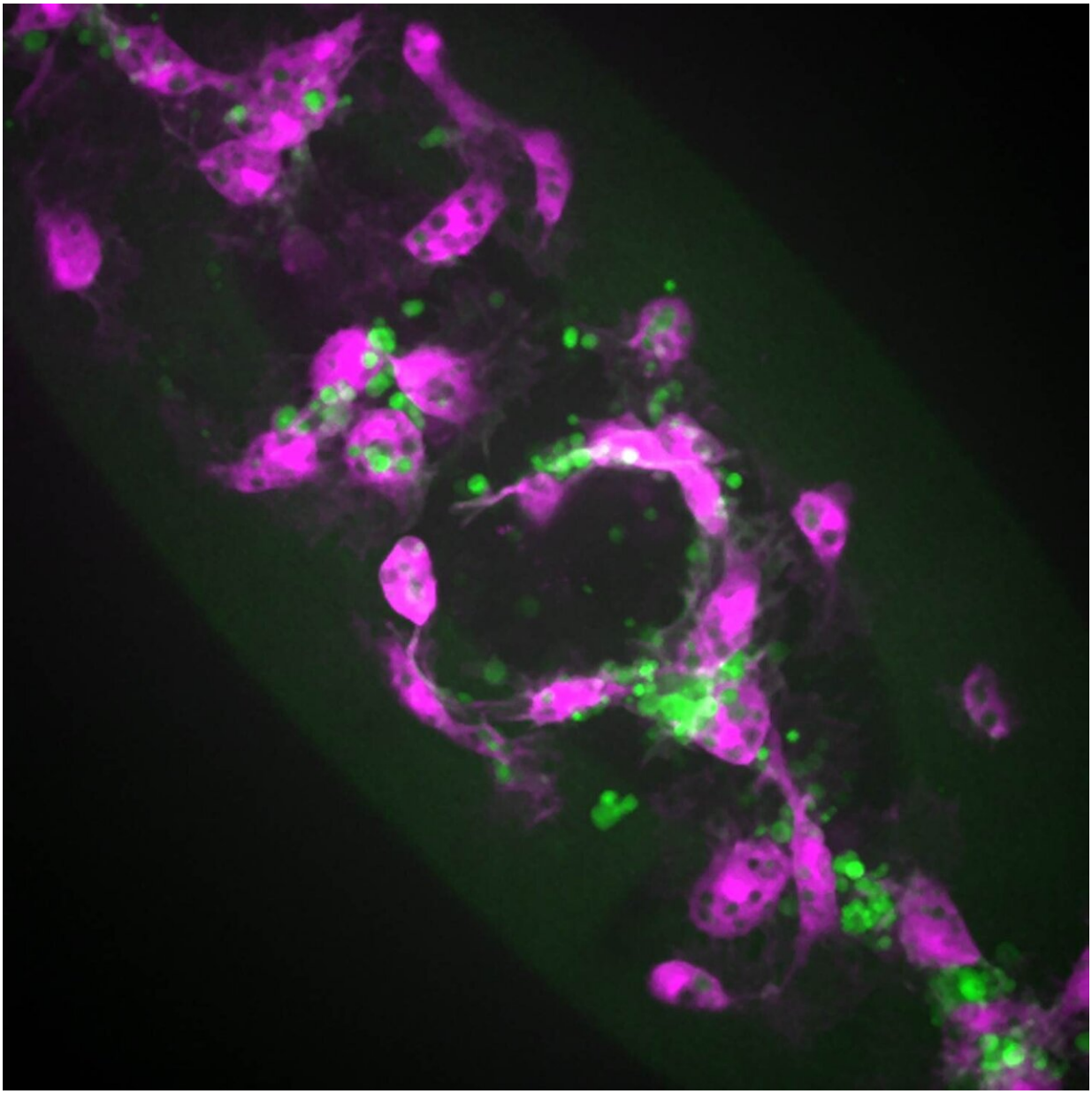
MedicalXpress

Dead cells disrupt how immune cells respond to wounds and patrol for infection

May 20 2019



Fruitfly macrophages responding to wound in presence of apoptosis. Credit: University of Sheffield

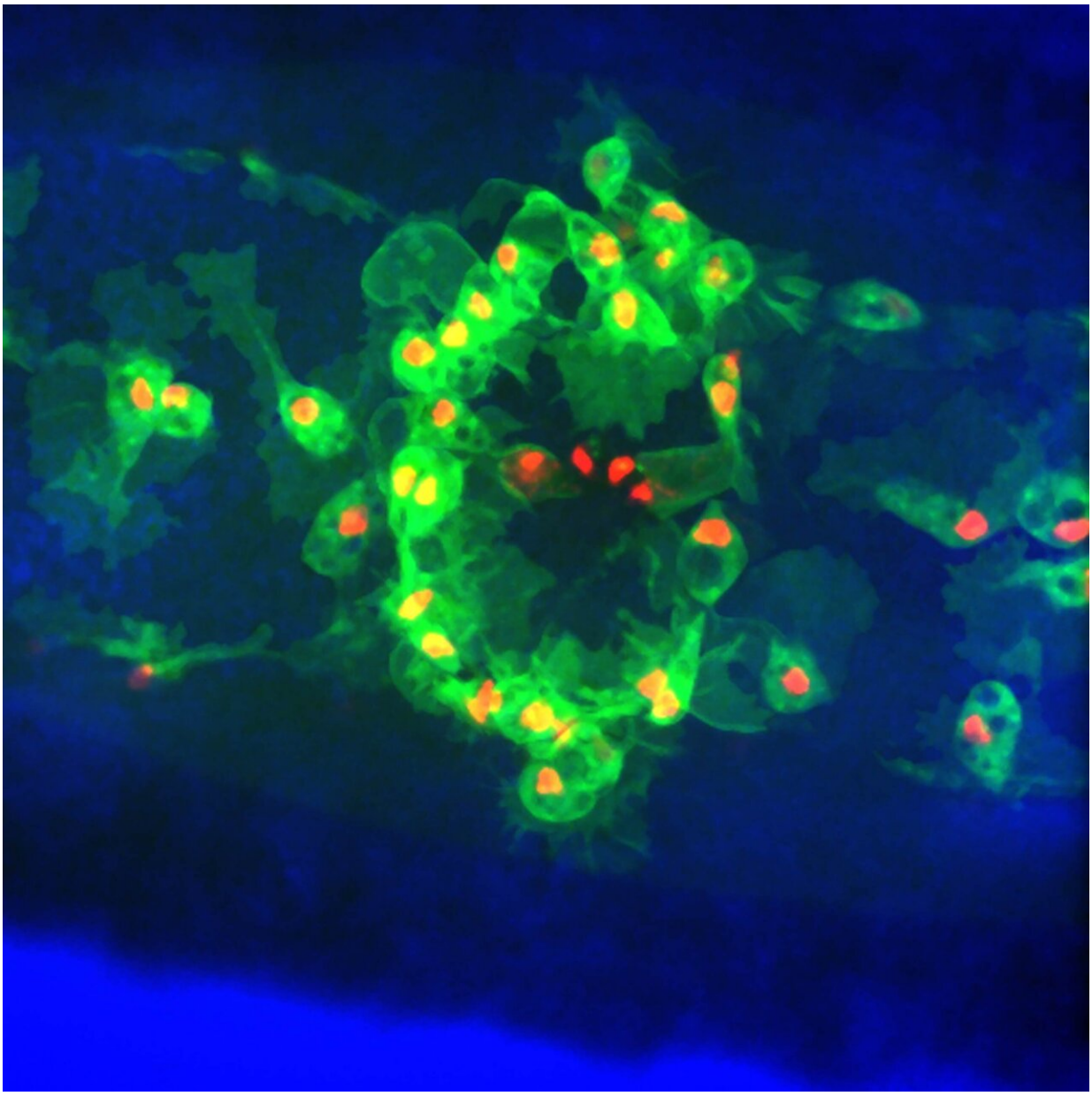
Dead cells disrupt immune responses and undermine defence against infection, new research has found.

The study, led by scientists at the University of Sheffield, revealed that cells which are programmed to die, a process known as apoptosis, can disrupt the normal function of immune cells, called macrophages. This can impact on how well they respond to wounds and patrol the body to seek out infection.

Our macrophages are needed at wound sites to prevent infection and to aid healing processes, but these white blood cells can also cause and worsen many human diseases, including cancer, heart disease and neurodegenerative disorders.

The findings, published in the journal *PLoS Biology*, show that immune cells prioritise the clearance of dead cells, which overrides their normal migration to sites of injury, impairing immune responses.

The research, which seeks to understand how immune cells are controlled, could help pave the way for new therapies to manipulate these cells and accelerate healing processes. This study gives scientists new insights into the mechanisms that control immune cells within our bodies, such as how they get to and are kept at sites of injuries.



Macrophages at wound. Credit: University of Sheffield

Dr. Iwan Evans, from the Department of Infection, Immunity and Cardiovascular Disease at the University of Sheffield who co-author of the paper, said: "Billions of cells die within our bodies on a daily basis and many of these are removed and digested by our immune cells.

"If this removal process goes wrong it can lead to damaging autoimmune conditions. Excessive or inappropriate immune responses worsen or cause a very broad range of human diseases from cancer to neurodegeneration.

"This work studies fundamental biological processes that are going on inside our bodies everyday that are necessary to keep us healthy."

The research to investigate the interactions between dying cells and immune cells was conducted using fruit flies which contain macrophage-like cells highly similar to our own immune cells. The new study also uncovered a novel role for a protein called Six-Microns-Under (or Simu) in keeping immune cells at sites of injury. Without this protein the macrophages left wound sites precociously.

Hannah Roddie, fellow co-author of the study and Research Associate at the Department of Infection, Immunity and Cardiovascular Disease at the University of Sheffield, said: "The study shows that the way fruit fly blood cells respond to injuries and dying cells is even more similar to how our own immune cells respond than previously thought.

"We are now looking into what signals macrophages use to track down dying cells and how they choose between the dead cells and wounds. We're fascinated to understand how immune cells are kept at the sites of injuries."

More information: Hannah Grace Roddie et al. Simu-dependent clearance of dying cells regulates macrophage function and inflammation resolution, *PLOS Biology* (2019). DOI: 10.1371/journal.pbio.2006741

Provided by University of Sheffield