The duration of the action potential at the level of 20%, 50% and 90% repolarization (DPD20, DPD50, DPD90) increased from 17.4 ± 1.3 to 19.3± 1.1 ms, from 44.4±3.1 to 49.9±2.2 ms, from 99.1±5.1 to 108.9±4.2, which is 10%; 11%; 9%, respectively ($p<0.05$; n=9). The rest of the studied parameters did not change significantly. An increase in concentration by one order of magnitude (NPY 10-7M) did not lead to significant changes in the studied parameters (n=9). NPY at a concentration of 10-6M caused a decrease in the frequency of occurrence of the action potential by 21% ($p<0.05$) The duration of the action potential at the level of 20% repolarization (DPD20) increased from 19.0±1.9 to 19.9±2.0 ms, which is 5%, respectively ($p<0.05$; n=9). The rest of the studied parameters did not change significantly.
Thus, the maximum effect was observed at a concentration of 10-8M. We attribute the observed changes to the fact that NPY acts on If currents through the alpha subunit of the G protein. As a result, there is a decrease in the frequency of occurrence of the action potential and a prolongation of the duration of PD.

S2.149. Electrical activity of rat working myocardiocytes during alpha2-adrenoreceptor stimulation

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It is known that isolated rat myocardium contains beta1-adrenoreceptors, beta2-adrenoreceptors, beta3-adrenoreceptors, beta4-adrenoreceptors, as well as alpha1-adrenoreceptors and alpha2-adrenoreceptors. [1] Research indicate that α2-AR isoforms (α2A-, α2B- and α2C) are expressed in cardiac myocytes with the potential to safeguard cardiac muscle under adrenergic surge by governing intracellular Ca2+ handling and contractility. By adjusting the balance between protein kinase and phosphatase activities, sarcolemmal α2-ARs are capable of counterbalancing signaling cascades that provoke hypertrophic cardiac remodeling under chronic activation of adrenergic and angiotensinergic signaling. In this regard, the reprograming gene or cell based therapies aimed at cardiac specific restoration or enhancement of α2-AR signaling may represent future therapeutic directions for prevention or treatment of heart failure. [2]
The aim of our study was to identify the effect of alpha2- AR stimulation on the electrical activity of the heart of adult rats.
White outbred rats aged 3.5-4 months were used in the work. Experiments were performed using perfused preparation (solution Tyrode, 37ºC, pH=7.4) from the right atrium of the rat under conditions of rhythmic stimulation (5 Hz). The effect of clonidine hydrochloride (10-6 M) on the duration of action potential (AP) at the level of 50 and 90% repolarization (APD50%, APD90%) was assessed using standard microelectrode technique. During the experiments, all the requirements of ethical standards for working with laboratory animals were observed. Clonidine hydrochloride has been shown to cause a statistically significant decrease in APD50% and APD90%.
Modulation of adrenergic activity through pharmacological approaches plays an important role in a wide range of cardiac disorders. The electrophysiological method using a constant imposed rhythm allows us to conclude that α2-AR plays a significant role in the regulation of the electrical activity of working cardiomyocytes.
The study was supported by the Russian Science Foundation grant No. 21-15-00121, https://rscf.ru/project/21-15-00121/.
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S2.150. Electrophysiological studies of the effect of photocontrolled azobenzene and stilbene derivatives on rat neonatal cardiomyocyte cells

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It is known that azoTAB (azobenzene trimethylammonium bromide) and c-TAB (stilbene trimethylammonium bromide)[1], derivatives of azobenzene and stilbene, respectively, are capable of changing the excitability of neonatal cardiomyocyte cell culture in a photocontrolled manner. The energetically stable trans-form of azoTAB and c-TAB is capable of suppressing spontaneous activity and the propagation velocity of excitation waves. Restoration of the excitability of the culture of cardiomyocytes can be achieved by washing these substances from it. Isomerization of trans-azoTAB into cis-azoTAB, obtained as a result of irradiation with soft ultraviolet (λ~365 nm), the excitability of the culture of cardiomyocytes is restored. While the cis-form of c-TAB, obtained under the same conditions, fixes the blockade of cell culture excitability. A study was made of the effect of trans- and cis-forms of azoTAB and c-TAB on voltage-gated ion channels involved in the formation of the action potential. The aim of the work was to understand whether the change in the conductivity of cardiomyocytes under the action of photocontrolled substances (azoTAB and c-TAB) is mediated through the modulation of voltage-gated ion channels responsible for the formation of the action potential. The effect of trans- and cis-forms of azoTAB and c-TAB on voltage-dependent fast sodium (INav), L-type calcium (ICav), and potassium (IKv) currents was studied on isolated neonatal cardiomyocytes using the patch-clamp method in the whole-cell configuration. As a result, it was found that under the action of the above substances, the fast sodium and calcium current of the L-type is suppressed, but the slow potassium currents, on the contrary, increase. Moreover, complete suppression in the case of azoTAB occurs at a concentration of 100 μM [2], and in the case of c-TAB, at a lower concentration - 60 μM. According to the study of the toxicity of azoTAB and c-TAB to cardiomyocytes in our laboratory, it was found that the toxicity to c-TAB cells is less than azoTAB, and in c-TAB it begins at a concentration of more than 100 μM. suppression of voltage-dependent sodium and calcium currents, which are responsible for the formation of an action potential in cardiomyocytes. Since this process is reversible, and in the case of c-TAB it also varies depending on what effect we want to fix (wash and restore the excitability of the cardiomyocyte cell culture or irradiate with soft ultraviolet and fix the conduction block in cardiomyocytes), these substances are of interest, for example , for ablation.
Fundings
The work was supported by the State order in the Science section No. 55, topic: “Development of personalized methods of cellular technologies in cardiac surgery” of the Government of the Moscow Region and by the Ministry of Science and Higher Education of the Russian Federation in the scope of the government assignment (Agreement 075-03-2023-106 13.01.2023)
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