Bio-mimetic Nanovesicles for Epigenetic Reprogramming

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Exosomes draw attentions due to their roles in intercellular communications. Especially, exosome secreted from stem cells have potential applications in regenerative medicine. Nevertheless, the researches of exosomes has been hindered due to the small quantity of exosomes; exosomes of (100ng) are collected from 106 embryonic stem cells in 24 hr by using density gradient ultra-centrifugation. to overcome this limitation, artificial exosomelike nanovesicles derived from cells are practical alternative to exosomes secreted from cells. to generate more exosome-like nanovesicles with homogeneity in both quality and quantity, an extrusion system with centrifugal force was developed, and contain RNas and more cytosolic proteins than exosomes. The nanovesicles that had a spherical shape enclosed by lipid bilayer were found by TEM. Their size was similar to exosomes (50 ~ 150 nm). Amount of generated nanovesicles was about 100 times more than exosomes from same number of ES cells. Also, these nanovesicles contained about 2 times more RNas and cytosolic proteins than exosomes. We verified that intracellular contents were from ES cells using RT-PCR and western blotting. Also we found that the nanovesicles induced phosphorlation of MAPK regulating proliferation and cell survivals. The nanovesicles generated by the extrusion system using centrifugal force contain more intracellular contents than cell-secreted exosomes, and are able to deliver RNas and proteins to the target cells. Thus, the nanovesicles engineered from living cells are expected to contribute to exosome research fields or vesicle-based therapy.