

Establishment of novel drug delivery system by fusion of liposomes and ultrasound technologies

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Microbubbles, ultrasound contrast agents have been established in diagnostic echocardiography. Recently, it was reported that microbubbles could promote for drug and gene delivery into cells by combination of ultrasound exposure. Most of microbubbles had more than 2 μm in diameter and they were difficult to through capillary vessel. To improve this problem, we developed novel liposomal bubbles (Bubble liposomes) containing the ultrasound imaging gas (perfluoropropane). These Bubble liposomes were less than 1 μm in diameter and induced cavitation by exposure with ultrasound. At first, we attempted to deliver plasmid DNA into cells using this cavitation power. It was showed that Bubble liposomes could directly and effectively deliver plasmid DNA into cytosol due to enhance the permeability of cell membrane by utilizing cavitation with ultrasound exposure. Utilizing this method, we succeeded to deliver various types of molecules such as siRNAs, anti-cancer drugs and antigens. In this symposium, we introduce about the feasibility of Bubble liposomes with ultrasound as novel drug and gene delivery tools.