Biological Functionality of Marine Algae-derived Exosomes-like Nanoparticles: Regenerative Potential Found in the Red Alga Pyropia yezoensis

Seokmin Lee* , Bomi Ryu†[1], Jimin Hyun[1], Seungjin Jeong[1], and Jiyeon Kim[2]

[1]Department of Food Science Nutrition, Pukyong National University, Busan 48513, Republic of Korea – Corée du Sud

[2]Pukyong National University – Corée du Sud

Résumé

In recent years, there has been an increase in studies on the various biological effects of exosomes, such as antioxidant, anti-inflammatory, and notably, cell regeneration-promoting properties. However, most of this research has been based on mammals or terrestrial plants, with little attention given to algae and marine cells, which could be significant sources of extracellular vesicles (EVs). In this study, we isolated exosome-like nanoparticles from the marine red alga *Pyropia yezoensis* using ultracentrifugation and analyzed their biofunctional properties. The exosome-like nanoparticles, characterized in terms of size and structure using nanoparticle tracking analysis and transmission electron microscopy, ranged from 30 to 150 nm. To identify and quantify the functional molecules within the exosome-like nanoparticles, we conducted a multi-omics analysis. Through metabolomics, lipidomics, and proteomics, we comprehensively characterized the key metabolites, lipids, and proteins that constitute the exosomes. Furthermore, these exosome-like nanoparticles demonstrated significant protective effects on wound healing in EA.hy926 endothelial cells. These findings suggest the potential application of algae-derived exosomes in regenerative medicine.

Mots-Clés: extracellular vesicles (EVs), Nanoparticles, Regenerative, Red Alga, Pyropia dentata

*Intervenant

†Auteur correspondant: bmryu@pknu.ac.kr