## Compression Decreases Anatomical and Functional Recovery and Alters Inflammation after Contusive Spinal Cord Injury

Michael Orr[1] • Jennifer Simkin, PhD[2] • William Bailey[1] • Neha Kadambi[3] • Anna Leigh McVicar[4] • Amy Veldhorst[1] • John Gensel, PhD[1]

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*[1]Physiology, University of Kentucky • [2]Biology, University of Kentucky • [3]Paul Laurence Dunbar High School • [4]University of Kentucky*

Spinal cord injury (SCI) research faces the dichotomy of controlling model systems and extrapolating to highly diverse clinical cases. Previous model systems commonly employ contusion and compression as clinically relevant biomechanics, but there are few that account for the common case of the interaction of both contusion and compression. Our mouse model analyzes the effects of compression (20s) across moderate/severe contusion forces (50kdyn and 75kdyn) on functional recovery, anatomical recovery, and secondary cascades. Through this analysis, we hope to uncover unifying features of compression in contusion SCI, regardless of severity. We hypothesized that compression, regardless of impact force, will decrease functional recovery, decrease anatomical recovery, and increase proportion of pro-inflammatory, pathological macrophages/microglia in the spinal cord. Indeed, we find that compression decreases both locomotor recovery and anatomical recovery, according to cross-sectional tissue sparing (50kdyn > 20s 50kdyn; 75kdyn > 20s 75kdyn). Interestingly, compression groups prematurely cease to improve after 14 days post injury, which suggests that the initial mode of injury affects downstream secondary cascades. In analyzing secondary cascades, we targeted macrophage/microglial activation and phenotype. While there was no difference in total activity due to compression, there was a proportional increase in a pro-inflammatory marker, MARCO, is indicative of a pathological macrophage phenotype. The results of this study improve our understanding of the role of compression in contusion SCI and improve our ability to translate findings in laboratory models to diverse clinical cases.