Scientists discover body's protection shield

November 18 2019

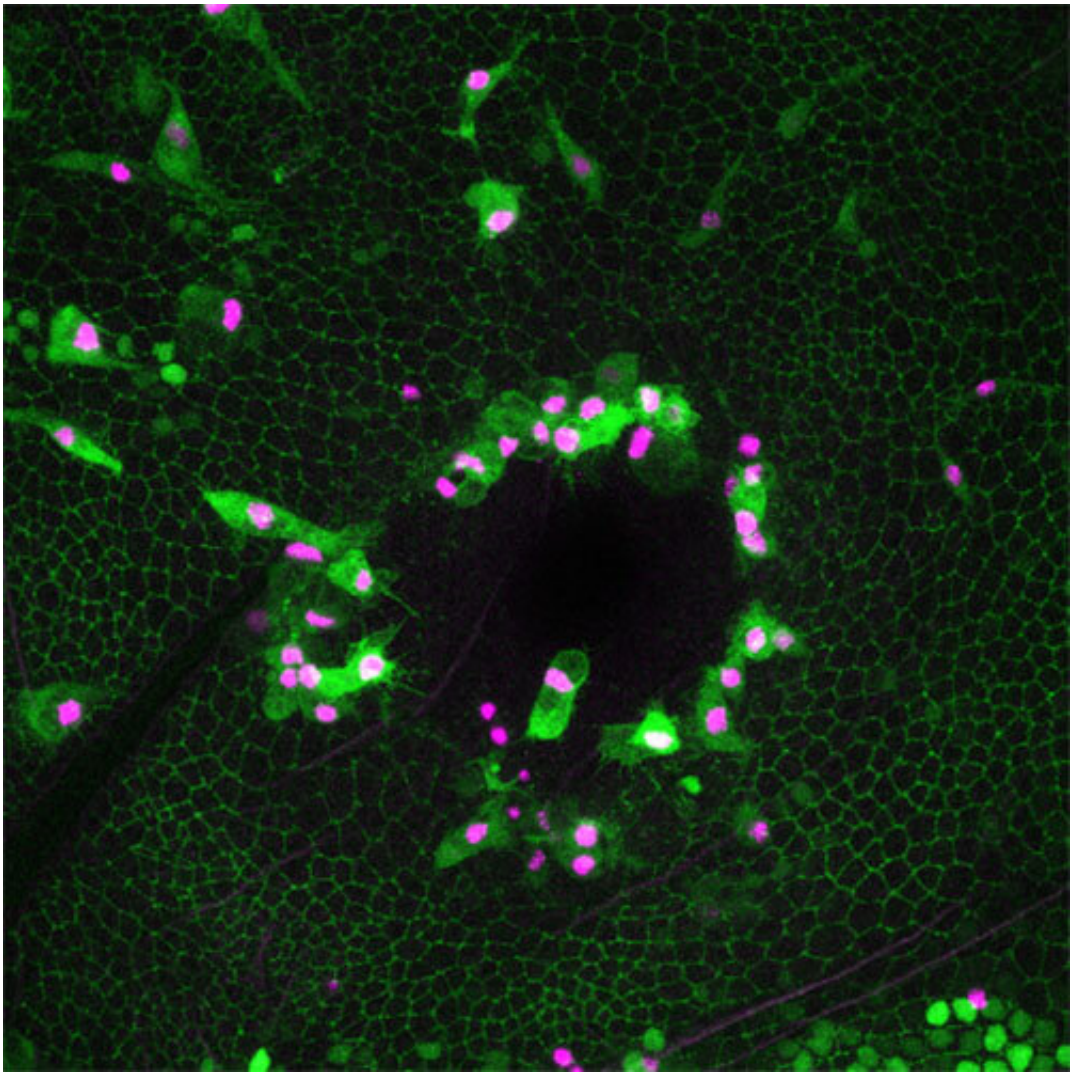

Image of a fly wound and inflammation. Credit: Helen Weavers

Scientists have discovered a way to manipulate the body's own immune

response to boost tissue repair. The findings, published in *Current Biology* today, reveal a new network of protective factors to shield cells against damage. This discovery, made by University of Bristol researchers, could significantly benefit patients undergoing surgery by speeding recovery times and lowering the risk of complication.

When a tissue is damaged, (either accidentally or through surgery), the body quickly recruits immune cells to the injury site where they fight infection by engulfing and killing invading pathogens, through the release of toxic factors (such as unstable molecules containing oxygen known as "reactive oxygen species" e.g. peroxides). However, these bactericidal products are also highly toxic to the host tissue and can disrupt the repair process. To counteract these harmful effects the repairing tissue activates powerful protective machinery to "shield" itself from the damage.

Now, researchers from Bristol's School of Biochemistry studying tissue repair, have mapped the exact identities of these protective pathways and identified how to stimulate this process in naïve tissues.

Dr. Helen Weavers from Bristol's Faculty of Life Sciences, and the study's lead author, explains: "In healthy individuals, injured tissues normally quickly repair themselves following damage. Within a healing skin wound, a stress-response is activated that recruits inflammatory cells, which in turn release a multitude of bacteriocidal factors, including reactive oxygen species (ROS), to eliminate invading pathogens.

"In this study we used translucent fruit flies to watch wound repair live as it happens and follow the behavior of the recruited immune cells. In doing so, we uncovered a network of protective pathways which shield tissues from inflammatory damage and make repairing tissues more 'resilient' to stress. We also demonstrated that ectopic activation of these pathways further enhanced tissue protection, whilst their inhibition led to

significant delays in wound closure.

"Now we know their identities and how they are activated, we hope to develop ways to stimulate this protective machinery in patients prior to elective surgery."

The findings have clear clinical relevance to patients because therapeutic activation of these cytoprotective pathways in the clinic could also offer an exciting approach to 'precondition' patient tissues prior to elective surgery.

Dr. Weavers added: "We are now uncovering even more 'resilience' pathways that help to protect our body tissues from stress, both at sites of wounding and in other vulnerable organs that are often exposed to similar stressors. Since we find that the protection machinery is activated by the same pathways that also initiate the inflammatory response, we think the resilience machinery has evolved as a fail-safe mechanism for tissue protection each time inflammation is triggered.

More information: Helen Weavers et al. Injury Activates a Dynamic Cytoprotective Network to Confer Stress Resilience and Drive Repair, *Current Biology* (2019). DOI: 10.1016/j.cub.2019.09.035

Provided by University of Bristol