

## **Innovations in MDR therapy: essential oil applications**

### **ABSTRACT**

There are three common outcomes when testing the application of combinatory therapies for potential use in the clinical setting against multi-drug resistant (MDR) bacteria; whether synergistic, additive or antagonistic. Due to their relatively more favourable outcomes, antibiotics and adjuvant achieving synergism have been the primary focus in the development of therapeutics thus far; this has also resulted in less attention given to additive interactions, which may be equally effective. Hence, in this study, the authors investigated the effects of additivity using a representative combination model involving *Cinnamomum verum* (cinnamon bark) essential oil (CBO) and meropenem, a carbapenem class of antibiotics. Based on the zeta potential measurements, outer membrane permeability and scanning electron microscopy, synergistic and additive interactions of cinnamon bark oil (CBO) indicated comparable bacterial membrane disruption, alluding similar degrees of cell perturbations at the molecular level. Results from this study suggests that further investigations should be looked into for combinatorial therapeutic pairs achieving additive indices so as not to disqualify potentially useful alternatives in antibiotic therapy.

**Keyword:** Antimicrobial resistance; Multidrug resistance; Essential oils; Cinnamon bark oil; Meropenem; *Klebsiella pneumoniae*