

Spontaneous Episodes of Autonomic Dysreflexia and Circadian Oscillations in Autonomic Functions Following Spinal Cord Injury

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Background: Spinal cord injury (SCI) is associated with impaired blood pressure regulation that is characterized by resting hypotension, loss of circadian oscillations, and episodes of autonomic dysreflexia (AD).

Objective: To characterize temporal characteristics of spontaneously occurring AD and circadian oscillations in cardiovascular indices in response to experimental SCI.

Design/Method: 6 Male Wistar rats underwent implantation of radiotelemetry transducers 3 weeks prior to T3 complete SCI. Continuous arterial blood pressure, core body temperature and heart rate were recorded 7 days pre-SCI and up to 30 days post-SCI. Spontaneous was characterized by an algorithm developed on MatLab. Circadian oscillations in blood pressure and core body temperature were measured by averaging cardiovascular indices every hour.

Results: As early as day 2 post-SCI, AD occurred up to 14 times daily with an average pressor response of 28.5 ± 11.1 mmHg. From days 14 and 28 post-SCI onwards there was a significant increase in the frequency (up to 39 events) and severity (max pressor response of 69 mmHg) of AD (both $p < 0.037$). During the first 2 weeks post-SCI the characteristic nocturnal dip in blood pressure and core body temperature was absent, but was restored at 3 weeks post-SCI onwards (i.e. blood pressure and temperature were lower during sleep versus active period, $p < 0.036$).

Conclusion: AD is present as early as 2 days post-SCI, but does not take on a traditional phenotype until 3-4 weeks post-SCI. Circadian oscillations in blood pressure and core body temperature are disturbed during the first 2 weeks post-SCI, but begin to return at 3 weeks post-SCI.

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