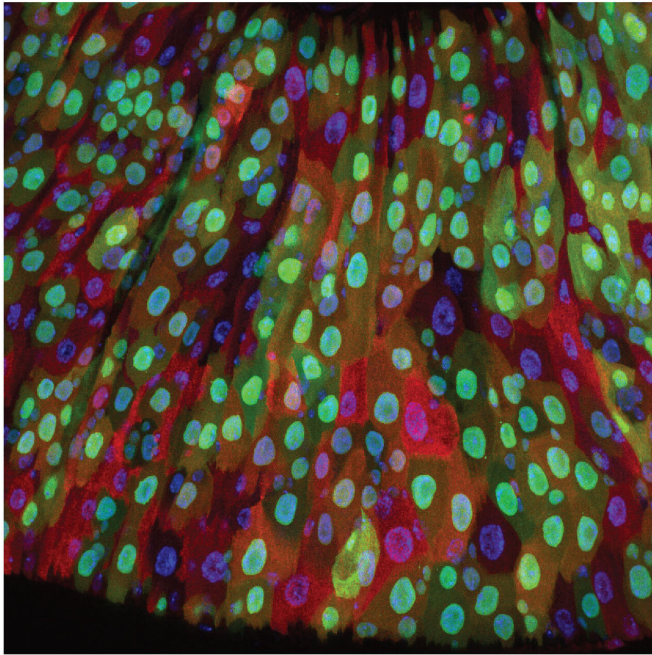


# Adult fly intestine could help understand intestinal regeneration

25 September 2019



A fly intestine under pathogenic infection. The green cells are new cells produced during intestinal regeneration. The red signal is p38 activation in IECs upon damage. Credit: University of Bristol

Intestinal epithelial cells (IECs) are exposed to diverse types of environmental stresses such as bacteria and toxins, but the mechanisms by which epithelial cells sense stress are not well understood. New research by the universities of Bristol, Heidelberg and the German Cancer Research Center (DKFZ) have found that Nox-ROS-ASK1-MKK3-p38 signaling in IECs integrates various stresses to facilitate intestinal regeneration.

The research, published in *Nature Communications* today, used the adult fly intestine, which is remarkably like a human intestine, to understand how IECs sense stress or damage, defend themselves and promote epithelial

[regeneration](#).

Stress sensing pathways are activated upon a variety of stresses in fly IECs, but how these pathways are activated and how they promote IEC resilience and intestinal regeneration are not known.

The researchers found that NADPH Oxidase (Nox) in IECs produce [reactive oxygen species](#) (ROS) upon stress, but it wasn't fully understood how ROS promote intestinal regeneration. The paper has shown that it is partly effected by Ask1-MKK3-p38 signaling in IECs, stimulating their production of intestinal stem cell (ISC) mitogens and ISC-mediated regeneration. p38 was previously found to facilitate mammalian intestinal regeneration when damaged, but how it senses damage was not understood.

The researchers are still unclear how stress is sensed by [intestinal epithelial cells](#) but believe it is possible that Nox senses stress. The study also found damage activates stress sensing pathways in fly IECs but how these pathways effect IEC resilience and intestinal repair is not fully clear.

Dr. Parthive Patel, Elizabeth Blackwell Institute (EBI) Early Career Fellow in the School of Cellular and Molecular Medicine at the University of Bristol, said: "Our work has potential applications for regenerative medicine. Reactive oxygen species play an important role in tissue regeneration and even in neuronal axon regeneration."

"It is also relevant for diseases that develop from the loss of epithelial integrity such as inflammatory bowel diseases, which increases risk for colorectal cancer. Understanding how tissues sense stress and promote their resilience and repair will provide novel therapeutic strategies."

**More information:** Parthive H. Patel et al. Damage sensing by a Nox-Ask1-MKK3-p38

signaling pathway mediates regeneration in the adult *Drosophila* midgut, *Nature Communications* (2019). DOI: [10.1038/s41467-019-12336-w](https://doi.org/10.1038/s41467-019-12336-w)

Provided by University of Bristol

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