

Validation of Spinal Cord Injury Sensory Deficit Model with Head-Fixed Rat

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Background/Objective: Numerous studies have reported restoring motor function through spinal cord stimulation in a rodent spinal cord injury model; however, replicating sensory information through spinal cord stimulation has not been thoroughly tested. We have previously trained rats to detect artificial sensations which lead to the question if this can be generated in a spinal cord injured rat. Our study begins to address this question by first validating a spinal cord injury model to test. Our hypothesis is if a decrease in the percent correct response compared to pre-procedure is observed, then this will verify sensory loss in this dorsal column lesion model of spinal cord injury.

Methods: We use sensory detection in a head-fixed rat to verify a spinal cord injury sensory deficit model. We begin by placing a water-deprived rat into a custom-made head-fix set up where two water spouts are placed in front of the rat. Vibration stimuli is applied to the hind paw via a vibration motor set at 200 hz \pm 50 hz. The rat is trained to associate stimulus with left spout and no stimulus with right spout. Correct percent response is recorded and once rat demonstrates detection, the rat undergoes a dorsal column hemi-section procedure. Post procedure, the rat will be placed back in the head-fix set up to repeat the behavioral experiment.

Results: Thus far, only habituation training has been completed with the rat. The following steps include detection training, dorsal column hemi section, and re doing the detection training to measure a difference in correct response rate.

Conclusion and Potential Impact: This is a crucial step for spinal cord injury research as this confirms sensory loss and will allow further testing to restore sensation. After validation, we can begin testing to restore sensation using stimulation of the spinal cord.