CDB SEMINAR

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14:00~15:00 Seminar Room A7F

Integration of signals acting along orthogonal axes of the neural tube determines the competence of neural progenitors and diversity of cell types

Summary

A relatively small number of inductive signals are responsible for the diversity and pattern of cell types generated in the developing vertebrate central nervous system. In part this is achieved by signals acting as graded morphogens to induce multiple different cell types. In addition however, changes in cellular competence – temporal shifts in the response of cells to a signal – also contribute to the array of cell types generated. Here we investigate how these two mechanisms are combined to increase the variety of cell types generated and provide spatial control over their location. We provide evidence that FGF signaling emanating from the posterior of the embryo gates a change in competence of neural progenitors to Shh and BMP, the two morphogens that are responsible for patterning the ventral and dorsal regions of the neural tube, respectively. Newly generated neural progenitors are exposed to FGF signaling and this induces the expression of Nkx1-class transcription factors. Ventrally, this acts in combination with Shh induced FoxA2 to specify floor plate cells and in combination with BMP signaling dorsally to induce neural crest cells. Hence similar mechanisms function to increase neural cell type diversity and specify cell types at the dorsal and ventral poles of the neural tube. Moreover these data reveal how tissue morphogenesis produces changes in the coincidence of signals acting along orthogonal axes of the neural tube that is exploited to define spatial and temporal transitions in the competence of cells to interpret morphogen signaling.

Reference

Ribes et al., Genes and Development (2010) vol24, 1186-1200

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