Plant-derived exosome vesicles from fruits as novel functional ingredients: Development of a scalable process for their isolation and application

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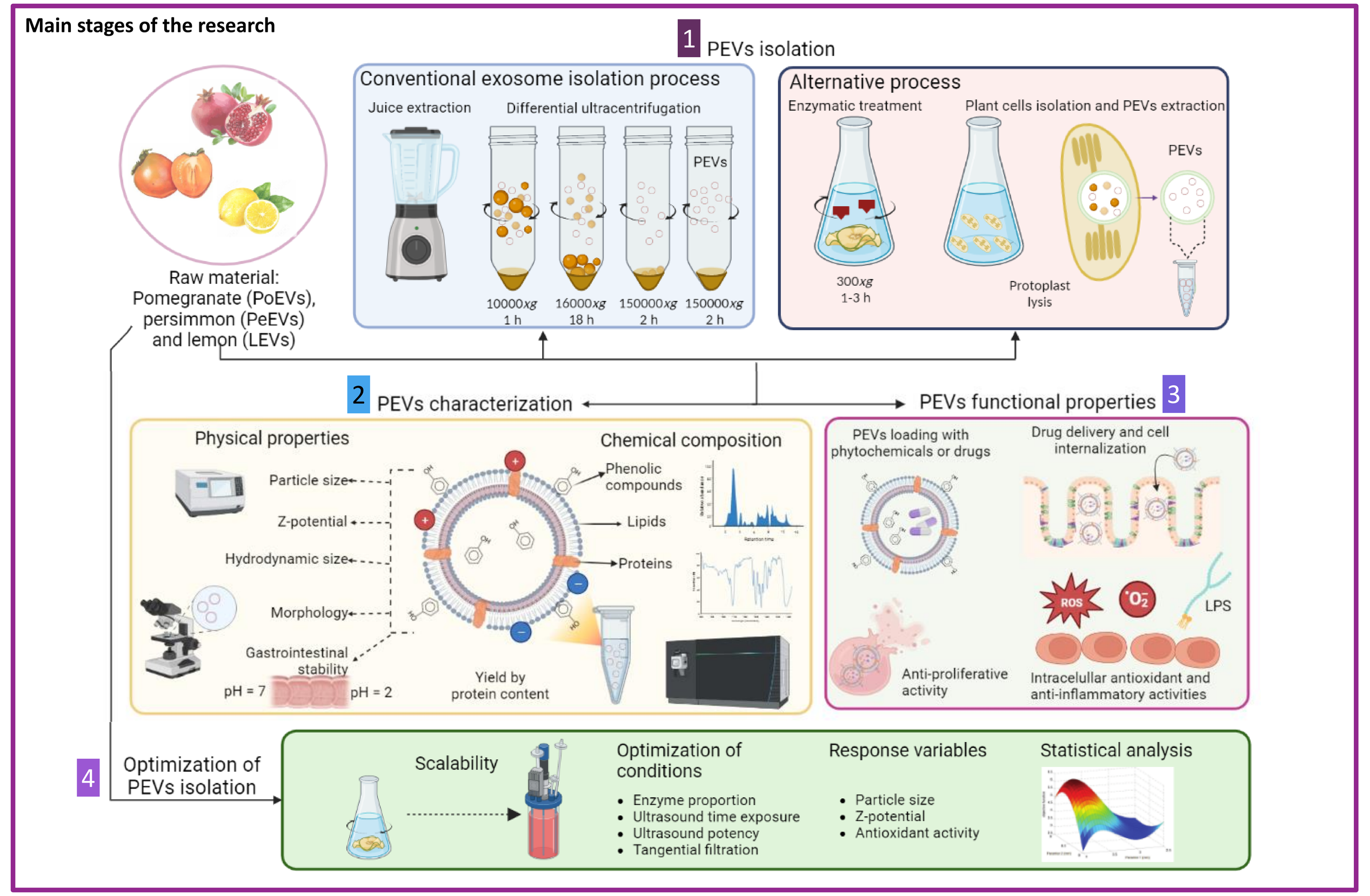
Background:
- Plant-derived exosome vesicles (PEVs) exert bioactive activities not fully elucidated similar to human exosomes.
- Common fruits and vegetables are sources of PEVs.
- PEVs isolation is limited by ultracentrifugation (time-consuming and instrument-dependent), reducing their application.
- There is a need for a rapid and practical method for PEVs isolation.

General aim:
- To develop a scalable process for the isolation of PEVs.

Specific aims:
- To develop an alternative method for the isolation of PEVs.
- To characterize PEVs from conventional and alternative methods.
- To assess the biological potential of PEVs in human cells as biocargoes and functional ingredients.
- To optimize the conditions of the alternative method for PEVs isolation.

Main stages of the research



Results obtained so far

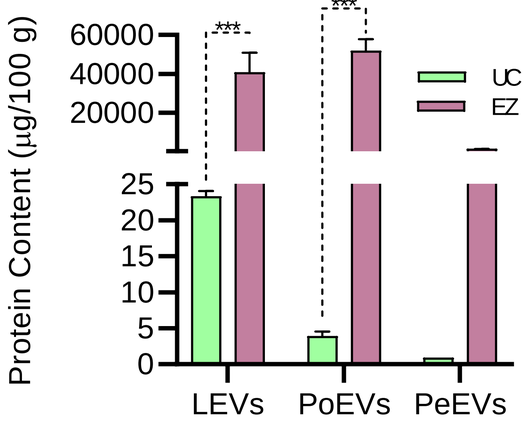


Figure 1. PEVs yield production by ultracentrifugation (UC) and enzymatic (EZ) processes, by protein content. ***p<0.001, *t-student* test.

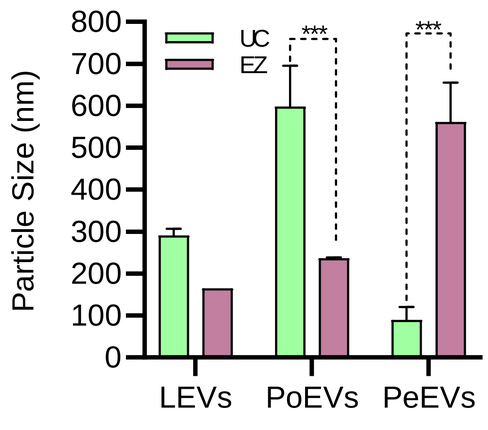


Figure 2. PEVs size obtained by ultracentrifugation (UC) and enzymatic (EZ) processes, by dynamic light analysis (DLS). ***p<0.001, *t-student* test.

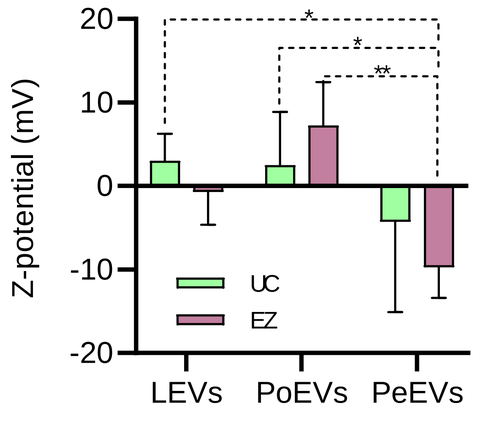


Figure 3. PEVs Z-potential obtained by ultracentrifugation (UC) and enzymatic (EZ) processes. ***p<0.001, ANOVA with Tukey's post hoc test.

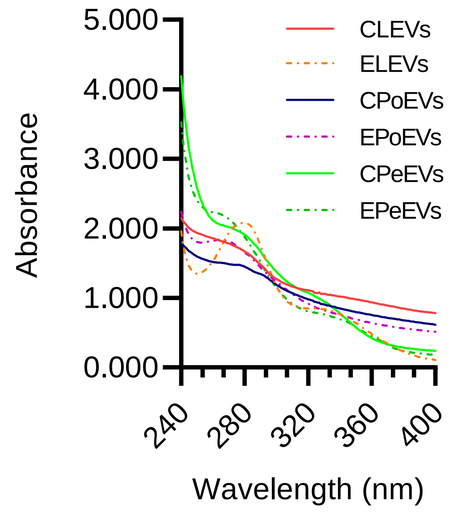


Figure 4. UV-vis spectra of PEVs.

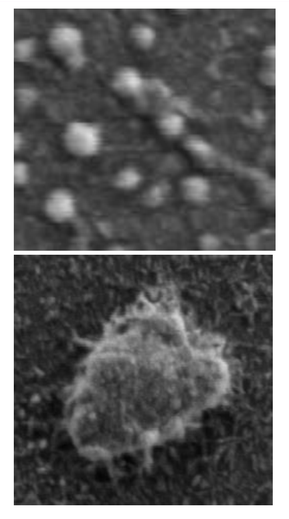


Figure 5. SEM micrographs of LEVs obtained by enzyme treatment from far (upper, 200 nm) and close (below, 50 nm).

Potential applications:
- Nanovehicles of functional phytochemicals such as phenolics as well as exogenous proteins.
- Functional ingredients for nutraceutical and cosmetical products.
- A scalable process to isolate PEVs facilitating their application.

Relevant literature:
- 10.3390/antiox12040943
- 10.1038/mt.2013.190
- 10.2174/1389201019666181017115755