



## Small molecules promoting differentiation/maturation of stem cell-derived myogenic cells

A combinatorial small molecule treatment that promotes differentiation and maturation of myotubes derived from pluripotent stem cells.

Technology ID

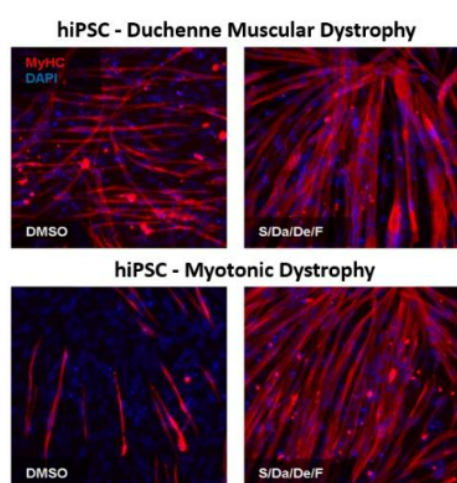
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Category

Life Sciences/Biochemicals & Small Molecules

Life Sciences/Human Health

Life Sciences/Research Tools



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**IP Status:** US Patent Issued; **Issued Patent No.** 11,697,798

### Applications

- Cell culture of human pluripotent stem cell-derived myotubes

### Key Benefits & Differentiators

- **Enhanced differentiation/maturation:** Increased expression of myosin heavy chain isoforms
- **Improved contractile force:** Treatment upregulates contractile function genes
- **Readily available compounds:** Inhibitor compounds are purchased commercially

### Technology Overview

Human pluripotent stem cells represent an attractive model system for studying various genetic diseases due to their ability to differentiate in vitro into various cell types of the body. This feature allows for studying disease mechanisms in vitro using patient specific induced pluripotent stem (PS) cells. One challenge encountered when using PS cell-derivatives to study diseases has been the tendency to produce embryonic, fetal, or generally immature forms of the terminally differentiated cell types desired (as reported for cardiomyocytes, hepatocytes, and pancreatic cells). The lack of full maturation of terminally differentiated cells is an impediment to the application of PS cell-derivatives for recapitulation of disease phenotype and disease modeling.

To address this challenge, researchers at the University of Minnesota conducted a small molecule screen for potential candidates able to promote differentiation/maturation of PS cell-derived myotubes. They identified the compounds SB431542 (S), DAPT (Da), Dexamethasone (De), Forskolin (F) and PD0325901 (P) as potent enhancers of maturation. Combinatorial treatment with S/Da/De/F resulted in myotubes with enhanced maturation, as evidenced by the expression profile of myosin heavy chain isoforms, and the upregulation of genes related with muscle contractile function. Together, treatment with these compounds generates muscle cells that could be used to study skeletal muscle function and screen for possible therapeutic compounds in a more physiologically relevant state.

## Phase of Development

### TRL: 3-4

Proof-of-concept using these compounds has been successfully demonstrated in human iPSCs derived from Muscular Dystrophy patients.

## Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

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## Researchers

- [Rita Perlingeiro, PhD](#) Professor, Department of Medicine-Cardiovascular Division

## References

1. Sridhar Selvaraj, Ricardo Mondragon-Gonzalez, Bin Xu, Alessandro Magli, Hyunkee Kim, Jeanne Lainé, James Kiley, Holly Mckee, Fabrizio Rinaldi, Joy Aho, Nacira Tabti, Wei Shen, Rita CR Perlingeiro(11/11/2019) , <https://elifesciences.org/articles/47970#s4>, <https://elifesciences.org/>, 8