

Nanotech for Improved Wound Healing

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In healthy individuals wounds will heal quickly with little intervention. However, in certain disease conditions, such as diabetes, the healing process, which involves migration, proliferation, and differentiation of different types of skin cells, is often compromised. This is a challenging problem in healthcare for those looking after chronically ill patients and post-operative skin cancer patients, as well as environments where antibiotic-resistant strains of pathogenic bacteria and microbial fungi might be present.

Chronic wounds and non-healing wounds can lead to serious issues of infection and tissue death, necrosis, and in extreme cases can require limb amputation.

Writing in the journal [Applied Materials Today](#), a team from the [Chinese Academy of Sciences](#), explain how molybdenum ions have, in laboratory tests, been shown to promote the migration and proliferation of human dermal fibroblasts cells, human umbilical vein endothelial cells, and human hair dermal papilla cells. They hypothesized that a material capable of carrying molybdenum nanoparticles might be used as a dressing that would steadily release these ions into the wound and trigger these cellular processes to accelerate healing where underlying health conditions were otherwise stymieing the natural wound-healing processes.

The team has now developed a novel synthesis of molybdenum sulfide nanoparticles which can be incorporated as clusters into a sodium alginate hydrogel. This material has a porous microstructure and carries within it a uniform distribution of molybdenum nanoparticles. The team has now demonstrated that their nanoparticle-laden hydrogel has a significant effect on promoting new blood vessel growth, angiogenesis, around the wound bed and also leads to

regeneration of hair follicles. The tests were carried out on a wound present on an in vivo murine model of diabetes.

The team also tested the hydrogel on wound healing in a nude mouse model of melanoma where wound healing is compromised by the presence of insidious skin cancer cells. The healing process in this case was improved by a photothermal process as well as the steady release of molybdenum(IV) ions into the wound site.

The team concludes that their nanoparticle-loaded hydrogel "may be one of the promising candidates for disease-impaired wound healing and provides a broad prospect for the development of skin regeneration in the future."

Read the [original article](#) on Materials Today.