Press Release

Dynamic New Connections

Researchers of the University of Freiburg decode a signal activating the first cell movements in the embryo

A research team of the University of Freiburg has elucidated the molecular control mechanisms that transform the initially tightly cohesive earliest cells of the zebrafish embryo so that the first major cell migration in their development is initiated. The researchers from the Department of Developmental Biology of the Institute of Biology I, the Center for Biological Systems Analysis, and BIOSS Centre for Biological Signalling Studies, the Cluster of Excellence of the University of Freiburg, under the direction of Prof. Dr. **Wolfgang Driever** have published the results in the current issue of the scientific journal "Developmental Cell".

A better understanding of cell migration is of high biomedical relevance. Whereas for a healthy human or animal body cell movements are for example essential for wound healing, it may be lethal when cancer cells start to migrate into the body and induce metastases. Cell migration can be studied especially well during embryogenesis of model organisms such as the zebrafish, because it develops in the water, and the movements of each cell can be observed under the microscope.

Following fertilization of the egg, during the next cell divisions all cells of the embryo have to stick together tightly. Otherwise the embryo may split into parts. Shortly thereafter, cells have to start to migrate to build the germ layers of the embryo. To accomplish this, the tight connections have to be resolved. The biologists from Freiburg were able to show that the important

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stem cell factor Oct4 controls the synthesis of a signal, the epidermal growth factor (EGF), which in turn controls the transport of the crucial cell adhesion molecule E-Cadherin from the cell membrane to the interior of the cell in endosomes. These mechanisms regulate the activity of E-Cadherin at the cell membrane and enable cells to dynamically form new connections and start to move.

The project was performed in the Collaborative Research Center (SFB 850) "Control of Cell Motility in Morphogenesis, Cancer Invasion and Metastasis". The results are relevant for potential mechanisms involved in cancer metastasis, because similar regulations involving EGF and E-Cadherin contribute to the so-called epithelio-mesenchymal transition that may initiate tumour invasion. Furthermore, the contribution of the stem cell factor Oct4 is crucial to study the properties of cancer stem cells.

Original publication:

Sungmin Song, Stephanie Eckerle, Daria Onichtchouk, James A. Marrs, Roland Nitschke, Wolfgang Driever. Pou5f1-dependent EGF expression controls E-cad endocytosis, cell adhesion, and zebrafish epiboly movements. Developmental Cell Vol. 24, p 486-501. DOI: 10.1016/j.devcel.2013.01.016

Caption: Groups of red and green labelled cells in a zebrafish during their first migration.

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