Antibacterial action of lipid nanocapsules containing fatty acids or monoglycerides as co-surfactants.

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Résumé en anglais	Lipid nanocapsules (LNCs) are a new generation of biomimetic nanocarriers obtained via a phase inversion temperature method and have an oily core of medium-chain triglycerides that is surrounded by a shelf containing a lipophilic surfactant (lecithin) and a hydrophilic surfactant macrogol 15-hydroxystearate. The aim of the present study was to produce LNCs with antibacterial activity by replacing lecithin with other lipophilic surface active compounds, namely medium-chain fatty acids and their 1-monoglycerides, which are known to have antimicrobial properties. Fatty acids and monoglycerides were found to affect the properties of LNCs, such as particle size and zeta potential. Incorporation of a co-surfactant decreased significantly particle size (p□0.0039). Furthermore, incorporation of either lecithin or fatty acids with at least 10 carbon atoms yielded LNCs with the zeta potential significantly more negative than that of LNCs composed solely of triglycerides and macrogol 15 hydroxystearate (p□0.0310). Moreover, they were capable of decreasing the phase inversion temperature. The activity of the LCNs against Gram-positive S. aureus, including a methicillin-resistant strain, increased with increases in the length of the hydrocarbon tail. Monoglyceride-LNCs were found to be more active than the corresponding fatty acids. The opposite behaviour was observed for Gram-negative bacteria, whereby only caproic acid- and caprylic acid-LNCs were found to be active against these organisms. The monoglyceride-LNCs were bactericidal, and they killed in a time-dependent manner. Fatty acid-LNCs killed in a concentration-dependent manner. A haemolysis assay was performed to obtain preliminary information on the safety of the tested LNCs. In the case of fatty acid-LNCs, the concentrations at which bacterial growth was inhibited were similar to the haemolytic concentrations. However, monoglyceride-LNCs showed antibacterial action at concentrations much lower than those at which haemolysis was observed. In conclusion, monoglyceride-LNCs are promising candidates as carriers for the encapsulation of antibacterial agents, particularly against S. aureus.
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