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Cytotoxicity evaluation of nanodiamond doped with ethidium bromide

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Nanodiamond (ND) has higher biological compatibility than the other carbon based nanoparticles. Because modification of surface functional groups of ND is relatively facile, it is often used as an efficient-carrier of medicinal drugs. In this study, we examined surface modification of both positively charged ND (pND) and negatively charged ND (nND) with ethidium bromide (EtBr) and their biochemical characters. After alkali treatment of pND and nND, they were mixed with EtBr (weight ratio ND: EtBr=5:1), respectively and could stand at the room temperature. Based on the UV absorbance measurement of the supernatant, EtBr was found to be adsorbed on pND and nND with efficiency of 22% and 95%, respectively. nND-EtBr was revealed to show remarkable cytotoxicity over a dose of 6.25 μg/ml (EtBr concentration was calculated around 1.19 μg/ml) for 48 hours treatment to lung cancer cell line(A549), with cell viability of 56%. In a similar manner, effects on the hamster normal lung cell line (CHL/IU) was also evaluated and remarkable cytotoxicity was obtained when nND-EtBr was exposed at 12.5 μg/ml (EtBr concentration was calculated around 2.38 μg/ml) for 48 hourd treatment with cell viability of 63%. Cytotoxicity of nND itself was also confirmed to both cell line, but their viability was higher than that of nND-EtBr. Among pND and pND-EtBr, we did not confirm the difference of cytotoxicity. Moreover, at the concentration of 25 μg/ml nND-EtBr (EtBr=4.75 μg/ml), we also confirmed the fluorescence emission derived from EtBr in cytoplasm of living cell. As results revealed that nND-EtBr complex introduced the higher cytotoxicity than free EtBr and instant ND and we confirmed that this complex was penetrated in the living cell. Mechanism of cytotoxicity is now under investigation.

Biography

Mizuki Mori has received Bachelor's degree in Engineering from Kanagawa Institute of Technology, Kanagawa Japan. She is presently a Master's student in Applied Chemistry Division. Her research is about mechanism of genotoxicity of EtBr related compounds and currently investigates the cytotoxicity of EtBr adsorbed ND.

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