

Phenotype microarray profiling of the antibacterial activity of red cabbage

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ABSTRACT

Background: Functional food can be a potent source of wide array of biocomponents with antimicrobial activity. We investigated the antibacterial activity of red cabbage (RC) extract on Gram negative and positive ATCC strains. Most interesting, we, for the first time, explored and analysed the complete phenotypic profile of RC-treated bacteria using Omnilog Phenotype Microarray.

Results: This study revealed that the phenotype microarray (PM) screen was a valuable tool in the search for compounds and their antibacterial mechanisms that can inhibit bacterial growth by affecting certain metabolic pathways. It was shown that RC exerted remarkable antibacterial effect on *S. aureus* and *E. coli* bacteria, and PM showed a wide range phenotypic profile of the exerted RC antibacterial activity. RC targeted the peptide, carbon, nutritional assembly, and sulfur metabolic pathways altogether. The peptidoglycan synthesis pathway was inferred to be targeted by RC extract at a metabolic point different from other available cell wall-targeting drugs; these could be hot targets for the discovery of new therapy for many problematic microbes.

Conclusions: Taken together, the phenotype microarray for functional food and medicinal plants can be a very useful tool for profiling their antimicrobial activity. Moreover, extracts of functional food can exert antibacterial activity by hitting a wide range of metabolic pathways, at the same time leading to very difficult condition for bacteria to rapidly develop resistance. Therefore, using functional foods or medicinal plants as such, or as extracts, can be superior on mono-targeting antibiotics if the optimal concentrations and conditions of these functional foods were sought.

Key words: red cabbage, bacteria, antibacterial, phenotype microarray, Omnilog, Biolog