

Satellite Cell Proliferation at Different Phases of the Menstrual Cycle Following Electrical-Stimulation-induced Muscle Damage

WERNER HUNTER, BRANDON PFEIFER, & ROBERT D. HYLDAHL

Hyldahl Research Lab; Exercise Science; Brigham Young University; Provo, UT

Category: Undergraduate

Advisor / Mentor: Hyldahl, Robert (robhyldahl@byu.edu)

ABSTRACT

Estrogen plays a variety of roles in women's health, affecting bone, muscle, cardiovascular, metabolic, and connective tissue function. Satellite cells are known to be essential in the regenerative capabilities of skeletal muscle, and current studies suggest that estrogen plays a crucial role in satellite cell proliferation following muscle damage. Estrogen levels fall and rise during the early and late stages of the follicular phase of the menstrual cycle, respectively. **PURPOSE:** To investigate the role of menstrual cycle phase on satellite cell proliferation in response to muscle damage. We hypothesized that skeletal muscle satellite cell content would increase to a greater extent when muscle damage is induced during the late follicular phase (high estrogen) compared to the early follicular phase (low estrogen). **METHODS:** 22 premenopausal females were recruited and split into two groups, early follicular (EF) and late follicular (LF). After menstrual cycle tracking and phase confirmation, subjects provided a muscle biopsy one week prior to test day. On test day, subjects underwent 200 electrically stimulated eccentric muscle contractions (ES). Subjects reported gave a final biopsy 7 days following ES. Sections from muscle biopsies were stained with Pax7, laminin and DAPI to identify and quantify satellite cells. **RESULTS:** Baseline satellite cell content was similar for the EF (0.088 ± 0.03 SC/fiber) and LF (0.094 ± 0.03 SC/fiber) groups. 7 days following electrical stimulation, muscle satellite cell content increased ($p=0.02$) in both EF (0.123 ± 0.05 SC/fiber) and LF (0.124 ± 0.03 SC/fiber) groups, with no significant difference between groups ($p=0.79$). **CONCLUSION:** Our data indicate that muscle damage induced by electrical stimulation results in skeletal muscle satellite cell proliferation similarly during the early follicular and late follicular phases of the menstrual cycle.