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# New Insights into the Development of Epithelial Cells

**Epithelial cells cover all internal and external surfaces of the body. They have an upper and a lower side, which have different functions. Until now, scientists assumed that these two poles develop in all epithelial cells in the same manner - irrespective of whether they are located in the heart, in the retina, or in the nervous system. Now, Dr. Nana Bit-Avragim, Dr. Nicole Hellwig, and Dr. Salim Abdelilah-Seyfried have shown that, depending on the tissue, a different variation of a complex consisting of five core proteins is active and orientates the epithelial cells. The results of the MDC scientists have now been published in the Journal of Cell Science (2008, Vol. 121, pp. 2503-2510)*.**

Scientists worldwide use zebrafish to study the development of vertebrates, the group to which humans also belong. Zebrafish are only a few centimeters long and their embryos are transparent, which is why researchers can observe every change under the microscope. In the early development of zebrafish, the heart is like a tube surrounded by a pump of epithelial cells.

The upper and lower sides of an epithelial cell are clearly different. The upper side, which forms a boundary between organs and either tissue fluid, hollow spaces, or the environment, has a different function than the lower side facing the connective tissue. Both poles of an epithelial cell are vital for the functioning of the heart and other organs.

Different proteins steer cell polarity
Until now, the scientists had assumed that the development of the cell poles was steered by a protein complex which scientists call Crumbs/Nagie oko complex. "What is surprising is that, depending on the tissue, the protein complex has a different composition while being fully functional," Dr. Abdelilah-Seyfried explained. Thus, some proteins in the heart are not needed, but for the development of epithelial cells of the retina they are fundamental. "The program as understood previously may apply for individual cells in the laboratory," Dr. Abdelilah-Seyfried said, "but in a complex organism like the zebrafish, there are many deviations." In the opinion of the researchers, these deviations indicate that the epithelial cells have adapted to their tasks in the respective tissue. Until now, these processes have not been fully elucidated. Next, the MDC researchers want to find out whether still more proteins are involved in epithelial cell polarization.

*Divergent polarization mechanisms during vertebrate epithelial development mediated by the Crumbs complex protein Nagie oko

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