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Evaluation of interaction mechanisms between *Acinetobacter baumannii* bacteria and lipidic nanocapsules by flow cytometry

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Acinetobacter baumannii is an important nosocomial pathogen, resistant to many commonly-used antibiotics. Considering the limited number of antibiotics in development, interesting strategies could lay on the use of natural resources especially essential oils (EOs). An interesting strategy underlined the antibacterial potential of EO components (carvacrol, cinnamaldehyde) loaded LNCs against *A. baumannii*. The aim of this study was to realize and characterize DiO-LNCs loaded with antibacterial actives. The antibacterial activity of these nano-carriers was evaluated *in vitro* against *A. baumannii*. Finally, we determine the interactions between bacteria and LNCs over time thanks to the fluorescence of DiO-LNCs and the properties of trypan blue in order to precise the physicochemical mechanisms occurring at the level of the biological membrane. The results underlined the attractiveness of the encapsulated actives compared to unloaded-LNCs. These results demonstrated the capacity of carvacrol-loaded-LNCs to interact and penetrate the bacterial membrane in comparison with cinnamaldehyde-LNCs and unloaded-LNCs. Moreover, the fluorescence of bacteria remained constant after contact with carvacrol-loaded-LNCs and cinnamaldehyde-LNCs whereas the fluorescence of the blank-LNCs decreased over time. This phenomenon could be explained by the release of these blank-LNCs by efflux pumps.

There after, modifications of carvacrol after substitution of hydroxyl functions by fatty acids (acetic acid, palmitic acid) demonstrated the crucial role of these latter for antibacterial activity. Finally, after contact with an efflux pump inhibitor CCCP (carbonylcyanide-3-chlorophenyl hydrazine), the results underlined a total synergistic effect for Car-LNCs showing that the CCCP is associated with action mechanism of carvacrol especially at the level of efflux pump mechanism.

Biography

Angelique Montagu is a PhD student at the University of Angers through a CIFRE thesis with Eydo pharma, dealing with essential oils encapsulation for the treatment of nosocomial infections under the direction of Pr. Marie-Laure Joly-Guillou and Pr. Patrick Saulnier. She studied biology at the University of Angers and she obtained master's degree in biology whose the subject was the use of mesenchymal stem cells as vehicles for lipid nanocapsules for the treatment of glioma.

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