



Robust Polymeric Nanoparticles for the Delivery of -Aminoglycoside Antibiotics using Carboxymethyl-dextran-b Poly(Ethyleneglycols) Lightly Grafted with n-Dodecyl Groups.

Ghareb M. Soliman, Janek Szychowski, Stephen Hanessian, Françoise M. Winnik

Abstract:

Aminoglycoside antibiotics are effective in the treatment of infections caused by aerobic Gram negative bacilli, but their widespread use is hampered by serious side effects that may be alleviated through the use of tailored delivery systems. Robust polyion complex (PIC) micelles, incorporating up to 50 weight % drug, were prepared using two aminoglycosides: paromomycin and neomycin, and a dihydrophilic block copolymer consisting of a poly(ethyleneglycol) (PEG) chain linked to a carboxymethyl-dextran fragment (CMD) lightly grafted with n-dodecyl groups. The micelles were stable under physiological conditions (pH 7.4, 150 mM NaCl), in contrast to micelles formed by the unmodified CMD-PEG and the aminoglycosides or their guanidylated derivatives. The aminoglycosides were released from the n-dodecyl-CMD-PEG micelles in a pharmacologically active form as indicated by their ability to kill test micro-organisms in culture. This study opens up new opportunities in the biomedical applications of PIC micelles with inherently enhanced stability.

Published In:

Soft Matter., DOI: 10.1039/C0SM00316F , Vol. 6 , pp. 4504-4514