Neither environmental enrichment nor voluntary wheel running enhances recovery from incomplete spinal cord injury in rats

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Environmental enrichment and exercise may be neuroprotective or promote recovery after different forms of CNS injury. Here, we tested the possible effects of moderate environmental enrichment and voluntary exercise on the outcome of incomplete spinal cord injury in rats. We provided rats in standard cages with basic environmental enrichment (carton house, nesting material, tube, gnawing sticks). We also analyzed the effect of increased activity by housing spinal-cord-injured rats in cages with or without access to running wheels. In a third experiment, we looked at the possible effect of pre-injury training. In all experiments, a battery of behavior tests were used. Enriched environment provided before, after or both before and after injury did not alter the outcome on any of these tests. Similarly, despite excessive running after injury, no differences in terms of recovery and behavior were found in the running experiment. Similarly, running prior to injury did not significantly decrease the degree of functional deficit caused by the injury. Since there were no effects of further enrichment, above the possible effects of being socially housed, and since exercise did not improve the outcome, we conclude that these forms of increased activity do not render the animals significantly less sensitive to spinal cord injury and do not cause robust improvement when initiated after injury. While these results pose a limit to how helpful environmental and physical training programs may be in rodent impact injury models, they do not contradict the fact that voluntary and guided training can be effective tools in human spinal cord rehabilitation.