Inhibitory K+ current activated by odorants in toad olfactory neurons

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Odorant responses of isolated olfactory neurons from the toad Caudiverbera caudiverbera were monitored by using patch-clamp techniques. Depending on the stimulus, the same neuron responded with an increase or a decrease in action potential firing. Odorants that activate the cAMP cascade in olfactory cilia increased electrical activity, caused membrane depolarization, and triggered inward currents. In contrast, odorants that do not activate the cAMP cascade inhibited electrical activity, produced membrane hyperpolarization, and activated outward currents in a dose-dependent fashion. Such currents were carried by K+ and blocked by tetraethylammonium. Similar currents were recorded from Xenopus laevis. Our results suggest that this K+ current is responsible for odorant-induced inhibition of action potential firing in olfactory neurons.