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MODERN LABORATORY DIAGNOSTICS OF THE THYROID GLAND

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Abstract
The thyroid gland plays a crucial role in regulating metabolism and energy balance in the body. Disorders of the thyroid, such as hypothyroidism and hyperthyroidism, can significantly affect a patient's quality of life. Modern laboratory diagnostic methods allow for timely detection and management of these conditions, which is essential for successful treatment and prevention of complications. The aim of this study is to review the main contemporary methods of thyroid laboratory diagnostics, their principles, and clinical significance.

Keywords: thyroid gland, metabolism, hypothyroidism, hyperthyroidism.

Introduction

Aim of the Study:
To examine modern methods of thyroid laboratory diagnostics, define their principles, and determine their clinical significance for the timely detection and treatment of thyroid diseases.

Materials and Methods:
This study reviews various contemporary laboratory diagnostic methods for thyroid function, including the measurement of Thyroid-Stimulating Hormone (TSH), Free Thyroxine (FT4), Free Triiodothyronine (FT3), and autoimmune markers such as antibodies to Thyroid Peroxidase (TPOAb) and Thyroglobulin (TgAb). The methods used for these measurements include immunoassays, chemiluminescent immunoassays (CLIA), enzyme-linked immunosorbent assays (ELISA), direct equilibrium dialysis, and ultrafiltration. Additionally, genetic tests using next-generation sequencing (NGS) and polymerase chain reaction (PCR)-based methods are reviewed, along with imaging techniques such as thyroid ultrasound and functional tests like radioactive iodine uptake (RAIU) and fine-needle aspiration biopsy (FNAB).

Results:
Thyroid-Stimulating Hormone (TSH): TSH levels in blood serum are the most informative test for suspected thyroid dysfunction. Elevated TSH levels indicate hypothyroidism, whereas decreased levels suggest hyperthyroidism. Immunoassay techniques for TSH measurement have high sensitivity and specificity.

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Free Thyroxine (FT4) and Free Triiodothyronine (FT3): FT4 and FT3 are the active hormones of the thyroid gland. Measurement of their free forms is more informative as they are biologically active. In hypothyroidism, FT4 levels are typically low with elevated TSH, while in hyperthyroidism, FT4 levels are high with suppressed TSH. FT4 is measured using direct equilibrium dialysis or ultrafiltration followed by immunoassay, whereas FT3 is particularly useful in diagnosing hyperthyroidism.

Autoimmune Markers: TPOAb and TgAb: High levels of these antibodies are observed in autoimmune thyroid diseases like Hashimoto's thyroiditis and Graves' disease. They are measured using CLIA or ELISA. Thyroid-Stimulating Immunoglobulins (TSI): These antibodies are key markers for Graves' disease, measured using bioassays that detect their ability to stimulate cyclic AMP production in cells expressing the TSH receptor.

Other Diagnostic Tests: Thyroglobulin (Tg): Used primarily for monitoring differentiated thyroid cancer post-surgery. Tg measurements are performed using immunoassays.

Calcitonin: Used for diagnosing and monitoring medullary thyroid carcinoma, measured using two-site immunoassays.

Genetic Studies: NGS and PCR-based methods identify mutations associated with hereditary thyroid cancers, such as mutations in the RET proto-oncogene. Imaging and Functional Tests: Thyroid Ultrasound: Non-invasive technique to evaluate thyroid size, structure, and nodules, and guide FNAB. Radioactive Iodine Uptake (RAIU) and Scanning: Measures thyroid iodine uptake, useful in evaluating hyperthyroidism.

Fine-Needle Aspiration Biopsy (FNAB): Gold standard for evaluating thyroid nodules, performed under ultrasound guidance.

Conclusion

Modern laboratory diagnostics of the thyroid gland encompass a wide range of tests that not only detect thyroid dysfunction but also elucidate its etiology and predict outcomes. The combination of hormonal studies, autoimmune markers, specific proteins, genetic tests, imaging, and functional tests provides a comprehensive approach to diagnosing and treating thyroid diseases. The introduction of new technologies and the improvement of existing diagnostic methods continue to expand clinicians' capabilities in managing these conditions, thereby improving patients' quality of life and reducing the risk of complications.

References

1. Burxanova D. S., Umarova T. A., Kudratova Z. E. Acute myocarditis linked to the administration of the COVID 19 vaccine //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 11. – С. 23-26.

2. Кудратова З. Э. и др. Атипик микрофлора этиологияли ўткир обструктив бронхитларининг ў зига хос клиник кечиши //Research Focus. - 2022. - Т. 1. - №. 4. - С. 23-32.

3. Kudratova Z. E, Normurodov S. Etiological structure of acute obstructive bronchitis in children at the present stage - Thematics Journal of Microbiology, 2023. P.3-12.

4. Kudratova Z. E., Tuychiyeva S. K. Atipik mikroflora etiologiyali o'tkir obstruktiv bronxitlar etiopatogenezining zamonaviy jixatlari. Research Focus, 2023, B. 589-593.

Licensed under a Creative Commons Attribution 4.0 International License.

5. Kudratova Z. E., Karimova L. A. Age-related features of the respiratory system. Research Focus,Tom 2, P. 586-588.
6. Исомадинова Л. К., Даминов Ф. А. Современная лабораторная диагностика хронического пиелонефрита у детей //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 112-116.
7. Isomadinova L. K., Daminov F. A. Glomerulonefrit kasalligida sitokinlar ahamiyati //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 117-120.
8. Isomadinova L. K., Qudratova Z. E., Shamsiddinova D. K. Samarqand viloyatida urotiliaz kasalligi klinik-kechishining o'ziga xos xususiyatlari //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10. – С. 51-53.
9. Isomadinova L. K., Qudratova Z. E., Sh B. F. Virusli gepatit b fonida Covid-19 ning klinik laborator kechish xususiyatlari //Journal of new century innovations. – 2023. – Т. 30. – №. 3. – С. 60-65.
10. Isomadinova L. K., Yulayeva I. A. Buyraklar kasalliklarning zamonaviy diagnostikasi //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10 Part 3. – С. 36-39.

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