

Integrative Biology

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How is the chirality information transferred during the mollusk development?

Body handedness of Gastropod *Lymnaea stagnalis* is determined by a single gene locus that functions maternally. We have previously shown that the gene dictates the cytoskeletal dynamics at the third cleavage and have created fertile snails of mirror-image body plan by mechanically manipulating the blastomeres at this stage. In this talk, we shall show that nodal expression started at the 33-49 cell stage and was confined only to the left or the right side of embryos, in a mirror-image manner for the sinistral and the dextral snails, throughout the development until the shell was getting formed. The mechano-manipulation reversed the entire expression. Thus, the blastomere arrangement at the 8-cell stage regulates the asymmetric expression of *nodal/Pitx* genes. At the 24-cell stage, the organizer macromere 3D moved to the central location of vegetal side, filled almost entire cleavage cavity where it contacted with micromeres. MAPK (mitogen-activated protein kinase) was activated in 3D macromere 30 - 60 min. after embryo reached the 24 cell stage. Treatment with U0126, a specific inhibitor of MEK (MAPK/ERK kinase), at the 4-8 cell stage completely inhibited the expression of nodal and its downstream Pitx, whereas, similar treatment at the 24-cell stage after the activation of MAPK did not inhibit the gene expressions. These results clearly indicate that chirality determined at the 8-cell stage is transferred to the 24-cell stage via spiral cleavage and MAPK at the 24-cell stage controls the left-right asymmetric expression of *nodal/Pitx* genes.

Biography

Reiko Kuroda has obtained her PhD in Chemistry from The University of Tokyo and carried out Postdoctoral studies at King's College London. Her research focuses on chirality both in the field of chemistry and biology: Chirality recognition, transfer and amplification in the solid state, development of chiroptical spectrophotometers to follow aggregation processes of e.g., β -amyloids and the molecular basis of snail coiling. She has 320 papers published to her credit.

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