Synthetic Circuits for the Targeting and Differentiation of Cardiomyocytes to Repair Infarcted Cardiac Tissue

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Abstract

Cardiomyocyte Differentiation Circuit

We designed an injectable cardiomyocyte differentiation circuit based on the current controversy of cardiomyocytes from stem cells to generate cardiac-like cardiomyocytes. We introduce the role of our system in the repair of acute and chronic heart failure.

Introduction

Cardiomyocytes are crucial for the function of the heart. They are responsible for the contraction of the heart, which pumps blood throughout the body. The differentiation of cardiomyocytes is a critical process for the repair of heart tissue in cases of damage or disease.

Circuit Description

The circuit is designed to induce the differentiation of cardiomyocytes from stem cells. It consists of a series of factors and signaling pathways that stimulate the cardiomyocyte differentiation process.

Circuit Operation

The circuit works by delivering the necessary factors to induce the differentiation of cardiomyocytes. These factors are delivered to the site of injury, where they interact with the stem cells to promote their differentiation into cardiomyocytes.

Circuit Outcomes

The differentiated cardiomyocytes can then be used for tissue repair, potentially improving heart function and reducing the risk of heart failure.

CRP Targeting Circuit

CRP circuit includes several key components, such as the CRP receptor, which binds to CRP and triggers a signaling cascade that ultimately leads to the proliferation and differentiation of cardiomyocytes.

CRP Targeting Circuit Results

Fig. 1. CRP Targeting and Signaling Circuit Diagram

CRP Targeting Circuit Diagram

Effects To Ad In Anti-apoptosis, Attenuation Of The Tissue Microenvironment, and Integration

Ligation CRP binding to the receptors also increases the expression of the CRP receptor, leading to a feedback loop that further enhances the differentiation process.

Future Directions

The development of such circuits has significant implications for the treatment of heart failure. Future work will focus on optimizing the circuit design and improving the efficacy of the differentiation process.

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