Development of a nanoliposomal formulation for alpha-mangostin in overcoming cisplatin-induced nephrotoxicity

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α-Mangostin, a bioactive compound extracted from the pericarp of the fruit mangosteen, has various bioactivities, including anti-cancer, anti-inflammatory, anti-infective and anti-oxidative properties. Recently, α-mangostin has also been recognized for its protective effect against cisplatin-induced toxicity. However, its low aqueous solubility and poor absorption are the major hurdles to fully realize its potential for clinical usage. With the ability of nanoliposomes in improving aqueous drug solubility and intracellular drug delivery, we aimed to develop novel nanoliposomal formulations for α-mangostin, and to examine the role of α-mangostin loaded liposomes in protecting nephrons from cisplatin cytotoxicity. Kidney cell lines (MDCK and HEK-293) pre-treated with liposomal α-mangostin significantly decreased the intracellular reactive oxygen species generation, as compared to those exposed to cisplatin without liposomal α-mangostin. Liposomal α-mangostin also upregulated the superoxide dismutase and downregulated the caspase-3 activity, which lowered oxidative stress, prevented cell cycle arrest and apoptosis. Additionally, liposomal α-mangostin significantly lowered the intracellular ERK activation, which can minimize inflammation and proliferative damage to kidney cells. Serum levels of urea and creatinine from mice treated with liposomal α-mangostin in the presence of cisplatin were significantly lower than those exposed to cisplatin alone, suggesting the ability of liposomal α-mangostin to confer nephroprotection. Our findings demonstrate potential clinical relevance of liposomal α-mangostin in cisplatin-induced nephrotoxicity that warrants further future development.