## DATA SET GROUP B EXPLORE 2 LESSON 27



## Study 1

## Pax7+ satellite cells in young and older adults following resistance exercise

Publish Date: 2013 Journal: Muscle & Nerve Authors: Dillon K. Walker Ph.D., Christopher S. Fry Ph.D., MICAH J. Drummond Ph.D., Jared M. Dickinson Ph.D., Kyle L. Timmerman Ph.D., David M. Gundermann MSc, Kristofer Jennings Ph.D., Elena Volpi MD, Ph.D., Blake B. Rasmussen PhD Link: https://doi.org/10.1002/mus.23266

#### **Overview of the Study**

This study investigated satellite cell (SC) activity in response to acute resistance exercise (RE). Satellite cells, which are a part of muscle fibers, have been known to be involved in muscle recovery from exercise.

Ten young and eleven older individuals perform resistance exercises consisting of 8 sets of 10 repetitions of bilateral leg extension exercise at 70% of 1RM with a 3-minute rest period between sets. Muscle biopsies were taken prior to the exercise, six hours after exercise, and 24 hours after exercise.

Scientists then analyzed the muscle biopsies to determine how the number of active satellite cells, also known as Pax7+ cells, changed in the muscle tissue in response to exercise.

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#### Results



**Figure 1** The number of Pax7+ cells at baseline and at 6 and 24 h post resistance exercise in young (black lines) and older (grey lines) men (solid lines) and women (dashed lines). \*Different from baseline,  $P \le 0.006$ . †Different from all groups at 24 h,  $P \le 0.006$ .

## Study 2

# Exercise promotes satellite cell contribution to myofibers in a load-dependent manner

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#### **Overview of the Study**

This study investigated how changes to the intensity of exercise would impact the amount of satellite cells (SC) that are recruited to myofibers in mouse plantar flexor muscles. Scientists used mice running on treadmills in this study. Mice were randomized into three groups: sedentary controls (no running), voluntary low load endurance wheel running where there is no extra resistance on the wheel (VRun), and voluntary high load resistance wheel running where extra resistance is placed on the wheel (VResRun). The mice ran on the treadmills every day for eight weeks. The minimal distance that mice needed to run was set at 2 km per night.

Muscle tissues were collected 24 hours after the last exercise session. Subsequently, the m. soleus (SOL), m. plantaris (PLT), m. gastrocnemius (GAS), m. tibialis anterior (TA), and m. extensor digitorum longus (EDL) were harvested, weighed, and frozen. Frozen sections ( $10 \mu m$ ) of muscle were created. The muscle sections were then imaged with immunofluorescence microscopy to detect the presence of mGFP<sup>+</sup> SCs fused with myofibers.



### Results Figure 2

## mGFP<sup>+</sup> (a green color) myofibers indicate fusion of SCs to myofibers. The images show representative crosssections of soleus (SOL), plantaris (PLT), gastrocnemius (GAS), tibialis anterior (TA), and extensor digitorum longus (EDL) muscles with GFP<sup>+</sup> myofibers to which SCs fused.