

Potential of biocellulose carrier impregnated with essential oils to fight against biofilms formed on hydroxyapatite.

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Streszczenie

In this research, bacterial cellulose (BC), one of the most promising biopolymers of the recent years, was saturated with thyme, eucalyptus and clove essential oils (EOs) and applied against staphylococcal and pseudomonal biofilms formed on hydroxyapatite (HA). BC dressings were thoroughly analyzed with regard to their physical properties. Moreover, the exact composition and ability of particular EO molecules to adhere to HA was assessed. Additionally, cytotoxicity of oil-containing, cellulose-based dressings towards osteoblasts and fibroblasts as well as their impact on reactive oxygen species (ROS) production by macrophages was assessed. The results revealed the high ability of BC dressings to absorb and subsequently release EOs from within their microstructure; the highest number of compounds able to adhere to HA was found in the thyme EO. The eucalyptus EO displayed low, while thyme and clove EOs displayed high cytotoxicity towards fibroblast and osteoblast cell lines. The clove EO displayed the highest eradication ability toward staphylococcal, while the thyme EO against pseudomonal biofilm. Taken together, the results obtained indicate the suitability of EO-saturated BC dressings to eradicate pseudomonal and staphylococcal biofilm on HA surface and moreover, to not trigger reactive oxygen species production by immune system effector cells. However, due to cytotoxic effects of thyme and clove EOs towards cell lines *in vitro*, the eucalyptus EO-saturated BC dressing is of highest potential to be further applied.

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