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Cytotoxicity Enhancement of Doxorubicin in Conjugation with PAMAM G4.5 Dendrimer Containing Gold Nanoparticles

Erny Sagita[1]*, Joshita Djajadisastra[1] and Abdul Mutalib[2]

[1]Faculty of Pharmacy, Universitas Indonesia, Gedung ARumpunIlmu Kesehatan Lantai 1, Kampus UI Depok, West Java, Post code 16424
[2]National Nuclear Energy Agency of Indonesia

Abstract : Poly(amidoamine) dendrimer (PAMAM) encapsulated gold nanoparticles (AuNPs) were prepared by reduction of gold salts with $NaBH_4$. The dendrimers used were PAMAM generation 4.5 having carboxyl groups surface. After incorporation of AuNPs into PAMAM, doxorubicin molecules were attached to PAMAM surface groups via ester linkage using dicyclohexylcarbodiimide coupling reaction. The conjugates obtained were characterized by UV-Vis spectroscopy, infrared spectroscopy, dynamic light scattering and transmission electron microscopy. We also evaluated cytotoxicity of doxorubicin before and after conjugation with PAMAM-AuNPs.As the result, we could prepare conjugate of doxorubicin-PAMAM-AuNPs (DOX-PAMAM-AuNPs) with particle size of 25.92 ± 7.99 nm (using TEM) and 147.88 nm (using DLS method). From this research, we found that DOX-PAMAM-AuNPs conjugate could reduce doxorubicin binding to human serum albumin, from 60.71 ± 0.99 % to 47.12 ± 12.39 %. Cytotoxicity assay of DOX-PAMAM-AuNPs conjugate against MCF-7 cell line gave IC_{50} value at 0.035 ± 0.039 µg/mL, while free doxorubicin had larger IC_{50} value, which was0.868 ± 0.235 µg/mL.
Keywords : Doxorubicin, Gold Nanoparticles, PAMAM G4.5 Dendrimer.

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