

Pembuatan karakterisasi dan peningkatan sitotoksitas nanopartikel emas gom arab terfungsionalisasi doksorubisin = preparation characterization and cytotoxicity enhancements of gold nanoparticle acacia gum functionalized doxorubicin

Hadi Sudarjat, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20404256&lokasi=lokal>

Abstrak

[ABSTRAK

Doksorubisin merupakan obat pilihan utama dalam terapi kanker, tetapi memiliki indeks terapi rendah. Sehubungan dengan alasan tersebut maka pada penelitian ini dilakukan pembuatan dan karakterisasi nanopartikel emas (AuNP) - gom arab terfungsionalisasi doksorubisin untuk meningkatkan indeks terapinya. AuNP dibuat dengan mereduksi H₂AuCl₄ dengan natrium sitrat kemudian ditambahkan gom arab sebagai penstabil (GA-AuNP) dan setelah itu difungsionalisasikan dengan doksorubisin (Dox-GA-AuNP). Dox-GA-AuNP dikarakterisasi dengan spektrofotometri UV-Vis, spektrofotometri infra merah, dynamic light scattering dan transmission electron microscopy. Doksorubisin memiliki spektrum serapan UV-Vis maksimal pada panjang gelombang 479 nm, sedangkan Dox-GA-AuNP memiliki spektrum serapan UV-Vis maksimal pada panjang gelombang 485 nm. Spektrum IR Dox-GA-AuNP menunjukkan adanya pita serapan ikatan keton dan amin yang berbeda dengan pita serapan ikatan keton dan amin pada doksorubisin bebas. Ukuran partikel Dox-GA-AuNP adalah 113,6 nm dengan karakteristik monodispersi (PDI 0,423), dan memiliki morfologi berbentuk sferis. Pengujian sitotoksik dilakukan terhadap doksorubisin bebas dan Dox-GA-AuNP. Hasil yang diperoleh menunjukkan bahwa pengujian sitotoksitas Dox-GA-AuNP pada lini sel MCF-7 memberikan IC₅₀ 0,28 g/mL sedangkan doksorubisin bebas memiliki IC₅₀ 1,305 g/mL. Doksorubisin yang telah difungsionalisasikan dengan GAAuNP dapat mengurangi ikatan protein dengan serum albumin manusia dari 62,51 ± 2,21 % (Dox Bebas) menjadi 22,91 ± 10,9 % (Dox-GA-AuNP). Dengan menurunnya ikatan protein dan meningkatnya efek sitotoksitas pada Dox-GAAuNP dibandingkan dengan doksorubisin bebas dapat disimpulkan bahwa Dox-GA-AuNP dapat meningkatkan indeks terapi doksorubisin.

ABSTRACT

Doxorubicin is a drug of choice for cancer therapy, but it has low index therapy. For that reason the reseach had been done to make and characterize gold nanoparticle - acacia gum functionalized doxorubicin to increase the therapy index. Gold nanoparticles was prepared by reducing H₂AuCl₄ with sodium citrate and gum arabic was added as a steric stabilizer, and then being functionalized by doxorubicin (Dox-GA-AuNP). Dox-GA-AuNP was characterized by UV - Vis spectrophotometry, infrared spectrophotometry, dynamic light scattering and

electron microscopy transmission. The UV-Vis spectrometry showed that doxorubicin has a maximum spectrum absorption of 479 nm while Dox-GAAuNP is 485 nm, FTIR spectrofotometry showed that Dox-GA-AuNP has ketone and amine bonds absorption band which is different from absorption band of doxorubicin. The particle size of Dox-GA-AuNP is 113.6 nm with Poly Dispersion Index of 0.423, and morphological shape is spheric. The cytotoxic assay was conducted on MCF-7 cell line for Dox-GA-AuNP and doxorubicin. The results showed that Dox-GA-AuNP provides IC50 of 0.28 mg / mL while the IC50 of doxorubicin is 1.305 mg / mL. Protein bond of Dox-GA-AuNP is 22.91 ± 10.9 % while protein bond of doxorubicin is 62.51 ± 2.21 %. The decreasing of protein bond and increasing of cytotoxicity effect of Dox-GA-AuNP compared to doxorubicin conclude that Dox-GA-AuNP can increase the therapy index of doxorubicin.;Doxorubicin is a drug of choice for cancer therapy, but it has low index therapy. For that reason the reseach had been done to make and characterize gold nanoparticle - acacia gum functionalized doxorubicin to increase the therapy index. Gold nanoparticles was prepared by reducing HAuCl₄ with sodium citrate and gum arabic was added as a steric stabilizer, and then being functionalized by doxorubicin (Dox-GA-AuNP). Dox-GA-AuNP was characterized by UV - Vis spectrophotometry, infrared spectrophotometry, dynamic light scattering and electron microscopy transmission. The UV-Vis spectrometry showed that doxorubicin has a maximum spectrum absorption of 479 nm while Dox-GAAuNP is 485 nm, FTIR spectrofotometry showed that Dox-GA-AuNP has ketone and amine bonds absorption band which is different from absorption band of doxorubicin. The particle size of Dox-GA-AuNP is 113.6 nm with Poly Dispersion Index of 0.423, and morphological shape is spheric. The cytotoxic assay was conducted on MCF-7 cell line for Dox-GA-AuNP and doxorubicin. The results showed that Dox-GA-AuNP provides IC50 of 0.28 mg / mL while the IC50 of doxorubicin is 1.305 mg / mL. Protein bond of Dox-GA-AuNP is 22.91 ± 10.9 % while protein bond of doxorubicin is 62.51 ± 2.21 %. The decreasing of protein bond and increasing of cytotoxicity effect of Dox-GA-AuNP compared to doxorubicin conclude that Dox-GA-AuNP can increase the therapy index of doxorubicin., Doxorubicin is a drug of choice for cancer therapy, but it has low index therapy. For that reason the reseach had been done to make and characterize gold nanoparticle - acacia gum functionalized doxorubicin to increase the therapy index. Gold nanoparticles was prepared by reducing HAuCl₄ with sodium citrate and gum arabic was added as a steric stabilizer, and then being functionalized by doxorubicin (Dox-GA-AuNP). Dox-GA-AuNP was characterized by UV - Vis spectrophotometry, infrared spectrophotometry, dynamic light scattering and electron microscopy transmission. The UV-Vis spectrometry showed that doxorubicin has a maximum spectrum absorption of 479 nm while Dox-GAAuNP is 485 nm, FTIR spectrofotometry showed that Dox-GA-AuNP has ketone and amine bonds absorption band which is different from absorption band of

doxorubicin. The particle size of Dox-GA-AuNP is 113.6 nm with Poly Dispersion Index of 0.423, and morphological shape is spheric. The cytotoxic assay was conducted on MCF-7 cell line for Dox-GA-AuNP and doxorubicin. The results showed that Dox-GA-AuNP provides IC50 of 0.28 mg / mL while the IC50 of doxorubicin is 1.305 mg / mL. Protein bond of Dox-GA-AuNP is 22.91 ± 10.9 % while protein bond of doxorubicin is 62.51 ± 2.21 %. The decreasing of protein bond and increasing of cytotoxicity effect of Dox-GA-AuNP compared to doxorubicin conclude that Dox-GA-AuNP can increase the therapy index of doxorubicin.]