

Transfection of Plasmid DNA into Cells by Ultrasonic Cavitation In-Vitro

S. Bao, B. T. Thrall, and D. L. Miller

Ultrasound has been reported to induce DNA transfection. This research examined the conditions required for transfection and the role of cavitation in this phenomenon. Cultured Chinese hamster ovary cells were exposed to 2.25 MHz ultrasound in the presence of 20 ug/ml luciferase reporter plasmid (pGL2, Promega Corp.) and 10% of Albuex^R (Mallinckrodt Medical). Sterile polyethylene exposure chambers filled with 4.5 ml of the suspension were rotated at 60 rpm during the 1 min exposures. After exposure, cells were cultured for two days and then assayed for luciferase production. Cells growth and viability decreased for increasing exposure pressure amplitudes as expected for effects of *in vitro* cavitation. Luciferase activity per 10⁶ cells (relative units) of 0.75, 518, 4,238, 4,750, and 5,325 was obtained for exposure at 0, 0.28, 0.40, 0.56, and 0.80 MPa, respectively. Exposure at 0.8 MPa of cell suspensions without Albuex^R and without tube-rotation, which minimizes cavitation, yielded cell viability loss was induced by ultrasound exposure of cell suspensions, but only in a rotating tube supplemented with gas bodies. This implies that ultrasonic cavitation is responsible for this phenomenon. [Supported by NIH CA42947].

USTUR-0055-96