

An Antimicrobial-Bacterial Cellulose-Manuka Honey Loaded Dressing for the Active Treatment and Monitoring of Wounds

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Chronic wounds are a significant healthcare threat worldwide, affecting an estimated 6.5 million people in the U.S. and costing the healthcare system an estimated \$25 billion annually (10). With the drastic increase in obesity and diabetes, there is a critical need for innovative wound care strategies that accelerate healing and recovery and limit the use of antibiotics through wound monitoring technology. The goal of this study was to develop a biodegradable, antimicrobial wound dressing, for the purpose of detecting infection and healing wounds. Bacterial cellulose (BC), a biopolymer derived from kombucha tea, was purified, and loaded with manuka honey (MH) to obtain long lasting antimicrobial properties. Alkaline pH within a wound bed is a strong indicator of infection or biofilm formation. A pH sensing indicator was fabricated by loading anthocyanin, a natural dye extracted from red cabbage (*Brassica oleracea*), into bacterial cellulose patches, which were incorporated into the MH/BC dressing for the purpose of detecting infections. BC's complex 3-D structure allows MH to slowly release, giving it a more prolonged effect at the wound site. T-test of disk diffusion results indicated MH/BC dressings functioned significantly better than 100% unloaded manuka honey at inhibiting both Gram-positive and Gram-negative *Staphylococcus epidermidis* and *Escherichia coli*, respectively at 48, 72 and 96 hours (*S. epidermidis* $P = 0.0164$, *E. coli* $P = 0.200$). This promising multi-functionalized dressing combines the proven antimicrobial benefits of manuka honey with the ability for patients and physicians to quickly identify wound infection.

Awards Won:

Fourth Award of \$500

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Associated Technologies Association (DCAT): DCAT First Prize