



# Current status of core needle biopsy of the thyroid

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Thyroid nodules are a common clinical problem. Fine-needle aspiration (FNA) and large-needle biopsy have been used to diagnose thyroid nodules [1,2]. Before the 1980s, large-needle biopsy was the standard procedure for the thyroid, but FNA became the standard diagnostic tool in the 1980s because it is a safe procedure that leads to accurate diagnoses [3]. With advances in core needle biopsy (CNB) devices (i.e., spring-activated core needles) and development of high-resolution ultrasound, it has become possible to make accurate diagnoses while minimizing complications [4]. Although 18- to 21-gauge core needles can be used to biopsy thyroid nodules, 18-gauge needles are most commonly used in Korea [5,6]. The relationships among the size of the needle, the number of core specimens, and diagnostic accuracy have not yet been conclusively established, but the general tendency is that thinner needles cause less damage to the normal thyroid, but allow a smaller amount of thyroid tissue to be biopsied to be obtained. These relationships may be validated in the future.

The current guidelines contain limited recommendations for thyroid CNB. The National Cancer Institute, American Association of Clinical Endocrinologists/American College of Endocrinology/Associazione Medici Endocrinologi (AACE/ACE/AME), and the Korean Society of Thyroid Radiology (KSThR) have proposed CNB for thyroid nodules with previous nondiagnostic FNA results [7–9]. The AACE/ACE/AME, British Thyroid Association, and KSThR have suggested CNB for lymphoma, anaplastic carcinoma, medullary carcinoma, and metastasis to the thyroid [8–10]. However, the American Thyroid Association does not recommend the use of CNB [11].

Recently, CNB has been used for various kinds of thyroid nodules. CNB has been suggested as an alternative to FNA in patients with previous nondiagnostic results [12] or atypia of undetermined significance [13]. It is also useful for the differentiation of rapidly growing thyroid tumors (lymphoma vs. anaplastic thyroid carcinoma), the differentiation of follicular lesions (follicular neoplasm vs. nodular hyperplasia), medullary thyroid carcinoma, calcified thyroid nodules, and degenerating thyroid nodules [6,14,15]. Several studies have suggested the value of CNB as a first-line diagnostic tool for the thyroid [16]. According to a meta-analysis [17], both CNB and FNA had a specificity of 99.5%, but the sensitivity was higher for CNB (74% [95% confidence interval, 67% to 81%] vs. 50% [95% confidence interval, 44% to 56%]). CNB also demonstrated significantly fewer nondiagnostic (5.5%,  $P < 0.001$ ) and inconclusive (8.0%,  $P < 0.001$ ) results than FNA (22.6% and 40.2%, respectively). In large cohort studies including more than 500 patients, the false-negative rate ranged from 1% to 3% [16,18,19]. The main reason for the false-negative results was targeting error.

Regarding the safety of thyroid CNB, current thyroid guidelines suggest that it is safe, well-tolerated, and associated with a low complication rate if performed by experienced doctors [5,7]. The complication rate has been reported to range from 0% to 4.1%, with a low major complication rate (0%–1.9%). Various complications may occur, such as hematoma (the most common complication), voice change, infection, hemoptysis, edema, vasovagal reaction, and dysphagia.

## ULTRA SONO GRAPHY

### PERSPECTIVE

<https://doi.org/10.14366/usg.17018>  
pISSN: 2288-5919 • eISSN: 2288-5943  
Ultrasonography 2017;36:83-85

Received: February 23, 2017

Revised: March 6, 2017

Accepted: March 8, 2017

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Ultrasound in Medicine (KSUM)



#### How to cite this article:

Baek JH. Current status of core needle biopsy of the thyroid. *Ultrasonography*. 2017 Apr;36(2):83-85.

Recently, a large-scale single-center study analyzed 6,687 nodules from 6,169 patients, and reported no procedure-related deaths, a 0.06% major complication rate, and a 0.79% minor complication rate [20]. To minimize complications, CNB should be performed by trained doctors with continuous monitoring of the needle tip using real-time ultrasound. Moreover, knowledge of the neck anatomy, anatomical variations, and potential complications is also required for the safe performance of CNB [21].

As the current evidence for the efficacy and safety of thyroid CNB has grown, the KSThR organized a task force team and released the 2016 Thyroid CNB Guidelines [15]. These guidelines include 11 recommendations regarding indications, the device, the procedure, clinical outcomes, and complications. These guidelines also contain "A Pathology Reporting Proposal of the Korean Endocrine Pathology Thyroid Core Needle Biopsy Study Group" [22]. This categorical reporting system for CNB is similar to the Bethesda system, and is useful to ensure effective communication between pathologists and clinicians, reducing the likelihood of the misinterpretation of pathologic results.

In conclusion, the KSThR has suggested guidelines to improve the efficacy and safety of CNB for diagnosing thyroid nodules. Doctors performing CNB should know the basic CNB techniques and neck anatomy. In the future, it will be necessary to perform validation studies of the role of thyroid CNB according to the KSThR guidelines and new pathologic reporting proposals.

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### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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