Nanoparticles (NPs), such as liposomes and albumin, currently employed in clinical practice, aim to improve the solubility and efficacy while decreasing the adverse side effects. The enhanced permeability and retention (EPR) effect is becoming the gold standard for the development of nanomedicine.

SUMMARY OF THE INVENTION

[0005a] In one aspect, there is provided use of a therapeutically effective amount of an anti-cancer agent encapsulated in nanoparticles in the manufacture of a medicament for treating cancer in a subject intraperitoneally, wherein nanoparticles are characterized to slowly release anti-cancer agent at a rate of 30% or less per 24 hours based on in vitro drug dissolution.

[0005b] In one aspect, there is provided use of a therapeutically effective amount of an anti-cancer agent encapsulated in sustained release nanoparticles in the manufacture of a medicament for treating cancer via regional delivery in a subject wherein the anti-cancer agent nanoparticles are characterized to slowly release anti-cancer agent at a rate of 30% or less per 24 hours based on in vitro drug dissolution and are administered intrapleurally.

[0006] In one aspect provided herein are methods for treating cancer intraperitoneally in a subject comprising administering to said subject in need thereof an anti-cancer agent encapsulated in nanoparticles wherein nanoparticles are characterized to slowly release anti-cancer agent in a timely fashion that allows efficient killing of tumor cells.

[0007] In another aspect provided herein are methods for treating cancer via regional delivery in a subject comprising administering to said subject in need thereof an anti-cancer agent encapsulated in sustained release nanoparticles wherein the anti-cancer agent nanoparticles are administered intrapleurally.

INCORPORATION BY REFERENCE

[0008] All publications, patents, and patent applications mentioned in this specification are herein incorporated by reference to the same extent as if each individual publication, patent, or patent application was specifically and individually indicated to be incorporated by reference.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The novel features of the invention are set forth with particularity in the appended claims. A better understanding of the features and advantages of the present invention will be obtained by reference to the following detailed description that sets forth illustrative embodiments, in which the principles of the invention are utilized, and the accompanying drawings of which:

[0010] FIG. 1A-1F show exemplary characteristics and synergism of sustained-release liposomal paclitaxel. (1A) The unilamellar morphology of the liposomes was demonstrated by transmission electron microscopy, with the liposomes estimated to have an average size of 100 μm. (1B) Mathematical processing of the *in vitro* release data showed that the release of paclitaxel from liposomes obeyed the Higuchi release kinetics (square root of time, $R^2 = 0.9864$), indicating a diffusion-controlled model. (1C) Intra-tumor drug concentration of Nano-Taxol versus Taxol® by systematic or regional delivery. Regional delivery of Nano-Taxol achieves the highest $AUC_{0-\infty}$. (1D) Flow cytometry of apoptosis assay of tumor after regional delivery of Nano-Taxol versus systematic delivery of Taxol, the current standard therapy for ovarian cancer. Apoptosis is significantly higher in the former group (75.2%) then in the latter group (23.3%). (1E) Chou-