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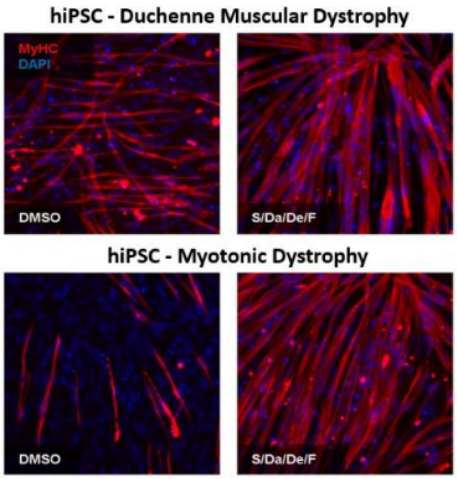
Small molecules promoting differentiation/maturation of stem cell-derived myogenic cells

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



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.

Technology ID
20180079

Category
Life Sciences/Biochemicals & Small Molecules
Life Sciences/Human Health
Life Sciences/Research Tools

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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

Please contact our office to share your business' needs and learn more.

Researchers

- **Rita Perlingeiro, PhD** Professor, Department of Medicine-Cardiovascular Division

References

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