

## Poster #2

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**Abstract Short Title:** "Oscillated Expression of MyoD"

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### Potential Impacts of the Oscillated Expression of Myogenic Transcription Factors on Muscle Stem Cells

*Lily Den Hartog, Dr. Atsushi Asakura*

Circadian rhythms (CR) are oscillations of approximately 24 hours in various functions regulating cells throughout the body, which are regulated in the suprachiasmatic nucleus of the hypothalamus to allow an organism to adjust for daily environmental changes. These cycles have a molecular basis, driven by a feedback mechanism involving circadian master transcription factors. This feedback loop of CR is present in all tissues examined and persists cell-autonomously at a single-cell level, including in muscle stem cells. The MyoD is essential for muscle stem cell differentiation and regeneration, assisting with directing progenitor cells to form skeletal muscle lineage. MyoD is regulated by transcription factors dictating the CR, and further research is needed in order to determine the particular effects of the activity oscillation on differentiation level. Moreover, optogenetics is the control of genetically modified cell activity with light. I assessed the effectiveness of the devised optogenetic system to activate MyoD in 10T1/2 fibroblast cell line cells by using a blue-light illuminator to expose cells to light during given time intervals after infection of retroviral vectors for GAVPO-mediated MyoD expression. The optogenetic system showed clear MyoD expression stimulated by blue-light illumination in fibroblast cell line. I anticipate that the oscillation-mediated muscle differentiation will have a measurable effect because of the established presence of the CR in muscle stem cells and in MyoD expression. This knowledge can be utilized both in future muscle research and in clinical applications for DMD, as therapies can be maximized in accordance with prime differentiation patterns.