

Headless Tadpoles and Cancer – Results of Defective Cellular Communication

Highly complex biochemical signaling systems tell body cells to divide, to stop growing or to specialize on specific tasks. Among the key cellular communication systems is the Wnt signaling pathway which controls embryonic development and also plays a role in the development of tumors. Scientists of the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) have now been able to close a critical gap in our knowledge of this well-explored sequence of biochemical signals.

About 20 different members of the Wnt family of proteins start a signaling cascade that transmits commands from specific docking sites on the cell membrane across the cytoplasm to the nucleus. The cell responds to the signal by switching on or off specific genes. In the latest issue of *Nature*, a group of researchers headed by **Professor Dr. Christof Niehrs** describe the critical step of signal transduction from the cell membrane to the cytoplasm – a step that had been unknown so far. They demonstrated that an enzyme called casein kinase 1 γ (CK1 γ) is indispensable for transmitting Wnt signals from the cell membrane receptors into the cell.

In vertebrates, Wnt signals determine the formation of the body axes. The Heidelberg researchers use the effect of CK1 γ on embryos of the clawed frog *Xenopus* to demonstrate that CK1 γ is an important element of the Wnt signaling pathway. If CK1 γ is switched off in the frog embryo, this leads to the development of tadpoles with vestigial abdomens and enlarged heads. By contrast, if the investigators increase the CK1 γ level in the embryo, malformed headless tadpoles are the result. The function of CK1 γ is highly conserved in evolution: In the fruit fly *Drosophila*, blocking of CK1 γ also interrupts the Wnt signaling pathway.

Since alterations in various genes of the Wnt pathway are described in most of the common tumors, this cellular communication pathway is of central interest for cancer research. The more complete our knowledge of its individual steps, the more possibilities are opened up to interfere specifically with the defective communication of transformed cells using advanced therapeutic agents.

Publication: Gary Davidson, Wei Wu, Jinlong Shen, Josipa Bilic, Ursula Fenger, Peter Stanek, Andrei Glinka, and Christof Niehrs: Casein kinase 1 γ couples WNT receptor activation to cytoplasmic signal transduction. *Nature*, December 8th, 2006

The task of the Deutsches Krebsforschungszentrum in Heidelberg (German Cancer Research Center, DKFZ) is to systematically investigate the mechanisms of cancer development and to identify cancer risk factors. The results of this basic research are expected to lead to new approaches in the prevention, diagnosis and treatment of cancer. The Center is financed to 90 percent by the Federal Ministry of Education and Research and to 10 percent by the State of Baden-Wuerttemberg. It is a member of the Helmholtz Association of National Research Centers (Helmholtz-Gemeinschaft Deutscher Forschungszentren e.V.).

This press release is available at www.dkfz.de/pressemitteilungen

Dr. Julia Rautenstrauch
Division of Press and Public Relations
Deutsches Krebsforschungszentrum
Im Neuenheimer Feld 280
D-69120 Heidelberg
T: +49 6221 42 2854
F: +49 6221 42 2968