Calcium is Initial Trigger In Immune Response To Healing

For the first time scientists studying the cellular processes underlying the body's response to healing have revealed how a flash of calcium is the very first step in repairing damaged tissue. The findings, published in *Current Biology*, could lead to new therapies that speed up the healing process following injury or surgery.

Until recently, very little was known about how damaged tissue activates and attracts the first white blood cells to the wound — the first stage in the healing process. However, researchers from the University of Bristol's School of Biochemistry in collaboration with a team from the University of Bath, have shown that the very first trigger in this process is a flash of calcium which spreads like a wave back from the wound edge through gap junctions that connect all the cells.

This flash of calcium signal goes on to activate an enzyme known as DUOX that synthesises hydrogen peroxide, which, in turn, attracts the first white blood cells to the wound. This white blood cell invasion, which is initiated during our inflammatory responses, is needed to kill off invading microbes and stop the onset of septicaemia following tissue damage.

The findings indicate that the wound-induced calcium flash represents the earliest identified signal following wounding and might therefore orchestrate the rapid recruitment of immune cells.

To assess the impact of a reduced calcium flash upon the inflammatory response the team used Drosophila (fruit fly) embryos because they are translucent which makes it easy to image the inflammatory response and because of their simple genetics. The team found that blocking the calcium flash inhibited H2O2 release at the wound site leading to a reduction in the number of immune cells migrating to the wound.

Paul Martin, Professor of Cell Biology and an expert in wound healing at the University, said: "White blood cells are a little like 'Jeckyll and Hyde' in that they help us heal but are also the reason behind why we scar so we really need to know how they are regulated at wounds in order to learn how to control their behaviours for future therapeutic intervention."

Will Razzell, the lead PhD researcher on this study, added: "We are more than ever understanding the pathways that lead to immune cell attraction to wounds. As calcium represents the immediate inflammatory signal, we now have a good foundation to investigate this complicated process further."

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