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Titel des Beitrags: A recoverable state of axon injury persists for hours after spinal cord contusion in vivo.

Abstract: Therapeutic strategies for spinal cord injury (SCI) commonly focus on regenerating disconnected axons. An alternative approach would be to maintain continuity of damaged axons, especially after contusion. The viability of such neuropreservative strategies depends on the degree to which initially injured axons can recover. Here we use morphological and molecular in vivo imaging after contusion SCI in mice to show that injured axons persist in a metastable state for hours. Intra-axonal calcium dynamics influence fate, but the outcome is not invariably destructive in that many axons with calcium elevations recover homeostasis without intervention. Calcium enters axons primarily through mechanopores. Spontaneous pore resealing allows calcium levels to normalize and axons to survive long term. Axon loss can be halted by blocking calcium influx or calpain, even with delayed initiation. Our data identify an inherent self-preservation process in contused axons and a window of opportunity for rescuing connectivity after nontransecting SCI.

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