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Label-free, Non-genetic Methods of Sorting Human Stem Cell Derived Cardiomyocytes

Tech ID: 22045 / UC Case 2010-609-0

ABSTRACT

Researchers at the University of California, Davis have developed a method of identifying and sorting cardiomyocytes (CMs) derived from human pluripotent stem cells using second harmonic generation microscopy.

FULL DESCRIPTION

Human embryonic and induced pluripotent stem cells (PSCs) can differentiate and reform into any cell type found in the human body. PSC-derived cardiomyocytes (PSC-CMs), which are muscle cells in the heart that control heart contraction, could potentially be a new source of transplantable cells for regenerative therapies in cardiovascular medicine. Additionally, PSC-CMs can potentially be used for cardiac drug delivery and screening, and the development of in vitro models for various heart diseases. However, PSC-CMs must be cleared of all residual PSCs and thus become a pure population of CMs before therapeutic applications to ensure effectiveness. Currently, there are no established methods for sorting pure populations from PSC-CMs. Current proposed sorting methods have developed flaws including lack of detection sensitivity, chemical interactions that risk rendering samples nonviable, and genomic techniques that raise clinical safety concerns. Other methods are invasive or require time-consuming processes.

Researchers at the University of California, Davis have developed a method of identifying and sorting CMs derived from human pluripotent stem cells using second harmonic generation (SHG) microscopy. SHG is a laser-based technique that can identify CMs with high sensitivity. Moreover, this method can differentiate CMs at different stages of maturation. This method does not require genetic modification of the cell or any exogenous labels to be used, which makes this an attractive technique for obtaining pure populations of CMs for clinical and therapeutic use, as well as for tissue engineering and drug discovery applications.

APPLICATIONS

- ▶ Identifying stem cell-derived cardiomyocytes
- ▶ Sorting for pure populations of PSC-CMs

FEATURES/BENEFITS

- ▶ Label-free (xeno-free)
- ▶ Non-genetic (vector-free)
- ▶ High sensitivity, detects even immature cardiomyocytes
- ▶ Can discriminate cells at different maturation cells

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,879,224	01/30/2018	2010-609

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Imaging Modalities and Methods for Enhanced, Label-free Histopathology During Surgery](#)
- ▶ [An Optical System for Parallel Acquisition of Raman Spectra from a 2-Dimensional Laser Beam Array](#)

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OTHER INFORMATION

KEYWORDS

Sorting methods, Stem cell identification, Label-free, Cardiomyocytes, Second harmonic generation (SHG)

CATEGORIZED AS

- ▶ **Optics and Photonics**
 - ▶ All Optics and Photonics
- ▶ **Biotechnology**
 - ▶ Health
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 - ▶ Gene Therapy
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2010-609-0

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