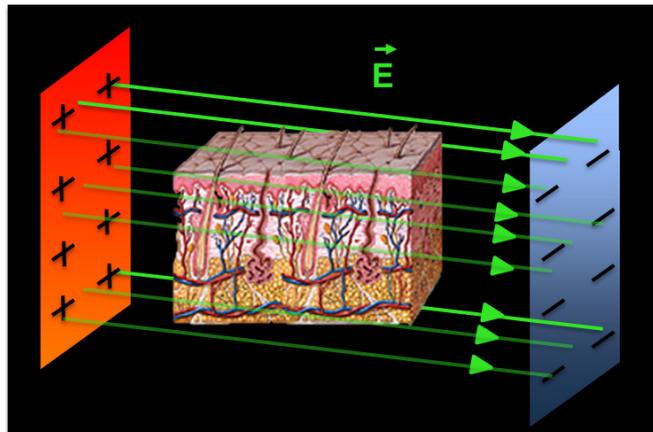


## PRESS RELEASE

High voltage, short pulsed electric fields hold promise to reveal the enigma of scars and to induce scarless tissue regeneration

September 19, 2013 — High voltage, short pulsed electric fields, used for disinfection and solid tumor destruction, selectively damage cell membranes, while preserving overall tissue structure, a phenomenon that may be a key factor in scarless tissue regeneration.



The enigma of scars has puzzled human mind for thousands of years. Any organ or tissue after serious injury forms a scar. The mechanism by which scars form are not known, and there are very limited therapies available to block scar formation. Now, a team based at the Center for Engineering in Medicine at the Massachusetts General Hospital (MGH) report that high voltage short electric fields appear to destroy all cells in skin tissue but lead to full regeneration with no scars. These strong but short pulsed electric fields selectively kill the cells, while preserving the extracellular matrix tissue structure including the local blood supply, which are needed for healthy tissue growth and functional regeneration.

"It is a fascinating finding," says Alexander Golberg, PhD of MGH, the paper's first author. "We compared this technique with thermal burns and found many different aspects post-injury both in terms of the extent of damage and the dynamics of recovery".

Currently, pulsed electric fields are primarily used for disinfection and solid tumor ablation. Pulsed fields selectively kill cells in the tissue presumably by a mechanism called irreversible electroporation. After exposure to the fields, large pores appear in cell membranes that eventually lead to cell death.

"Previously, scarless regeneration has only been observed in adult amphibians and early in mammalian fetuses, both of which do not have an adaptive immune response. Even though our rodents had an intact adaptive immune system, we were able to generate scarless skin regeneration in these adult mammals. Further study of this technique will help us better understand the mechanism of scarring," says Martin L. Yarmush, MD, PhD, director of the MGH Center for Engineering in Medicine, the senior author of the paper.

"This development not only holds a great promise for unraveling many aspects of the complex wound healing process but also to potentially lead to new therapies," Golberg says, "We believe that this model will enable other laboratories to learn and uncover new aspects of adult tissue growth and development."

The paper will appear in the inaugural issue of the new journal "Technology".

Additional co-authors of the Technology paper are G. Felix Broelsch, M.D, MGH; Stefan Bohr, M.D, PhD, MGH; Martin C. Mihm, Jr., M.D, BWH; William G. Austen, Jr., M.D, MGH; Hassan Albadawi, M.D, MGH; and Michael T. Watkins M.D, MGH.

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