PRINCIPLES OF MODERN STUDY OF ISCHEMIC HEART DISEASE

NEW RENAISSANCE international scientific journal

ResearchBib IF - 11.01, ISSN: 3030-3753, Volume 2 Issue 3

Haydarov Navro'zbek Furqat o'g'li

Asian International University, Bukhara, Uzbekistan

https://doi.org/10.5281/zenodo.15023250

Abstract. Ischemic Heart Disease (IHD), also known as Coronary Artery Disease (CAD), is a leading cause of morbidity and mortality worldwide. It occurs due to atherosclerosis, a condition characterized by the buildup of plaque within the coronary arteries, leading to reduced blood flow to the myocardium. The clinical manifestations of IHD range from asymptomatic cases to angina pectoris, myocardial infarction, heart failure, and sudden cardiac death. Risk factors include hypertension, diabetes, dyslipidemia, smoking, obesity, and a sedentary lifestyle.

Diagnosis is based on clinical evaluation, electrocardiography (ECG), cardiac biomarkers, echocardiography, stress testing, and coronary angiography. Treatment strategies include lifestyle modifications, pharmacological therapy (antiplatelet agents, beta-blockers, statins, nitrates), and invasive interventions such as percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG). Preventive measures play a crucial role in reducing the incidence and severity of IHD, emphasizing the importance of early detection and risk factor management. Continued research is essential for improving therapeutic approaches and patient outcomes.

Key words: Coronary Artery Disease, Atherosclerosis Myocardial Infarction (MI) Angina Pectoris, Ischemia Plaque, Thrombosis, Stenosis.

ПРИНЦИПЫ СОВРЕМЕННОГО ИЗУЧЕНИЯ ИШЕМИЧЕСКОЙ БОЛЕЗНИ СЕРДЦА

Аннотация. Ишемическая болезнь сердца (ИБС), также известная как ишемическая болезнь сердца (ИБС), является основной причиной заболеваемости и смертности во всем мире. Она возникает из-за атеросклероза, состояния, характеризующегося накоплением бляшек в коронарных артериях, что приводит к снижению притока крови к миокарду.

Клинические проявления ИБС варьируются от бессимптомных случаев до стенокардии, инфаркта миокарда, сердечной недостаточности и внезапной сердечной смерти. Факторы риска включают гипертонию, диабет, дислипидемию, курение, ожирение и малоподвижный образ жизни. Диагноз ставится на основании клинической оценки, электрокардиографии (ЭКГ), сердечных биомаркеров, эхокардиографии, стресстестирования и коронарной ангиографии.

Стратегии лечения включают изменение образа жизни, фармакологическую терапию (антиагрегантные препараты, бета-блокаторы, статины, нитраты) и инвазивные вмешательства, такие как чрескожное коронарное вмешательство (ЧКВ) или аортокоронарное шунтирование (АКШ). Профилактические меры играют решающую роль в снижении заболеваемости и тяжести ИБС, подчеркивая важность раннего выявления и управления факторами риска. Продолжение исследований имеет важное значение для улучшения терапевтических подходов и результатов лечения пациентов.

Ключевые слова: ишемическая болезнь сердца, атеросклероз, инфаркт миокарда (ИМ), стенокардия, ишемическая бляшка, тромбоз, стеноз.

Pathogenesis

Atherosclerosis is a multifactorial, immunoinflammatory disease of the arteries driven by lipids. Risk factors, such as smoking, hypertension, diabetes mellitus, male gender and inflammation accelerate the process where lipids enter the intima and atherosclerotic plaque develop in the coronary arteries. Reduced blood flow in the coronary arteries due to atherosclerotic luminal narrowing and endothelial dysfunction creates an imbalance between oxygen demand and supply in the myocardium causing ischemia. In the event of plaque rupture acute coronary thrombosis may occur and cause partial or complete occlusion of the artery and abrupt hypoperfusion and myocardial infarction.

Nonatherosclerotic causes of myocardial ischemia include primary or induced coronary artery vasospam, impaired microcirculation or arteriolar dysregulation, coronary emboli, decreased coronary perfusion due to hypotension, decreased blood oxygen content, significant increased myocardial oxy- gen demand (eg, severe aortic stenosis, tachyarrhythmia).

Symptoms

Chronic Coronary Syndrome

In the 2019 ESC Guidelines on CCS,¹ six clinical scenarios are most frequently encountered among patients with suspected CAD: (i) 'stable' angina symptoms, and/or dyspnea; (ii) patients with new onset of heart failure or left ventricular (LV) dysfunction; (iii) asymptomatic and symptomatic patients with stabilized symptoms <1 year after an ACS event or patients with recent revascularization; (iv) asymptomatic and symptomatic patients >1 year after initial diagnosis or revascularization; (v) patients with angina and suspected vasospastic or microvascular disease; (vi) asymptomatic subjects in whom CAD is detected at screening. The likelihood of CAD increases with typical presentation although presentation is not a specific determinant. NEW RENAISSANCE international scientific journal ResearchBib IF - 11.01, ISSN: 3030-3753, Volume 2 Issue 3 Many patients suspected for CCS present atypical or nonanginal symptom characteristics. Patients with obstructive CCS may even be asymptomatic, in particular among

patients with diabetes mellitus, or solely manifest as heart failure. Severity of angina is clinically graded by the Canadian Cardiovascular Society classification (CCS-class), where the angina threshold is quantified according to the relation to physical activity.

Intensity.

Acute Coronary Syndrome

ACS covers acute myocardial infarction and unstable angina pectoris. Acute myocardial infarction is defined as myocardial injury and necrosis due to myocardial ischemia with a subsequent elevation in cardiac troponin, while unstable angina pectoris represents the unstable clinical manifestation of CAD with longer lasting angina pectoris at rest without evidence of necrosis and therefore no elevation of cardiac troponin. Symptoms of ACS are acute onset of angina pectoris that is prolonged ongoing for >20 minutes. Like CCS accompanying symptoms of nausea, fatigue, and dyspnea may occur. Unstable angina pectoris can also present as crescendo angina, that is, worsening of angina in intensity, severity, and activity threshold for onset.

Diagnosis

Diagnosis of CCS

The general approach for initial diagnostic management of patients suspected of CCS is based on selecting the most suit- able noninvasive functional or noninvasive anatomical test from the given patient's characteristics in order to qualify the risk of obstructive CAD and indication for revascularization. Only if the risk of obstructive CAD is very high or obstructive CAD is not ruledout by clinical assessment or by noninvasive testing invasive coronary angiography is recommended. The initial diagnostic work-up can be summarized in 5 steps: Assessment of the symptoms and excluding ACS; Clinical cardiac examination including resting electrocar- diogram (ECG) and echocardiography; (3) Evaluation of coexisting cardiac and medical conditions that may influence the symptoms, the choice of further testing, or potential treatment; and from this; Evaluate probability and clinical likelihood of CCS; and finally from this; Decide whether further testing is needed and, if so, decide between noninvasive anatomical test coronary computed tomography angiography (CTA) or noninvasive functional tests including stress ECG, stress echocardiography, single-photon emission computed tomography (SPECT) or positron emission tomography (PET) perfusion imaging, stress cardiac magnetic resonance (CMR) perfusion imaging, or coronary computed tomography angiography derived fractional flow reserve (FFR-CT) for further cardiac imaging and testing.

Diagnosis of ACS

Acute myocardial infarction is diagnosed by the presence of elevation of cardiac troponin values, and at least one of the following: symptoms compatible with angina, new ischemic ECG changes, development of pathological Q-wave in ECG, imaging evidence of new loss or reduced function of viable myocardium, or identification of coronary thrombus by ICA. Unstable angina pectoris is diagnosed as the same clinical presentation as ACS but with no troponin elevation.

Noninvasive and Invasive Tests for CAD

Coronary Computed Tomography Angiography (CTA)

Coronary CTA is recommended in suitable patients with low to intermediate clinical likelihood of CCS. To obtain optimal and sufficient image quality a minimum of a 64- slice scanner and optimal scanning protocol including ECG- triggering and ECG gated 3D reconstruction are required. Furthermore, patient characteristics should be taken into account. Preferable patients should have adequate breath holding abilities, sinus rhythm <60 bpm, BMI <30 kg/m², and absence of severe calcification. High calcium score compromises the image quality with a significant reduction in specificity in terms of stenosis evaluation. While regular coronary CTA does not allow stenosis evaluation in such patients, FFR- CT may provide high diagnostic performance and identification of hemodynamically significant stenosis over a wide range of coronary calcification scores. Meta-analysis evaluating the diagnostic accuracy of coronary CTA for >50% coronary stenosis, when compared to invasive angiography demonstrated 96.4% pooled sensitivity and 80.5% pooled specificity. In head-to-head comparison of [¹⁵O]H₂O PET and technetium 99m/tetrofosmin-labeled SPECT with invasive coronary angiography and FFR < 0.80 defined as significant obstructive CAD, coronary CTA had better sensitivity, 90% (95%CI, 83%-94%) but lower specificity 63% (95%CI, 52%-68%) than PET and SPECT. Prospective registry studies have shown that exclusion of obstructive CAD by coronary CTA is associated with a favor- able prognosis similar to exclusion by functional testing. Also randomized trials with up to 5 years follow-up and a meta-analysis have demonstrated that exclusion of CAD by coronary CTA is safe with similar or superior cardiac outcome compared to initial noninvasive functional testing.

Consequently, coronary CTA is now a class IB recommendation in the 2019 ESC guidelines. The favorable long-term outcome may be caused by identification of nonobstructive CAD and a resultant initiation of preventive therapies that is not achievable by noninvasive functional testing modalities. While coronary CTA seems to be associated with increased overall catheterizations, it is associated with reduced catheterizations showing no functional obstructive CAD compared to functional tests, increased revascularization and reduced myocardial infarction.

The use of computational fluid dynamics and image based modeling allow estimation of coronary flow and calculation of FFR from derived coronary CTA images, increasing the sensitivity and specificity of evaluation of obstructive CAD.

When compared with invasive FFR measurement with a cut off of ≤ 0.80 the accuracy is about 87%. FFR-CT >80% and no need for further diagnostic testing are associated with a favorable prognosis. In patients with multivessel disease FFR-CT can distinguish functionally significant from nonsignificant lesions with similar results as obtained by invasive measurements.

Cardiac Magnetic Resonance (CMR)

CMR with gadolinium contrast yields information about cardiac function and anatomy, including prior myocardial infarction and fibrosis, and myocardial perfusion. Performing imaging under rest and stress with adenosine or dobutamine, semiquantitative assessment of regional reversible and irreversible ischemia can be obtained. CMR has the advantage that patients are not exposed to ionizing radiation or x-ray. Evaluation of patients with known CAD is obtainable. In a meta-analysis of diagnostic studies with FFR ≤ 0.80 defining significant CAD pooled sensitivity and specificity was 88% (95%CI, 85%-92%), and 89% (95%CI, 83%-91%) respectively. A normal stress CMR is associated with a low risk of cardiac events (<1% per year) and a favorable prognosis. CMR is unable to identify hibernation per se but by CMR with gadolinium contrast the ischemic pattern of myocardial infarction can be determined. There is a continuous and inverse correlation between the extent of infarct transmurality and the probability of recovery of contractile function following revascularization. In clinical practice a threshold of<50% infarct transmurality is used to define viability. Disadvantages CMR include lower equipment and expertise availability worldwide. Potential toxicity of gadolinium-based contrast is a concern though limited clinical data exists.

Exercise Electrocardiogram

The diagnostic endpoint of an exercise ECG test is ischemic ECG changes defined as ≥ 1 mm horizontal or down-sloping ST-segment depression at peak exercise. Resting ECG abnormalities preclude accurate interpretation and exercise ECG tests are not recommended in such patients. They include abnormalities affecting the ST segment, such as LV hypertrophy, LBBB, ventricular-paced rhythm, or any resting ST-segment depression ≥ 0.1 mV. Pooled sensitivity and specificity when compared to invasive anatomically significant CAD exercise ECG only performs 56% (95% CI, 46%-69%) and 62% (95% CI, 54%-69%), much lower than functional and anatomic testes, and the test has the least favorable ruling- out profile of the noninvasive tests and is rarely recommended.

ResearchBib IF - 11.01, ISSN: 3030-3753, Volume 2 Issue 3 Addition of coronary CTA in CCS diagnosing com- pared to exercise ECG alone not only qualifies the diagnosis but also significantly reduced death from CAD and nonfatal myocardial

EW RENAISSANCE international scientific journal

Invasive Coronary Angiography (ICA)

infarction.

Invasive coronary angiography provides anatomical evaluation of the coronary artery anatomy, including presence and severity of atherosclerosis by determining lesion location, luminal obstruction, lesion length, and the presence of collateral flow. Historically, an angiographic stenosis of >70% (>50% for left main) was considered significant, but angiographic evaluation of stenosis severity is not objective and severity can be difficult to evaluate such that a suspected significant may not be physiologically significant. The functional severity of a stenosis can be evaluated by invasively determination of myocardial FFR. FFR is defined as the maximal blood flow through a coronary artery, divided by the theoretical normal maximal flow through the same artery and is derived from the mean distal coronary artery pressure to the aortic pressure during maximal vasodilatation. An alternative modality is instantaneous wave-free ratio (iFR), which is a resting distal-to-proximal pressure ratio over a coronary stenosis. It is measured during a period in diastole when intracoronary resistance is constant. FFR <0.75-0.80 and iFR ≤ 0.89 are associated with reversible ischemia in noninvasive functional tests. In particular, angiographical stenoses of 55%-90% are subject to reclassification by invasive functional testing by FFR or iFR.

Evaluation of stenosis severity in angiographically intermediate lesions can also be obtained by intravascular imaging by intravascular ultrasound imaging (IVUS) or optical coherence tomography (OCT). IVUS is an ultrasound-based modality of intravascular imaging while OCT is a light-based modality with a higher resolution compared with IVUS but that requires complete blood clearance of the vessel. Intravascular imaging can assess vessel size, lumen area, plaque composition and volume, stent malapposition, residual thrombus, and dissections. It can as such be useful in evaluating stenosis severity, especially left main intermediate stenosis, lesion morphology, provide valuable intravascular information to guide in PCI, and evaluate pathology in stent failure.

Treatment

Overall treatment for ischemic heart disease consists of antithrombotic medication, antianginal medication, cardio- vascular risk factors modification, and revascularization when indicated.

Antithrombotic Therapy

Antiplatelet therapy reduces the risk of serious vascular events as myocardial infarction, stroke, and vascular death in moderate to high-risk patient at an increased risk of bleeding.

In patients with previous myocardial infarction or revascularization the beneficial effect of low dose aspirin 75- 100 mg daily substantially exceeds the bleeding risks and is a Class I, Level A recommendation. The evidence for primary prevention is not similarly well founded. In patients with evidence of CAD on imaging without previous myocardial infarction or PCI and in patients with moderate risk of CAD, aspirin is recommended preventively. In patients intolerant to aspirin, clopidogrel can be used instead. In patients with previous stroke or peripheral artery disease clopidogrel is preferred. In patients with CCS treated with PCI, dual antiplatelet therapy (DAPT) with clopidogrel 75 mg daily on top of aspirin is recommended. Duration of DAPT has been reduced over the last 10 years as randomized clinical trials and meta-analyses have demonstrated no overall additional beneficial effect of 12 months vs 6 months DAPT post-PCI.

In patients with high bleeding risk shorter DAPT duration must be considered. Post-PCI antiplatelet therapy in ACS patients DAPT is recommended for 12 months. Ticagrelor or prasugrel is first choice as they are superior to clopidogrel in these patients. Long-term (<1 year) DAPT or combination of aspirin and low-dose rivaroxaban may reduce cardiovascular events in high-risk patients but with an increased risk of bleeding.

These combinations may therefore be considered in high-risk patients with low bleeding risk, but are not recommended as standard treatment.

Patients with indication for oral anticoagulants, for example due to atrial fibrillation or mechanical heart valve, have increased bleeding risk after addition of antiplatelet therapy after PCI. As the effect of combing anticoagulants to ticagrelor or prasugrel has not been studied, this combination should be avoided and clopidogrel is recommended. The individual patient bleeding and cardiovascular risk should be taken into careful consideration when deciding the duration of double and triple therapy. In the ISAR-TRIPLE trial there was difference in the primary endpoint in patients treated with 6-week vs 6-month triple therapy, and no difference in TIMI major bleeding.

Antianginal Therapy

Short-acting nitroglycerin sublingual is the cornerstone of acute symptom relief from angina. Antianginal medications that reduce and prevent angina symptoms include beta-blockers, calcium channel blockers, and long-acting nitrates.

In symptomatic patients with reduced ejection fraction beta- blockers are indicated as they reduce mortality and morbidity. Beta-blockers and calcium channel blockers effectively reduce symptoms but have not been shown to improve patient outcome in CCS patients without heart failure or prior myocardial infarction. According to European and American guidelines beta-blockers and calcium channel blockers in monotherapy or in combination is first line in treating angina,

even though no randomized trial has investigated these medications against other antianginal medications, but only against each other. Current guidelines recommend addition of other antianginal drugs to beta-blockers and/or calcium channel blockers when residual angina is present. These include long-lasting nitrates, ivabradine, nicorandil, ranolazine, or tri- metazidine.

No trial has shown effect on mortality or morbidity, but these compounds may provide symptom relief. Ranolazine, long-lasting nitrates, and trimetazidine not only yield symptom relief but also improve exercise duration and time to angina during exercise test. Ivabradine has a similar effect but failed to demonstrate reduction in angina attacks.

The recommended medical treatment for microvascular angina are beta-blockers, calcium channel blockers and long- lasting nitrates and for vasospastic angina calcium channel blockers and long-lasting nitrates.

Revascularization

Revascularization in CCS

While optimal medical therapy is crucial for reducing symptoms, counteracting progression of atherosclerosis, and preventing atherothrombotic events, myocardial revascularization has a central role in the management of CCS as an adjunct to medical therapy. The two objectives of revascularization are symptom relief in patients with angina and/or improvement of prognosis.

Revascularization by PCI or coronary artery bypass grafting (CABG) may effectively relieve angina, eliminate myocardial ischemia and its adverse clinical manifestations, and reduce the risk of major acute cardiovascular events including myocardial infarction and cardiovascular death.

Therefore, revascularization should be considered in the presence of symptoms and objective evidence of ischemia by functional testing or diameter stenosis >90%, FFR \leq 0.80 or iFR \leq 0.89 in major vessel and LVEF \leq 35% due to CAD. Even in asymptomatic patients, revascularization may be considered if the same criteria are fulfilled and also when functional testing reveals large areas of reversible ischemia, that is, \geq 10% of the left ventricle. The choice of revascularization modality depends on anatomical coronary pathophysiology. Accordingly, the 2019 ESC guidelines recommend FFR- or iFR-guided revascularization as a Class I recommendation in CCS patients, unless a >90% diameter stenosis is evident, in which case revascularization can be performed upfront. iFR is closely related to FFR, and iFR-guided PCI (iFR \leq 0.89) is noninferior to FFR-guided PCI (FFR \leq 0.80) with respect to the risk of major adverse cardiac events.

FFR and iFR ratios are continuous variables and the exact cut-point for revascularization is not firmly settled. It is discussed whether the optimal cut-off is FFR ≤ 0.75 or FFR ≤ 0.80 . In randomized clinical trials and metaanalysis PCI in patients with FFR ≤ 0.80 reduced primary endpoints, mainly driven by reduced need for urgent revascularization but not reduced mortality.

Optimal medical treatment alone in patients with FFR > 0.80 is associated with favorable prognosis with very low event rate. Other observational studies and a randomized trials have demonstrated that deferral of PCI in patients with FFR ≥ 0.75 is also safe, though not unambiguous. Furthermore it should be taken into account that around the cut-off values FFR ≤ 0.80 or iFR ≤ 0.89 the FFR and iFR measurements are less precise.

Outside the range of FFR = 0.75-0.85 the measurement certainty of a FFR result is >95%, while close to this cutoff the certainty is less than 80%. Close to the cut-off FFR and iFR can complement each other, but the decision about treatment strategy should always be combined with a thorough clinical evaluation.

In patients with multivessel disease or left main CAD revascularization by CABG rather than PCI should be considered. PCI still seems to be inferior to CABG in patients with multivessel disease or left main CAD, although some studies have indicated that PCI is noninferior to CABG in terms of mortality and stroke. PCI is associated with increased need for revascularization. The outcome is dependent on the complexity of the coronary lesions esti- mated by SYNTAX score.

In patients with low anatomical complexity (SYNTAX score ≤ 22) subsequent primary end- point major adverse cardiac and cerebrovascular events (MACCE), composite endpoint defined as all-cause mortality, stroke, myocardial infarction, and repeat revascularization), and secondary endpoint death, myocardial infarction or repeated revascularization were not significantly different in PCI and CABG treated patients. In patients with intermediate SYNTAX score (SYNTAX 23-32) event rates in terms of myocardial infarction and repeated revascularization were increased in the PCI group, whereas death and stroke were not. High SYNTAX score \geq 33 was associated with a significant increase in MACCE, cardiac death, and myocardial infarction following PCI compared to CABG. As a consequence, revascularization of patients with multivessel disease or left main CAD and a low syntax score ≤ 22 can be done either by PCI or CABG depending on other clinical conditions of the patient. In patients with intermediate-to- high SYNTAX complexity CABG should be chosen. Patients with reduced EF < 35 due to obstructive CAD gain a prognostic effect of revascularization. Viability of myocardium can be assessed by FDG-PET, CMR and stress echocardiography. While some studies have failed to demonstrate a correlation between myocardial viability and benefit from revascularization, selection of patients that gain most benefit from revascularization in terms of improvement of left ventricular function depends on evaluation of the extend of viability of dysfunctional myocardium. Evaluation often requires investigation by a combination of PET, CMR, and stress echocardiography to determine the extent of dysunction, the degree of transmural affection, and the potential for regaining function in reversibly affected areas.

Conclusion

Noninvasive anatomic imaging with coronary CCA or noninvasive functional test with myocardial PET, SPECT, or CMR is recommended as the initial test to diagnose CAD in symptomatic patients where obstructive disease cannot be excluded by clinical assessment alone.

Coronary CCA is first line in suitable patients, while noninvasive nuclear or magnetic resonance technology can be used to further qualification of the diagnosis when coronary CCA is inconclusive, or in patients not suitable for coronary CCA.

Optimal medical treatment remains paramount, while FFR-guided myocardial revascularization in patients that are not responsive to antianginal treatment provides further symptom relieve as well has prognostic impact on prevention of spontaneous myocardial infarction.

REFERENCES

- Saodat, A., Vohid, A., Ravshan, N., & Shamshod, A. (2020). MRI study in patients with idiopathic cokearthrosis of the hip joint. *International Journal of Psychosocial Rehabilitation*, 24(2), 410-415.
- 2. Axmedov, S. J. (2023). EFFECTS OF THE DRUG MILDRONATE. Innovative Development in Educational Activities, 2(20), 40-59.
- Jamshidovich, A. S. (2023). ASCORBIC ACID: ITS ROLE IN IMMUNE SYSTEM, CHRONIC INFLAMMATION DISEASES AND ON THE ANTIOXIDANT EFFECTS. EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE, 3(11), 57-60.
- 4. Jamshidovich, A. S. (2023). THE ROLE OF THIOTRIAZOLINE IN THE ORGANISM. *Ta'lim innovatsiyasi va integratsiyasi*, 9(5), 152-155.
- 5. Jamshidovich, A. S. (2023). HEPTRAL IS USED IN LIVER DISEASES. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *35*(3), 76-78.
- Jamshidovich, A. S. (2023). EFFECT OF TIVORTIN ON CARDIOMYOCYTE CELLS AND ITS ROLE IN MYOCARDIAL INFARCTION. Gospodarka i Innowacje., 42, 255-257.
- Jamshidovich, A. S. (2024). NEUROPROTECTIVE EFFECT OF CITICOLINE. EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE, 4(1), 1-4.
- 8. Jamshidovich, A. S. (2024). THE ROLE OF TRIMETAZIDINE IN ISCHEMIC CARDIOMYOPATHY. *Journal of new century innovations*, 44(2), 3-8.



9. Jamshidovich, A. S. (2024). ВСЕ ЭФФЕКТЫ ПРЕПАРАТА ИМУДОН. *TADQIQOTLAR*, *31*(2), 39-43.

NEW RENAISSANCE international scientific journal

ResearchBib IF - 11.01, ISSN: 3030-3753, Volume 2 Issue 3

- 10. Jamshidovich, A. S. (2024). SPECIFIC FEATURES OF THE EFFECT OF THE HEPARIN DRUG. *TADQIQOTLAR*, *31*(2), 34-38.
- Jamshidovich, A. S. (2024). USE OF GLUCOCORTICOSTEROIDS IN PEDIATRIC PRACTICE. *TADQIQOTLAR*, 31(2), 29-33.
- 12. Jamshidovich, A. S. (2024). РОЛЬ ИНТЕЛЛАНОВОГО СИРОПА И ЦИАНОКОБАЛАМИНА В УЛУЧШЕНИИ ПАМЯТИ. *TADQIQOTLAR*, *31*(2), 44-48.
- 13. Jamshidovich, A. S. (2024). TREATMENT OF POLYNEUROPATHY WITH BERLITHION. *Ta'limning zamonaviy transformatsiyasi*, 4(1), 201-209.
- 14. Jamshidovich, A. S. (2024). USE OF ASCORIL IN BRONCHIAL ASTHMA. *Ta'limning zamonaviy transformatsiyasi*, 4(1), 191-200.
- 15. Jamshidovich, A. S. (2024). THE IMPORTANCE OF THE DRUG ARTOXAN. *Ta'limning zamonaviy transformatsiyasi*, 4(1), 182-190.
- Jamshidovich, A. S. (2024). THE ROLE OF RENGALIN IN CHRONIC BRONCHITIS. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 38(4), 116-123.
- Jamshidovich, A. S. (2024). THE ROLE OF ALMAGEL DRUG IN GASTRIC AND DUODENAL WOUND DISEASE. *Ta'limning zamonaviy transformatsiyasi*, 4(1), 173-181.
- Jamshidovich, A. S. (2024). THE ROLE OF CODELAK BRONCHO SYRUP IN CHILDREN'S PRACTICE. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(4), 109-115.
- 19. Jamshidovich, A. S. (2024). THE AEVIT DRUG EFFECT. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(4), 124-132.
- 20. Jamshidovich, A. S. (2024). THE IMPORTANCE OF ALCHEBA DRUG IN POST-STROKE APHASIA. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(4), 132-138.
- 21. Jamshidovich, A. S. (2024). THE ROLE OF HYALURON CHONDRO DRUG IN OSTEOARTHROSIS. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(4), 139-145.
- 22. Jamshidovich, A. S. (2024). EFFECT OF SIMETHICONE DROP IN FLATULENCE. Лучшие интеллектуальные исследования, 14(1), 95-101.
- 23. Jamshidovich, A. S. (2024). BENEFITS OF BETADINE SOLUTION. Лучшие интеллектуальные исследования, 14(1), 116-122.



NEW RENAISSANCE international scientific journal

- 25. Jamshidovich, A. S. (2024). USE OF VIGANTOL IN RICKETS. Лучшие интеллектуальные исследования, 14(1), 102-108.
- 26. Jamshidovich, A. S. (2024). THE VITAPROST DRUG RESULTS. Лучшие интеллектуальные исследования, 14(1), 109-115.
- 27. Jamshidovich, A. S. (2024). THE ROLE OF BISEPTOL DRUG IN URINARY TRACT DISEASE. Лучшие интеллектуальные исследования, 14(1), 89-94.
- Jamshidovich, A. S. (2024). PROPERTIES OF THE DRUG DORMIKIND. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(5), 88-92.
- 29. Jamshidovich, A. S., & Komilovich, E. B. (2024). IMMUNOMODULATORY FUNCTION OF DIBAZOL DRUG. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ* ИДЕИ В МИРЕ, 38(5), 83-87.
- Jamshidovich, A. S., & Komilovich, E. B. (2024). ADVANTAGES OF THE DRUG HEPTRAL. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(5), 98-101.
- Эргашов, Б. К., & Ахмедов, Ш. Ж. (2024). ГИПЕРТОНИЧЕСКАЯ БОЛЕЗНЬ ЭТИОЛОГИЯ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(6), 59-69.
- Komilovich, E. B., & Jamshidovich, A. S. (2024). HYPERTENSION, CLASSIFICATION AND PATHOGENESIS. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 38(6), 50-58.
- 33. Komilovich, E. B., & Jamshidovich, A. S. (2024). YURAK ISHEMIYASI. STENOKARDIYADA SHOSHILINCH TIBBIY YORDAM. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(6), 12-20.
- 34. Komilovich, E. B., & Jamshidovich, A. S. (2024). HYPERTENSION
 ETIOLOGY. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(6), 32-41.
- 35. Komilovich, E. B., & Jamshidovich, A. S. (2024). CARDIAC ISCHEMIA. ANGINA NURSING DIAGNOSIS AND CARE. *Journal of new century innovations*, *46*(1), 44-52.
- 36. Jamshidovich, A. S. (2024). IMPORTANT INDICATIONS OF THE DRUG WOBENZYM. Journal of new century innovations, 46(1), 29-32.

NEW RENAISSANCE international scientific journal

- 38. Jamshidovich, A. S. (2024). VIFERON USE IN CHILDREN. Journal of new century innovations, 46(1), 24-28.
- 39. Jamshidovich, A. S. (2024). USE OF DUSPATALIN (MEBEVERINE HYDROCHLORIDE) IN GASTROINTESTINAL DISEASES. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(5), 93-97.
- 40. Jamshidovich, A. S. (2024). ЭФФЕКТЫ СИРОПА ДЕПАКИНА (ВАЛЬПРОЕВАЯ КИСЛОТА). *Ta'lim innovatsiyasi va integratsiyasi*, *14*(2), 148-152.
- Jamshidovich, A. S., & Komilovich, E. B. (2024). THE IMPORTANCE OF THE DRUG ALLOCHOL FOR CHRONIC CHOLECYSTITIS. *Ta'lim innovatsiyasi va integratsiyasi*, 14(2), 133-137.
- 42. Jamshidovich, A. S., & Komilovich, E. B. (2024). ВАЖНЫЕ СВОЙСТВА ПРЕПАРАТА ДЕ-НОЛ (субцитрат висмута). *Ta'lim innovatsiyasi va integratsiyasi*, *14*(2), 143-147.
- 43. Jamshidovich, A. S., & Komilovich, E. B. (2024). SPECIAL FEATURES OF BUDECTON DRUG. *Ta'lim innovatsiyasi va integratsiyasi*, 14(2), 138-142.
- 44. Jamshidovich, A. S. (2024). ЭФФЕКТИВНОЕ ВОЗДЕЙСТВИЕ ПРЕПАРАТА КЕЙВЕР. Ta'lim innovatsiyasi va integratsiyasi, 15(3), 137-143.
- 45. Jamshidovich, A. S. (2024). USEFUL PROPERTIES OF THE DRUG YODOFOL. *Ta'lim innovatsiyasi va integratsiyasi*, 15(3), 144-149.
- 46. Jamshidovich, A. S. (2024). FITOTERAPIYANING AKUSHER-GINEKOLOGIYADA АНАМІҮАТІ. Лучшие интеллектуальные исследования, 15(2), 121-125.
- 47. Jamshidovich, A. S. (2024). THE IMPORTANCE OF THE DRUG DOPROKIN. Лучшие интеллектуальные исследования, 15(2), 109-114.
- 48. Jamshidovich, A. S. (2024). THE EFFECT OF DOSTINEX ON THE BODY. Лучшие интеллектуальные исследования, 15(2), 115-120.
- 49. Jamshidovich, A. S. (2024). РЕЗУЛЬТАТЫ ЭФФЕКТИВНОГО ДЕЙСТВИЯ ПРЕПАРАТА КАНЕФРОН. Лучшие интеллектуальные исследования, 15(2), 138-143.
- 50. Jamshidovich, A. S. (2024). СОВРЕМЕННЫЕ ЭФФЕКТЫ ПРЕПАРАТА ИНДОЛ. Лучшие интеллектуальные исследования, 15(2), 126-131.
- 51. Jamshidovich, A. S. (2024). EFFECT OF ISMIZHEN DRUG ON BODY IMMUNITY. Лучшие интеллектуальные исследования, 15(2), 132-137.
- 52. Jamshidovich, A. S. (2024). POSITIVE EFFECTS OF THE DRUG CARCIL. *Ta'lim innovatsiyasi va integratsiyasi*, 15(3), 127-131.

53. Jamshidovich, A. S. (2024). РЕЗУЛЬТАТЫ ЭФФЕКТИВНОГО ДЕЙСТВИЯ КАВИНТОНА. *Ta'lim innovatsiyasi va integratsiyasi*, 15(3), 132-136.

NEW RENAISSANCE international scientific journal

- 54. Jamshidovich, A. S. (2024). Современный Эффект Спрея Мометазон. *Research Journal of Trauma and Disability Studies*, 3(3), 62-65.
- 55. Jamshidovich, A. S. (2024). THE ROLE OF" SIMONTE PLUS" DRUG IN THE MODERN TREATMENT OF BRONCHIAL ASTHMA. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(5), 66-70.
- Jamshidovich, A. S. (2024). FEATURES OF THE BIOMECHANISM OF THE DRUG LEVOMYCETIN (CHLORAMPHENICOL). EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE, 4(9), 298-301.
- 57. Jamshidovich, A. S. (2024). THE MOST IMPORTANT INDICATORS OF OMEGA 3 SUBSTANCE IN THE METABOLISM OF THE HUMAN BODY. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(10), 113-117.
- Komilovich, E. B., & Khalimovich, M. N. (2024). CARDIAC ISCHEMIA. ANGINA CLINICAL FORMS AND DIAGNOSIS. *Journal of new century innovations*, 46(1), 70-78.
- 59. Komilovich, E. B. (2024). CORONARY HEART DISEASE. ANGINA EMERGENCY CARE. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(7), 235-242.
- 60. Komilovich, E. B. (2024). YURAK ISHEMIK KASALLIGI. STENOKARDIYANI DAVOLASHNING ZAMONAVIY TAMOYILLARI. *ОБРАЗОВАНИЕ НАУКА И* ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(6), 3-11.
- 61. Jamshidovich, A. S. (2024). THE MOST IMPORTANT BENEFITS OF GINGER FOR THE HUMAN BODY'S IMMUNITY. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(11), 269-273.
- 62. Axmedov, S. (2024). THE SPECIFIC EFFECT OF THE DRUG" BAKLASAN" IN CEREBROVASCULAR DISEASES AND ITS PRACTICAL SIGNIFICANCE TODAY. *Modern Science and Research*, *3*(12), 485-492.
- 63. Komilovich, E. B. Z. (2023). Coronary Artery Disease. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, *3*(12), 81-87.
- 64. Komilovich, E. B. (2024). CORONARY HEART DISEASE. ANGINA TREATMENT. Journal of new century innovations, 46(1), 95-104.
- 65. Komilovich, E. B. (2024). HYPERTENSION TREATMENT. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(7), 227-234.

66. Эргашов, Б. К. (2024). ИШЕМИЧЕСКАЯ БОЛЕЗНЬ СЕРДЦА. СТЕНОКАРДИЯ ПРОФИЛАКТИКА. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *38*(6), 21-31.

NEW RENAISSANCE international scientific journal

- 67. Axmedov, S. (2025). ВАЖНЫЕ СВОЙСТВА ПРЕПАРАТА ЭСКУЗАН ПРИ СОСУДИСТЫХ ЗАБОЛЕВАНИЯХ. *Modern Science and Research*, 4(1), 380-387.
- 68. Эргашов, Б. К. (2024). ГИПЕРТОНИЧЕСКАЯ БОЛЕЗНЬ ДИАГНОСТИКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(6), 70-78.
- 69. Komilovich, E. B. (2024). HYPERTENSION DIAGNOSTICS. *ОБРАЗОВАНИЕ НАУКА* И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 38(6), 42-49.
- 70. Xusenovich, M. S., & Turapjanovna, Z. M. (2024). SEMIZLIKNING TURLI FENOTIPLARDA KARDIOMETABOLIK XAVF OMILLARINI TAQQOSLASH. SO 'NGI ILMIY TADQIQOTLAR NAZARIYASI, 7(4), 112-116.
- 71. Husenovich, M. S., & Turabdjanovna, Z. M. (2024). STUDY OF DIURNAL PROFILE OF ARTERIAL HYPERTENSION IN DIFFERENT PHENOTYPE OBESITY. образование наука и инновационные идеи в мире, 43(1), 129-131.
- Xusenovich, M. S. (2024, September). SEMIZLIKNI TURLI FENOTIPLARIDA YURAK QON-TOMIR KASALLIKLARINI KELIB CHIQISH XAVFI PROGNOZI. In *INTERNATIONAL SCIENTIFIC RESEARCH CONFERENCE* (Vol. 3, No. 26, pp. 15-18).
- 73. Xusenovich, M. S. (2024). O 'ZBEKISTONDA RESPUBLIKASIDA YURAK-QON TOMIR KASALLIKLARI TARQALISHI VA HOZIRGI KUNDAGI KO'RILAYOTGAN CHORA TADBIRLAR. *AMERICAN JOURNAL OF SOCIAL SCIENCE*, 2(3), 79-82.
- 74. Xusenovich, M. S., & Allayarovich, A. A. (2024). O 'ZBEKISTONDA YURAK-QON TOMIR KASALLIKLARI TARQALISHI VA HOZIRGI KUNDAGI TENDENSIYASI. *MODELS AND METHODS FOR INCREASING THE EFFICIENCY OF INNOVATIVE RESEARCH*, 4(38), 54-57.
- 75. Ravshanovna, X. L. (2021, June). MINIMALLY INVASIVE METHODS OF TREATMENT OF DENTAL CARIES IN ADULTS. In " ONLINE-CONFERENCES" PLATFORM (pp. 118-119).
- 76. Axmedov, S. (2025). SPECIFIC PROPERTIES OF ROXERA DRUG IN CARDIOVASCULAR DISEASES. *Modern Science and Research*, 4(2), 472-479.
- 77. Kurbanova, N. V. (2024). Modern Presentation of Calcium-Containing Drugs in the Course of the Study of Dental Diseases. *International Journal of Alternative and Contemporary Therapy*, 2(7), 12-14.

78.

548.

NEW RENAISSANCE international scientific journal

- 79. Kurbanova, N. V. (2024). Clinical and Morphological Featuresthe Occurrence of Tooth Decay. *International Journal of Alternative and Contemporary Therapy*, 2(9), 128-132.
- Ахмедова, М., Кузиева, М., & Курбанова, Н. (2025). ЗАБОЛЕВАНИЙ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА И ФОРМУЛИРОВАНИЕ ДИАГНОЗА. Modern Science and Research, 4(1), 279-289.
- Kurbanova, N. V. (2024, July). Modern Views on the use of Metal-Ceramic Structures in Dental Prosthetics. In *Interdisciplinary Conference of Young Scholars in Social Sciences* (USA) (Vol. 8, pp. 15-18). https://www.openconference.us/index.ph.
- 82. Kurbanova, N. V. (2024). Clinical and Morphological Featuresthe Occurrence of Tooth Decay. *International Journal of Alternative and Contemporary Therapy*, 2(9), 128-132.
- Karamatovna, M. A. (2025). LEARNING LANGUAGES AS A FACTOR IN THE DEVELOPMENT OF STUDENTS'COMMUNICATION. Modern education and development, 19(3), 238-252.
- Мусаева, А. К. (2025). ИЗУЧЕНИЕ ЯЗЫКОВ КАК ФАКТОР РАЗВИТИЯ КОММУНИКАЦИИ СТУДЕНТОВ. Modern education and development, 19(3), 172-188.
- 85. Мусаева, А. К. (2025). ЗНАЧЕНИЕ РУССКОГО ЯЗЫКА В МЕДИЦИНСКОЙ КОММУНИКАЦИИ. Modern education and development, 19(3), 206-220.
- 86. Karomatovna, M. A. (2025). TILLARNI O 'RGANISH TALABLAR MULOQATINI RIVOJLANISH OMILLI. *Modern education and development*, *19*(3), 221-227.
- 87. Karamatovna, M. A. (2025). DEVELOPMENT OF STUDENTS'COMMUNICATIVE COMPETENCE IN THE PROCESS OF HIGHER EDUCATION BASED ON INNOVATIVE APPROACHES. *Recent scientific discoveries and methodological research*, 2(2), 58-64.
- 88. Karamatovna, M. A. (2025). TALABALAR KOMMUNIKATIV KOMPETENTSIYASINI OSHIRISHNING ZAMONAVIY YO'LLARI. Recent scientific discoveries and methodological research, 2(2), 18-26.
- 89. Karamatovna, M. A. (2025). EFFECTIVENESS OF INTERACTIVE TEACHING METHODS IN RUSSIAN LANGUAGE LESSONS IN FORMING STUDENTS'COMMUNICATION. *Recent scientific discoveries and methodological* research, 2(2), 47-57.

90. Karamatovna, M. A. (2025). ZAMONAVIY O'QITISH TIZIMIDA RUS TILINING TALABALAR MULOQATI SAMARADORLIGIGA TA'SIRI. *Recent scientific discoveries and methodological research*, 2(2), 65-72.

NEW RENAISSANCE international scientific journal

- 91. Karamatovna, M. A. (2025). AN IMPROVED MODEL OF THE METHODOLOGY FOR DEVELOPING COMMUNICATIVE COMPETENCE IN STUDENTS BASED ON INNOVATIVE TECHNOLOGIES. *Multidisciplinary Journal of Science and Technology*, 5(2), 454-456.
- 92. Мусаева, А., & Каландарова, Н. (2025). ВЛИЯНИЕ МЕЖДИСЦИПЛИНАРНОЙ ИНТЕГРАЦИИ НА РАЗВИТИЕ КОММУНИКАТИВНОЙ КОМПЕТЕНЦИИ СТУДЕНТОВ (на примере русского и турецкого языков). Modern Science and Research, 4(2), 567-581.