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Identification of a key molecule for the initiation of regeneration in axolotl

The research team of Prof. Elly Tanaka at the DFG Research Center for Regenerative Therapies Dresden (CRTD) - Cluster of Excellence at the TU Dresden achieved a breakthrough in the elucidation of important regulatory processes in the restoration of the axolotl's limbs. The publication of these results in *Nature*, one of the world's leading scientific journals once again proves the efficiency of Dresden as location of science and the importance of the CRTD in the field of regenerative biomedical research (DOI 10.1038/nature16974).

Dresden. Several animals in the animal kingdom are able to regenerate parts of their organs up to complete limbs after injury in a fully functional manner and without any scarring. This includes the salamander *Ambystoma mexicanum* (Axolotl), a true miracle healer. However, mammals including man can only dream about this. Therefore scientists around the world are trying to uncover the secrets of this process.

Prof. Elly Tanaka of the DFG Research Center for Regenerative Therapies Dresden (CRTD) - Cluster of Excellence at the TU Dresden and her team just made an important step toward this goal. All factors that are produced from the genome of injured axolotl tissue were tested for their ability to stimulate cells to enter cell division. This led to the identification of the MARCKS-like protein (MLP), which is a key molecule for triggering regeneration. If the molecule is blocked, the regeneration process is impaired.

Interestingly, the MARCKS-like protein is also found in mammals. Nevertheless, it appears to be differently regulated in man. "While in axolotl it is delivered outside of the cells into their direct environment, it remains within the cells in man", says Takuji Sugiura. That is why it is very important to identify its signaling chain and to understand how it acts. In the coming years it will be investigated whether and how the human MARCKS molecule can stimulate cell division in man. Professor Elly Tanaka sees this scientific result as very fundamental step in regenerative research: "Only the detailed deciphering of the regeneration process in the animal model "axolotl" enables us to fundamentally thinking about the development of tissue of limbs, for example in case of an amputation on humans."

This latest success of a CRTD research group once again proves the importance of basic research and animal models for the development of completely new therapeutic approaches and methods. Personalized medical approaches - therapies of the future – are based on molecular biological fundamentals and their decoding is the major focus of the CRTD's research activities.

Scientific publication

“MARCKS-Like Protein is an Initiating Molecule in Axolotl Appendage Regeneration”

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Founded in 2006, the DFG Research Center for Regenerative Therapies Dresden (CRTD), Cluster of Excellence at the TU Dresden has passed the third phase of the Excellence Initiative which aims at promoting top-level research and improving the quality of German universities and research institutions. The goal of the CRTD is to explore the body's self-healing potential and to develop completely new, regenerative therapies for hitherto incurable diseases. The key areas of research include haematology and immunology, diabetes, neurodegenerative diseases and bone regeneration. At the moment, eight professors and ten group leaders are working at the CRTD – integrated into an interdisciplinary network of 87 members at seven different institutions within Dresden. In addition, 21 partners from industry are supporting the network. The synergies in the network allow for a fast translation of results from basic research to clinical applications.

www.crt-dresden.de



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