E CONF SERIES

International Conference on Economics, Finance, Banking and Management
Hosted online from Paris, France
Website: econfseries.com 24th June, 2025

MODERN LABORATORY DIAGNOSTICS FOR HEART DISEASES: A REVIEW OF METHODS AND CLINICAL SIGNIFICANCE

Umarova T. A.
Assistant of the department of clinical laboratory diagnosis with the course of clinical laboratory diagnostics of PGD;

Daminov F. A.
DSc, Ass.Professor, head of the department of clinical laboratory diagnosis with the course of clinical laboratory diagnostics of PGD;

Fayziyeva B.
cadet of the department of clinical laboratory diagnosis with the course of clinical laboratory diagnostics of PGD; Samarkand state medical university
Samarkand, Uzbekistan

Abstract
Cardiovascular diseases (CVD) remain the leading cause of morbidity and mortality worldwide.
Effective diagnosis of these pathologies requires a comprehensive approach, including instrumental and laboratory methods. Laboratory diagnostics plays a key role in early detection, risk stratification, monitoring of disease progression, and evaluating therapy effectiveness. This article provides an overview of modern laboratory markers used in cardiovascular diseases, as well as their significance in clinical practice [1,2,3,4].

Keywords: laboratory diagnostics, therapy, biomarkers, myocardium, myocardial infarction, thrombus;

Introduction

According to the World Health Organization, cardiovascular diseases annually claim more than 17 million lives. Timely diagnosis and therapeutic intervention allow for a significant reduction in mortality and complications. In recent years, laboratory

medicine has achieved significant success in developing specific and sensitive biomarkers that reflect the functional state of the myocardium, vascular endothelium, inflammatory and thrombotic processes [5,6,7,8].

Cardiospecific biomarkers of myocardial damage

1. Troponins (cTnI and cTnT)
2. The most sensitive and specific markers of cardiomyocyte necrosis.
3. High-sensitivity troponin tests (hs-cTn) allow for early detection of acute myocardial infarction.
4. Troponin levels are also used for risk stratification and prognosis in unstable angina and other acute coronary syndromes.
5. Creatinine phosphokinase-MV (KFK-MV)
6. It is inferior to troponins in specificity, but it is used in dynamic observation for recurrent heart attacks, as well as in combination with other markers.
7. Myoglobin
8. It rapidly increases in the blood when muscles, including the myocardium, are damaged, but it has low specificity for the heart [9,10,11,12].

Heart failure biomarkers

1. Natriuretic peptides (BNP and NT-proBNP)
2. Released in response to the stretching of the heart ventricle walls.
3. High values correlate with the severity of chronic heart failure and prognosis.
4. They are used both in diagnostics and in monitoring the response to therapy.

Marker indicators of inflammation and atherogenesis

1. C-reactive protein (highly sensitive, hs-CRP)
2. Indicates the presence of systemic inflammation.
3. Elevated levels are associated with a high risk of atherosclerosis, coronary heart disease, and acute vascular events.
4. Lipoproteins and apolipoproteins
5. Dyslipidemia is a key risk factor for cardiovascular disease.

6. The levels of total cholesterol, LDL, HDL, triglycerides, as well as apolipoprotein B and A1 are determined.
7. Modern methods include the determination of low-density lipoproteins and lipoprotein (a) - an independent predictor of atherothrombosis [13,14,15].

Hemostasiological markers

1. D-dimer
2. Elevated levels may indicate thrombosis, including deep vein thrombosis, TELA, and myocardial infarction.Used in the differential diagnosis of acute cardiovascular diseases.
3. Homocysteine. Elevated levels are associated with endothelial dysfunction and accelerated development of atherosclerosis [16,17,18].

Genetic and molecular diagnostics. Modern approaches include the identification of gene polymorphisms associated with the risk of cardiovascular disease, such as mutations in the genes of lipoprotein receptors, angiotensin-converting enzyme, coagulation factors, and others. Genetic testing is especially relevant for familial forms of hypercholesterolemia and cardiomyopathies [19,20,21,22,23,24].

Innovative directions

- MicroRNA (miRNA)
- New promising biomarkers reflecting the expression of genes involved in the development of myocardial hypertrophy, ischemia, and fibrosis.
- They are being studied as potential tools for non-invasive diagnosis and prognosis.
- Metabolomics and proteomics. A comprehensive analysis of the patient's metabolic and protein profiles allows for the assessment of systemic changes in cardiovascular disease, the identification of new markers, and the individualization of therapy.

Conclusion

Laboratory diagnostics in cardiology went beyond just confirming a myocardial infarction. Modern biomarkers provide multi-level assessment of the cardiovascular system, allow for predicting complications, choosing treatment tactics, and evaluating its effectiveness. The introduction of new technologies, including molecular genetic methods and next-generation biomarkers, contributes to the formation of a personalized approach in cardiology practice.

References

1. Abduhakimov B. A. et al. Bolalar va o'smirlarda birlamchi tuberkulyozning o'ziga xos kechish xususiyatlari va klinik-laboratoriya usullari //Ta'lim innovatsiyasi va integratsiyasi. – 2024. – Т. 32. – №. 3. – С. 139-143.
2. Бердиярова Ш. Ш. и др. Клинико-лабораторная диагностика фолиевой кислотодефицитной анемии //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 46-53.
3. Umarova T. A., Kudratova Z. E., Axmadova P. Role of conditionally pathogenic microflora in human life activities //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 29-32.
4. Muhamadiyeva L. A., Kudratova Z. E., Sirojeddinova S. Pastki nafas yo'llari patologiyasining rivojlanishida atipik mikrofloraning roli va zamonaviy diagnostikasi //Tadqiqotlar. Uz. – 2024. – Т. 37. – №. 3. – С. 135-139.
5. Umarova T. A., Kudratova Z. E., Norboyeva F. Modern aspects of etiology and epidemiology of giardias //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 25-28.
6. Isomadinova L. K., Daminov F. A. Glomerulonefrit kasalligida sitokinlar ahamiyati //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 117-120.
7. Umarova T. A., Kudratova Z. E., Maxmudova H. Mechanisms of infection by echinococcosis //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 18-21.

8. Даминов Ф. А., Исомадинова Л. К., Рашидов А. Этиопатогенгетические и клинико-лабораторные особенности сальмонелиоза //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 61-67.
9. Umarova T. A., Kudratova Z. E., Baxromova M. Autoimmune diseases: new solutions in modern laboratory diagnostics //International Conference on Modern Science and Scientific Studies. – 2024. – С. 78-81.
10. Бердиярова Ш. Ш. и др. Узловой зоб и его клинико-лабораторная диагностика //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 38-45.
11. Umarova T. A., Kudratova Z. E., Muhsinovna R. M. The main purpose of laboratory diagnosis in rheumatic diseases //International Conference on Modern Science and Scientific Studies. – 2024. – С. 82-85.
12. Umarova T. A., Kudratova Z. E., Ruxshona X. Contemporary concepts of chronic pancryatitis //International Conference on Modern Science and Scientific Studies. – 2024. – С. 11-15.
13. Хамидов З. З., Амонова Г. У., Исаев Х. Ж. Некоторые аспекты патоморфологии неспецифических язвенных колитов //Молодежь и медицинская наука в XXI веке. – 2019. – С. 76-76.
14. Umarova T. A., Kudratova Z. E., Muminova G. Instrumental diagnostic studies in chronic pancreatitis //International Conference on Modern Science and Scientific Studies. – 2024. – С. 16-20.
15. Атамурадовна М.Л., Рустамовна Р.Г., Эркиновна К.З. Роль современных биомаркеров в изучении различных поражений головного мозга //Достижения науки и образования. – 2020. – №. 10 (64). – С. 88-90.
16. Рустамова Г. Р., Мухамадиева Л. А. Современные аспекты клинико-лабораторных методов исследования острой ревматической лихорадки //International scientific review. – 2020. – №. LXVI. – С. 106-110.
17. Кудратова З.Е. и др. Роль цитокиновой регуляции при обструктивном синдроме атипичного генеза у детей // Анналы Румынского общества клеточной биологии. – 2021. – Т. 25. – №. 1. – С. 6279-6291.
18. Erkinovna K. Z. et al. Bronchial obstruction syndrome in young children with respiratory infections of different etiology: features of clinical manifestations and immune response //Проблемы науки. – 2021. – №. 1 (60). – С. 60-62.

19. Кудратова З.Е. и др. Хламидийные инфекции (внутриклеточная инфекция) в развитии бронхита // TJE-Tematics journal of Education ISSN. – 2021. – С. 2249-9822.
20. Kudratova Z. E. et al. Principles of therapy of chlamydial and mycoplasma infections at the present stage //Вопросы науки и образования. – 2021. – №. 28 (153). – С. 23-26.
21. Rustamova G. R., Kudratova Z. E. CHRONIC ENDOMETRITIS OLD ISSUES NEW POSSIBILITIES //Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 12-14.
22. Erkinovna K. Z., Rustamovna R. G., Suratovna H. F. LABORATORY MARKERS OF PERINATAL HYPOXIC DAMAGE TO THE CENTRAL NERVOUS SYSTEM IN NEWBORNS //Наука, техника и образование. – 2020. – №. 10 (74). – С. 102-104.
23. Mukhamadieva L. A., Rustamova G. R., Kudratova Z. E. IMMEDIATE RESULTS OF COMPLEX TREATMENT OF CHILDREN WITH CHRONIC TONSILLITIS AND CHRONIC ADENOIDITIS ASSOCIATED WITH CMV AND EBV //Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 20-24.
24. Umarova T. A., Kudratova Z. E., Norxujayeva A. Etiopathogenesis and modern laboratory diagnosis of prostatitis //International Conference on Modern Science and Scientific Studies. – 2024. – С. 6-10.