The Physiology of Bioelectricity in Development, Tissue Regeneration and Cancer (Biological Effects of Electromagnetics Series)

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Recent advances in technology have led to the unprecedented accuracy in measurements of endogenous electric fields around sites of tissue disruption. State-of-the-art molecular approaches demonstrate the role of bioelectricity in the directionality and speed of cell migration, proliferation, apoptosis, differentiation, and orientation. New information indicates that electric fields play a role in initiating and coordinating complex regenerative responses in development and wound repair and that they may also have a part in cancer progression and metastasis.

Compiling current research in this rapidly expanding field, **Physiology of Bioelectricity in Development, Tissue Regeneration, and Cancer** highlights relevant, cutting-edge topics poised to drive the next generation of medical breakthroughs. Chapters consider methods for detecting endogenous electric field gradients and studying applied electric fields in the lab. The book addresses bioelectricity’s roles in guiding cell behavior during morphogenesis and orchestrating higher order patterning. It also covers the response of stem cells to applied electric fields, which reveals bioelectricity as an exciting new player in tissue engineering and regenerative medicine.

This book provides an in-depth exploration of how electric signals control corneal wound repair and skin re-epithelialization, angiogenesis, and inflammation. It also delves into the bioelectric responses of cells derived from the musculoskeletal system, bioelectrical guidance of neurons, and the beneficial application of voltage gradients to promote regeneration in the spinal cord. It concludes with a discussion of bioelectricity and cancer progression and the potential for novel cancer biomarkers, new methods for early detection, and bioelectricity-based therapies to target both the tumor and metastatic cancer cells.

This multidisciplinary compilation will benefit biologists, biochemists, biomedical scientists, engineers, dermatologists, and clinicians, or anyone else interested in development, regeneration, cancer, and tissue engineering. It can also serve as an ideal textbook for students in biology, medicine, medical physiology, biophysics, and biomedical engineering.

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