

What Training Should Be Offered to Cytopathology Technicians with the Incorporation of Molecular Tests in Cervical Cancer Screening?

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Qual Formação Oferecer a Técnicos em Citopatologia com a Incorporação de Testes Moleculares no Rastreamento do Câncer do Colo do Útero?

¿Qué Formación Oferecer a los Técnicos en Citopatología con la Incorporación de Pruebas Moleculares en el Rastreo del Cáncer de Cuello Uterino?

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INTRODUCTION

The well-established association between cervical cancer and high-risk human papillomavirus persistent infection enabled the development of biomolecular tests and new strategies for screening pre-neoplastic cervical lesions¹.

Since 2014, the World Health Organization (WHO) has recommended transitioning from programs that use cytology in cervical cancer screening to programs based on molecular tests for HPV detection when resources are available². This recommendation is based on the HPV test being more sensitive than cytology in longer screening intervals³.

In March 2024, the Brazilian Ministry of Health announced the decision to incorporate molecular tests into cervical cancer screening within the National Health System (SUS)⁴.

This change will reduce the number of cervical cytology exams, the primary screening method in force, representing one of the most performed activities by cytopathology technicians⁵.

According to the Ministry of Health's guidelines and directions for training cytopathology technicians, the formative axis of actions and procedures intrinsic to tests in the cytology field correspond to the greatest workload of this category's curricular content organization⁶.

In the face of this issue, it is essential to reflect on the formative process and work of these professionals, considering the incorporation of this new cervical cancer screening method.

DEVELOPMENT

THE WORK OF A CYTOPATHOLOGY TECHNICIAN

Adopting the technique described by Papanicolaou for early detection of cervical cancer was a breakthrough in the development of screening campaigns for this cancer, highlighting the important role of cytopathology technicians in the scope of public health⁷.

The cytopathology technician, also known as a cytotechnologist, works at labs classified as cytopathology or pathological anatomy diagnostic services, performing technical procedures and microscopic analysis of liquids, organic fluids, secretions, smears, and scrapings⁶.

Since the introduction of the Papanicolaou or Pap smear test, the reading of gynecological cytology slides corresponds to the most executed activity by cytopathology technicians, in addition to being the most recurring content among the specific cytopathology questions in entrance examinations for this professional category⁵.

MOLECULAR TESTS FOR CERVICAL CANCER SCREENING

In Brazil, actions to incorporate an organized screening program based on the detection of oncogenic HPV-DNA tests are already being implemented. The SECTICS/MS N. 3 Ordinance, of March 7, 2024⁴, conditioned the incorporation of the test to the update of the Ministry of Health's *Brazilian Guidelines for Cervical Cancer Screening*, considering a deadline of 180 days for making the technologies available on SUS.

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According to the preliminary publication of the guidelines, the recommendation for women of standard risk is to undergo the oncogenic HPV-DNA with partial or extended genotyping as the primary screening method for cervical cancer. When the sample assessed is negative, the oncogenic HPV-DNA test should be repeated every five years. When the sample is positive, the woman should be referred to colposcopy after the oncogenic HPV-DNA test results show the presence of types 16 and/or 18. The cytopathological test (reflex cytology) should be performed after an oncogenic HPV-DNA positive result for types other than 16 and/or 18. If cytology is altered or is shown as unsatisfactory, the woman shall be referred to a colposcopy⁸.

With the incorporation of this new protocol, there will be a considerable reduction in the number of cytopathological tests performed at SUS, directly impacting professionals who perform this test, including cytopathology technicians. Therefore, it is necessary to consider the performance of this professional so that their training is aligned with the job market's requirements.

THE NEXT STEP

The practice of cytotechnology is going through changes. Rockson⁹ points to a new era of education in cytotechnology due to new screening guidelines. In this context, acknowledging that the work of cytopathology technicians involves more than screening gynecological cytology slides is fundamental. The new curriculum defines the current scope and their participation in increasingly advanced practices. The domains encompassed in this structure include cell morphology in recognizing cell patterns associated with benign and malignant disease processes, application of histotechnology and immunohistochemistry techniques, technical support in producing material for rapid onsite evaluation during procedures of fine-needle aspiration, and use of computer-assisted screening devices projected to aid in locating abnormal cells.

Rockson⁹ also highlights that the skills discussed are already practiced by some professionals, but, in many cases, they were acquired more through practice than through formal education, reinforcing the importance of including them in the curriculum.

Mukherjee et al.¹⁰ described the experience of the cytotechnology program in the State of Nebraska (USA), highlighting the incorporation of new competencies into formal education, including complementary technologies like special colorings, immunohistochemistry, immunocytochemistry, and molecular diagnosis.

In Brazil, the National Cancer Institute (INCA)¹¹ has trained cytopathology technicians for over 30 years, offering the most traditional course in the education of these professionals, open to people from every region of the country. In the 2023 syllabus for the cytopathology technical course, INCA incorporated content related to histopathology and immunohistochemistry, intending to broaden the field of activity of professionals in this category.

To continue strengthening professional education and broadening curricular content aligned with global demands, INCA is restructuring its course, aiming to align technical qualifications to the new requirements and challenges of the health system.

In this scenario, it is possible to project that the profession tends not only to consolidate itself but also to reconfigure its identity, whose traditional training, based mainly on morphological reading, tends to be expanded to encompass a more integrated and technological vision of the diagnostic process.

THE CHALLENGES OF CHANGE

Over the last 20 years, the future of the cytopathology field has been much discussed in several countries¹⁰. Since 2020, the cytotechnology field has been recognized in the United States for providing advanced diagnostic services and medical support, integrating morphological interpretations into complementary technologies to provide safe and effective care to patients¹².

In Brazil, according to the Ministry of Education's National Catalog of Technical Courses (*Catálogo Nacional de Cursos Técnicos* – CNCT)¹³, cytopathology technicians should be able to “collaborate in the investigation and implementation of new technologies and execute, under the supervision of the responsible graduate professional, standardized laboratory activities referring to microscopic tests in their technical expertise”¹³.

However, we highlight the need to update the CNCT to promote better alignment with current technological demands, facilitating the incorporation of this new content into the curricula of technical courses.

Sturgis et al.¹⁴ published a report on the main data and results of the Cytology Education Symposium, which took place in November 2022, organized by the American Society of Cytopathology and the International Academy of Cytology. The document approaches, among other themes, the new educational possibilities in the field. Consistently, participants have reported that teaching environments face significant limitations, mainly due to budget restrictions and time available for training.

Given this scenario, it becomes fundamental that education centers are aligned with technological advances

and reorganized to meet the new health demands, especially when it comes to cancer screening. This requires making new equipment available and adjusting infrastructure to provide adequate training to cytopathology technicians, ensuring an education that is compatible with current job market requirements and transformations.

In the Brazilian context, there is also a need for a clearer and more normative definition of the attributions of technical and graduate-level professionals in the processing and analysis of samples aimed at cervical cancer diagnosis, through HPV-DNA tests and reflex cytology. This delimitation is essential to ensure the safety and technical quality of lab procedures and the proper allocation of responsibilities in the scope of multiprofessional teams.

CONCLUSION

Cytopathology technicians have played a fundamental role in cytopathological diagnosis since the introduction of the Papanicolaou test in Brazil. As health-applied technologies advance, especially in cytology labs, the scope of work of these professionals broadens significantly. The incorporation of complementary techniques, such as histology, immunohistochemistry, molecular tests, rapid onsite evaluation, and digital pathology, requires a more encompassing education adapted to new diagnostic demands.

In this context, recent changes in guidelines for cervical cancer screening make it even more urgent to reflect on the professional profile of the cytopathology technician. It is essential to acknowledge their importance in the lab context and strengthen their identity in the services of pathological anatomy, ensuring their education and attributions are aligned with the technological transformations and requirements of the current healthcare system.

CONTRIBUTIONS

Daniela Alves Santana and Paulo Roberto Soares Stephens have substantially contributed to the study design, planning, acquisition, analysis, and interpretation of the data; wording, and critical review. Mario Lucio Cordeiro Araújo Junior has substantially contributed to the data acquisition, analysis, and interpretation, wording, and critical review. All the authors approved the final version for publication.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

All the contents associated with the article are included in the manuscript.

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