Study: Adult human immune cells have stem cell-like function that stimulates healing

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A new study led by researchers at The Ohio State University Wexner Medical Center shows that human immune cells have stem cell-like function that can help stop prolonged inflammation and stimulate healing.

Findings of the study are published in the journal *Nature Communications*.

"It's interesting that immune cells of adult humans possess such plasticity that they may naturally convert into other cell types of the body," said Sashwati Roy, co-lead author of the study and a professor of general surgery at the Medical Center.

The study shows that immune cells of the adult body may behave like stem cells and generate new cell types required for wound healing. After injury, inflammation is necessary to enable repair, but it must terminate in a timely manner. In disease conditions such as diabetes, inflammation is prolonged, impairing the healing process.

The study shows that macrophages, which are immune cells responsible for inflammation, may behave like stem cells. Macrophages come to the wound site and are guided by skin cells to convert into fibroblasts. Fibroblasts help the healing process by depositing collagen and other products that provide strength to the new skin generated during the repair process.

"Conversion of macrophages to fibroblasts at the injury site is a novel observation that also explains how inflammation is terminated," Roy said.

During the study, wound fluid isolated from patients at Ohio State's Comprehensive Wound Center induced huddling of macrophages, indicative of readiness to convert to fibroblasts. Patients whose wound fluids were capable of doing so had better wound outcomes than those whose wound fluid failed to convert macrophage to fibroblast. In healing patients, evidence of macrophage converting to fibroblast was found.

However, in diabetes, such conversion wasn't efficient. Studies show that such desirable conversion of inflammatory cells was caused by signals (microRNA-21) transmitted to the immune cells from resident cells of the skin.

These findings show for the first time that immune cells are a major source of collagen-producing fibroblasts at the site of wound healing. The study also provides a new avenue to manage inflammation by converting inflammatory cells to other cell types.

"This work provides important clues demonstrating that cells of the adult human have remarkable plasticity. Such properties may be harnessed towards important breakthroughs in regenerative medicine," said Chandan K. Sen, director of Ohio State's Center for Regenerative Medicine and Cell-Based Therapies and co-lead author of the study.

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