The neuropeptide cart3 enhances finfold regeneration in zebrafish

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Overview

- Nerve signals are a necessary component of limb regeneration
- Neuropeptide Cart3 is expressed in sensory neurons located within the finfold of larval zebrafish
- Upon amputation, Cart3 is upregulated
- Finfold regeneration is increased by overexpressing Cart3

Regeneration Nerve Dependence

A. After 7 days the salamander is denervated and amputated. B. Regeneration only takes place in the innervated limbs, indicating that intact nerves are necessary for regeneration. C. Nerve deviation results in an ectopic blastema, causing the growth of an accessory limb. This study demonstrates that nerve-derived signals can stimulate limb growth.

Finfold Regeneration

Regeneration spanning 48 hours post amputation

Expression of Cart3

Cart3 expression is induced after tissue damage and remains upregulated during regeneration of numerous tissues. Data taken from http://www.tfregeneration.org

Inducing Cart3 Expression in a Stable Transgenic Line

Future Directions

- Quantify Cart3-mediated changes in cell proliferation within the blastema of regenerating fin folds
- Examine expression of markers of wound epithelium and blastema in Cart3 mutants and Cart3-overexpressing larvae
- Quantify Cart expression in larvae in which lepithin expression has been induced
- Generate mutants for genes that act downstream of leptin and cart in bone remodeling

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