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How wound's shape sets pace of recovery

The findings of the National University of Singapore's Mechanobiology Institute team could lead to better treatment for burns, cuts and other types of injuries. PHOTO: AGENCE FRANCE-PRESSE

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NUS scientists find that convex section of injuries heals faster than concave portion

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Researchers in Singapore have shed new light on how wounds heal, and their work could lead to better treatment for burns, cuts and other types of injuries.

Scientists have long known that two processes are involved in repairing wounds. In one, proteins form a ring around the wound's edge and tighten, closing the wound like the drawstrings of a purse. In another process called "cell crawling", cells migrate across the gap caused by the wound to close and mend it.

In their latest research, scientists at the National University of Singapore's Mechanobiology Institute (MBI) led an international team which found that a wound's shape affects how quickly it heals.

Laboratory tests on cultured human tissue as well as on the common fruit fly showed that wounds heal more quickly at their convex (bulging) parts compared with the concave (curved in) parts.

MBI researcher Andrea Ravasio said that at the convex parts, the two healing processes work together to repair wounds.

But at the concave portions, the purse-string mechanism pulls the wound's edge backwards, resulting in a tug of war between the processes that slows down the healing.

The scientists said that the findings, published last month in the prestigious scientific journal Nature Communications, are important as wounds have complex and different shapes.

The research could also lead to better treatment of chronic wounds and improve tissue regeneration methods.

Dr Ravasio said: "In future, when doctors use skin grafts to help burn patients, for example, they might be able to use drugs, other medical products or tissue engineering at the concave parts to speed up the cell migration mechanism."

While the laboratory tests were done on human kidney tissue, the scientists also developed a computer model that can simulate how wounds in different tissue types might heal if researchers input data such as the rate at which the ring of proteins pulls on layers under the skin as it tightens.

The research was conducted in MBI co-principal investigator Professor Benoit Ladoux's laboratory, and with scientists from institutes in France, Spain, Portugal, Israel and Britain.

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