

Animal study holds promise for treating diabetic ulcers and burns

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A combination of two drugs already approved by the U.S. Food and Drug Administration for different applications reduces wound healing time by one-quarter and significantly decreases scar tissue in mice and rats, Johns Hopkins researchers report. If the findings, reported in the September issue of the *Journal of Investigative Dermatology*, hold true in future human studies, the dual treatment could speed skin healing in people with skin ulcers, extensive burns, surgical wounds and battlefield injuries.

Zhaoli Sun, M.D., Ph.D., director of the Transplant Biology Research Center at the Johns Hopkins University School of Medicine, and his colleagues say the [wound healing](#) potential of the two drugs used in the animal study was discovered incidentally while looking for ways to prevent rejection of liver transplants. One of the drugs, AMD3100, is generally used to move stem cells from [bone marrow](#) to the bloodstream so the cells can be harvested and stored for patients recovering from cancer chemotherapy. The other, tacrolimus, tamps down the immune response. Sun and his team noticed that in addition to successfully preventing liver graft rejection in their study, the drugs, when used together, seemed to improve wound healing in animals.

Focusing on just the wound healing "side effect" of the drug duo, Sun and his colleagues launched the rodent study to determine how well the combination worked and what the mechanism behind its therapeutic effects might be.

The researchers first divided mice into four groups, each of which received four 5-millimeter circular cuts to remove skin and tissue from their backs. Some of the mice received injections of just AMD3100. Others received injections of tacrolimus in doses just one-tenth of what is usually given to prevent organ and tissue rejection. Another group received injections of both AMD3100 and low-dose tacrolimus. A fourth group, the control animals, received saline injections rather than the drugs.

Animals that received only saline healed completely in 12 days, while those that received both drugs healed in nine days, a reduction of 25 percent. Those that received either one of the two drugs had only a modest improvement in [healing time](#), cutting it by a single day.

The researchers had similar findings with groups of rats, where the drug combination working slightly better, reducing healing time by 28 percent compared to saline. Additionally, they found that the wounds in animals that received the [drug](#) combination healed with less [scar tissue](#) and regrew skin's hair follicles.

"The findings mean that wound healing is not only accelerated, but also that real skin regeneration is occurring," Sun says. "These animals had more perfect skin repair in the wound area."

Further tests showed that the drugs work synergistically, with AMD3100 pushing stem cells from bone marrow into the bloodstream and tacrolimus stimulating cells in wound areas to give off molecules that attract the [stem cells](#).

Though the study reported tested the [drug combination](#) only on surgical excisions, Sun and his colleagues say the beneficial effects also apply to burn injuries and excisions in diabetic rats in studies that are currently underway.

More information: "Pharmacological Mobilization of Endogenous Stem Cells Significantly Promotes Skin Regeneration after Full-Thickness Excision: The Synergistic Activity of AMD3100 and Tacrolimus." Qing Lin, Russell N Wesson, Hiromichi Maeda, Yongchun Wang, Zhu Cui, Jun O Liu, Andrew M Cameron, Bin Gao, Robert A Montgomery, George M Williams and Zhaoli Sun *Journal of Investigative Dermatology* (28 March 2014) | [DOI: 10.1038/jid.2014.162](https://doi.org/10.1038/jid.2014.162)

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