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Evaluation of drug delivery system targeting glioblastoma cells using liposome modified with monomeric fusion protein of CTX (M-CTX-FC)

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Glioblastoma multiforme (GBM) is the most common and aggressive of cancers, with poorest survival rate. Surgical removal of the tumor is the currently available option for the glioblastoma treatment. Even though the surgical removal poses several hurdles, the GBM also has a high rate of recurrence. Therefore, chemotherapy using specific ligand to target the tumor cell is the viable strategy for GBM treatment. Chlorotoxin (CTX), a 36-aa peptide, isolated from Egyptian scorpion venom has been reported to be MMP-2 ligand and inhibit a potentially glioma-specific chloride ion channel. We have previously reported the monomeric fusion protein of chlorotoxin (M-CTX-Fc) had greater inhibitory effect in glioblastoma cells (A172) and pancreatic cancer (PANC-1) compared to CTX peptide alone. All these reports raise the possibility that M-CTX-Fc could more broadly be used to specifically deliver cytotoxic drug to tumors. Thus, it is necessary to evaluate whether the M-CTX-Fc- modified liposome could target the GBM and further enhance the antitumor therapeutic index via increasing uptake in tumor cells. Using M-CTX-Fc modified liposome with common chemotherapeutic agent, Doxorubicin, we demonstrated that the presence of M-CTX-Fc increased the cytotoxicity against the glioblastoma cells compared with liposome. It also showed more rapid suppression of the cell growth. Considering the in vitro experiments, we expect that the M-CTX-Fc multivalent display on liposome should specifically target GBM tumor cell compared to native CTX peptide alone. Our results should be potentially useful for the chemotherapeutic intervention for GBM and further could be extended for the disease prognosis and imaging of GBM also.

Biography

Hafizah Mahmud is currently a PhD student at Lab of Nano-Biotechnology, Division of Biomedical Engineering, Graduate School of Natural Science and Technology, Okayama University, Japan. She received her MS and Bachelor degrees in Chemical Engineering (Bioprocess) from the University Teknologi Malaysia (UTM). Her current research is about drug delivery system targeting to the glioblastoma.

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