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Could FA-PG-SPIONs act as a hyperthermia sensitizing agent? An *in vitro* study

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Abstract

The therapeutic effect of polyglycerol coated iron oxide nanoparticles (PG-SPIONs, non-targeted nanoparticles) and folic acid-conjugated polyglycerol coated iron oxide nanoparticles (FA-PG-SPIONs, targeted nanoparticles) in combination with hyperthermia on viability of HeLa cells was investigated. It was observed that coated and uncoated SPIONs have spherical shapes with an average diameter of 17.9 ± 2.85 nm and 5.4 ± 0.75 nm, respectively. The penetration rate for cells treated with targeted nanoparticles was shown to be more than that of non-targeted nanoparticles. Moreover, it was revealed that the treatment of cells with ≥ 50 $\mu\text{g/ml}$ FA-PG-SPIONs in combination with hyperthermia induced cytotoxicity in comparison to control cells. The results also showed that increasing the concentrations of targeted nanoparticles (FA-PG-SPIONs) and heating time would increase the value of thermal enhancement factor (TEF). In contrast, TEF values were not increased with increasing heating time and concentrations of non-targeted nanoparticles (PG-SPIONs). On the other hand, TEF values were increased with increasing concentrations and heating time so that the maximum TEF value was obtained at the highest concentration (FA-PG-SPION, 200 $\mu\text{g/ml}$) as well as the longest heating

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