Biochemists identify how tissue cells detect and perfect

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Scientists have discovered how cells detect tissue damage and modify their repair properties accordingly.

The findings, published today in the journal [*Developmental Cell*](http://www.cell.com/developmental-cell/), could open up new opportunities for improving tissue repair in patients following illness or surgery.

The [Wellcome Trust-funded study](http://www.wellcome.ac.uk/), led by biochemists at the University of Bristol, examined the signalling process in damaged tissue cells and identified the cellular mechanisms responsible for activating effective repair.

In healthy adults the majority of tissue cells lie dormant unless challenged by wounding, at which point they sense a change in the molecular environment.

Plasma leaking from damaged blood vessels and causes fibroblast cells to migrate into the damaged tissue, contract the wound, and plug the gap by depositing a substance such as collagen, which provides the structural support.

[Dr Mark Bass](http://www.bristol.ac.uk/biochemistry/research/mb.html), lead author and Research Fellow in the [University’s School of Biochemistry](http://www.bristol.ac.uk/biochemistry/), said: “Each of these processes requires the turnover of cellular adhesions, and the challenge has been to determine how cells detect tissue damage and modify their adhesive properties accordingly.”

Using atomic force microscopy, the team were able to determine how a molecular sensor, syndecan-4, triggers the uptake and redeployment of adhesive molecules.

This novel signalling pathway causes fibroblasts and keratinocytes to migrate in response to the changing tissue architecture and follow the matrix fibres that make up the skin.

Such linear migration towards a damage signal allows the cells to arrive at the wound far more efficiently than if activated cells searched randomly about the tissue, and results in a very efficient healing response.

Dr Bass added: “We find that this signalling cascade is essential for efficient healing, this opens up considerable opportunities for improving tissue repair in patients.”

The Wellcome Trust-funded study, entitled ‘A syndecan-4 hair trigger initiates wound healing through caveolin- and RhoG-regulated integrin endocytosis’ by Dr Mark Bass is published in the journal *Developmental Cell*.