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Biomedical Lessons from Spiders and Axolotl

Regeneration has been a central aim in medicine, leading to various approaches to overcome injuries and organ failures. The caudate species *Ambystoma mexicanum* (axolotl) is able to regenerate fully functional body parts and therefore of high interest for regeneration research. While the complex regeneration of limbs in non-amphibian vertebrates will remain a challenge, accelerated wound healing with reduced scarring might be a realistic aim. After identification of AmbLOXe a unique lipoxygenase of the axolotl, *in vitro* and *in vivo* trials lead to promising results indicating a possible use of this enzyme to support wound healing in mammals. Although the axolotl is a famous animal model of regeneration and in our days a popular pet the species is critically endangered due to habitat pollution and invasive fish species. This situation highlights that biomedical research and species conservation are no opposites as extinction leads to an irretrievable loss of natural resources to overcome medical challenges.

Beside induction of regeneration treatment of defects by tissue engineered constructs is seen as a promising option. Spider silk has been used to treat skin wounds since ancient times. Recent research showed that this natural material provides excellent biocompatibility and -degradability combined with interesting mechanical properties. These features make spider silk suitable as scaffold for tissue engineering as well as implant material e.g. to treat peripheral nerve defects. In sheep a 6 cm tibial nerve defect regenerated fully functional after implantation of a decellularized vein graft filled with spider silk.

CV

Medical Department I, Laboratory for Molecular Gastroenterology Ruhr-University Bochum, Germany	2006 – 2008	research associate
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Research interests: regeneration, tissue engineering, adipose derived stromal cells, spider silk, *Ambystomatidae*, amphibian species conservation, amphibian primary cell cultures, alternatives to animal trials