

## Sensory Systems Basics and Principles I

### Lecture: Developmental Biology of the Retina and Retinal Cell Types

1. Describe similarities and differences between the eyes of vertebrates and cephalopodes
2. Describe differences between the eyes of vertebrates and insects
3. Development of the vertebrate eye. Which Statement(s) is/are wrong ?
  - The neural retina develops as an outgrowth of the forebrain
  - The eyecup forms through the invagination of the optic vesicle
  - The lens and the retinal pigment epithelium share a common ontogenetic origin
  - The optic nerve develops from the optic stalk
4. A coloboma is a developmental defect in eye development characterized by a slit or a hole in the eyelid, the iris, the retina, choroid or the optic disc. What is the developmental process that is impaired in the formation of a coloboma.
5. Name two genes that are important in eye development. What is their mode of action ?
6. PAX6 in eye development. Which statement(s) is/are correct ?
  - PAX6 belongs to the family of basic leucine zipper (bZIP) transcription factors
  - PAX6 has an evolutionary conserved role in eye development in most metazoan species
  - All PAX6 mutants are lethal in development
  - Ectopic expression of PAX6 induces the formation of eyes on the antennae and legs of flies.
7. List the main cell types in the retina
8. Rods and cones are not equally distributed in the primate retina. Which statement is wrong ?
  - Cones are concentrated in the centre of the retina
  - There is a dorso-ventral gradient of rods and cones in the retina
  - Rods are much more abundant than cones
9. What is the function of the retinal pigment epithelium
10. Imagine there would be no interneurons in the retina but that photoreceptors would directly transmit their signal to the brain. How thick would the optic nerve needed to be ?

