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Sensory Nerve Regeneration at the CNS-PNS Interface

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1. Introduction

Over a century ago, Ramon y Cajal, using the Golgi staining technique to label a subset of dorsal root ganglion (DRG) axons, showed that injured DR axons regenerate within the root but fail to re-enter the adult spinal cord. As shown in his drawing (Fig. 1), DR axons grow away from (arrow), or stop at (arrowheads), the junction between the CNS and PNS, termed the dorsal root entry zone (DREZ). Regeneration of dorsal root (DR) axons into spinal cord is prevented at the dorsal root entry zone (DREZ), the transitional zone between the CNS and PNS. Why regeneration fails at DREZ has remained an interesting issue both because dorsal root injuries are common and because DREZ serves as an excellent model system for studying the reasons for the failure of CNS regeneration.

Fig. 1. Cajal’s drawing illustrating DR axons growing away from (arrow) or arrested (arrowheads) at the entrance into adult spinal cord.


Peripheral nerve disorders are comprising one of the major clinical topics in neuromusculoskeletal disorders. Sharp nerve injuries, chronic entrapment syndromes, and peripheral neuropathic processes can be classified in this common medical topic. Different aspects of these disorders including anatomy, physiology, pathophysiology, injury mechanisms, and different diagnostic and management methods need to be addressed when discussing this topic. The goal of preparing this book was to gather such pertinent chapters to cover these aspects.

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