

Trends in Thyroid Fine-Needle Aspiration Cytology - Results from the Italian Cytopathology Committee National Practice Survey

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Summary

Objective. To understand the state of the art of Italian thyroid cytopathology practice, a survey was sent by the Italian Committee of cytopathology to the 846 registered emails of the Italian society of pathology and cytology (SIAPEC) members.

Methods. A survey divided in 4 sections (geographic distribution, pre-analytics, diagnostic work up, molecular testing) was sent to SIAPEC members in April 2023. An additional set of questions regarding molecular analysis was sent to first round participants.

Results. A total of 104/846 (12.2%) SIAPEC members replied to the survey. Non-pathologist physicians performed FNA in the majority of cases (78/104, 75%). The Italian Consensus for the Classification and Reporting of Thyroid Cytology (ICCRTC) system is adopted by most centers (94/104 90,38%), although in 32.6% it was used along with other classifications systems. Only 44/104 (42.2%) of the participants performed molecular tests on thyroid FNA, mostly upon requests from the caring physician (25/41, 61.1%).

Conclusion. This survey offers a snapshot of the current Italian thyroid FNA practice. The volume of thyroid FNA performed is similar to the pre-Covid workload and the ICCRTC is the most frequently adopted classification system. Molecular tests are performed by a significant minority of participants, with different testing modalities and clinical-pathological indications.

Key words: thyroid FNA, cytopathology, survey, ICCRTC, Italian Consensus

Introduction

Ultrasound (US)-guided fine-needle aspiration (FNA) is a minimal invasive diagnostic tool for the evaluation of thyroid nodules, allowing conservative management of cases featuring benign or low-risk cytopathological features while addressing high-risk and malignant ones to surgery. To achieve best practices, standardized specimen handling and well-established diagnostic criteria are essential, including a standardized reporting system. Additionally, a standardized reporting system is necessary. However, in clinical practice, there is significant variability worldwide, both in the adoption of reporting systems and in procedural aspects such as operator type, needle choice, and specimen preparation^{1,2}.

Surveys have proven useful in assessing the state of FNA local practices³⁻⁶. The results obtained by these surveys highlight more limited adoption of the FNA technique outside academic institutions⁷, local differences for the role of interventional cytopathologists who both perform and sign out the FNA, as well as the progressive, though still variable, implementation of molecular testing to refine of indeterminate diagnostic categories^{4,8}.

In Italy, although a few surveys have been conducted by endocrinologists, the current state of thyroid FNA practice from the pathology perspective remains largely undocumented^{9,10}.

This is particularly relevant considering that Italy is one of the few countries with an established national reporting system – the Italian Consensus for the Classification and Reporting of Thyroid Cytology (ICCRTC), first introduced in 2010 and currently undergoing revision^{11,12}.

In this context, the the cytopathology comitee of italian society of anatomic pathology and cytology (SIAPEC) has promoted a nationwide survey to collect updated information on the actual practice of thyroid cytopathology across the country. The questionnaire addressed several aspects, including who performs the sampling, how specimens are prepared and processed, which diagnostic terminology is adopted, and whether molecular tests are available and integrated into the routine workflow. This survey aims to provide a reliable snapshot of the Italian practice and to support the forthcoming third edition of the ICCRTC.

Methods

The survey was conducted in two rounds. The first set of 42 questions was sent in April 2023. Data covered included: (i) type of medical institution: university hospital, community hospital, private medical center, IRCCS (Istituto di Ricovero e Cura a Carattere Scientifico i.e. biomedical institution of relevant national interest); (ii) geographic distribution of the participants; (iii) preanalytical factors (healthcare professional performing preoperative sampling, sample collection modalities, specimen handling); (iv) diagnostic work-up (reporting system, diagnostic categories distribution, risk of malignancy for each center); (v) molecular testing. In January 2024, an additional set of 48 questions regarding molecular testing was sent only to participants who replied to the first round of the survey.

All questions pertained to data from the 5-year period between 2018 and 2022, except for those regarding the distribution of diagnostic categories and molecular testing, which exclusively pertained to the year 2022. The survey was sent using Google Forms to the Italian Society of Anatomic Pathology and Cytology's (SIAPEC: Società Italiana di Anatomia patologica e di Citopatologia Diagnostica) mailing list, which included 846 email addresses (the complete content of the survey is available as Supplementary data). Each participant provided aggregated data from their respective institution. To prevent duplication, all responses underwent careful cross-verification to ensure that data from the same institution were not reported more than once. Statistical analyses were conducted using R Studio 2023.03.01+446 software (R Core Team, Vienna, Austria). Geographic differences in thyroid FNA volume – normalized by the number of respondents' institutions – were assessed using a one-way ANOVA test, followed by Tukey's HSD test for multiple comparisons.

Results

INSTITUTION TYPE AND GEOGRAPHIC DISTRIBUTION

The first round of questions received 104/846 (12.2%) replies. The second set of questions - sent only to first-round participants - received 48/104 (46.1%) replies. Most replies were from Northern Italy (58/104, 55.7%), while 25.9% (27/104) and 16.5% (17/104) were from Southern Italy (including Sicily and Sardinia) and from Central Italy, respectively. Two participants did not disclose their geographical location. Most participants worked either in Community (62/104, 59.6%) or University Hospitals (23/104, 22.1%) (Tab. I and Fig. 1).

The number of thyroid FNAs performed each year between 2020 and 2022 were reported by almost all participants (102/104, 98%); the number of FNA performed in 2018 and 2019 were reported by 89/104 (85.5%) and 83/104 (79.8%) participants, respectively. The mean annual FNA volume is shown in Figure 1. A nationwide drop in the volume of thyroid FNAs was recorded in 2020, corresponding to the COVID-19 pandemic. The number of thyroid FNAs returned to pre-pandemic levels in 2022 (Fig. 2).

Focusing on more recent data (2022), centers from Northern Italy reported a higher volume of thyroid FNAs (40,932/86,378; 47.3%), followed by those from Central Italy (23,510/86,378; 27.2%), and those from Southern Italy (including Sicily and Sardinia) (20,676/86,378; 23.9%). Data regarding FNA distribution by area and by Italian regions are shown in Figure 3.

These data show a statistically significant difference between geographic areas ($F = 4.43728$, $p = .014323$).

Table I. Annual thyroid FNA procedures from 2018 to 2022, the geographical and institutional distribution of respondents.

Year	Total	Average per center
2022	86378	846,8
2021	74383	799,1
2020	53481	581,3
2019	75854	852,2
2018	73543	896,0
Geographical distribution	Total	Percentage
Northern Italy	58	55,7%
Central Italy	17	16,5%
Southern Italy (including Sicily and Sardinia)	27	25,9%
Not available	2	1,9%
Institution		
Community Hospital	62	59,6%
University Hospital	23	22,1%
IRCCS	11	10,6%
Private medical center	6	5,8%
Not available	2	1,9%

Abbreviation: IRCCS, Istituto di Ricovero e Cura a Carattere Scientifico; bio-medical institutions of relevant national interest).

When the mean value of thyroid FNA is normalized for the number of participating institutions, there is a significantly higher volume of thyroid FNAs by institution in Central Italy (1469.3) compared to Northern Italy (718.1) and Southern Italy (765.4) ($p = 0.01068$).

FNA PROCEDURE AND CYTOPREPARATION METHODS

All participants reported which healthcare profession-

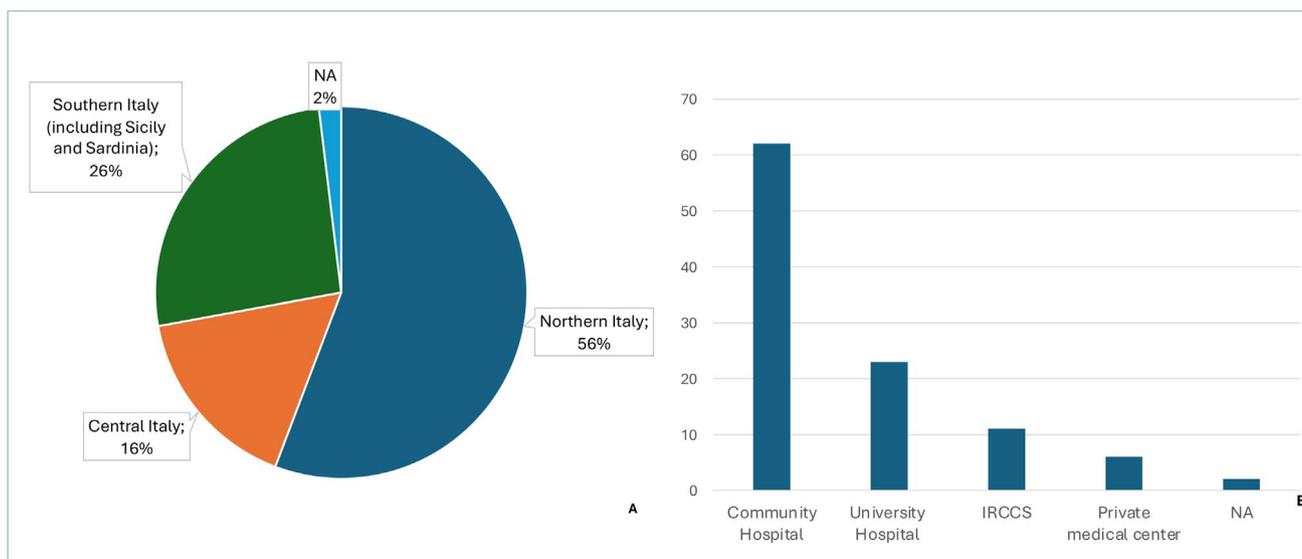


Figure 1. Respondent distribution by geographic area and institution type.

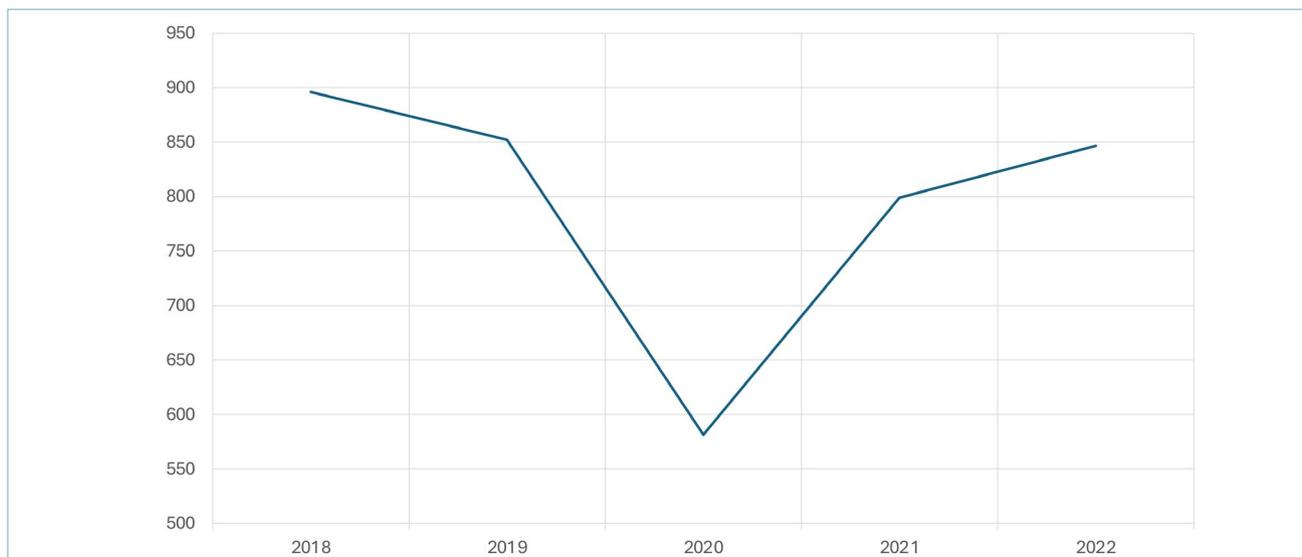


Figure 2. Trend of mean annual thyroid FNA procedures (2018-2022).

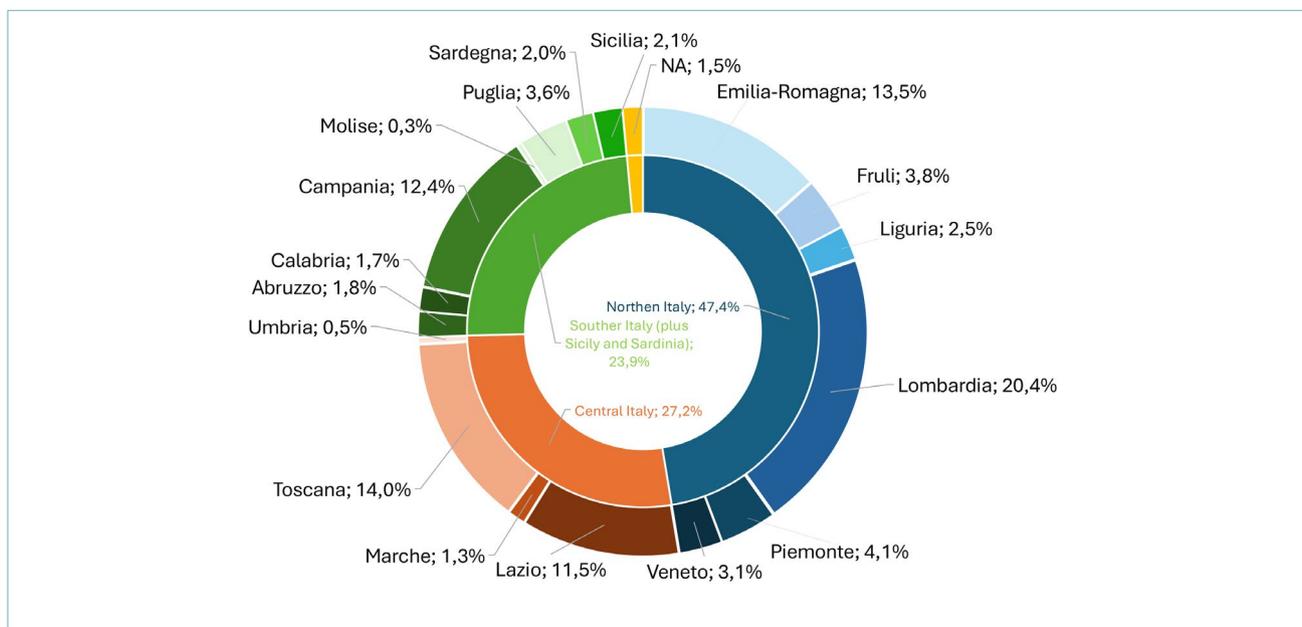


Figure 3. The regional distribution of thyroid FNA performed in Italy in 2022.

als performed the thyroid FNA in their institution (multiple responses allowed); nearly half of the respondents (57/104; 54.8%) reported two or more proceduralists. Thyroid FNAs were performed by interventional cytopathologists in 25% (26/104) of the centers; non-pathologists performed the procedure in the majority of cases (78/104, 75%). In particular, thyroid FNA were performed by endocrinologists and/or interventional

radiologists in 67/104 (64.5%) and 65/104 (62.5%) participating institutions, respectively. The majority of participants (87/104; 83.6%) indicated the needle gauge, including 23/87 (26.4%) using more than one gauge. The gauges most commonly adopted were 23 (33/87, 37.9%) and 25 (31/87, 35.6%). Interestingly, 8/104 (7.7%) institutions performed also thyroid core needle biopsies.

Information about sampling procedures was provided by 93/104 (89.4%) participants, with aspiration technique being the one most commonly adopted (68/93; 73.1%), followed by the non-aspiration capillary method (25/93; 26.8%).

All participants provided information about cytopreparation and staining procedures (multiple responses allowed). In 64/104 (61.5%) institutions, more than one cytopreparation technique was employed. Not surprisingly, 91/104 (87.5%) institutions performed direct smears, 47.1% (49/104) used cell-blocks, and 38.4% (40/104) adopted liquid-based cytology. Multiple cytological stainings were performed in 68/104 (65.3%) institutions; the Papanicolaou method was the one most widely adopted (80/104, 76.9%); conversely, May-Grunwald-Giemsa based stains and hematoxylin/eosin were adopted in 51% (53/104) and 49% (41/104) institutions, respectively. These data are reported in Supplementary Table I.

REPORTING SYSTEM

Data regarding reporting systems and healthcare professionals who report thyroid cytology is summarized in Table II (multiple responses allowed). All participants provided information about which reporting system was adopted in their institution. More than one reporting system was used in 34/104 (32.6%) institutions, and in more than two-thirds of these latter, they were used interchangeably (23/34, 67.6%). The Italian ICCRTC was the system most utilized (94/104; 90.3%). However, the Bethesda System for Reporting

Table II. Thyroid cytology reporting systems and healthcare professionals involved.

Reporting system*	N.	%
Italian ICCRTC consensus	94	90.4%
TBSRTC Bethesda system	23	22.1%
British Thyroid Association Thy system	6	5.8%
Descriptive terminology	0	0%
Reporting healthcare professional		
General surgical pathologist	34	69.4%
Dedicated cytopathologist	9	18.4%
Non-medical cytologist	6	12.2%

*Values exceed 100% because several medical centers use more than one reporting system

Table III. Distribution of Cytological Categories in Thyroid FNA Diagnoses.

ICCRTC	TBSRTC	N.	%
TIR1	Nondiagnostic	15534	18.4%
TIR2	Benign	50567	60.0%
TIR3A	Atypia of Undetermined Significance (AUS)	10598	12.6%
TIR3B	Follicular Neoplasm (Oncocytic follicular neoplasm)	3765	4.5%
TIR4	Suspicious for Malignancy	1413	1.7%
TIR5	Malignant	2333	2.8%

Abbreviation: ICCRTC, Italian Consensus for the Classification and Reporting of Thyroid Cytology Italian Consensus for the Classification and Reporting of Thyroid Cytology; TBSRTC, the Bethesda System for Reporting Thyroid Cytopathology.

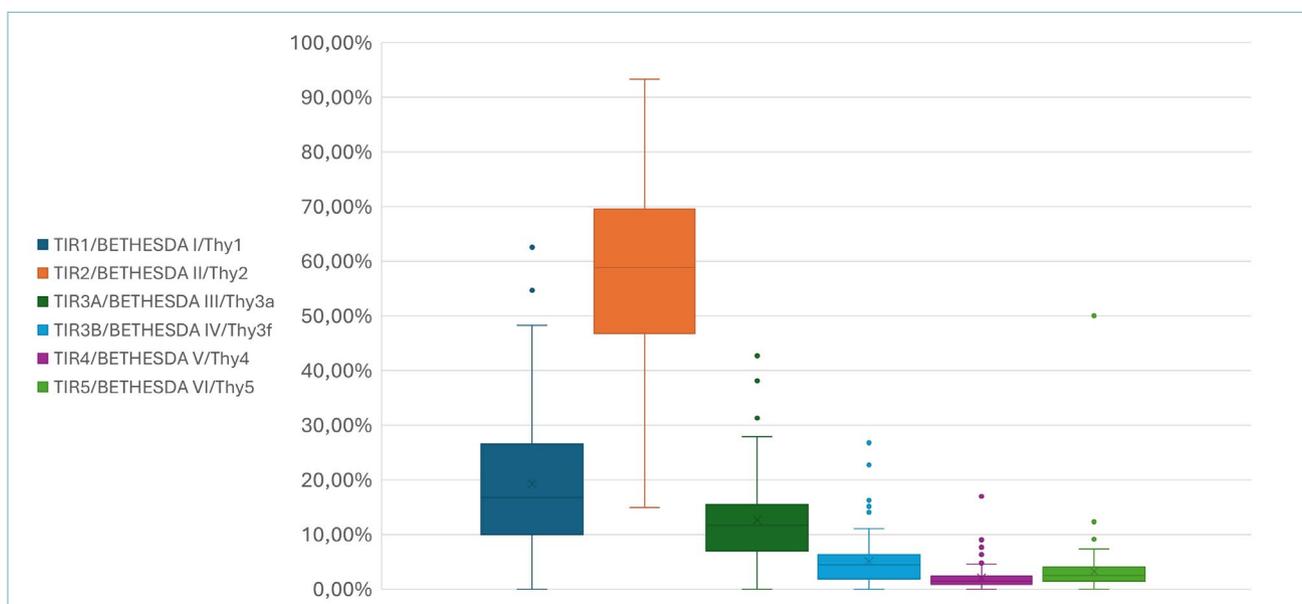


Figure 4. Distribution of cytological categories across centers in 2022.

Table IV. Comparison of Mean ROM Across Cytological Categories from surveyed Institutions: Present Survey vs. ICCRTC and TBSRTC.

ROM	Present survey	ICCRTC ^{14,24,25}	TBSRTC ²⁶
TIR1	22,78%	Not defined	13 (5-20)
TIR2	6,30%	< 3	4 (2-7)
TIR3A	17,40%	12.4% (8.8-15.9)	22 (13-30)
TIR3B	40,30%	44.4% (40.1-48.8)	30 (23-34)
TIR4	79,13%	85% (80-89)	74 (67-83)
TIR5	94,13%	99% (99-1.00)	97 (97-100)

Abbreviation: ROM, Risk of malignancy, ICCRTC, Italian Consensus for the Classification and Reporting of Thyroid Cytology; TBSRTC, the Bethesda System for Reporting Thyroid Cytopathology.

Thyroid Cytopathology (TBSRTC) was used in 22.1% (23/104) institutions; 5.8% (6/104) of participants also used the British Thyroid Association-Royal College of Pathologists (RCPATH) reporting system. No institution used descriptive terminology only for reporting thyroid FNA.

Nearly all respondents (96.1%, 100/104) provided data regarding the diagnostic category distribution in their centers for the year 2022. The overall national data is reported in Table III and the distribution is visualized in Figure 4.

Only 9/104 (8.6%) participants provided data on their institutions' risk of malignancy (ROM) for selected categories (Tab. IV)

Forty-nine of 104 (47.1%) participants provided infor-

mation about which healthcare professional signs out thyroid cytopathology in their institution. The average number of healthcare professionals per center was 3. Most were general surgical pathologists (34/49, 69.3%), who report both histology and cytology; pathologists specifically dedicated to cytopathology reported thyroid FNA in 18.3% (9/49) institutions. In 6/49 (12.2%) institutions thyroid FNA were also signed out by non-medical cytologist with a post-degree specialization in cytopathology. The average turnaround time (TAT) for reporting thyroid FNA was 7 working days (range: 2 - 21 days).

Pathologists who report thyroid cytology were involved in multidisciplinary tumor boards in less than a third of cases (20.1%; 21/104).

MOLECULAR BIOLOGY

Overall, 42.3% (44/104) institutions performed molecular testing on thyroid FNA. More than half (27/44; 61.3%) provided data about the number of molecular tests for the year 2022, reporting an average of 92 molecular tests per center (range: 1-448).

The majority of participants (42/44; 95.4%) provided information about the technology adopted for molecular testing (multiple responses allowed). The most common assays adopted were real-time PCR (22/42, 52.3%) and next-generation sequencing (NGS) (18/42, 42.8%).

Most participants (39/44; 88.6%) provided information about which genetic alterations were tested; *BRAF* p. V600E was tested in all cases, while *H/K/N-RAS*

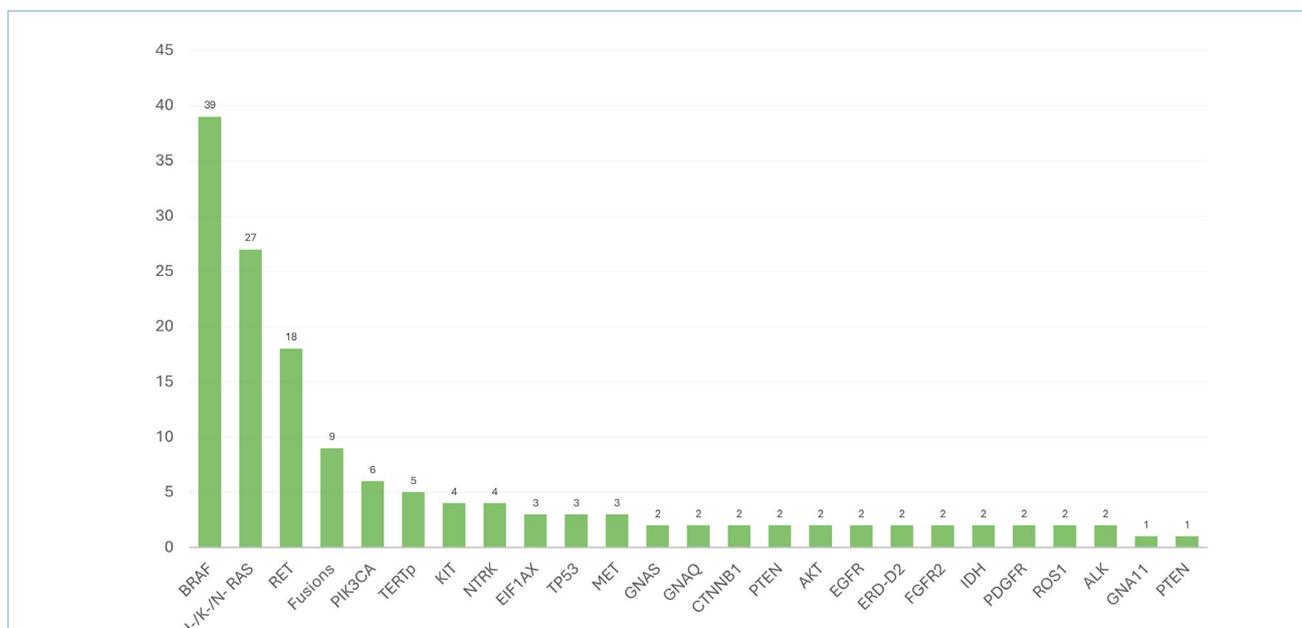


Figure 5. Frequency of molecular targets tested across institutions.

alterations in more than two-thirds of participant institutions (27/39, 69.2%). In 19/39 (48.7%) institutions, genetic alterations other than *BRAF p. V600E* and *H/K/N-RAS* were tested, including *RET* (fusion or point mutation), *PAX8* fusion and *TERT* promoter (*pTERT*) mutations (Fig. 5).

All participants provided information about the source material used for molecular testing (multiple responses allowed). Cells scraped from cytology smears was the most frequently employed source (21/44, 47.7%); needle rinse and sections from cell blocks were used in less than one-third of institutions (12/44, 27.2%). Only 4/44 (9.1%) institutions reported liquid-based cytology samples as a source for nucleic acids.

All institutions provided information about the modality of molecular testing; almost two-thirds (65.9%) performed molecular testing only upon clinician requests, while the remaining third (34.1%) performed reflex testing after a diagnosis of indeterminate cytology.

Only few participants (9/44; 20.4%) provided information regarding the molecular diagnostic report; molecular results were usually delivered as a separate report (7/9, 77.8%), but in 2 institutions (22.2%) molecular results were included in a single cytological-molecular report. The average TAT for molecular test results was 12 working days (range 6-31).

QUALITY CONTROLS

Thirty-seven out of 48 participants in the second round of the survey (77.1%) reported that quality controls were routinely performed at their institution (multiple responses allowed). Cyto-histological correlations were the most common quality control method (33/37, 89.2%), followed by monitoring of indeterminate diagnoses rates (20/37, 54%); periodical review of selected cases was performed in 9/37 (24.3%) institutions.

Discussion

The Italian Cytology Committee is a part of National Pathology Society (SIAPEC) and is devoted to advisory, organizational, and executive responsibilities on competence and initiatives in the field of Cytopathology, including educational activities and cytopathology practice monitoring¹³.

The committee endorsed the drafting and the application of the ICCRTC since its first edition¹¹, “together with experts from the SIAPEC endocrine pathology working group (GIPE: Gruppo Italiano di Patologia Endocrina). This classification was updated in 2014, based on a joint working panel which included the Italian Thyroid Association (AIT), the Italian Association of Clinical Endocrinologists (AME), and the Italian So-

ciety of Endocrinology (SIE)¹².

On the occasion of the third edition of the ICCRTC, whose publication is planned for the end of 2025, the Italian Cytopathology Committee provided a survey to assess the current state of laboratory practice regarding thyroid cytopathology, focusing on the use of standard reporting terminology, specimen acquisition and preparation, molecular testing implementation and quality assurance.

The survey highlighted regional disparities in thyroid FNA practices across Italy. While the majority of responses (55.3%) came from the regions of Northern Italy, those of Central Italy showed a significantly higher average number of FNA per participating institution. This may suggest that institutions which participated from Central Italy are more likely to be high-volume centers. Since a previous endocrinologist-targeted Italian survey revealed that FNA were requested more frequently than recommended, this result could also suggest tendencies toward more liberal FNA use in certain geographic areas¹⁰.

National data reinforce the worldwide evidence regarding the impact of the COVID-19 pandemic on FNA practices, showing a reduction in FNA numbers during the pandemic (Fig. 2)¹⁴. However, a return to pre-pandemic FNA volume occurred in 2022 (Fig. 2). In Italy, endocrinologists and radiologists are the healthcare professionals who usually perform thyroid FNA. Former surveys promoted by both Italian and Spanish endocrinologists associations showed a prevalence of endocrinologist-performed FNA^{3,10}. In contrast, the College of American Pathologists (CAP) surveys pointed towards a shift from endocrinologist- to radiologist-performed FNA. In fact, the results obtained from the 2011 CAP survey showed a prevalence of endocrinologist-performed FNA, whereas radiologists performed most of the thyroid FNA procedures according to the subsequent 2016 survey^{4,15}. These differences may reflect different target groups for each survey.

Thin needles (≥ 23 gauges) are usually employed, likely due to better tolerability and reduced blood contamination^{16,17}. The aspiration method, which involves applying negative pressure via the syringe plunger, is the most prevalent. This preference aligns with other experiences, as the aspiration technique may be favored for its higher adequacy rates, despite the potential for increased blood contamination that is balanced with the use of thin-gauge needles^{18,19}.

Direct smearing is the most common sample preparation method, valued for its expedited preparation and cost-effectiveness, followed by liquid-based cytology (LBC) and cell block preparations^{5,20}. Direct smears are usually the preferred choice also because they

allow a better recognition of background colloid and cytoarchitectural features, particularly when they are prepared by skilled cytopathologist²¹.

The present survey confirms that Papanicolaou is the most widely used stain⁴. Preference of the Papanicolaou stain over May-Grünwald-Giemsa (MGG) modified stains is explained by the better morphologic visualization of nuclear alterations associated with papillary thyroid carcinoma (PTC), which is the most commonly occurring thyroid malignancy²².

All participants used at least one reporting system, confirming the transition from narrative terminology to standardized nomenclature. ICCRTC is the most frequent reporting system, although 22.1% of respondents also use other systems concurrently, particularly TBSRTC. Though closely related, these systems differ regarding the microscopic criteria for the diagnosis of indeterminate categories. In particular, morphologic alterations such as subtle PTC-like nuclear atypia, are categorized as AUS (TBSRTC III), whereas the ICCRTC system classifies FNA featuring such atypia as TIR3B, which is considered a high-risk indeterminate category.

Focusing on more recent results (2022), our survey reveals variability in the frequency distribution of cytological categories among centers (Fig. 4). In particular, high-risk indeterminate (TIR3B), suspicious (TIR4) and Malignant (TIR5) FNAs show low frequencies across all centers, typically under 5%. The narrow spread and lack of significant outliers suggest high consistency in their usage among different participating institutions. Conversely, the distribution of nondiagnostic (TIR1) and benign (TIR2) categories reveals notable inter-center variability. TIR1 shows a wide range of reported frequency, with a median of 16.7%, including few institutions exceeding 50-60%. This variability may reflect differences in sampling adequacy or smear preparation, in particular considering that the in majority of institutions, an interventional cytopathologist who oversees the whole procedure is not available. TIR2 is the most frequently reported category overall, with a median frequency of approximately 60%, which is in line with frequencies expected for this category.²³ However, there is significant variation across participating institutions – with some reporting as low as 15% of cases as TIR2, and others in which TIR2 is close to 93% of all diagnoses (Fig. 4). This wide interquartile ranges implies heterogeneity and may reflect differences for thyroid FNA, request including cases in which FNA is performed without following guideline recommendations. The TIR3A category also exhibits considerable variability, with frequencies ranging widely among centers (Fig. 4). This highlights the variability of interpretation of microscopic criteria

associated with this low-risk indeterminate diagnosis and the need for more standardized criteria to ensure consistent classification. The upcoming revised edition of the ICCRTC system is expected to provide a clearer definition of the microscopic features that should be classified as TIR3A, including illustrative microphotographs, explanatory notes, and sample reports, as well as a description of the typical clinico-pathologic scenarios that associate with TIR3A. However, the mean frequency of TIR3A is 12.6%, only slightly above the recommended threshold of 10%, indicating that this challenging category is not abused in Italian medical centers.

Although few participants reported the ROM of selected diagnostic categories, results demonstrate a ROM for indeterminate categories more similar to that of the ICCRTC system than to that of TBSRTC, in particular for high-risk indeterminate diagnostic categories (TIR3B vs. TBSRTC IV) (Tab. IV)²⁴⁻²⁶. Thus, although TBSRTC and ICCRTC are used interchangeably in some of the participants' institutions, morphologic criteria adopted in the routine practice seem more in line with those proposed by the ICCRTC. To avoid any misclassification of thyroid FNA due to different criteria, the upcoming third ICCRTC edition will provide a chapter dedicated to the translation of classification systems.

Thyroid FNAs are usually signed out usually by certified pathologists who handle both cytology and histology; only 19.8% of cases are reported exclusively by dedicated cytopathologists, i.e. certified pathologists specifically dedicated to cytopathology. To the best of our knowledge, Italy has unique legislation that allows non-medical cytologists (usually with a degree in biology) with post-degree specialization to sign-out thyroid FNA, as confirmed in this survey by 12.2% centers. In the majority of countries, non-medical professionals like cytotechnicians are usually only involved in rapid on-site evaluation and in screening the smear for the pathologist sign out²⁷.

The average TAT for reporting thyroid FNA is 7 working days. Evidence suggests that entrusting thyroid cytology sign-out to dedicated cytopathologists can reduce the TAT, thereby improving patient management²⁸.

It is noteworthy that in nearly half (48%) of cases, the pathologist reporting thyroid cytology is also involved in thyroid multidisciplinary tumor boards. It is well established that the involvement of pathologists, and by extension cytopathologists, enhances patient management and facilitates the identification of errors. O'Connor et al. have highlighted this impact, particularly in the management of patients who have received diagnoses based on cytology samples²⁹.

The second round of the survey was dedicated to enquire the implementation of molecular tests in thyroid cytopathology. As in many other European countries, in Italy there is a universal health system which currently does not cover the cost of commercial tests centralized in private North American laboratories (e.g. Thyroseq, Afirma)³⁰. Thus, recent European guidelines recommend the use of molecular testing in indeterminate categories³¹, several medical centers, including European ones, have adopted sustainable alternatives to thyroid-specific comprehensive testing, either by using broadly available, non-thyroid specific commercial cancer panels or by designing and validating custom panels targeting key genetic alterations involved in thyroid tumorigenesis³⁰. Nearly half of the respondents to the first round of questions have access to molecular testing for thyroid cytopathology. In the majority of cases methods are RT-PCR or NGS panels; a variety of cytologic samples are suitable for molecular testing, but cells scraped from direct smears are the most frequent source for nucleic acid extraction in Italy (47.7%). The most frequent gene alteration tested is *BRAF* p.V600E which is virtually always diagnostic of a PTC. However, although highly specific, cost-effective, and easy to detect, the sensitivity of *BRAF* p.V600E is limited – especially in indeterminate thyroid FNAs³². *H/K/N-RAS* alterations are tested in the majority of the participating institutions (61%). However, since *H/K/N-RAS* mutations are also found in benign neoplastic nodules, they are not as useful as *BRAF* p.V600E in the decision making process for indeterminate thyroid nodules³³. Given the low-risk of malignancy for *RAS*-mutated lesions, these can be managed conservatively in the appropriate clinical context³⁴. Besides these most common mutations, 48.7% centers also test additional alterations, including *RET* point mutations in medullary thyroid carcinoma and *TERT* promoter mutation. The detection of *TERT* promoter mutation, associated with aggressive clinical course, can be helpful in selecting the most appropriate surgical management and follow-up intensity³⁵. The best modality to perform molecular testing – as reflex test for all indeterminate FNA diagnoses, restricted to the confirmation of an indeterminate FNA diagnosis after repeated FNA, or only if requested by the caring physician – is still unclear. The high cost of these tests combined with the fact that they are variably reimbursed by the national health care system explain why in the majority of cases (65.9%) molecular testing is performed only after a specific request by the caring physician. Only a few participants provided information about the format of molecular diagnostic reporting. In the vast majority of cases, molecular results were delivered as a separate

standalone report, although it may be argued that results of molecular testing should be integrated directly into the cytopathology report, allowing for a unified interpretation which may be more informative for clinicians⁴. Indeed, molecular findings may appear as a separate section or as an addendum to the cytology report. In the upcoming third edition of the ICCRTC, a dedicated chapter focused on additional techniques is included, also addressing the best modalities for the reporting of molecular tests.

More than two-thirds of the participants in the second round of this survey adopted quality control methods at their institutions. Periodic quality controls improve the consistency of cytologic preoperative diagnoses, and the correct application of the classification scheme used to report the diagnoses. To allow the proper implementation of the upcoming third edition of the ICCRTC, the SIAPEC Cytopathology Committee is planning dedicated workshops targeted to all professional involved in thyroid FNA routine diagnosis.

Conclusions

The survey conducted by the Italian Cytopathology Committee provided a comprehensive overview of thyroid cytopathology practices in Italy, highlighting the need for standardization and training to enhance diagnostic quality. The insights gathered will inform the update of the ICCRTC, promoting the adoption of uniform diagnostic criteria and the integration of molecular testing into daily workflows, with the goal of optimizing clinical management of thyroid nodules.

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CONFLICTS OF INTEREST STATEMENT

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AUTHORS' CONTRIBUTIONS

GA, CB, GT and GT contributed to the conceptualization of the manuscript. GA, CB, GT and GT were involved in drafting the manuscript and critically revising it for important intellectual content. Supervision was provided by CB, GT and GT. All authors provided data for the drafting of the manuscript. All authors read and approved the final version of the manuscript.

ETHICAL CONSIDERATION

The research was conducted ethically, with all study procedures being performed in accordance with the requirements of the World Medical Association's Declaration of Helsinki.

Written informed consent was obtained from each participant/patient for study participation and data publication.

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