

Biodegradable and biocompatible controlled release and delivery systems of selected antioxidants used in cosmetology

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ABSTRACT

In this article we report the synthesis as well as molecular and biological characterization of biodegradable conjugates of oligo(3-hydroxybutyrate) (OHB) with two selected antioxidants and cosmetic components, p-anisic (p-AA) and vanillic acids (VA). The results presented here indicate that anionic ring-opening oligomerization (ROO) of β -butyrolactone initiated by p-anisic acid potassium salt or vanillic acid sodium salt is a convenient method for introducing bioactive compounds to biodegradable and biocompatible OHB chains.

The molecular level structure of the resulting bioconjugates, in which bioactive compounds are covalently bonded with biodegradable and biocompatible OHB chains, has been proven by ESI-MS/MS tandem mass spectrometry supported by nuclear magnetic resonance (NMR) spectroscopy. Furthermore, the performed hydrolytic degradation studies of bioconjugates allowed to gain detailed insight into the hydrolysis process and confirmed the release of p-anisic acid and vanillic acid. *In vitro* studies demonstrated that all of the conjugates studied were well tolerated by KB and HaCaT cell lines as they had no marked cytotoxicity, while conjugates with a relatively short OHB carrier are optimal to support keratinocyte function.

It was also shown that the obtained bioconjugates can penetrate all layers of the skin, which opens up their potential application in cosmetology.

Keywords: cosmetic delivery system, antioxidants, biodegradable polyesters, ESI-MS analysis, tandem mass spectrometry

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