Responses of the Mouse Vomeronasal Organ to Salivary Compounds

Abstract

Pheromones are the chemical signals by which mammals communicate sociosexual information with conspecifics. The vomeronasal organ of mammals is thought to be critical in the detection of these cues. Glandular secretions from the facial region of mice have been implicated as pheromonal sources through behavioral, electrophysiological and molecular approaches. Focusing on secretions of the salivary glands as a potential source of pheromonal cues, I conducted a series of experiments to characterize the response of male and female mice to salivary stimuli. I used expression of immediate early gene egr-l to quantify the neuronal response in the vomeronasal organ to saliva as well as salivary gland extracts. Surprisingly, extract made from the submaxillary gland induced a more robust response than did collected saliva as measured by the immediate early gene assay. I observed expression of the immediate early gene egr-l in neurons of the basal layer of the vomeronasal organ of male and female mice exposed to male or to female submaxillary gland extract. Size fractionation showed that the bulk of this response was due to large molecules, most likely proteins up to 30kDa in size. Submaxillary gland extract from female mice induced more robust expression of egr-1 in the vomeronasal organ of both male and female mice than did submaxillary gland extract from male mice, suggesting that there might be pheromonally active compounds with sexually dimorphic expression contained in the complex biological matrix of salivary gland extract. We cannot conclude whether the compounds underlying the responses demonstrated here are naturally secreted in saliva, but their induction of neuronal activity in the vomeronasal organ implies some function in intraspecies pheromonal communication.