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Editors:

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## Cinnamon essential oil and nanoemulsion: antibiofilm activity on *Acinetobacter baumannii* clinical isolates

Tea Ganić<sup>1\*</sup>, Stefana Vuletić<sup>1</sup>, Magdalena Stevanović<sup>2</sup>, Maja Kuzmanović<sup>2</sup>, Stefana Cvetković<sup>1</sup>, Biljana Nikolić<sup>1</sup>, Saša Đurović<sup>3</sup>, Dušan Kekić<sup>4</sup>, Dragana Mitić-Čulafić<sup>1</sup>

<sup>1</sup> Chair of Microbiology, Faculty of Biology, University of Belgrade, Belgrade, SERBIA

<sup>2</sup> Institute of Technical Sciences of SASA, Belgrade, SERBIA

<sup>3</sup> Institute of General and Physical Chemistry, Belgrade, SERBIA

<sup>4</sup> Institute of microbiology and Immunology, Faculty of Medicine, University of Belgrade, Belgrade, SERBIA

\*Email: tea.ganic@bio.bg.ac.rs

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### Objective

*Acinetobacter baumannii* is a pathogenic species which presents a danger to healthcare facilities due to the rapid spread of antibiotic resistance. Plants are currently being explored as a potential source of bioactive compounds that could be used to combat infectious diseases. Cinnamon is used as a food spice, but essential oil has been proven for antimicrobial activity. Due to reduced stability and solubility of essential oil, nanoemulsion (NE) synthesis could provide stronger antimicrobial effects. Investigation and comparison of antimicrobial activity of cinnamon (*Cinnamomum zeylanicum* L.) bark essential oil (EO) and NE on the *A. baumannii* ATCC19606 and clinical isolates. Effect of EO and NE on biofilm formation and biofilm eradication.

### Methods

GC/MS was performed in order to determine chemical composition of commercially purchased EO (P0125285, Frey + Lau, GmbH, Henstedt-Ulzburg, Germany). Droplet/particle size and polydispersity index of NE was determined by photon correlation spectroscopy (PCS). Minimal inhibitory concentration of EO and NE were defined using MIC assay. Effects of EO and NE were also examined on biofilm formation and eradication. Crystal violet staining was used for biofilm biomass quantification.

### Results

GC/MS analysis determined that the most common compound was trans-Cinnamaldehyde (61.9%). NE droplet/particles had multimodal distribution, shown by PCS. MIC values for EO were in range 0.25mg/mL – 0.5mg/mL, and for NE 0.125mg/mL – 0.25mg/mL. Both tested substances showed good effect on biofilm eradication, and destroyed biofilm biomass up to 64%, whilst the inhibition of biofilm formation was up to 70%.

### Conclusion

Taking all the results into account, it is a good start for further investigations of both EO and NE as a potential antimicrobial agent. Deeper knowledge about the mechanisms of actions of both of these tested substances could help us to understand the best and the most effective way to use them, in order to combat against *Acinetobacter baumannii*.

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