Healaria: Development of Herbal-Based Nanoparticles With Regenerative Effects on Dugesia japonica Planaria for Wound Healing Applications as a Basis for Innovative Wound Dressing

Thaisuriyan, Krittayot (School: Mahidol Wittayanusorn School)
Sawangsuriya, Panisa (School: Mahidol Wittayanusorn School)
Amphon, Prach (School: Mahidol Wittayanusorn School)

Chronic wounds are a major health concern, especially among the elderly and people with conditions like diabetes. Without proper treatment, they can lead to infection, tissue loss, or even amputation. Conventional dressings offer only physical protection and often lack therapeutic functions such as moisture control or antimicrobial activity. This study proposes an innovative approach by combining traditional Thai herbal medicine with nanotechnology. Turmeric (Curcuma longa), asiatic pennywort (Centella asiatica), and aloe vera (Aloe barbadensis) were tested on Dugesia japonica, a model organism known for tissue regeneration. Turmeric, particularly its compound curcumin, showed the strongest effect due to its anti-inflammatory, antioxidant, and antimicrobial properties. Curcumin was synthesized into zinc oxide nanoparticles (Cur-ZnONPs), averaging 86.61 ± 6.03 nm, and applied at 0.25–0.50 mg/mL, significantly enhancing regeneration. To improve delivery, the nanoparticles were encapsulated in a chitosan–alginate hydrogel, enabling controlled release and stability. This eco-friendly system merges ancient herbal wisdom with modern science, offering a sustainable solution for advanced wound care.

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