

# Molecular Identification and the Immunolocalization of Purinergic Signaling Receptors in the Mammalian Vomeronasal Organ

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## Abstract

Information about the external world is conveyed through the nervous system via specialized sensory organs such as the vomeronasal organ (VNO). The VNO is crucial for pheromone detection and the regulation of social behavior in many mammals. Recent research has shown that purinergic signaling pathways in the VNO plays a role in the chemosensory activity of the organ. There are two families of purinergic receptors that may be involved in this activity, P2X and P2Y. We hypothesized that the vomeronasal sensory neurons express both P2X and P2Y receptors which, when activated by ATP or other purine/pyrimidine nucleotides work to maintain homeostasis and assist in signal transduction in the tissue. This hypothesis was partially addressed using reverse transcription polymerase chain reaction (RT-PCR), immunohistochemistry, and immunocytochemistry to determine where P2X receptors are expressed and if P2Y receptors are expressed in the mouse VNO. RT-PCR results suggested that there is gene expression of P2Y<sub>1</sub>, P2Y<sub>2</sub>, P2Y<sub>6</sub>, P2X<sub>1</sub>, and P2X<sub>3</sub> receptors in the tissue. A selection of the more commonly expressed purinergic receptors explored with immunohistochemistry indicated that P2Y<sub>1</sub>, P2Y<sub>2</sub>, and P2X<sub>1</sub> receptors are widely expressed throughout the VNO, including expression in the sensory and non-sensory epithelia. Immunocytochemistry results demonstrated expression of P2Y<sub>1</sub> and P2Y<sub>2</sub> receptors on the vomeronasal sensory neurons, further supporting our hypothesis that the purinergic receptors play a role in signal transduction. In conclusion, the data strongly support the hypothesis that

there are purinergic receptors present in the VNO of mice and is in agreement with our previous data showing purinergic receptor-mediated modulation of chemosensory signal transduction in vomeronasal sensory neurons.