Oncobeat: Platform for Screening for Chemotherapy-Induced Cardiotoxicity

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# Methods for Preventing Chemotherapy-Induced Cardiotoxicity

## Background & Unmet Need

- **Cardiotoxicity**
  - Cardiotoxicity is a major concern for patients receiving chemotherapy, as well as the development of new chemotherapeutic drugs.
  - Of the 50% of cancer patients that receive chemotherapy, between 5–25% of survivors develop chemotherapy-induced cardiovascular diseases.
  - Moreover, cardiotoxicity is a leading cause of failure for new chemotherapy drug development.
  - Chemotherapy-induced toxicity affects multiple cardiac cell types, including both cardiomyocytes and pacemaker cells.
  - Current cardiotoxicity screens only evaluate cardiotoxicity to cardiomyocytes, but not pacemaker cells.

- **Unmet Need**
  - Methods for screening drugs that protect both cardiomyocytes and pacemaker cells from chemo-induced cardiotoxicity.

## Technology Overview

- **The Technology**
  - A human stem cell-based platform to screen for cardioprotective drugs.

- **The Discovery**
  - The inventors have developed a method of generating and isolating sinoatrial node (SAN) cells, also known as pacemaker cells, from human embryonic stem cells.
  - These SAN cells can be used as part of a platform for screening chemotherapeutic drugs for cardiotoxicity.

- **PoC Data**
  - SAN cells generated using this system demonstrate molecular and electrophysiological characteristics of pacemaker cells.
  - A candidate cardioprotective drug, CardioPro, has been identified which protects heart cells from doxorubicin-induced cardiotoxicity *in vitro* and *in vivo*.

### Inventors:
- Shuibing Chen
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- Zaniar Ghazizadeh

### Patents:
- US Patent Application Filed

### Publications:

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### Cornell Reference:
- D-8784, D-8785
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**Technology Applications**

- Screening platform for identifying cardioprotective drugs
- Prevention of chemotherapy-induced cardiotoxicity using CardioPro drug candidate
- Platform for modeling other cardiac diseases such as cardiomyopathy

**Technology Advantages**

- Platform integrates both pacemaker and cardiomyocyte cell types, providing a more complete picture of cardiotoxicity than current platforms
- Isolation of pacemaker and cardiomyocytes, as well as analysis of cardiotoxicity, is made easier by the development of several reporter lines

**Supporting Data / Figures**

- Figure 1: Schematic of screening platform for cardioprotective drugs.

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Supporting Data / Figures

CardioPro prevents cell death (indicated by cleaved-Caspase3) in human pacemaker cells in vitro

CardioPro prevents arrhythmia and cell death (indicated by cleaved-Caspase3) in the murine heart in vivo.

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