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Layer-by-layer nanocoating of antibacterial niosome on orthopedic implant

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Abstract

The major clinical hindrance of orthopedic implants is the bacterial infection, which can lead to biofilm formation and ultimately results in implant rejection. In this research, layer-by-layer nanocoating consists of vancomycin/PLA/vancomycin-loaded niosomes was designed. Vancomycin-loaded niosomes were formulated by thin film hydration method and the attributes of niosomes in terms of size, zeta potential, drug loading and EE, were assessed. The size was 340.5 ± 2.95 nm with the zeta potential and %EE was 45.4 ± 0.77 mV and $50.47 \pm 3.66\%$ respectively. The dip coating technique was used to deposit a thin film, which was characterized morphologically under FE-SEM. Drug release from coated bone plates with and without vancomycin-loaded niosomes was also studied and results suggested that bone plates coated with vancomycin-loaded niosomes have accumulated more vancomycin than the control group and hence aided in the prolonged release up to two weeks. These niosomes-coated bone plates demonstrated superior antibacterial activity for longer time period, without exhibiting any cytotoxic effects towards normal cells (L929). These findings offer a promising approach to

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