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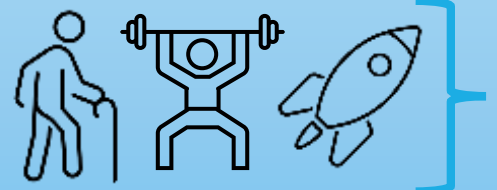
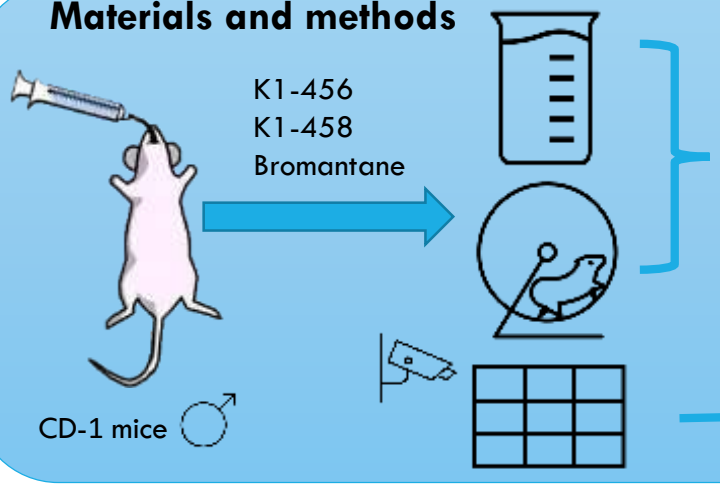
Effect of bispidine containing monoterpenoid moieties on physical performance in mice



Currently, increasing physical performance is an urgent task, not only in the field of extreme conditions, for the purposes of sports and military medicine, but also in the pharmacology of a healthy person

The aim of this work is to study the effect of **monoterpenoid derivatives** with 3,7-diazabicyclo [3.3.1] nonane (bispidine), compounds **K1-456** and **K1-458** on the **physical performance** of mice using the classic **treadmill test** and **Porsolt** forced swimming test with a load after a single injection.

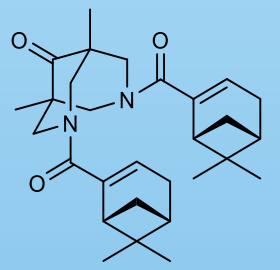
Materials and methods



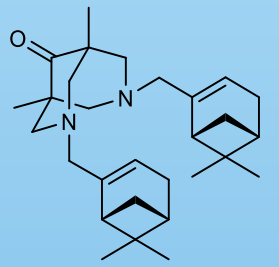
Physical endurance was studied in two tests: Porsolt forced swimming test with a load of 7% of body weight and running on a treadmill.

To assess the effect of the investigated agents on locomotor activity, an open field test was performed.

The studied compounds



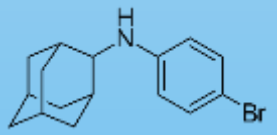
K1-456



K1-458

A comparison drug

Bromantane



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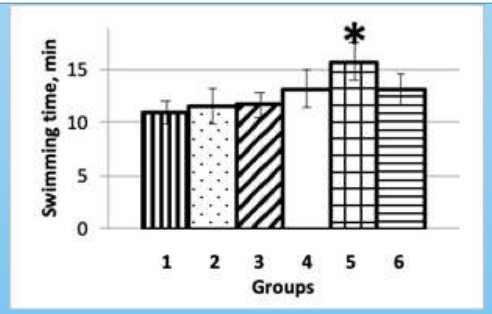
Results and discussion

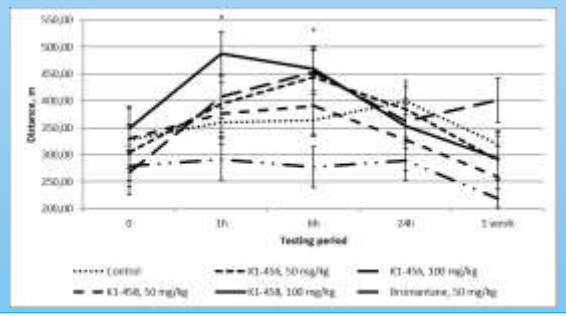
The Porsolt forced swimming test



Significantly 44% increase in the duration of swimming compound K1-458 at a dose of 100 mg / kg. The introduction of K1-458 and the comparison bromantane at a dose of 50 mg/kg led to an increase in the duration of swimming of animals at the level of the trend (by 20%). Compound K1-456 at a dose of 100 mg / kg and 50 mg / kg increased the swimming time of mice at the trend level by 7% and 6%, respectively.

Designation of groups: 1- Control, 2 - K1-456, 50 mg/kg, 3 - K1-456, 100 mg/kg, 4 - K1-458, 50 mg/kg, 5 - K1-458, 100 mg/kg, 6 - Bromantane, 50 mg/kg.

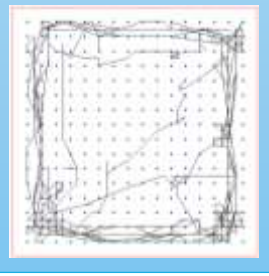
The test "running on a treadmill to failure"



The performance was assessed 1, 6, and 24 hours after a single administration of the compound. It was found that K1-458 at a dose of 100 mg/kg significantly increases the running time relative to the control group after 1 hour and 6 hours after intragastric administration. A comparison of the data does not significantly affect the running distance of animals relative to the control group, and within the group, the running distance significantly increases 6 hours after the comparison with the initial test

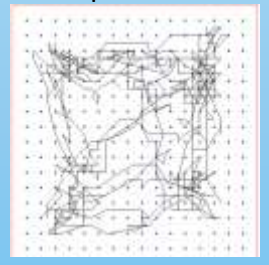
The open field test

Track plot Control



Track plot Bromantane

Track plot K1-458 100 mg/kg



The test agents significantly increase motor activity, distance traveled, speed of movement and reduce the time of the stationary moment. Compound K1-458 has such a stimulating effect in two doses of 50 and 100 mg/kg, compound K1-456 only in a dose of 100 mg/kg.

Conclusion

For the first time, it was found that derivatives of monoterpenoids with a 3,7-diazabicyclo [3.3.1] nonane (bispidine) backbone, having methyl substituents in 1 and 5 positions, are able to increase the endurance of animals in Porsolt forced swimming and running tests "to failure", exceeding the action comparison drug bromantanum. The most pronounced actoprotective activity is exerted by compound K1-458, containing residues of (-) - myrtenal linked to the bispidine moiety through amino groups, at a dose of 100 mg/kg after a single injection. Thus, bispidine derivatives containing monoterpenoid residues are a promising new class of organic compounds for the search for new actoprotectors.

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