

Developmental regulation and cell lineage control in sensory epithelia

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An important performance objective of epithelial tissues is the precise self-regulation of growth and size. We study this phenomenon in sensory epithelia of the mouse, especially the olfactory epithelium (which transduces the sense of smell), the neural retina (which transduces visual signals), and the gustatory epithelium of the tongue (which transduces taste). We seek to understand how these epithelia achieve correct cell numbers and proportions of cell types during development, as well as how they maintain homeostasis when environmental insults stimulate them to regenerate, since both of these properties are crucial for their function(s). In addition, because embryonic epithelia and their underlying mesenchyme form focal organizing centers that not only pattern organs during development, but also form stem cell niches that are crucial for growth and regeneration, we have begun to concentrate, both in experimental studies and in modeling, on the relationship between growth control and patterning. This talk will focus on how secreted signals, such as TGF- β superfamily proteins, control cell lineage progression behaviors such as self-renewal, cell cycle speed, and differentiation (fate); and how regulation of lineage progression parameters plays a central role in dictating the patterning, growth, and regeneration of epithelia.