ABSTRACT

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Production of insect odorant receptors in yeast for structural studies

Insect olfactory receptors (ORs) are proteins involved in olfaction in insects. Insect ORs are 7-transmembrane domain proteins that possess a unique structure, forming a heteromeric complex with a highly conserved co-receptor (ORCO). The heteromeric complex constitutes an ion channel, which opens allowing movement of ions upon activation by a ligand. Specificity of ORs is variable, and little is understood about where this specificity arises and how the binding of an active ligand subsequently opens the ion channel. Despite significant functional studies of insect ORs, only two structures, ORCO from the fig wasp *Apocrypta bakeri*, and a homomeric complex of OR5 from the jumping bristletail, *Machilis hrabei*, have been determined. This structural work relied on a well-established expression system, HEK293 cells, which are commonly used for functional screening of ORs. However, HEK cells are not an optimal system for protein production for structural analysis. In this project, we begin to develop a more efficient protein production system for structural investigation of insect OR-ORCO complexes, focusing on ORs of Lepidoptera and Culicidae (moths and mosquitoes). Initial work has focused on the expression of insect OR-ORCO complexes with a fusion eGFP in a *Pichia pastoris* yeast.