

Finely tuned electrical fields give wound healing a jolt

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A new research report appearing in the June 2016 issue of the *Journal of Leukocyte Biology*, opens up the possibility that small electrical currents might activate certain immune cells to jumpstart or speed wound healing. This discovery, made by a team of scientists from the United Kingdom, may be of particular interest to those with illnesses that may cause wounds to heal slowly or not at all.

"In some instances, such as diabetes, the body's ability to heal is compromised and wounds can become infected. In instances where there is a lack of [macrophages](#) present, the application of 'synthetic' electric fields using clinical devices would assist the repair process, not only by attracting macrophages to damaged sites to support healing but also by changing their properties to facilitate wound repair and importantly to reduce infection," said Heather M. Wilson from the University of Aberdeen, Aberdeen, U.K.

To make their discovery, scientists exposed macrophages, originating from human blood, to [electrical fields](#) of strength similar to that generated in injured skin. When the current was applied, the scientists found that the macrophages moved in a directed manner and from these studies would be predicted to move to the edge of damaged skin to facilitate healing. Not only did the electrical fields coax macrophages into moving directionally, they also significantly enhanced the ability of macrophages to engulf and digest extracellular particles, called "phagocytosis." Phagocytosis is an important process in wound healing whereby macrophages clean the wound site, limit infection and allow the [repair process](#) to proceed. Electric fields enhanced the uptake and clearance of a variety of targets known to promote inflammation and impair healing. These targets included latex beads, expended [white blood cells](#), and the opportunist fungal pathogen, *Candida albicans*. The experiments also showed that electric fields selectively augmented the production of protein modulators associated with the healing process,

confirming that macrophages are tuned to respond to naturally generated electrical signals in a manner that boosts their [healing](#) ability.

"The field of bioelectromagnetics is beginning to reveal how we might use intentionally directed electrical or magnetic fields to provoke specific biological responses," said John Wherry, Ph.D., Deputy Editor of the *Journal of Leukocyte Biology*. "This new work identifies previously unappreciated opportunities to tune immune system function with electrical fields and has potentially wide-reaching implications for wound repair for a variety of diseases where macrophages play a role, including infectious disease, cancer and even obesity."

More information: J. I. Hoare et al. Electric fields are novel determinants of human macrophage functions, *Journal of Leukocyte Biology* (2015). [DOI: 10.1189/jlb.3A0815-390R](https://doi.org/10.1189/jlb.3A0815-390R)

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