



ANKLE SPRAINS DECREASE PHYSICAL ACTIVITY IN MICE ACROSS THE LIFESPAN

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INTRODUCTION

- Lateral ankle sprains are one of the most common injuries suffered during physical and recreational activity.
- Even more concerning than the initial ankle sprain is the high recurrence rate and development of chronic ankle instability (CAI).
- Patients with CAI subjectively report symptoms including pain, giving way, and significantly altered levels of function.
- It is not currently known how physical activity levels are altered across the lifespan after an acute lateral ankle sprain.
- Physical inactivity is currently classified as one of the three highest risk behaviors in the development of cardiovascular disease, cancer, and other chronic diseases such as diabetes and obesity.
- Further research is needed to better understand the long term effects of ankle sprains on physical activity levels.

PURPOSE

- To investigate physical activity across the lifespan after a lateral ankle sprain.

Figure 1: Cage set up including running wheel, magnetic sensor, and digital odometer.

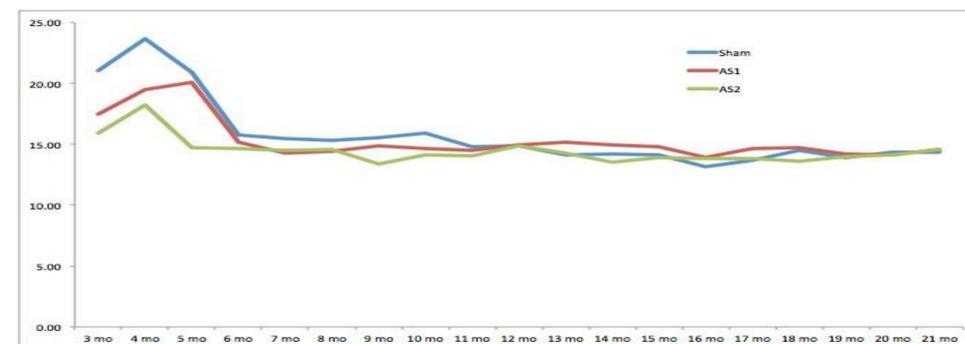
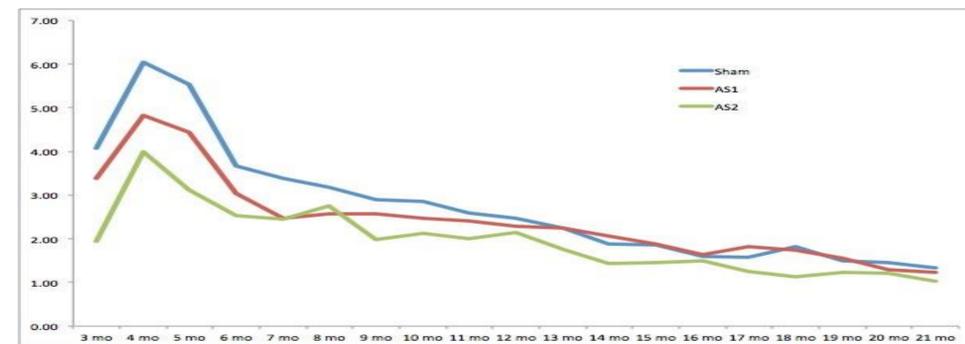


Biodynamics Research Laboratory at
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METHODS

- Thirty male mice (CBA/J), from Jackson Laboratory (JAX; Bar Harbor, ME) were randomly placed into one of three groups: the transected calcaneofibular ligament (CFL) group, the transected anterior talofibular ligament and CFL (ATFL/CFL) group, and a SHAM group.
- Mice were housed in a vivarium with 12-h light/dark cycles and standardized temperature (18-22°C) and relative humidity (20-40%). Water and standard chow were provided ad libitum. The UNC Charlotte Institutional Animal Care and Use Committee approved all study procedures as meeting the USDA and the Animal Welfare Act guidelines for the appropriate treatment of animal subjects.
- Under anesthesia and using proper sterilization techniques, all mice received a small curvilinear incision behind the lateral malleolus of the right hind foot. The respective ligaments were then transected for the CFL and ATFL/CFL groups, but no ligaments were damaged or the SHAM group. Incisions were closed using surgical adhesive before post operative care was administered over 72-hours.
- Three days after surgery all mice were placed in individual cages with running wheels. Physical activity (i.e. distance run) was measured using a solid surface running wheel (127 mm, Ware Manufacturing, Phoenix, AZ), magnetic sensor, and digital odometer (Sigma Sport BC600, Olney, IL). Daily running wheel measurements were recorded beginning four days after surgery until the end of the lifespan.

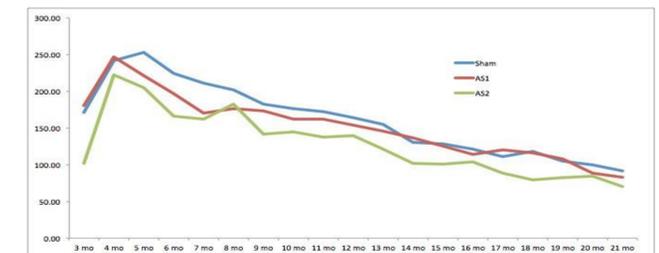
Figure 2 and 3. Distance (km/day), and Speed (m/min)



RESULTS

- The mice in the ATFL/CFL group had significantly decreased duration (p=0.0239), distance (p=0.013), and speed (p=0.003) compared to the SHAM group during week one.
- During weeks two and three, the ATFL/CFL group had significantly less distance (p=0.0001) and duration (p=0.002) compared to the SHAM and CFL only group.
- For mice in the ATFL/CFL the duration of physical activity (time) remained significantly decreased (p = .0022) across the lifespan (until 20 months) compared to the other groups.

Figure 4. Duration (min/day) ran



CONCLUSIONS

- The mice with the more severe ankle sprain (ATFL/CFL) group were noticeably less physically active across the lifespan than the SHAM and CFL group.
- Alterations to the ATFL/CFL ligaments may have also consequently changed the joint function of the respective ankle.
- These physical alterations may be the cause of the ATFL/CFL group being less physically active across the lifespan.
- Decreased physical activity levels may lead to an increased risk for developing a number of chronic diseases.

ACKNOWLEDGEMENTS

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