate cytology, including Atypia of undetermined significance (AUS), Follicular Neoplasm or 'Suspicious for follicular neoplasm' (FN). Each category is associated with a risk of cancer that covers a range from 10%-15% (AUS), to 15-30% (FN). Based upon your child's specific category and cancer risk, your doctor may recommend further tests or surgical removal for definitive diagnosis.

### 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](http://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](http://www.thyroid.org)





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4. **Non-diagnostic** – This means that there are not enough cells in the sample to make a diagnosis. Despite the doctor's best efforts, even being able to see that the needle was in the nodule during the biopsy, the specimen sometimes does not have enough thyroid cells to make a proper diagnosis. Non-diagnostic samples can also occur when only cyst fluid is taken out, as well as for other reasons, such as the presence of too much blood. In these cases, the biopsy may be repeated, and if non-diagnostic a second time, surgery may be recommended.

For more detailed information about FNA results, please see the [Thyroid Nodules' brochure](#).

## **GENETIC TESTING FOR THYROID BIOPSIES?**

Within the past few years, several molecular tests have become available to help determine whether some nodules are cancerous or benign. These tests look for changes in the thyroid nodule's genetic make-up, for changes in the DNA. Only tests that look for point mutations or rearrangements in the DNA (how the DNA 'spelling' is organized) have been studied in children and teens. The tests that look for 'expression', called gene expression classifiers, have not been studied or validated in patients less than 21 years of age and should not be used. Your doctor can review which specific tests are available and indicated. Prior authorization by your insurance company will be needed to ensure that you do not have to pay the large cost out of pocket



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