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Discovery promises unique medicine for treatment of chronic and diabetic wounds

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A unique new medicine that can start and accelerate healing of diabetic and other chronic wounds is being developed at Umeå University in Sweden. After several years of successful experimental research, it is now ready for clinical testing.

Behind this new medicine is a group of researchers at the Department of Medical Chemistry and Biophysics who have made the unique finding that the protein plasminogen is a key-regulator that initiates and accelerates wound healing by triggering the inflammatory reaction. Their discovery is now being published in the highly ranked journal *Blood*.

“Today we have the knowledge needed to develop a medicine,” says Professor Tor Ny, one of the authors of the article. “The bulk of the preclinical research has been completed, and we have had meetings with the Medical Product Agency to discuss a program for clinical testing.”

Plasminogen is a well-known plasma protein that is produced in the liver and found in all bodily fluids. The Umeå researchers have now re-assessed its role and managed to show that the concentration of plasminogen increases dramatically in and around wounds, which is an important signal to start the inflammatory reaction required for healing. In diabetic wounds the level of plasminogen does not increase in the same way, and this seems to be the reason why these wounds do not heal. In diabetic mice and rats the researchers were able to show that the healing process starts immediately when plasminogen is injected around the wound, which then heals fully.

A cell line for producing plasminogen on a larger scale has also been developed, and the goal is to start clinical testing as soon as funding can be arranged. The researchers have high hopes, as plasminogen is an endogenous protein that can be assumed not to produce side effects.

The need for a biologics for treating chronic wounds is urgent. Diabetic wounds that do not heal are the most severe type of chronic wounds, affecting millions of people annually. Many of the roughly 350 million diabetes patients in the world develop foot ulcers, and in 10-15 million cases this ultimately leads to amputation. Today's treatment of diabetic wounds consists primarily of traditional wound care, with compresses and bandages; there is no effective medication.

The Umeå researchers are initially concentrating on diabetic wounds, but plasminogen also has great potential for working on other types of wounds. This includes tympanic membrane perforations and periodontitis. Being a pro-inflammatory activator, plasminogen has moreover been shown to be effective in combating antibiotic-resistant bacteria (MRSA).

More information: Yue Shen, Yongzhi Guo, Peter Mikus, Rima Sulniute, Malgorzata Wilczynska, Tor Ny, Jinan Li: Plasminogen is a key proinflammatory regulator that accelerates the healing of acute and diabetic wounds, *Blood*. 2012 May 4. [Epub ahead of print] doi:10.1182/blood-2012-01-407825

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