

CELL MIGRATION

Collective cell courtship

Coordinated cell movements drive morphogenesis, and we now learn that the migration patterns of different cell types can be intimately entwined. Theveneau *et al.* show that the migration of neural crest (NC) and placode precursor cells during *Xenopus laevis* and zebrafish development are mutually dependent, and that they engage in a 'chase-and-run' behaviour that is important for persistent directed migration.

By tracking the migration of NC cells and placode precursors *in vivo* and *in vitro*, the authors observed that NC cells chemotax towards the placodal cells, which initiates the directed migration of placodal cells away from NC cells. Consistent with previous studies of NC chemotaxis, the directed migration of NC cells was driven by the chemoattractant stromal cell-derived factor 1 (*sdf1*), which was expressed by placodal cells. NC cells and placodal

cells formed transient contacts containing neural cadherin (N-cadherin) when co-cultured *in vitro*, and traction force microscopy showed that these NC–placode junctions generated a tension force that suggested they were functional.

What causes placodal cells to move away from NC cells following this transient contact? Upon contact with NC cells, there was a redistribution of traction forces in placodal cells, as well as a shift of focal adhesions away from the contact site and a local reduction in protrusion stability. The authors tracked the behaviour of placodal cells upon collision with NC cells, and showed that the directed movement of placodal cells away from NC cells had the characteristics of a typical 'contact-inhibition-of-locomotion' response. This placodal 'run' required N-cadherin and also non-canonical WNT planar cell polarity signalling. Using time-lapse

analysis in both *X. laevis* and zebrafish embryos, the authors confirmed that this chase-and-run behaviour occurs *in vivo* and, using grafts of mutant cells, they showed that this coordination is important for the normal pattern of NC migration and placodal cell organization.

Thus, the localized cell rearrangements that drive epithelial placode formation are mediated by coordinating precursor migration with NC cell movement. NC cells initially chemotax towards placode precursors, and the transient contacts that form between these two cell types trigger repolarization of the placode precursors and their directed migration away from the NC cells. It will be interesting to see whether such courtship behaviour is relevant for the migration patterns of other cell types during development and disease.

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ORIGINAL RESEARCH PAPER Theveneau, E. *et al.* Chase-and-run between adjacent cell populations promotes directional collective migration. *Nature Cell Biol.* <http://dx.doi.org/10.1038/ncb2772> (2013)



IMAGE SOURCE