

Innervation of the musculoskeletal system in physiological and pathological conditions: Insights from organ-on-a-chip models

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Dysregulation of musculoskeletal tissues innervation can have profound effects on the locomotor system, contributing to the emergence of chronic pain and disability, thereby imposing a heightened burden on individuals and society. Such is the case with conditions like rheumatoid arthritis (RA), osteoarthritis (OA), implant aseptic loosening (AL), bone metastases, fractures, and various rare bone disorders. This talk will specifically concentrate on elucidating how bone tissue reciprocally influences the growth and guidance of peripheral nerve terminals, both in physiological and pathological contexts. Notably, we will explore the intricate interplay between bone and nerve dynamics, shedding light on their reciprocal modulation. Furthermore, a focal point of discussion will be the utilization of micro-physiological systems as invaluable tools for delineating the intricacies of this crosstalk. By employing these sophisticated systems, we aim to unravel the nuanced interactions between bone and peripheral nerves, providing insights into the underlying mechanisms that shape the pattern of innervation. This comprehensive examination seeks to enhance our understanding of the bidirectional communication between the skeletal and nervous systems, with potential implications for therapeutic interventions targeting conditions characterized by disrupted bone-nerve dynamics.

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