

Pembuatan karakterisasi uji in vitro dan in vivo nanopartikel emas berbasis konjugat gom arab vinkristin sebagai terapi obat kanker terarah = Preparation characterization in vitro and in vivo test of gold nanoparticle based on conjugated gum arabic vincristine as a targeted cancer drug therapy

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Abstrak

[ABSTRAK

Nanopartikel emas berpotensi dikembangkan sebagai nano medisn karena sifat nya yang mudah disintesa, mempunyai banyak kegunaan dan biokompatibel pada tubuh manusia. Dengan bantuan gom arab sebagai penstabil, vinkristin dikonjugasikan dengan nanopartikel emas. Penelitian ini berhasil mengembangkan sintesis dan karakterisasi nanopartikel emas berbasis gom arab terkonjugasi vinkristin dengan distribusi ukuran partikel rata rata dibawah 100 nm dengan menggunakan analisa ukuran partikel dan mikroskop transmisi elektron. Dilakukan uji sitotoksik dengan metode garam tetrazolium/ MTT [3-(4,5-dimethylthiazo-2-yl)-2,5-diphenyl tetrazolium bromide] pada konjugat vinkristin-gom arab-nanopartikel emas menggunakan lini sel MCF-7 and CCRF. Hasil uji sitotoksisitas digambarkan dengan nilai IC50. Hasil uji pada 2 formula (vinkristin-gom arab-nanopartikel emas sebelum pemurnian dan sesudah pemurnian dengan kromatografi size exclusion) terhadap lini sel MCF-7 mempunyai IC50 berturut turut sebesar 3,59 and 3,10 μg/mL, sementara vinkristin murni sebagai pembanding menunjukkan IC50 yang lebih besar yaitu 125 μg/mL. Terhadap lini sel CCRF, konjugat sebelum pemurnian dan sesudah pemurnian nilai IC50 berturut turut adalah 1,026 μg/mL dan 2,607 ug/mL. Sementara berdasarkan data in vivo untuk melihat biodistribusi konjugat pada hewan uji dan kemampuan sebagai agen pengontras pada Computed tomography (CT) ternyata konjugat mampu terdistribusi di liver dan ginjal hewan uji dan dihasilkan nilai Haunsfield Unit (HU) pada uji dengan Computed tomography (CT) pada konjugat VCR-GA-AuNP lebih tinggi dibandingkan nilai HU pada Iodium sebagai pembanding. Dari hasil diatas dapat disimpulkan bahwa konjugat (Vinkristin-Gom Arab-Nanopartikel emas) mempunyai kemampuan untuk diteliti lebih lanjut dan dikembangkan sebagai bahan baru terapi obat kanker terarah.;

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ABSTRACT

Gold nanoparticles (AuNP) are potentially developed as nano medicine because AuNP are easily synthesized, functionalized, and biocompatible. With gum arabic as stabilizer, vincristine was conjugated with gold nanoparticles. Gold nanoparticles (AuNP) coated with conjugated gum arabic (GA) and vincristine

(VCR) were successfully synthesized and characterized. The conjugation of GAVCR and AuNP displayed a narrow hydrodynamic particle size distribution with average size < 100 nm by TEM and particle size analyser. We investigated cytotoxic activity of conjugated vincristine-gum arabic-gold nanoparticle by tetrazolium salt assay (MTT) using cancer cell line MCF-7 and CCRF. Cytotoxic activity of conjugated VCR-GA-AuNP before and after purification by Size Exclusion Chromatography (SEC), against leukemia cell line CCRF and breast cancer cell line MCF-7 was described by IC50 value. All formulation had a cytotoxic activity with IC50 < 20 µg/ml. The IC50 of the conjugate before and after purification against MCF-7 cell line were 3.59 and 3.10 µg/mL, respectively. Meanwhile, the IC50 of vincristine was considerably larger (>125 µg/mL). The IC50 of samples against CCRF cell line were 1,026 and 2,607 µg/mL, respectively. Based on in vivo data to evaluate the biodistribution and their capacity for a contrast agent, conjugate could be distributed in the liver and kidneys with the resulting Hounsfield Unit (HU) value of VCR-GA-AuNP is higher than the HU value of Iodine as a comparison. In conclusion, conjugated VCR-GA-AuNP had a good prospect for further investigation and could be developed as materials for new targeted cancer drug therapy; Gold nanoparticles (AuNP) are potentially developed as nano medicine because

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