1. No.
   2019G003

2. Title
   Development of RGD grafted exosomes formulation for the targeting of lung cancer and its therapeutic application

3. Period
   2019-2023

4. Summary
   The aim of this study is to develop a new method for the production of multifunctional extracellular vesicles (EVs) that can be efficiently taken up by lung cancer cells and evade phagocytosis by macrophages, and their application to lung cancer therapeutics. We designed and synthesized RGD-modified HFQ lipids and KK-modified HFQ lipids that are taken up by lung cancer cells, and developed RGD/PEG-modified EVs and KK/PEG-modified EVs using micelles with PEG lipids and rapid post-modification of milk-derived EVs by microfluidic post-insert method to determine physicochemical properties and quality characteristics were clarified. Next, RGD/PEG-modified EVs were developed by purifying macrophage-derived EVs, which are expected to have anti-tumor effects, and their physicochemical properties and quality characteristics were clarified. All of them had the same or slightly smaller average particle size than the original EVs, and their zeta potentials were on the neutral side due to PEG shielding, with no significant effect on quality. These multifunctional EVs were efficiently taken up by lung cancer cells and evaded phagocytosis from macrophages. We also constructed a lung cancer model system to evaluate their antitumor effects *in vivo*. These findings provide useful basic information for the functional molecular modification of EVs for pharmaceutical applications, and will provide useful insights for the future development of multifunctional EVs formulations for lung cancer therapy.