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BIO-ELECTRIC FIELD ENHANCEMENT: THE INFLUENCE ON MEMBRANE POTENTIAL AND CELL MIGRATION IN VITRO

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Objective: The extracellular matrix consists of critical components that affect fibroblast polarization and migration. The existence of both intrinsic and extrinsic electrical signals that play essential roles in the development, physiology, regeneration and pathology of cells were discovered over a century ago. Here we study how the bioelectric field enhancement device and its generated extrinsic electrical signaling affects the membrane potential and migration of fibroblasts in vitro.

Approach: This is an experimental analysis of membrane potential and cell migration of L929 cells (murine fibroblasts) where the cells are grown in treated media that has been reconstituted with an aqueous solution that has been exposed to an electromagnetic field that is generated by this device versus cells grown in identically prepared control media that has not been exposed to the electromagnetic field.

Results: The growth of fibroblasts in the treated media shows hyperpolarization of the plasma membrane and significant increase in cell migration when compared to control groups.

Innovation: These experiments highlight the potential of the bioelectric field enhancement device for future chronic, non-healing wound care management.

Conclusions: Fibroblast growth media that was reconstituted with an aqueous solution that had been exposed to bio-electromagnetic field enhancement device electromagnetic field shows significant effects on cell polarity and cell migration of these fibroblasts in vitro. This device has also shown enhanced chronic wound healing in anecdotal reports from patients globally for decades when used as a footbath/bath and could lead to a novel bioelectric application in wound healing.