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From odors to brain: how odor binding is transduced into electrical signals traveling to the brain.

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The initial steps of olfaction occur in olfactory sensory neurons located in the olfactory epithelium of the nasal cavity of vertebrates. These neurons are responsible for the detection of odorant molecules present in the surrounding environment and the generation of neural signals that are transmitted to the brain. Once an odor molecule binds to a receptor in the cilia of an olfactory sensory neuron, it triggers a transduction cascade that initiates an electrical signal that travels from the sensory neuron to the olfactory bulb. The odor-induced tranduction current is due to the activation of both cation and anion channels. It is well known that the calcium-activated chloride channel TMEM16B/ANO2 is highly expressed in the cilia of olfactory sensory neurons, but previous attempts to establish a physiological role in olfaction have been unsuccessful. We have recently found that genetic ablation of TMEM16B results in defects in the olfactory behavior of mice and the cellular physiology of olfactory sensory neurons.

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