Abstract

The present study investigated the cholinergic system in the African naked mole-rat (Heterocephalus glaber) with focus on the muscarinic acetylcholine receptor subtypes M_1 and M_4. The protein sequences for the subtypes m_{1-5} of the naked mole-rat were compared to that of the house mouse (Mus musculus) using basic local alignment search tool (BLAST). The presence and function of M_1 and M_4 was investigated in vivo, using the formalin test with the muscarinic receptor agonists xanomeline and VU0152100. Spinal cord tissue from the naked mole-rat was used for receptor saturation binding studies with [^{3}H]-N-methylscopolamine. The BLAST test revealed 95 % protein sequence homology showing the naked mole-rat to have the genetic potential to express all five muscarinic acetylcholine receptor subtypes. A significant reduction in pain behavior was demonstrated after administration of 8.4 mg/kg in the formalin test. Administration of 50 mg/kg VU0152100 resulted in a non-significant tendency towards antinociception. The antinociceptive effects were reversed by the muscarinic acetylcholine receptor antagonist atropine. Binding studies indicated presence of muscarinic acetylcholine receptors with a radioligand affinity comparable to that reported in mice. In conclusion, muscarinic acetylcholine receptor subtypes are present in the naked mole-rat and contribute to antinociception in the naked mole-rat.