Evaluation of citral and soybean flavonoids as potential efflux pump inhibitors in drug-resistant *Escherichia coli*

戴靜宜 (5121)

2022/05/04

Outline

1. Introduction
2. Methods
3. Results
   - Modulation assay
   - Accumulation assy
   - Efflux inhibition assay
   - Biofilm inhibition assay
4. Conclusion

Abstract

Resistance to antibiotics poses a major global threat according to the World Health Organization, and the drug efflux pump is the most serious drug resistance mechanism. The efflux pump inhibitor (EPI) can inhibit the operation of the efflux pump by competitively inhibiting or blocking the energy transfer. EPIs are being looked as promising adjunctive therapies with the known antibiotics to improve their antibacterial potency at low concentrations, reduce the emergence of AMR and virulence. Flavonoids are phenolic secondary metabolites in plants, which have various medicinal properties, such as anti-allergic, antioxidant, anti-inflammatory and inhibiting efflux pumps. Therefore, the objective of this study served to evaluate whether the four flavonoids, apigenin, chrysin, glycitein and hesperetin can inhibit the AcrB efflux pump. *E. coli* Kam3 pSYC-*acrB* was used in this study. In the modulation test, ciprofloxacin, clarithromycin, erythromycin and tetracycline were incubated with these four flavonoids. All tested flavonoids were able to enhance the activity of clarithromycin to at least 2-fold. In the accumulation assay, using EtBr as a fluorescent dye, either apigenin or hesperetin caused an increase in accumulation similar to positive control. In the efflux inhibition assay, it was observed that apigenin, chrysin and hesperetin can prevent the fluorescent dye from leaving the cells, so it can be preliminarily confirmed that apigenin and hesperetin can inhibit the efflux pump of AcrB. In the biofilm inhibition assay, four flavonoids showed inhibition to the biofilm formation of *E. coli* Kam3 pSYC-*acrB*. In conclusion, apigenin and hesperetin can inhibit the biofilm formation of *E. coli* Kam3 pSYC-*acrB* and partial inhibition of the AcrB efflux pump.