Antioxidant Effect of Extracellular Vesicles Derived From Houttuynia Cordata

Poster ID 32

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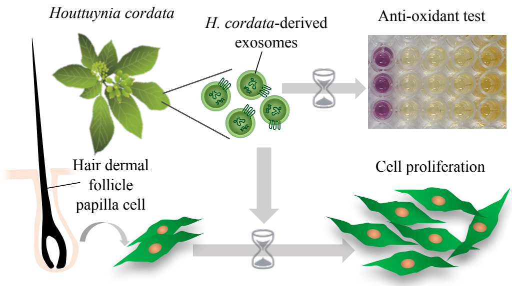
Introduction:



Plant-derived extracellular vesicles (EVs) are capable of efficiency delivering mRNAs, miRNAs, lipids, and proteins to mammalian cells by interspecies communication. Houttuynia cordata has been found to exhibit strong antioxidant properties. We suggested that *H. cordata*-derived EVs (H-EVs) would effectively promote hair regeneration and prevent hair loss. Plant-derived EVs critically contribute represent a new candidate natural component that shows potential to be developed for cosmetic, and pharmaceutical products.

Materials & Methods:

1. Isolation of extracellular vesicles from *H. cordata*

Houttuynia cordata-derived EVs were isolated by processing the leaves with a mixer grinder, and centrifuging the obtained extract at 3,000× g for 20 min.

Then, large debris was removed by filtering the supernatant through a membrane step to remove and then the filtered EVs were concentrated by centrifuging at 5000× g for 10 min in an Amicon Ultra-4 PL 100 K concentrator.

2. Size characterization of isolated H-EVs

Hydrodynamic size distribution was determined by measuring intensity from H-EVs using dynamic light scattering (DLS). For zeta potential measurement, the H-EVs were diluted with distilled water, and diluted samples were detected using a Zetasizer nano system.

3. 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay

DPPH scavenging activity (%) = $[(A_{control} - A_{sample}) / A_{control}] \times 100$

Where, Acontrol is the absorbance of the control without H-EVs and Asample is the absorbance of the tested sample.

4. Wound healing assay

Wound healing = $[(A_{0h} - A_{24h}) / A_{0h}] \times 100$

Where, A_{0h} is the area of the initial wound calculated after scratching, and A_{24h} is the area of the unhealed wound that remained at 24 h.

Results & Discussion:

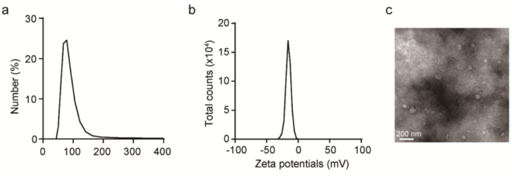


Figure 1. Characterization of exosomes from *Houttuynia cordata.* (a) Dynamic light scattering (DLS) measurements of size distribution. (b) Zeta potential measurements. (c) Transmission electron microscopy (TEM) images of exosomes from Houttuynia cordata (Scale bar: 200 nm). The hydrodynamic diameters of LEVs-TMO were approximately 100 nm were observed.

Results & Discussion:

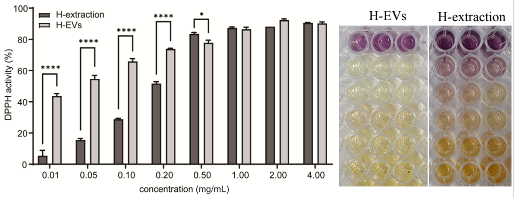


Figure 2. DPPH radical scavenging activity of *Houttuynia cordata*-derived exosomes, compared to extract of Houttuynia cordata. The results showed that H-EVs had superior scavenging activity to extract of Houttuynia cordata. Houttuynia cordata-derived exosomes confirmed that the scavenging activity increased in a concentration-dependent manner.

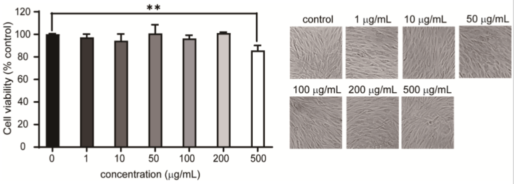


Figure 3. The percentage of cell viability on dermal papilla cells. No cytotoxicity was observed up to a concentration of 200 µg/mL.

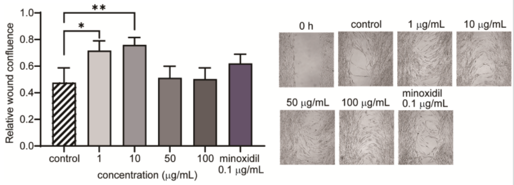


Figure 4. Proliferation effects of *Houttuynia cordata*-derived exosomes on human dermal papilla cells. wound scratch assay *in vitro* model to measure proliferation of human dermal papilla cells. 10 µg/mL H-EVs treatment significantly increased in cell proliferation and migration rate compared to minoxidil, the positive control.

Conclusions:

Our findings suggest that *H. cordata* derived extracellular vesicles represent a novel candidate of hair loss treatment that may be used to promote hair growth and prevent hair loss. H-EVs exhibit high radical scavenging activity compared to the extracts of H. cordata by DPPH assays. The results showed that H-EVs has potent antioxidant activity and HFDP cell proliferative effect on HDP cells *in vitro*. These results demonstrated that HFDP cell exposure to H-EVs accelerated cell proliferation. On the basis of our results, we propose that H-EVs could be implemented as an active substances for pharmaceutical or cosmeceutical industries. To ensure hair growth promoting activity of H-EVs from reducing oxidative stress, further studies are required to understand the effects of natural bioactive compounds from H-EVs on specific molecular pathways.

Acknowledgements:

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