The molecular evolution of animal phototransduction and photoreceptor cells

Abstract (250)

Introduction

Results and Discussion

**Extended gene families of phototransduction components are generally broadly distributed throughout Eukarya.**

* Common phototransduction components
* Rhabdomeric-specific phototransduction components
* Ciliary-specific phototransduction components

**Patterns of major duplication, speciation and loss events clarify gene family expansions.**

* GPCR Kinases: an ancient family that expands in Metazoa
* Phospholipase C: Holozoan origin of the beta subgroup from an ancient eukaryotic family
* Cyclic Nucleotide Gated Ion Channels: ancient origin of alpha and beta subtypes

**Identification of putative photoreceptor cells throughout animals**

* *D. melanogaster* rhabdomeric PRC profile is more distinguished than *H. sapiens* and *M. musculus* ciliary profiles
* *C. intestinalis* and *S. purpuratus* PRC metacells
* Photoreceptor-like metacells in non-bilateria
  + *PRC-like in Cnidaria*
  + *PRC-like in Placozoa*
  + *PRC-like in Porifera*
  + *PRC-like in Ctenophora*

**Genetic profile of PRC-Like metacells and transcription factors in common throughout animals**

* Network analysis reveals structure of relationships amongst metacells
* Species-specific combinations of transcription factors across Metazoan PRC-like metacells

Conclusions

Methods

**Reconstruction of the Evolution of Phototransduction Components**

* Species List and Species Tree
* Data Mining
* Phylogenetic Trees
* Gene tree to species tree reconciliation
* Collection of phototransduction marker genes for photoreceptor cells in non-model organisms

**Identification of putative photoreceptor cell types from single-cell RNAseq data**

* Species datasets
* MetaCell pipeline for clustering cells
* Identification of photoreceptor metacells in the model organisms *D. melanogaster*, *H. sapiens* and *M. musculus*
* Identification of candidate photoreceptor metacells in non-model organisms

**Exploration of the genetic profile of candidate PRCs and comparison across species**

* Identification of genes involved in transcription
* Comparison of genes in common across species

References