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Spinal Cord Contusion Impairs Sperm Motility in the Rat Without Disrupting Spermatogenesis

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Our previous studies demonstrated various abnormalities in spermatogenesis after spinal cord injury (SCI) in cord-transected rats. In this study, we examined whether abnormalities in spermatogenesis in SCI rats were related to the degree of SCI. We used spinal cord contused (SCC) rats as a model. Adult male Sprague-Dawley rats were subjected to various degrees of cord contusion caused by the weight of a rod dropped from different heights (12.5, 25, 50, and 75 mm) using a New York University IMPACTOR. Testicular histology revealed persistent complete spermatogenesis in all SCC rats 4, 8, or 14 weeks after cord contusion regardless of the extent of SCI. Northern blot complementary DNA (cDNA) hybridization revealed transient but significant decreases in the levels of Sertoli cell-specific transcripts in SCC rats. In addition, levels of messenger RNA (mRNA) transcripts for germ cell-specific transition protein-2 and protamine-1 were consistently decreased in these rats. Such effects were related to the height of the weight drop and were associated with reduced levels of mRNA for cyclic adenosine monophosphate (cAMP) responsive element modulator (CREM). These results demonstrated specific effects of SCI on spermiogenesis and were consistent with altered cAMP signaling in testicular cells after SCI. Sperm motility was also significantly decreased in SCC rats and was related to the height of weight drop. Normal sperm motility recovered only in those rats injured by weight drop from 12.5- and 25-mm heights. In summary, current results demonstrate persistent abnormalities in spermiogenesis and sperm motility in rats that suffered spinal cord contusion by weight drop. Such effects were related to the height of the weight drop and thus to the extent of SCI.

Key words: Spinal cord injury, cAMP, sperm

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