

Effects of Circadian Homeostasis on Recovery After Spinal Cord Injury in Mice



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Introduction

Circadian rhythms play a vital role in maintaining and regulating physiologic homeostasis. As one of the contributors of metabolic dysregulation, spinal cord injury (SCI) results in various disrupted physiological processes and the emergence of neurologic pathology.¹ Imposed feeding rhythms have the capacity to synchronize or increase oscillations in models of decreased amplitude of metabolic and feeding rhythms.² Circadian clock disruptions and inappropriate feeding patterns together result in metabolic dysfunctions and diseases.

Hypotheses

- Disrupted circadian function exacerbates metabolic deficits after SCI.
- Dysregulated rhythm can be reinstated by a regulated form of diet.

Methods

Subjects

36 *Mus Musculus* (C57BL/6)
8 Sham-AL, 8 Sham-TRF, 7 SCI-AL, 13 SCI-TRF

Procedures

- Spinal cord injury (SCI) vs Sham
- SCI: T9 contusion
- All mice were ensured recovery and hydration before returning to their cage, each of which housed 2 mice.

Diet

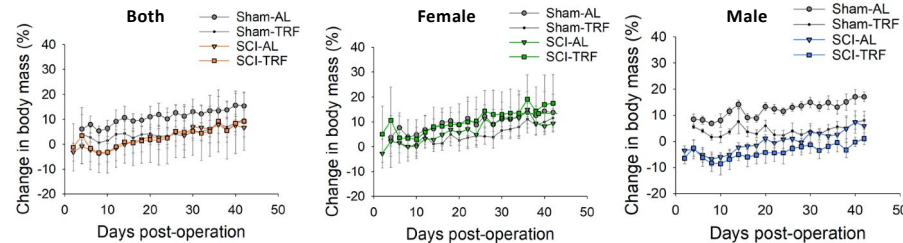
- Time-restricted feeding (TRF) vs Ad libitum (AL)
- 2 – 42 dpo
- 10 hour feeding time from the beginning of each dark cycle

Measures

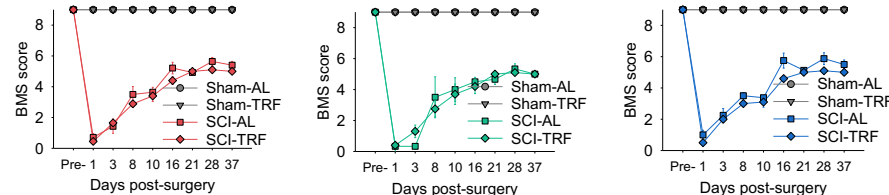
- Body mass: weight measured every other day
- Locomotor recovery: BMS performed at 1, 3, 8, 10, 16, 21, 28, 37 dpo
- Glucose tolerance: IVGTT performed at 38 dpo

Results

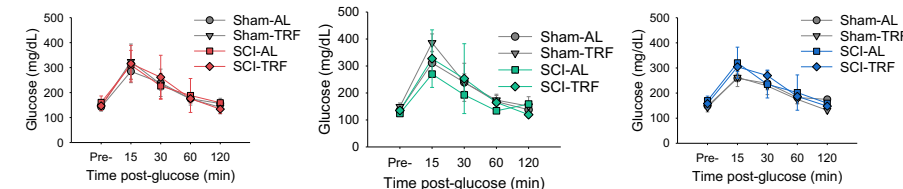
Body mass. Increase of body mass in male mice is statistically significant ($p < 0.001$) regards to both diet and injury type.



Locomotor activity. There was no statistical significance in the effects of SCI and diet on locomotor activity.



Glucose Tolerance. There was no statistical significance in the effects of SCI and diet on glucose tolerance.



Conclusion

There was the effect of SCI and diet on body mass of male mice. Locomotor activity and glucose tolerance test showed no statistical significance. Some of the limitations of the study includes loss of animals during and promptly after the operation, potentially due to high amount of stress on them. This led to small and inconsistent sample sizes in the condition groups. Future research could incorporate other tools to improve recovery, such as regulating the type of diet or inducing more restrictions. Increasing the sample size would demonstrate better representation of the effects of TRF on SCI recovery.

Acknowledgments

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References

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