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Experimental analysis of neural crest migration during development

Experimental analysis of neural crest migration during development Cell migration and cell fate decisions are strongly influenced by microenvironmental signals during embryonic development and cancer. Yet, it is largely unclear how cells receive and interpret microenvironmental signals that influence their fate and choice of direction. To address these questions, we use the neural crest (NC) as our model system. NC cells are a highly invasive, multipotent embryonic cell population that are sculpted into discrete migratory streams and patterned into multiple derivatives by the microenvironments cells travel through. We have developed an in vivo imaging platform in chick that permits single cell resolution and behavior analysis of fluorescently labeled NC cells. By combining molecular intervention with time-lapse imaging, we have discovered a role for NC cell chemotaxis and how cells may respond to distinct microenvironmental signals and navigate to precise locations. We will show recent tissue transplantation and ablation experiments that alter the position of NC cells along a migratory route and discuss how cells respond to local microenvironmental signals. These data provide the basis for close collaboration with mathematical modellers and offer insights into the underlying mechanisms of embryonic pattern formation.