Insight Medical Publishing
Journal of Cell and Developmental Biology
2020
Vol.5 Issue.1

Role of Bioelectricity in the Regeneration

Dr. Mit Bhavsar
University Hospital Frankfurt, Frankfurt, Germany

Abstract

Endogenous electrical signals play an instructive role in many cellular behaviors, including development, wound healing, Cancer progression, and tissue regeneration. Specifically, during tissue regeneration, two events during which stem cells actively proliferate and differentiate, endogenous electrical signals (like membrane potential (Vmem)) plays an important role. Membrane potential (Vmem) refers to the voltage difference across a cell's bilayer membrane that is established by the balance of intracellular and extracellular ionic concentrations. Although maintenance of ionic homeostasis is a critical feature of cell viability and metabolism, a clear relationship has been suggested between the Vmem levels and the cell functions like proliferation and differentiation. The Vmem across the membrane of cells that are in high proliferative states (embryonic, adult stem cells, cancer cells, etc.) have been shown to trend towards being more positive and are depolarized, while the Vmem of cells that are in low proliferative states (neurons, fibroblasts, skeletal muscle cells, fat cells, etc.) are more negative or hyperpolarized. Several authors have shown a correlated change in Vmem with either initiation or cessation of growth.

While considerable modern work underscores the link between Vmem and the cell cycle, this fascinating bioelectric control mechanism is still not well known in the field of regenerative medicine. Here, in this study we investigate how the membrane potential (Vmem) establish itself in different proliferative (e.g. Cancer cells, Mesenchymal stem cells) and non-proliferative cells (e.g. fibroblasts) to verify the differences in the level of Vmem. Changes in Vmem are investigated using membrane voltage sensitive fluorescence dye DiBAC4 in synchronized seeded populations in culture with increase in time, density, and cell contact. In addition to that, we also investigate the role of

Vmem in these cells in controlling the regeneration related events (Cell proliferation and differentiation) by pharmacological blockade of ion channels, to find out if this mechanism is an attractive target for the modulation in regenerative medicine.

Biography:

Dr. Mit B. Bhavsar (Male) received his M.Sc. (Biomedical engineering) and Ph.D. (Neurophysiology) degrees from the Universities of Aachen and Gottingen, Germany, in 2011 and 2016, respectively. His Ph.D. studies focused on stimulating brain neurons using EStim pulses to generate motor responses in small insects. In 2017, Dr. Bhavsar joined the department of Experimental Orthopaedics and Trauma Surgery at GUF, as a postdoctoral fellow, where his research focuses on developing EStim based medical treatments. Specifically he uses in vitro and in-vivo model systems to study the effects of EStim on osteogenesis and bone healing. He has published his research in high impact scientific journals and has participated in several international conferences.

Presenting author details
Full name: Mit Bhavsar
Contact number: 004917638531500
Twitter account: @iMitbhavsar
LinkedIn account: https://www.linkedin.com/in/mit-bhavsar-phd-b9854934/