

# Kazakh National Medical university named S. D. Asfendiyarov



## ISW: Pharmacological tests of CHD



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# **Content:**

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**Dipyridamole test**

**Test with dobutamine**

**Test with ergometrine**

**The test with isoprenaline**

**Pharmacological tests** – is medicamental provocation of coronary attacks with simultaneous control in the form of ECG records.

The tests is indicated in cases of impossibility of carrying out of veloergometric (defects of locomotor apparatus, intermittent claudication, chronic lung disease, with psychological bias in the tests with the physical load).



# Dipyridamole test

## Mechanism:

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Test with dipyridamole (chimes) is used to detect coronary insufficiency, especially in those cases when for various reasons it is impossible to conduct tests with dosed physical load.

Relatively rapid intravenous administration of large doses of dipyridamole, a potent vasodilator, leads to a significant expansion of the arterioles in areas of the unaffected coronary arteries, whereas the arterioles in the pool stenotic coronary vessels dilate to a much lesser extent. This leads to abnormal redistribution of blood in different areas of the cardiac muscle: increasing blood flow to areas of intact myocardium and reduced coronary blood flow in stenotic coronary arteries (microdamage the phenomenon of “victimize”). As a result, areas of ischemia of the heart muscle, the localization of which corresponds to the pools of blood supply to the affected coronary vessels.



# How to administered and dose of dipyridamole ?

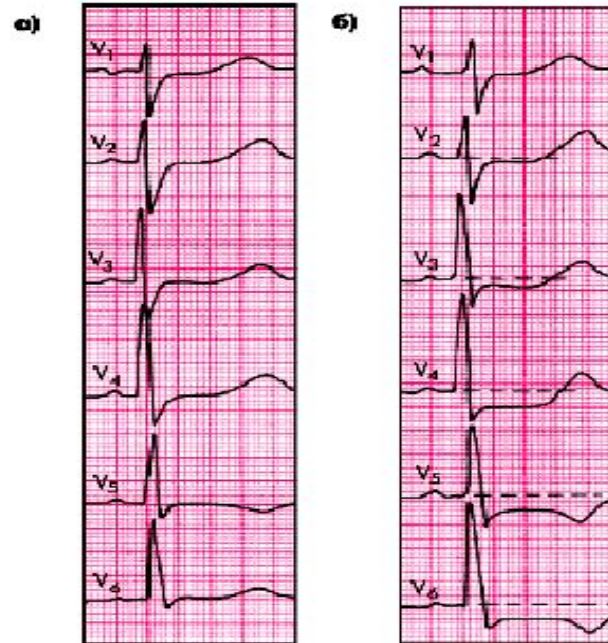
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Before the test you should stop taking medications and food products containing xanthine derivatives (aminophylline, theophylline, coffee, strong tea, etc.). Dipyridamole is administered intravenously at a dose of 0.75 mg per 1 kg of body weight, which is usually 10-12 ml of 0.5% solution. Most often the calculated dose divided into 3 equal parts, which is administered in 3 phases. During the first three minutes of the first third of the administered dose, and then for the next 3-5 minutes — the second a third. If this time does not appear of clinical and/or electrocardiographic signs of myocardial ischemia, for the next 3-5 minutes to enter the last third of the dose.

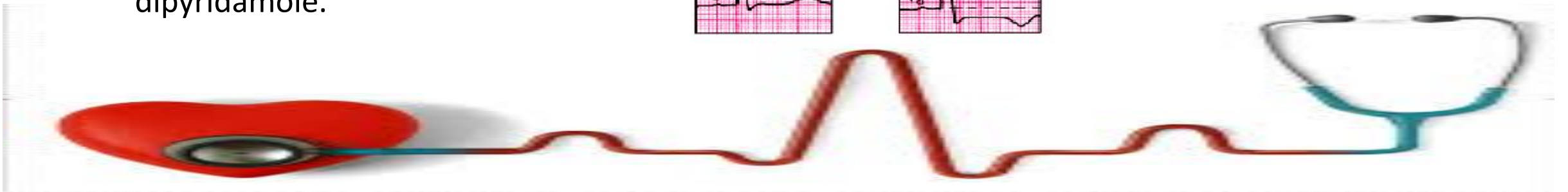


# Dipyridamole+ECG

Dipyridamole the test is carried out under constant supervision of the ECG. In the absence of signs of myocardial ischemia ECG recorded after 10, 15 and 20 min after the drug administration. A study completed by intravenous administration of 10 ml of 2.4% solution of aminophylline, which is a physiological antagonist of dipyridamole.



ECG changes in the chest leads in a patient with ischemic heart disease (positive test).  
a — initial ECG (at rest);  
b — ECG, (offset segment RS–T is below the isoelectric line horizontal)

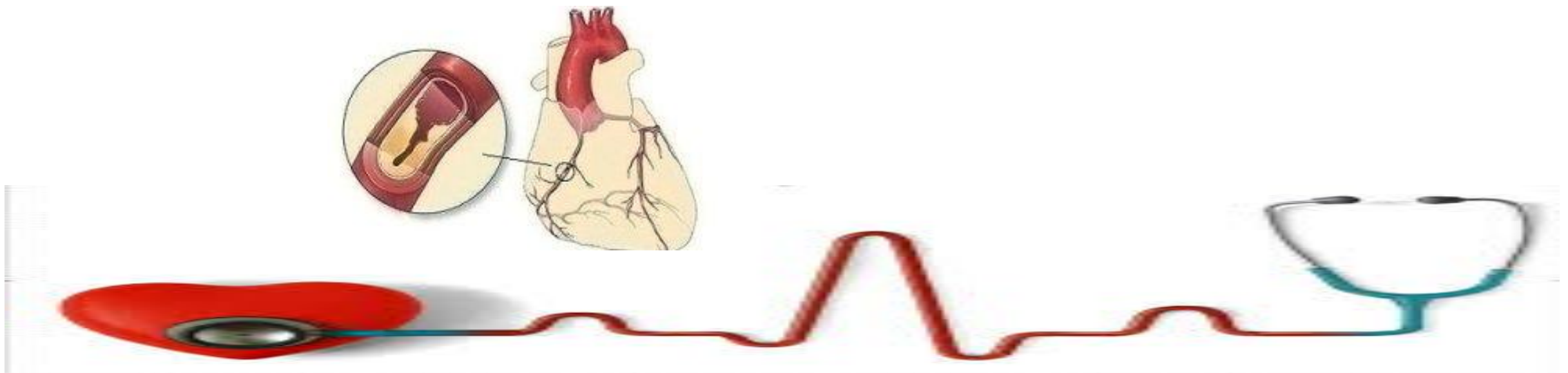


## Dipyridamole criteria for a positive test

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Dipyridamole criteria for a positive test are the same as during the tests with dosed physical load: ischemic depression or elevation of segment RS–T is 1.0 mm or more from baseline. Introduction of dipyridamole may be accompanied by slight tachycardia, a decline AD, headache, heaviness in the lower limbs.

Dipyridamole test sensitivity is 60-75% and specificity of 70-90%.



# Test with dobutamine

## Mechanism:

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The sample with dobutamine is one of the most informative functional stress tests and is currently widely used in clinical practice. Dobutamine possesses, as is well known, a strong beta given action. With the introduction of the drug increases heart rate, raises blood pressure, increases the heart and, consequently, the need of myocardium in oxygen. In conditions of limited coronary blood supply this causes transient myocardial ischemia.

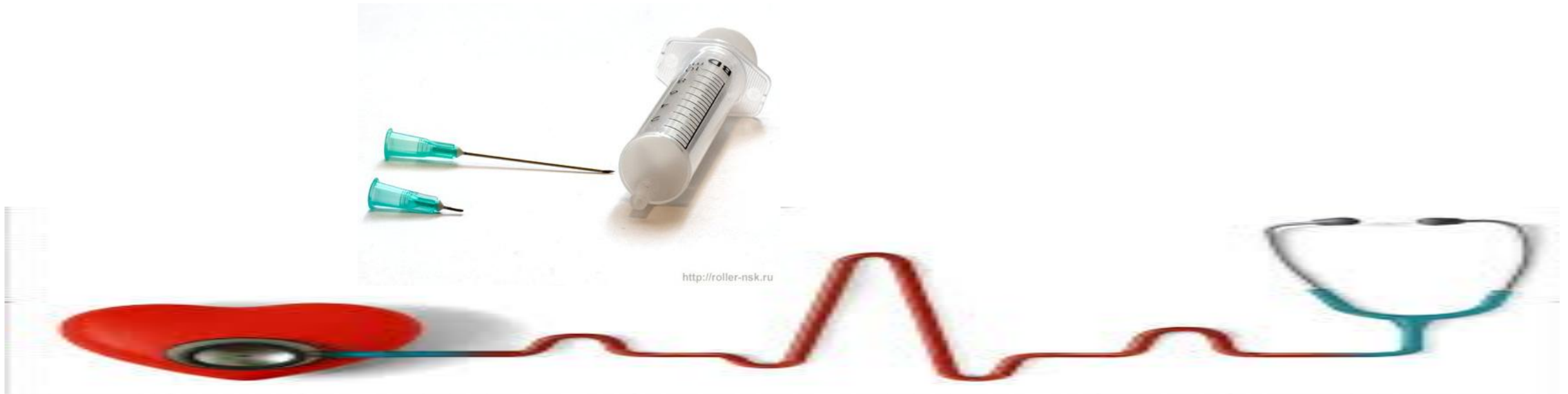




# How to administered and dose of Dobutamine?

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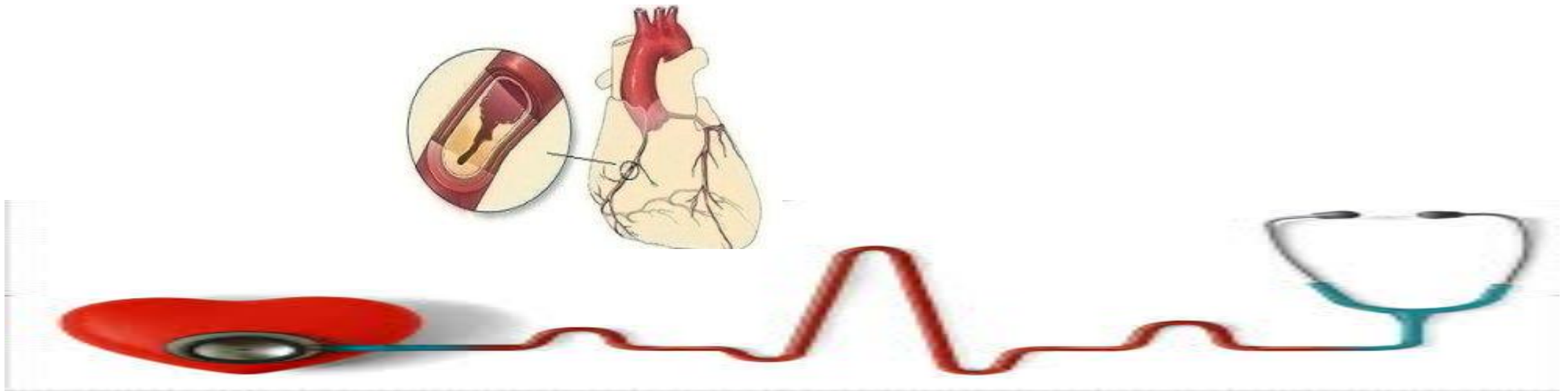
Dobutamine is administered intravenously in increasing doses (5, 10, 15, 20, 30 mg per 1 kg of body weight per minute) at intervals of 3 min. Introduction of the drug is carried out using an automatic Infusomats.



# Criteria for a positive test

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For the diagnosis of transient myocardial ischemia using the same criteria as in the tests with dosed physical load and dipyridamole test. The sensitivity of the sample with dobutamine isoproterenol is 60-70% and specificity of 70-90%. The sample used mainly for the diagnosis of coronary artery disease in patients who perform extensive physical activity for various reasons impossible.



# Test with ergometrine

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Test with ergometrine, stimulating alpha-adrenergic receptors, is used primarily to confirm the mechanism of spastic coronary insufficiency, particularly in patients with CHD, which during coronary angiography stenosis is not detected and the clinical picture makes the suspect a form of vasospastic angina (Prinzmetal's angina). Test with ergometrine dangerous development of severe complications (MI, sudden death, ventricular arrhythmias), and therefore it is used to diagnose coronary artery disease only in specialized research institutions .

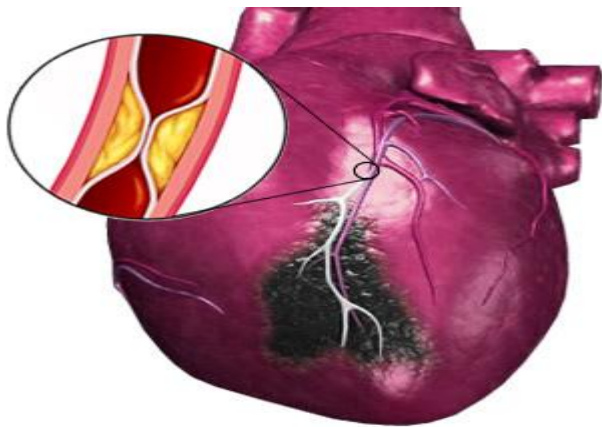
# The test with isoprenaline

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## **Mechanism:**

The test with isoprenaline performed to detect coronary insufficiency. The drug has beta given effect, combining the effect on b1 and b2 receptors.

Isoprenaline increases heart rate, myocardial contractility and coronary blood flow, resulting in increased need of myocardium in oxygen, just as is happening during the tests with physical load or with electric stimulation of Atria.



# How to administered and dose of Isoprenaline ?

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Isoprenaline (izadrin) in an amount of 0.5 mg (1 ampoule of the drug) pre-diluted in 250 ml of isotonic sodium chloride or 5% glucose solution.

In order to avoid undesirable reactions of the cardiovascular system the drug is initially administered slowly (at a speed of 30 drops per minute) for 2-3 minutes. Then the rate of administration gradually increased, focusing on your heart rate. After reaching a heart rate of 130 per minute is continued for 3 minutes introduction of the drug at the same rate, trying to keep your heart rate at an affordable level.



# Results of test:

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A test with isoprenaline regarded as **positive** for the manifestation of the ECG changes of ischemic nature in combination or without combination with angina. If pain in the chest are not accompanied by ECG changes, then the sample is regarded as **doubtful**.

The absence of angina and ECG changes indicates that the sample with isoprenaline is **negative**. The test is usually well tolerated. You may experience redness of the face alternating with pallor, transient hypertension. Usually after 5-10 minutes after the cessation of administration of ECG isoprenaline comes to its original state.

If the ECG is not normal or is not angina should enter beta-blocker - propranolol at a dose of 3-5 mg IV slowly (over 5 minutes).



# References:

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- 1 – G/E Roitberg, A/V Pokrovskii Internal disease, Cardiovascular system
- 2- [http://uffeen.ucoz.ru/news/farmakologicheskie\\_proby\\_nagruzochnaja\\_stenokardija/2013-12-23-111](http://uffeen.ucoz.ru/news/farmakologicheskie_proby_nagruzochnaja_stenokardija/2013-12-23-111)
- 3- <http://heartlib.ru/docs/index-3922.html>

