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Modern Approaches To The Diagnosis, Treatment And Prevention Of Myocardial Infarction: World Research Overview

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Abstract: Myocardial infarction (MI) is one of the leading causes of death and disability worldwide. Current research highlights the importance of timely diagnosis, adequate treatment and prevention to reduce mortality and complications. The article provides an overview of the epidemiology, pathogenesis, clinical picture, diagnostic methods and modern approaches to the treatment and prevention of MI, based on international research data. Special attention is paid to the role of markers of cardiac injury, modern strategies for revascularization, drug therapy, and preventive measures. The review makes it possible to systematize existing knowledge and identify promising areas for further research and improvement of clinical practice.

Keywords: Myocardial infarction, ischemic heart disease, troponins, revascularization, risk factors, prevention.

1. Introduction: Myocardial infarction (MI) remains one of the leading causes of death and morbidity worldwide. According to the World Health Organization (WHO, 2025), coronary heart disease causes more than 9 million deaths annually. Despite significant progress in cardiology, acute coronary syndromes remain one of the most severe forms of cardiovascular disease [1, 9].

The purpose of this article is to review current world

data on the pathogenesis, diagnosis, treatment and prevention of myocardial infarction, systematize existing approaches and identify promising areas for further research.

Epidemiology. The prevalence of myocardial infarction varies by region, age, and gender. In developed countries, mortality tends to decrease due to improved prevention and treatment, while in low-and middle-income countries, mortality remains high (Virani et al., 2021). Men suffer more often, especially at the age of 45-65 years, but after 70 years, the risk for women is compared with men [13, 14].

Table 1.

MI prevalence by region (per 100,000 people)

Region	Men	Women	Source
USA	210	120	Benjamin et al., 2024
Europe	180	110	WHO, 2025
Asia	150	90	Virani et al., 2021
Russia	200	130	WHO, 2025

Recent trends show that acute MI accounts for 20-40% of all hospitalizations for cardiovascular diseases. In Europe and the United States, STEMI mortality is reduced due to the widespread use of percutaneous coronary interventions and modern antiplatelet agents [3, 5, 8, 12].

Pathogenesis of myocardial infarction. The main mechanism of MI development is coronary artery thrombosis against the background of rupture or erosion of atherosclerotic plaque [2, 4, 7].

Main mechanisms:

- Atherosclerotic vascular damage.
- Endothelial dysfunction and inflammation.
- Increased blood clot-forming activity.

Risk factors: hypertension, diabetes mellitus, obesity, smoking, dyslipidemia, genetic predisposition (Libby, 2013).

Clinical picture and classification. Typical MI symptoms include sudden severe pain behind the sternum, radiation to the left arm, neck, or jaw, shortness of breath, sweating, and nausea. Atypical forms are more common in women, the elderly, and diabetics (Reed et al., 2017).

Table 2.

Classification of myocardial infarction

Type of	MI Features	Treatment
STEMI treatment	ST segment elevation on ECG	Immediate PCI

NSTEMI	Without ST elevation	Drug therapy + PCI if necessary
Heart attack with complications	Shock, arrhythmias, myocardial rupture	Complex treatment, possible CABG

Diagnostics. Diagnosis of MI is based on a combination of the clinical picture, ECG and biochemical markers [10, 11].

Instrumental methods:

- ECG - detection of STEMI.
- Echocardiography - assessment of myocardial function.
- Coronary CT — condition of the arteries.

Biochemical markers:

- Troponins I and T are the main markers of myocardial damage.
- Creatine Kinase-MB is an additional marker.
- New markers: Copeptin, H-FABP (Fox et al., 2009).

Treatment. Treatment for MI includes medication, revascularization, and rehabilitation.

Medications: antiplatelet agents, anticoagulants, beta blockers, statins.

Revascularization:

- PCI is the standard for STEMI.
- CABG — for multiple vascular lesions.

Rehabilitation: physical activity, risk factor management, post-infarction treatment (Ibanez et al., 2020).

Prevention:

Primary prevention: control of blood pressure, lipids, sugar; smoking cessation; active lifestyle.

Secondary prevention: Antiplatelet agents, statins, regular monitoring, symptom education (Khera et al., 2022).

Prospects and innovations

- New biomarkers and methods of early diagnosis.
- Telemedicine and digital technologies.
- Genetic research and personalized medicine (Krittanawong et al., 2020).

2. Conclusion

Myocardial infarction remains a global health problem. Early detection, modern therapy, and comprehensive prevention can reduce mortality and complications. Future research should develop personalized approaches, new diagnostic technologies, and effective prevention strategies.

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