

FUNCTIONAL EVOLUTION OF PRIMATE ODORANT RECEPTORS

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The olfactory system provides excellent models for evaluating primate adaptation to the diverse and changing environments as the olfactory receptors are imperative in determining odor perception and in modulating species-specific behaviors. Consistent with this, chemosensory receptors including the odorant receptors (OR) are among the fastest evolving genes in animals. Though extensive bioinformatic analyses of OR sequences in primates have been conducted, little is known about the functional changes of individual receptors during evolution. Using heterologous cell systems in which OR genes are expressed in cell lines, functional evaluation of ORs in primate evolution has become increasingly feasible. Orthologs of ORs can be cloned from different species and functional analysis of these orthologs and their nonsynonymous changes should reveal OR responses to the cognate ligands that activate ORs and specific amino acid residues causing increases or decreases in sensitivity, as well as changes in ligand selectivity of the ORs. Functionally important residues can be used to evaluate sites with evidence of natural selection as predicted by existing computational analyses.

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