Towards Induction of Lens Regeneration
Engineering the salamander genome using CRISPR-Cas9 triggered genomic tailoring
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Why Salamanders?
It is important to study regenerative capacity of salamanders at the molecular level as this will enhance our knowledge to induce same effect in other non-regenerative models, with an ultimate goal to apply to Homo sapiens. To make it possible it is not only important to study animal models at the genetic level, but also to efficiently tailor their genes.

CRISPR-Cas9 as Engineering Tool
Till now clustered regularly interspaced short palindromic repeat (CRISPR) method has proved to be a powerful tool to manipulate genetic signaling in various species covering from C.elegans to in vitro human cell lines. We are using CRISPR-Cas9 system to manipulate salamander’s genetic circuit, suspecting to play a role in regeneration.

Introduction

CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats) is a naturally occurring system found in bacteria and archaea that serves as an adaptive immune system. It allows the bacterial cell to remember and counteract infections by various viruses. In recent years, CRISPR has been engineered for use in various fields, including medicine, agriculture, and basic research. The CRISPR-Cas9 system is considered a powerful tool for gene editing. It uses a guide RNA to target specific DNA sequences, allowing for precise cutting of the DNA at those locations. Cas9 is a type of nuclease that can cut DNA at the site guided by the RNA. By using CRISPR-Cas9, scientists can efficiently manipulate genes in both in vitro and in vivo applications.

The salamander genome is being engineered using the CRISPR-Cas9 system. The goal is to study the regenerative capacity of salamanders at the molecular level and to apply this knowledge to other non-regenerative models with the ultimate goal of enhancing regeneration in Homo sapiens.

Strategies

1. Peptide-Cas-9-SV40-NLS-tbb-2 3’UTR
2. pu6_CONTROL_SgRNA
3. pu6-BseR1-BseR1-SgRNA

Figure 2: Most efficient Genetic Engineering tool

Discussion

The research project can open a novel window in the field of regeneration, and can lead to develop the methodology to enhance regenerative capacity in animal models, which have lost it.

Acknowledgments

I would like to acknowledge my advisor Dr. Tsonis and all other current Tsonis lab members for helping in this research project. I would also like to thank the Department of Biological Sciences, University of Dayton for their support.