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Orexin 1 receptors in the orbitofrontal cortex regulate delay-based decision-making

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The orexins are neuropeptide transmitters made exclusively in hypothalamic neurons that have extensive central nervous system (CNS) projections (1). Orexin is mainly expressed by neurons located in the posterior of the hypothalamus. Despite being small in number, these neurons release orexin through the CNS and affect a variety of physiological functions including sleep, hunger, and drug abuse (2). Decision making is an adaptive behavior that takes into account several internal and external input variables and leads to the choice of a course of action over other available and often competing alternatives. The OFC plays a key role in processing reward and it is involved in delay based decision making (3). Hence, in the present study, we conducted a series of experiments to clarify the role orexin receptor 1 in the OFC regulate delayed-based decision making.

Material and Methods: The rats had been trained in a delay-based form of cost-benefit T-maze decision making task before test day. The two goal arms were different in the amount of accessible reward. The animals could choose high reward arm (HR arm) and pay cost (waiting 20 sec) to achieve large reward or obtain a low reward in the other arm immediately (LR arm). Before surgery, all animals were selecting the HR arm on almost every trial. During test days, the rats received local injections of either DMSO 20% /0.5µl, as vehicle, or SB334867 (3, 30, 300 nM/0.5µl), as selective OX1-receptor antagonist, within the OFC.

Results: Our results demonstrate profound effects of OFC's OX1r on delay-based decision making, due to bilateral microinjection of SB334867, into the OFC, changed the animal's preference to a low reward.

Conclusion: These results imply that OX1-receptor has a crucial role for allowing the animal to pay a cost to acquire greater rewards.

Biography

Monireh Naderi Tehrani, is a Master student her second year at the Kashan University of medical sciences in Iran. She performed her research at this university under Dr. Hamidi's supervision. She is a debutant researcher in the field of neuroscience. She is a nurse and she saw the problem of the patient with the CNS disorder in the hospital. She tried to know more about the nervous system for that reason she decide to continue her education in this field of science.

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