We have previously reported that exposure to just 6 mins of uncontrollable shock 24 hrs following contusion injury impairs locomotor recovery, delays recovery of bladder function, increases mortality and spasticity, and leads to greater tissue loss at the injury epicenter. Uncontrollable shock also elevates corticosterone in these subjects for up to 7 days, suggesting that these effects may be related to long-lasting increases in corticosterone. The exact mechanism through which corticosterone exerts its effects remains unknown. However, increases in corticosterone are often associated with modulation of pro-inflammatory cytokines, which are known to exacerbate secondary damage following spinal cord injury. The current experiment examines the impact of uncontrollable shock on pro-inflammatory cytokines at the injury site in contused rats.

Subjects received a moderate contusion injury (12.5 mm drop) using the NYU impactor. Twenty-four hours later a baseline measure of locomotor performance was taken using the BBB scale. Subjects received 6 mins of uncontrollable tailshock (1.5 mA, 80 ms duration with average ITI of 2 secs) or an equivalent amount of tube restraint. Six, 24, 72, or 168 hrs later, locomotor performance was re-assessed and subjects were sacrificed. At the time of sacrifice, a 5 mm segment of spinal cord was taken at the injury site and total protein was extracted and analyzed for IL-1β and IL-6 using ELISA kits (BioSource, Carlsbad, CA, sensitivity < 3 and 8 pg/ml, respectively) according to the manufacturers instructions.

Uncontrollable shock caused an increase in IL-6 within the spinal cord at 6 hrs and an increase in IL-1β at 24 hrs. IL-6 levels were comparable across shock conditions at 24 hrs however, unshocked subjects had higher IL-6 levels at 72 and 168 hrs. Interestingly, these changes were associated with an overall decrease in spleen weight that emerged at 6 hrs and persisted for at least 7 days in subjects that received uncontrollable shock. Decreases in spleen weight have also been reported in stressed animals. Taken together these results suggest that uncontrollable shock causes an increase in pro-inflammatory cytokines at the injury site within 24 hrs that may contribute to secondary damage and further loss of function.