

Molecular mechanisms of enhanced wound healing by copper oxide-impregnated dressings

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This study explored whether the hypothesis that constant release of copper ions directly into hard-to-heal wounds in individuals with compromised peripheral blood supply would enhance angiogenesis, skin regeneration, and wound healing.

Copper plays a key role in angiogenesis and in the synthesis and stabilization of extracellular matrix skin proteins, which are critical processes of skin formation.

It was hypothesized that introducing copper into wound dressings would enhance wound repair.

Wound dressings containing copper oxide were applied to wounds inflicted in genetically engineered diabetic mice (C57BL/KsOlaHsd-Lepr^{db})

Results included:

- Increased gene and in situ up-regulation of proangiogenic factor (e.g., placental growth factor, hypoxia-inducible factor-1 alpha, and vascular endothelial growth factor)
- Increased blood vessel formation ($p < 0.05$)
- Enhanced wound closure ($p < 0.01$) as compared with control dressings (without copper) or commercial wound dressings containing silver.

The study demonstrated the capacity of copper wound dressings to enhance wound healing and sheds light onto the molecular mechanisms by which copper oxide-impregnated dressings stimulate wound healing.

“It is clear, however, that copper directly or indirectly stimulates many factors, some of which are impaired in diabetics and are important for keratinocyte and fibroblast proliferation, epithelialization, collagen synthesis, extracellular matrix remodeling, and angiogenesis, resulting in accelerated wound healing.”

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Read the full text online: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1524-475X.2010.00573.x>