

Extracellular matrix remodeling and amphibian limb tissue regeneration

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Extracellular matrix (ECM) remodeling, i.e. ECM degradation and reformation, is a critical process in tissue regeneration. Amphibian axolotl and xenopus froglet represent regeneration-competent and regeneration-deficient animals, respectively, and can serve as ideal comparison animal models to study tissue regeneration, including limb epimorphic regeneration. This study was to understand the differences on the ECM remodeling at the early stage of tissue regeneration between axolotl and xenopus froglet. After amputating the hindlimbs at middle tibia level, we collected the blastema from axolotl and the pseudoblastema from xenopus froglet at several regeneration stages, and compared the activities of ECM degradation enzymes such as matrix metalloproteinases (MMPs) and the expression of ECM proteins. Results showed that about 10 members of MMPs and their internal inhibitors were detectable in both axolotl blastema and xenopus pseudoblastema tissues. However, the expression of MMPs in axolotl reached their peaks at the histolysis stages (about 4~5 days after limb amputation), while such peaks occurred earlier in xenopus pseudoblastema tissue, i.e. at 24 hours after amputation. The types of ECM proteins produced by both axolotl blastema and xenopus pseudoblastema were about 4.8% of total proteins, but the expression patterns and the classifications of ECM proteins were very different between axolotl blastema and xenopus pseudoblastema. The differences on ECM remodeling between regeneration-competent axolotl and regeneration-deficient xenopus froglet might create different signal environment to mediate stem cell release, migration, and differentiation, and induce local cell dedifferentiation, proliferation and differentiation, which result in different regeneration abilities in these two animals.

Biography

Fengyu Song has received her D.D.S. from Western China University of Medical Science in China and completed her Ph.D. from Indiana University School of Dentistry and postdoctoral studies from Indiana University Center of Regenerative Biology and Medicine. She has published more than 15 papers in reputed journals and served as a panelist for NSF panel review, reviewers for five reputable journals and an editorial board member of Journal of Endodontics, the official journal for the American Association of Endodontics.

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