



EFFECT OF THE N-DEZ ALKALOID ON THE ACTIVITY OF THE NA⁺/CA²⁺ EXCHANGE SYSTEM IN VASCULAR SMOOTH MUSCLE CELLS.

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The Na⁺/Ca²⁺ exchange system in vascular smooth muscle cells is important for maintaining intracellular Ca²⁺ homeostasis and controlling vascular tone. Under physiological conditions, this system ensures the relaxation process mainly by releasing Ca²⁺ ions out of the cell. However, in cases where vascular smooth muscle cells are dysfunctional or in pathological conditions, the Na⁺/Ca²⁺–exchange system operates in reverse mode as a result of a decrease in the concentration of Na⁺ in the external environment or a decrease in the activity of Na⁺/K⁺–ATPase. This can lead to the accumulation of Ca²⁺ ions inside the cell, increased contractile activity of vascular smooth muscle, and increased vascular tone and arterial blood pressure. In recent years, special attention has been paid to the search for biologically active compounds that modulate the Na⁺/Ca²⁺ exchange system and to the identification of their vasorelaxant mechanisms of action. In this regard, the aim of this study is to evaluate the effect of the N-DEZ alkaloid on the activity of the Na⁺/Ca²⁺–exchange system in vascular smooth muscle cells.



Research methods and materials. The experiments were conducted under isometric conditions using aortic preparations from white rats (200–250 g). The contractile activity of the aortic preparation was recorded under isometric conditions using an FT-03 force transducer (Grass Instrument Co., USA).

The results obtained. In the experiments, the effect of the N-DEZ alkaloid on the $\text{Na}^+/\text{Ca}^{2+}$ exchange system was evaluated in Krebs' solution, which does not contain Na^+ ions in the external environment. Under these conditions, slowly developing contractions were observed in aortic rings as a result of the activation of the $\text{Na}^+/\text{Ca}^{2+}$ exchange system in reverse mode. The N-DEZ alkaloid (150 μM) reduced the force of these contractions by $55.8 \pm 4.1\%$ compared to the control. In order to further clarify the result, additional experiments were conducted in the presence of Na^+/K^+ -ATPase inhibitor ouabain (10 μM). The reductions induced by ouabain were also reduced by $59.5 \pm 3.9\%$ compared to the control by the alkaloid N-DEZ (150 μM). These results revealed that the alkaloid N-DEZ reduces the entry of Ca^{2+} ions into the cell by inhibiting the activity of the $\text{Na}^+/\text{Ca}^{2+}$ -exchange system in the reverse mode.

Conclusion. The results obtained indicate that one of the mechanisms of the vasorelaxant effect of the N-DEZ alkaloid is associated with inhibition of the $\text{Na}^+/\text{Ca}^{2+}$ -exchange system in the reverse mode in vascular smooth muscle cells. This effect may result in a decrease in intracellular Ca^{2+} concentration and relaxation of vascular smooth muscle.