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Ubiquitous sugar molecule could be key to repairing deep wound without scarring

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Blocking fragments of the sugar molecule hyaluronan that triggers inflammation could be the key to robust healing and less scarring in deep wounds, Canadian researchers reported at the American Society for Cell Biology's 50th Annual Meeting in Philadelphia.

In laboratory rats, the small peptide, named 15-1, which blocks fragments of the ubiquitous sugar molecule, hyaluronan, promoted wound healing, minimized scarring and forged stronger new tissue.

These effects did not occur in the untreated animals in the study, according to Cornelia Tölg, Ph.D., of the London (Ontario) Regional Cancer Program.

With collaborators in Canada and the U.S., Tölg identified peptide 15-1 for its ability to cap molecular receptors in epithelial and dermal cells that react to fragments of the hyaluronan molecule by setting off a cellular pathway linked to inflammation.

A single dose of peptide 15-1 reduced wound contraction, collagen deposits, inflammation and growth of unwanted new blood vessels in lab animals. The researchers said that these findings may have clinical implications for human wound healing.

A major component in skin, hyaluronan has been known to play a complicated although unclear role in closing deep wounds and minimizing fibrotic scarring in repaired tissue.

Until the late 1970s, hyaluronan was considered to be little more than the inert "goo" that filled the extracellular matrix, but has since emerged as a biological star in a wide range of biological processes, from embryonic heart development to tumor metastasis to wound repair.

The relationship between hyaluronan levels and tissue regeneration is paradoxical according to Tölg. Hyaluronan levels are extremely high in developing embryos and newborns, which can recover readily from surgery without scarring.

But throughout adult life, levels of intact hyaluronan drop while the proportion of broken hyaluronan molecules increases.

Thus, while the intact hyaluronan molecule promotes strong healing, hyaluronan fragments engage the receptor for hyaluronan-mediated motility (RHAMM), setting off inflammation that can result in fibrotic scarring and weak granulated tissue.

Tölg and colleagues used microscopic beads coated with hyaluronan to pinpoint two small peptides that bound to the shape of the molecule.

One of them, peptide 15-1, showed an affinity for fastening itself to hyaluronan fragments, effectively keeping them from the RHAMM.

Provided by American Society for Cell Biology