



Synergistic interactions between doxycycline and terpenic components of essential oils encapsulated within lipid nanocapsules against gram negative bacteria

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Mots-clés	Doxycycline [8], Essential Oils [9], Lipid nanocapsules [10], Resistant bacteria [11], synergy [12]
Résumé en anglais	<p>The combination of essential oils (EOs) with antibiotics provides a promising strategy towards combating resistant bacteria. We have selected a mixture of 3 major components extracted from EOs: carvacrol (oregano oil), eugenol (clove oil) and cinnamaldehyde (cinnamon oil). These compounds were successfully encapsulated within lipid nanocapsules (LNCs). The EOs-loaded LNCs were characterised by a noticeably high drug loading of 20% and a very small particle diameter of 114nm. The <i>in vitro</i> interactions between EOs-loaded LNCs and doxycycline were examined via checkerboard titration and time-kill assay against 5 Gram-negative strains: <i>Acinetobacter baumannii</i> SAN, <i>A. baumannii</i> RCH, <i>Klebsiella pneumoniae</i>, <i>Escherichia coli</i> and <i>Pseudomonas aeruginosa</i>. No growth inhibition interactions were found between EOs-loaded LNCs and doxycycline (FIC index between 0.7 and 1.30). However, when bactericidal effects were considered, a synergistic interaction was observed (FBC index equal to 0.5) against all tested strains. A synergistic effect was also observed in time-kill assay (a difference of at least 3 log between the combination and the most active agent alone). Scanning electron microscopy (SEM) was used to visualise the changes in the bacterial membrane. The holes in bacterial envelope and leakage of cellular contents were observed in SE micrographs after exposure to the EOs-LNCs and the doxycycline combination.</p>

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Liens

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