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Recommended Citation

Erives, Cristian (2019). "Sex Differences in Exercise Recovery," *Kansas State University Undergraduate Research Conference*. <https://newprairiepress.org/ksuugradresearch/2019/posters/22>

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Sex Differences in Exercise Recovery

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Abstract

Recent findings from our laboratory suggest that recovery from peripheral fatigue measured by pre- and post-potentiated twitch forces following extreme intensity (80%) exercise is faster than following severe intensity exercise (40% MVC). Women have been shown to have predominately higher percentages of slow twitch muscle fibers compared to men. **Purpose:** To test the hypothesis that Q_{tw} (potentiated twitch) following exercise is recovered faster in women in both exercise intensities. **Methods:** 6 subjects (3 men, 3 woman, age 24 ± 4 yrs, 74.5 ± 17.4 kg; 173 ± 5 cm) performed 2 intermittent isometric knee extension tests to exhaustion at 40% and 80% MVC. Repetitions were performed at a 60% duty cycle (3s on, 2s off). Exercise intensities were chosen to elicit time to task failure (T_{lim}) in < 2 min (extreme intensity) and 2-15 min (severe intensity). Task failure was defined as the inability to maintain target force of MVC (40%, 80%). Q_{tw} (potentiated twitch) measurements were made every 30s prior to and immediately following exercise. Q_{tw} was compared pre- and post-exercise between intensity. Furthermore, individual Q_{tw} were compared over time during recovery following extreme and severe exercise in men and women. **Results:** Recovery from fatigue following severe intensity exercise shows significant decreases in force production in men and women compared to baseline values: * significantly different from baseline value. Significant decreases in all six force production values following extreme intensity exercise were found in men, while women showed only initial value to be significantly different. Recovery from fatigue in women after the first 30 second measurement increased to near baseline value where the difference in force production was no longer significant. **Conclusion:** No significant difference in recovery in men and women following severe intensity exercise was found. There were significant differences from recovery in men compared to women following extreme intensity exercise. Force production in women 30 seconds into recovery indicated recovery was significant compared to men.

Introduction

- Recent findings from our laboratory suggest that recovery of peripheral fatigue measured by pre- and post-potentiated twitch forces following extreme intensity (80%) exercise is faster than following severe intensity exercise (40% MVC).
- Individuals with predominately slow twitch muscle fibers recover faster than those with predominately fast twitch muscle fibers (Haizlip, 2015).
- Women have been shown to have typically higher percentages of slow twitch muscle fibers compared to men (Haizlip, 2015; Wust, 2008).
- Therefore, the current study investigates potential differences in recovery from extreme and severe intensity exercise between sexes.
- Hypothesis:** Recovery from fatigue will be more rapid in women than in men.

Methods

- 6 subjects (3men, 3women, age 24 ± 4 yrs, 73 ± 15 kg, 175 ± 10 cm) performed two isometric knee extension tests to task failure at 40% and 80% MVC.
- Exercise intensities were chosen to elicit time to task failure in < 2 min (extreme intensity) and 2-15 min (severe intensity).
- Task failure was defined as the inability to maintain target force.
- Neuromuscular measurements were made every 30 s prior to exercise and immediately following task failure to calculate muscular fatigue.
- Twitch force (peripheral fatigue) were compared pre- and post-exercise and between intensities (severe and extreme) in men and women.
- Individual potentiated twitches were compared over time during recovery following extreme and severe exercise.
- Comparison of recovery in men and women were made from both severe and extreme domains.

Results

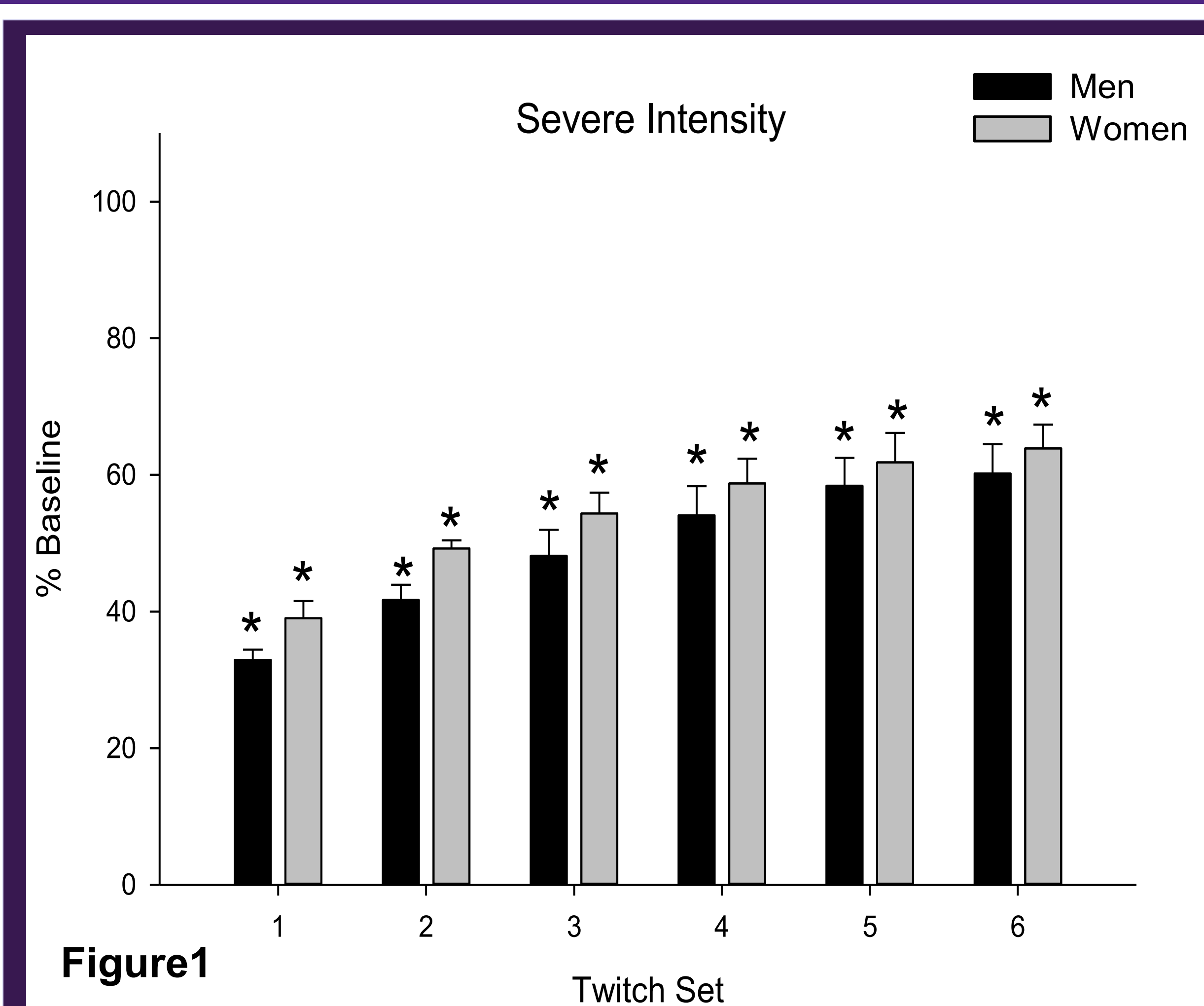


Figure1

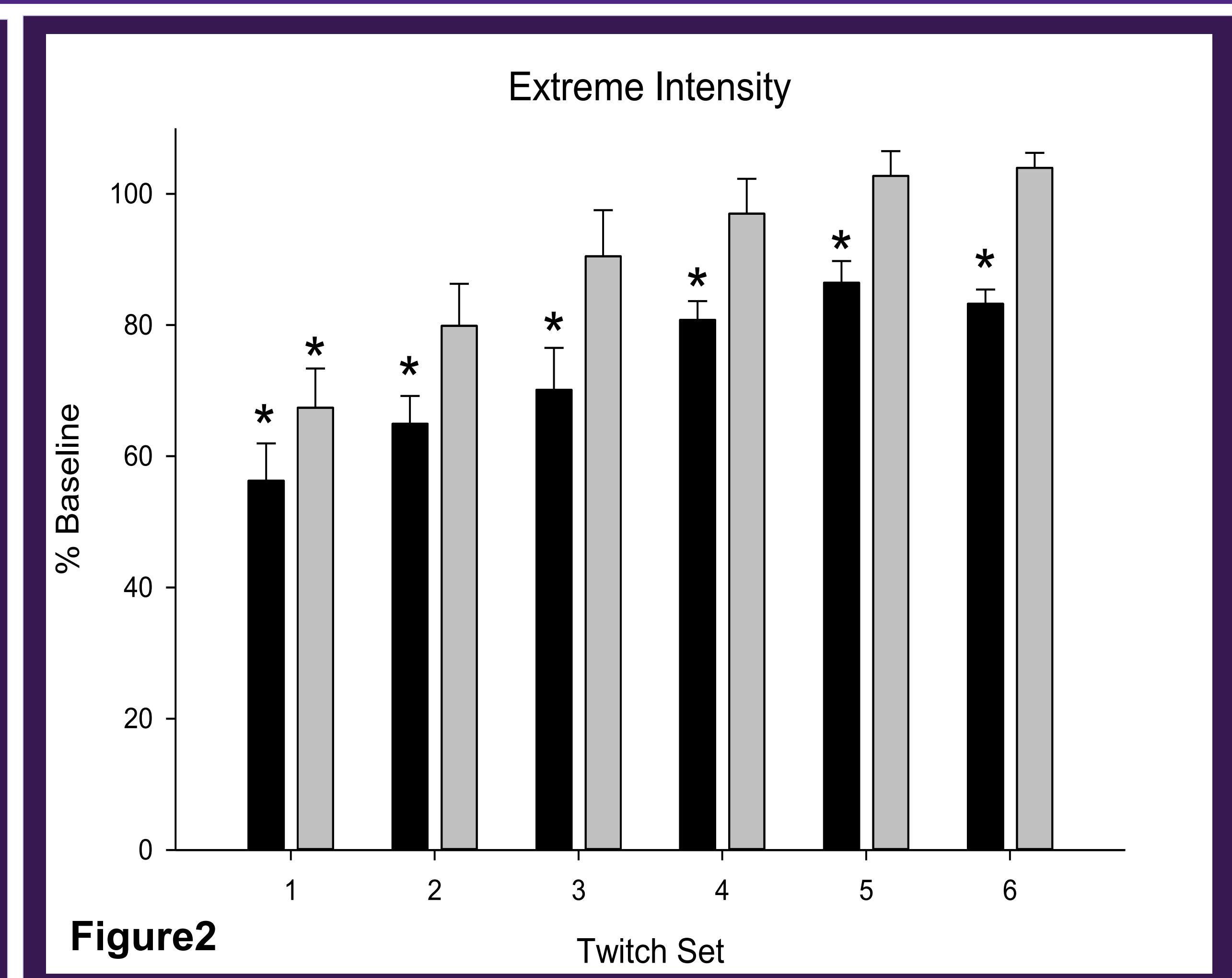


Figure2

Figure1: Recovery from fatigue following severe intensity exercise shows significant decreases in force production in men and women compared to baseline values. * significantly different from baseline value

Figure2: Significant decreases in all six force production values following extreme intensity exercise were found in men, while women showed only initial value to be significantly different. Potentiated twitch force in women was only different during the first measurement, suggesting that peripheral fatigue was no longer present after one minute post-exercise. * significantly different from baseline value.

Conclusion

Peripheral fatigue had not recovered to pre-exercise values in men or women through 3 minutes following severe exercise. Men also showed less twitch force 3 minutes after extreme exercise while women had recovered to near pre-exercise values within 30 s following extreme exercise. This suggests that there are mechanisms in women that are able to recover faster than men after extreme exercise. One potential mechanism is greater slow-twitch fiber type distribution.

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