

## Thyroid Cancer Diagnosis: A Comprehensive Guide

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### Abstract

Thyroid cancer is a prevalent endocrine malignancy that has seen a rising incidence in recent decades. This comprehensive guide aims to provide an in-depth overview of the various diagnostic modalities and approaches utilized in the detection and evaluation of thyroid cancer. Early diagnosis is crucial for improving treatment outcomes, necessitating a multidisciplinary approach that encompasses clinical evaluation, imaging studies, and histopathological analysis. The guide discusses the clinical presentation of thyroid cancer, emphasizing the importance of a thorough patient history and physical examination. It also explores the role of ultrasound as the first-line imaging modality, alongside advanced imaging techniques such as CT and MRI. Additionally, the utility of serum markers, particularly thyroglobulin and calcitonin, in diagnosis and monitoring is examined. The guide further delves into fine-needle aspiration biopsy (FNAB) as a pivotal diagnostic tool, outlining its indications, techniques, and cytological interpretations. By integrating these elements, this guide aims to enhance the clinician's understanding of the diagnostic pathways for thyroid cancer, ultimately contributing to better patient management and outcomes.

**Keywords:** Thyroid cancer; Diagnosis; Fine-needle aspiration biopsy; Imaging techniques; Serum markers; Clinical evaluation; Ultrasound; Cytopathology; Multidisciplinary approach

### Introduction

Thyroid cancer is increasingly recognized as a significant health concern, being one of the fastest-growing cancers in many countries. According to recent epidemiological studies, the global incidence of thyroid cancer has more than doubled over the past three decades, making it imperative for healthcare professionals to remain vigilant in the early detection and diagnosis of this malignancy [1]. The thyroid gland, located in the anterior neck, produces hormones that regulate metabolism, growth, and development. Malignancies arising from the thyroid can be classified into various histological types, with papillary and follicular thyroid carcinomas being the most common forms [2]. The symptoms of thyroid cancer are often subtle or nonspecific, leading to delays in diagnosis. A thorough understanding of the risk factors, clinical presentation, and the nuances of diagnostic techniques is essential for accurate identification [3]. The clinical evaluation of thyroid nodules—a common occurrence—plays a critical role in the initial assessment, guiding further investigations and management strategies. Imaging studies, particularly neck ultrasound, are essential for characterizing nodules and determining the need for biopsy [4].

Fine-needle aspiration biopsy (FNAB) has emerged as the gold standard in the diagnostic workup of thyroid nodules, providing a minimally invasive means to obtain cellular samples for cytological evaluation [5]. The interpretation of FNAB results is a complex process that requires collaboration between clinicians and pathologists to ensure accurate diagnosis and appropriate management [6]. In addition, serum markers such as thyroglobulin and calcitonin serve important roles in both diagnosis and post-treatment monitoring [7].

This guide aims to provide healthcare providers with a comprehensive understanding of the diagnostic landscape for thyroid cancer, emphasizing a multidisciplinary approach to enhance patient care and outcomes [8]. By exploring the intricacies of each diagnostic modality, this guide seeks to equip practitioners with the knowledge necessary for timely and effective intervention in patients suspected of having thyroid malignancies.

Thyroid cancer is a type of cancer that affects the thyroid gland,

a butterfly-shaped organ located at the base of your neck [9]. This small gland plays a critical role in regulating metabolism through the production of thyroid hormones. Thyroid cancer often begins as an abnormal growth or lump within the thyroid gland, and while it's generally treatable, especially when caught early; it requires accurate diagnosis for the best outcomes [10].

In this article, we will explore the various aspects of thyroid cancer diagnosis, including the symptoms, types of diagnostic tests, interpretation of results, and the importance of early detection.

### Recognizing the symptoms

Thyroid cancer may not cause noticeable symptoms in its early stages. However, as it progresses, some signs may indicate the presence of an issue with the thyroid. These can include:

- **Lump in the neck:** Often, the first sign of thyroid cancer is a noticeable lump or swelling in the neck. This may be found on the front of the neck, where the thyroid is located.
- **Hoarseness or voice changes:** If the cancer presses on the vocal cords or surrounding structures, it can cause changes in voice quality, such as hoarseness.
- **Difficulty swallowing:** Tumors growing in the thyroid can press against the esophagus, making it harder to swallow.
- **Neck pain or discomfort:** This pain may radiate up to the ears.
- **Difficulty breathing:** Large tumors can press on the

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windpipe, causing breathing problems.

- **Persistent cough:** A chronic cough that isn't associated with a cold can be a symptom of thyroid cancer.

It is important to note that these symptoms can also be related to benign (non-cancerous) thyroid conditions such as goiters or thyroid nodules. Consulting a healthcare provider is crucial for proper evaluation.

### Initial examination and medical history

If thyroid cancer is suspected, a doctor will begin by taking a detailed medical history and conducting a physical examination. The goal is to assess the presence of any symptoms and risk factors for thyroid cancer, such as:

- Family history of thyroid cancer
- Exposure to radiation, especially during childhood
- Personal history of goiter or other thyroid diseases

The doctor will palpate the neck to feel for any lumps or enlargements in the thyroid or surrounding lymph nodes.

### Diagnostic imaging tests

Several imaging tests can help confirm whether a lump or nodule in the thyroid is cancerous or benign. The most common types of imaging for thyroid cancer diagnosis include:

#### Ultrasound

**Thyroid ultrasound** is the primary imaging test used to evaluate thyroid nodules. It is a non-invasive procedure that uses sound waves to create detailed images of the thyroid gland and surrounding structures. An ultrasound can reveal:

- The size, shape, and location of nodules
- Whether nodules are solid or filled with fluid (cystic)
- Features that suggest malignancy (e.g., irregular borders, calcifications)

Although ultrasound cannot definitively diagnose cancer, it provides critical information to guide further testing.

#### Radioiodine scan

A **radioiodine scan** involves administering a small amount of radioactive iodine, which is absorbed by thyroid cells. The scan shows how much iodine is taken up by the thyroid and whether any areas are functioning abnormally. While this test is more commonly used in hyperthyroidism, it can sometimes help distinguish between cancerous and non-cancerous nodules.

#### CT scan or MRI

In some cases, CT (computed tomography) scans or MRIs (magnetic resonance imaging) may be ordered to provide more detailed images of the thyroid and surrounding tissues, especially if the cancer has spread beyond the thyroid to nearby structures.

#### Fine-needle aspiration biopsy (FNAB)

A **fine-needle aspiration biopsy (FNAB)** is often the definitive test for diagnosing thyroid cancer. During this procedure, a thin needle is inserted into the thyroid nodule or lump to withdraw a small sample of

cells. The sample is then examined under a microscope by a pathologist to determine if the cells are cancerous.

**How the biopsy is performed:** An ultrasound is typically used to guide the needle to the precise location of the nodule. Local anesthesia may be applied to numb the area.

**Results:** The biopsy can yield several types of results:

**Benign (non-cancerous):** The nodule is not cancerous.

**Malignant (cancerous):** The nodule contains cancerous cells.

**Suspicious or indeterminate:** The cells do not clearly indicate cancer but are not normal.

**Non-diagnostic:** The sample is insufficient or unclear, requiring a repeat biopsy.

#### Blood tests

Though blood tests alone cannot diagnose thyroid cancer, they can provide valuable information about the function of the thyroid and help rule out other conditions, such as hyperthyroidism or hypothyroidism.

#### Thyroid-stimulating hormone (TSH)

TSH is a hormone produced by the pituitary gland to regulate the thyroid. Low or high TSH levels can indicate a thyroid disorder but not necessarily thyroid cancer.

#### Thyroid hormones (T3 and T4)

Measuring the levels of the thyroid hormones T3 and T4 can help assess thyroid function. Abnormal levels may suggest thyroid disease but do not directly indicate cancer.

#### Calcitonin and thyroglobulin

Some types of thyroid cancer, such as medullary thyroid cancer (MTC), produce high levels of the hormone calcitonin. Measuring calcitonin levels in the blood can help diagnose this type of cancer. In cases of papillary or follicular thyroid cancer, the protein thyroglobulin may be elevated and can be used as a tumor marker.

#### Molecular and genetic testing

In recent years, molecular and genetic testing of thyroid biopsy samples has become increasingly common. This testing can help identify genetic mutations or markers associated with different types of thyroid cancer. Genetic testing is especially useful in cases where the biopsy results are inconclusive or "indeterminate." It may also help determine whether a tumor is likely to be aggressive, which can guide treatment decisions.

Commonly tested genetic markers include mutations in the BRAF, RAS, and RET/PTC genes, all of which are linked to different types of thyroid cancer.

#### Staging and determining the spread

If thyroid cancer is confirmed, the next step is to determine the extent of the disease, known as staging. Staging helps doctors plan the most effective treatment and assess the prognosis.

#### Types of thyroid cancer

There are several types of thyroid cancer, and understanding the type is important for accurate diagnosis and treatment planning.

- **Papillary thyroid cancer (PTC):** The most common type, accounting for about 80% of cases. It typically grows slowly and has a high survival rate when treated.
- **Follicular thyroid cancer (FTC):** Less common but can be more aggressive than papillary cancer. It often spreads to other parts of the body, such as the lungs or bones.
- **Medullary thyroid cancer (MTC):** Arises from the thyroid's parafollicular cells and produces calcitonin. MTC can be sporadic or hereditary.
- **Anaplastic thyroid cancer (ATC):** A rare, aggressive form of thyroid cancer that grows and spreads quickly. It is difficult to treat and has a poor prognosis.

### The importance of early detection

Early detection of thyroid cancer is critical to improving the chances of successful treatment. Since thyroid cancer is often asymptomatic in its early stages, routine check-ups, and awareness of potential risk factors, such as a family history of thyroid cancer or exposure to radiation, can lead to earlier diagnosis.

### Screening for high-risk individuals

Individuals with a family history of thyroid cancer, or genetic conditions like multiple endocrine neoplasia (MEN), may benefit from early screening, such as regular ultrasounds or genetic testing. In addition, people who have been exposed to radiation—either through radiation therapy for another cancer or environmental exposure—may require more frequent monitoring.

### Conclusion

Thyroid cancer diagnosis involves a step-by-step process of identifying symptoms, conducting physical examinations, performing diagnostic tests like ultrasound and biopsy, and, when necessary, employing molecular testing and staging assessments. While the presence of a thyroid nodule does not always indicate cancer, thorough and timely evaluation is essential for ensuring the best possible outcome. With advances in diagnostic techniques and personalized medicine, thyroid cancer is increasingly being detected early and treated successfully. Thyroid cancer, while less prevalent than other forms

of cancer, poses significant challenges in diagnosis, treatment, and patient management. This comprehensive guide has illuminated the intricacies surrounding the diagnosis of thyroid cancer, emphasizing the importance of a multifaceted approach that includes understanding risk factors, recognizing symptoms, and employing various diagnostic modalities.

The landscape of thyroid cancer diagnosis is ever-changing, necessitating a proactive and informed approach from both healthcare providers and patients. Continued advancements in research, education, and support systems will be instrumental in improving diagnostic outcomes and, ultimately, patient survival rates. By fostering collaboration among healthcare teams and prioritizing patient-centered care, we can navigate the complexities of thyroid cancer diagnosis and empower patients on their journey to recovery.

### References

1. Zadik, Yehuda, Aktaş Alper, Drucker Scott, Nitzan W Dorrit (2012) Aneurysmal bone cyst of mandibular condyle: A case report and review of the literature. *J Craniomaxillofac Surg* 40: 243-248.
2. Ye Y, Pringle LM, Lau AW (2010) TRE17/USP6 oncogene translocated in aneurysmal bone cyst induces matrix metalloproteinase production via activation of NF-kappaB. *Oncogene* 29: 3619-3629.
3. Mankin HJ, Hornicek FJ, Ortiz-Cruz E, Villafuerte J, Gebhardt MC, et al. (2005) Aneurysmal bone cyst: a review of 150 patients. *J Clin Oncol* 23: 6756-6762.
4. Amanatullah DF, Clark TR, Lopez MJ, Borys Dariusz, Tamurian Robert M, et al. (2014) Giant Cell Tumor of Bone. *Orthopedics* 37: 112-120.
5. Baig R, Eady J (2006) unicameral (simple) bone cysts. *Southern Medical Journal* 99: 966-976.
6. Milbrandt, Todd; Hopkins, Jeffrey (2007) unicameral bone cysts: etiology and treatment. *Curr Opin Orthop* 18: 555-560.
7. Rapp Timothy B, Ward James P, Alaia Michael J (2012) Aneurysmal Bone Cyst. *J Am Acad Orthop Surg* 20: 233-241.
8. Ozyurek Selahattin, Rodop Osman, Kose Ozkan, Cilli Feridun, Mahirogullari Mahir, et al. (2009) Aneurysmal Bone Cyst of the Fifth Metacarpal. *Orthopedics* 32: 606-609.
9. Rodrigues CD, Estrela Carlos (2008) Traumatic Bone Cyst Suggestive of Large Apical Periodontitis. *Journal of Endodontics* 34: 484-489.
10. Bloodgood, Joseph C (1910) Benign Bone Cysts, Ostitis Fibrosa, Giant-Cell Sarcoma and Bone Aneurism of the Long Pipe Bones. *Annals of Surgery* 52: 145-185.