The Role of Immune-Inflammatory Response in the Process of Salamander Tail Regeneration and Its Intervention Measures: A Preliminary Study

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Tissue organs of amphibians such as the liver possess perfect regenerative capacity, whereas human limb amputation cannot regenerate, and the underlying mechanisms remain unclear. Numerous studies have confirmed that tissue immune-inflammatory response is one of the critical factors influencing perfect tissue regeneration. The purpose of this study was to investigate the impact of immune-inflammatory response on tissue regeneration. The research methodology involved performing tail amputation on the posterior limbs of salamanders to establish a salamander tail regeneration model. Two opposing strategies were employed as technical approaches: using lipopolysaccharide (LPS) to induce excessive inflammatory response in the amputated tail wound tissue, and taurine (TAU) to suppress the immune-inflammatory response in the amputated tail wound tissue. Subsequently, the salamander tail regeneration process was observed to explore the role and mechanism of tissue immune-inflammatory response in salamander tail regeneration, thereby providing theoretical and interventional strategy support for the development of damaged tissue organ regeneration technologies. The results demonstrated that compared with the control group, both LPS and TAU treatment groups exhibited inhibitory effects on tail regeneration, manifested as significantly slowed growth rate of the regenerated tail. The conclusion drawn is that endotoxin-induced excessive inflammation delays tail regeneration, while taurine-mediated inflammation suppression almost completely blocks tail regeneration, suggesting that moderate inflammation serves as the foundation for regeneration initiation, whereas excessive inflammation can inhibit the regenerative process.

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