Monitoring anti-virulence effects of phenolic extracts from upcycled products using pseudo-targeted metabolomics

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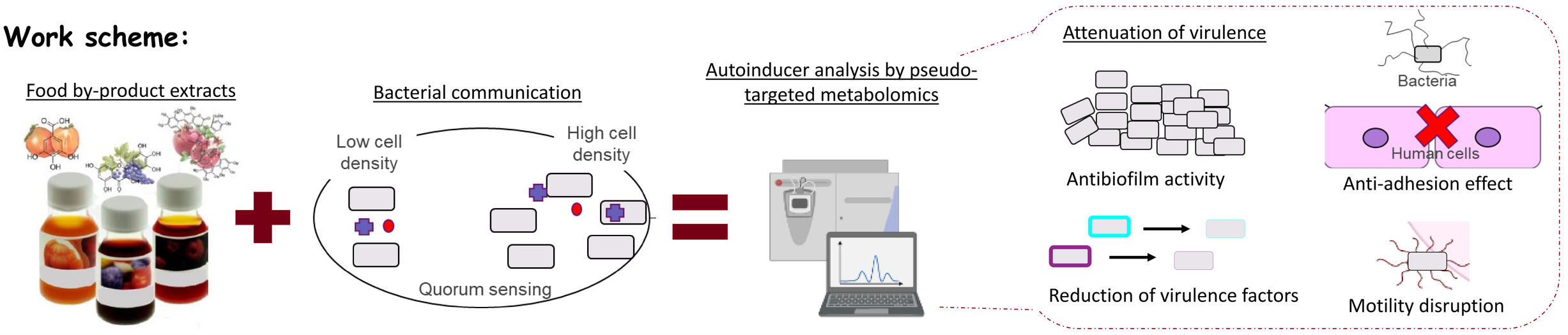
Background: The rising incidence of antimicrobial resistance urges novel antimicrobial development with phytochemicals as appealing potential therapeutics. Phytochemical compounds from by-products exert a noted and well documented antibacterial potential with understudy antibacterial-derived properties. Fruit by-products are usually rich sources of these type of compounds. **Aim:** we aimed to assess the potential of phenolic extracts of three by-products: persimmon, pomegranate and grape to modulate bacterial virulence factors through pseudo-targeted metabolomic analysis of quorum sensing or bacterial communication.

Work scheme:



Results

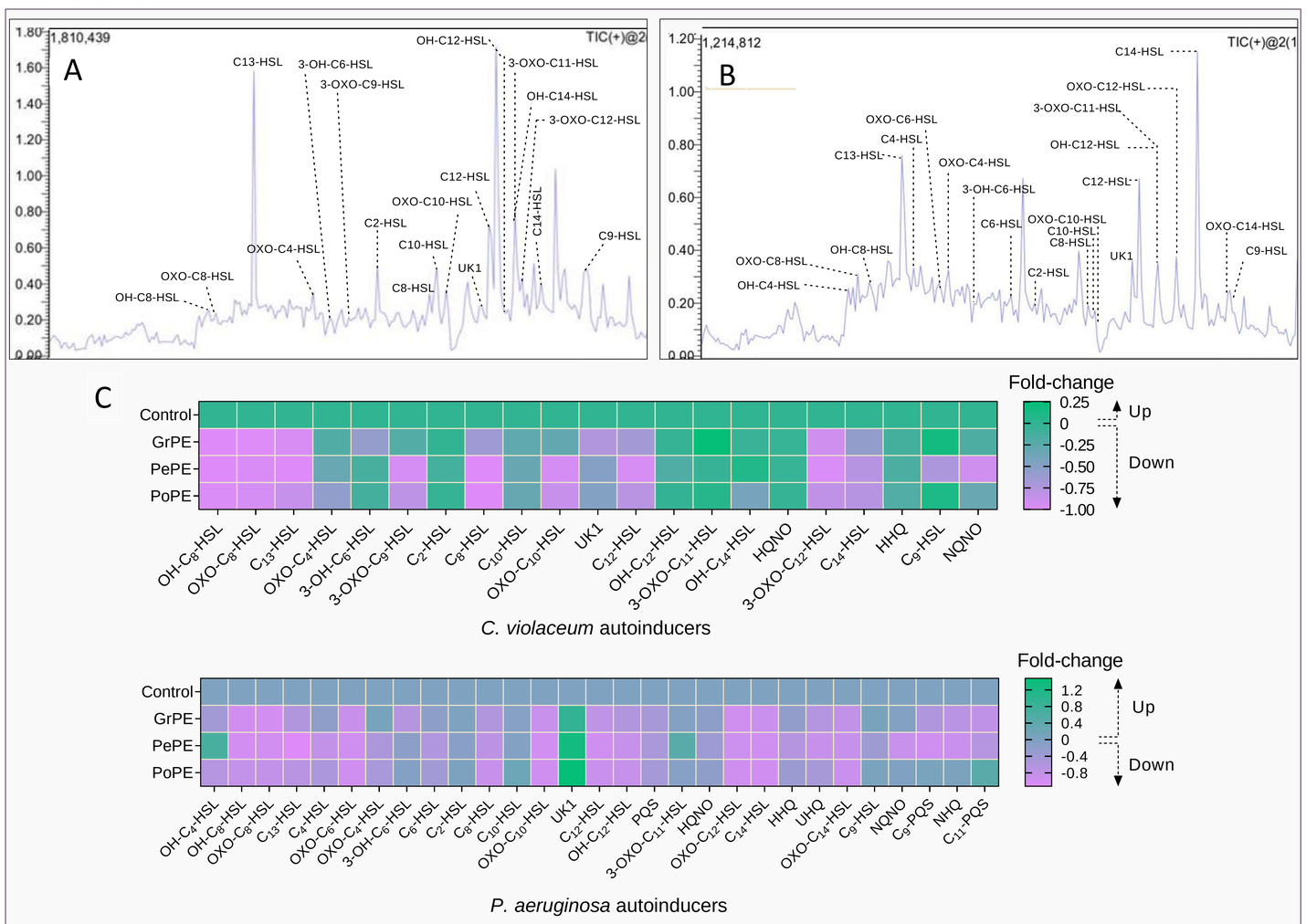


Fig. 1 - Bacterial communication disruption by phenolic extracts. (A) Acyl-homoserine lactones (AHLs) detected in (**A**) *Chromobacterium violaceum* and in (**B**) *Pseudomonas aeruginosa*. (**C**) Modulatory effect in the profile of bacterial autoinducers by grape (GrPE), persimmon (PePE) and pomegranate (PoPE) phenolic extracts (n=3).

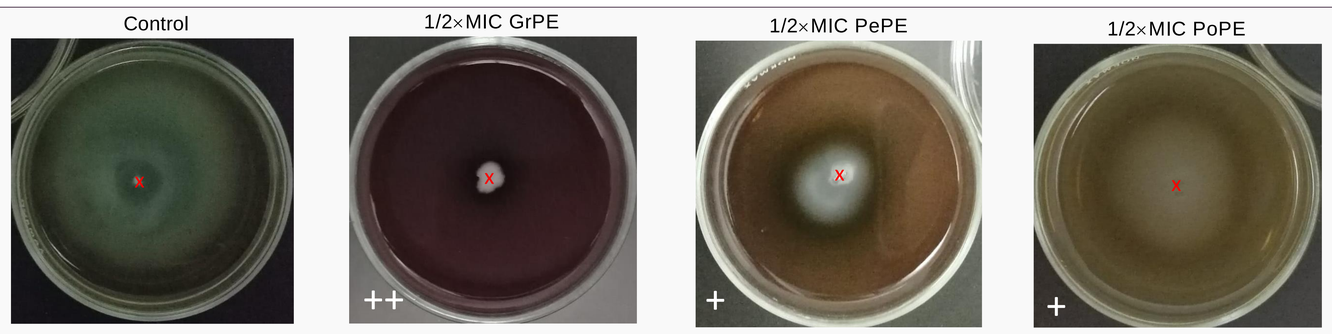


Fig. 2 - Disruption of swarming motility of *P. aeruginosa* by (++) grape (GrPE), followed by persimmon (PePE) and pomegranate (PoPE) phenolic extracts (+) (n=3).

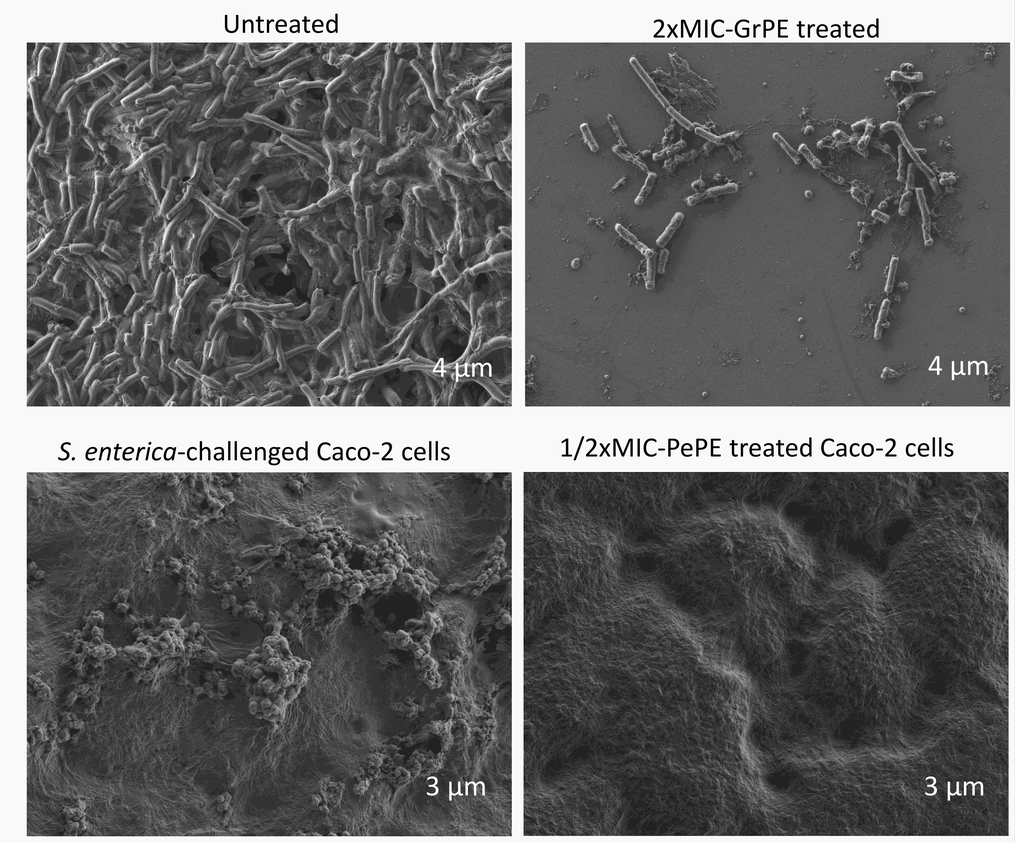


Fig. 3 - Field-emission scanning electron microscope (FESEM) micrographs of the (**A**) pre-formed biofilm destruction of *P. putida* by grape phenolic extract (GrPE). (**B**) Reduction of *Salmonella enterica* adhesion by persimmon phenolic extract (PePE) on Caco-2 cell monolayers.

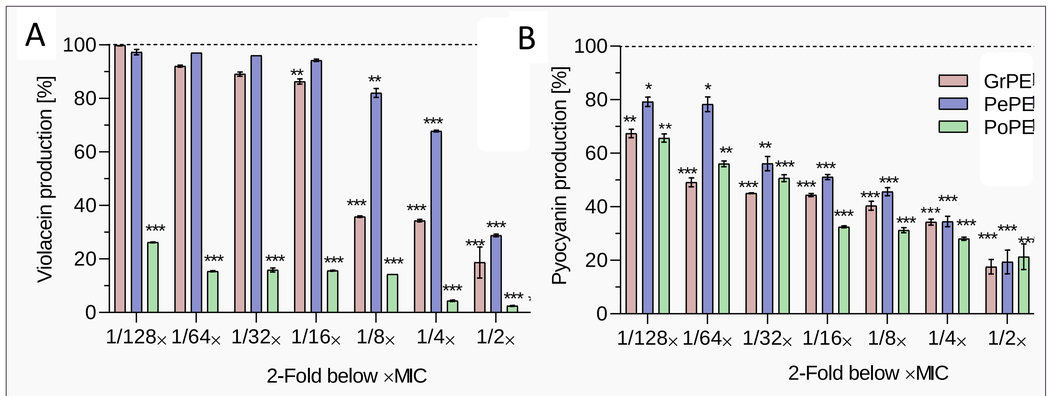


Fig. 4 - Reduction of (A) violacein and (b) pyocyanin production by *C. violaceum* and *P. aeruginosa* by sub-inhibitory doses of grape (GrPE), persimmon (PePE) and pomegranate (PoPE) phenolic extracts. Restuls were compared to untreated cells (control) (***p<0.001; **p <0.01; *p <0.05, Two-way ANOVA with Dunnett's post hoc test). Results are mean ± SD.

We conclude The use of pseudo-targeted metabolomics as a monitoring tool allows for the annotation of both virulence molecules and bioactive compounds within the extracts, shedding light on their mechanisms of action while predicting their potential.

Paper of interest:
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