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Studying the effect of 5-fluorouracil loaded on polymer nanoparticles and exposed to ultrasonic waves in improving the tumoricidal effect in hepatocellular carcinoma in mice

A relatively novel strategy for drug delivery enhancement is the application of polymeric Nanoparticles (NPs) in combination with relatively low-intensity Ultrasound (US). Bovine Serum Albumin (BSA) NPs were prepared using intermittent desolvation method and investigated in combination with US irradiation as drug delivery system to improve the therapeutic efficacy of 5-fluorouracil (5-FU) against experimentally induced hepatocellular carcinoma (HCC) in mice by 0.06% 4-dimethylaminoazobenzene (DAB) and 0.05% aqueous solution of phenobarbital (PB). Characterization of 5-FU loaded BSA NPs revealed a completely spherical particle with smooth surface and low level of agglomeration, and average particle size of 70 nm. The in vitro drug release studies revealed an enhanced and controlled release of 5-FU from BSA NPs under the effect of US with drug loading efficacy (DLE) of 19.23% and encapsulation efficacy (EE) of 62.5%. Liver tissue and serum samples were collected and subjected to malonyldialdehyde (MDA) and alanine amino transferase (ALT), and also histochemical staining of alkaline phosphatase (ALP) and alpha-fetoprotein immune-histochemically (AFP). Respecting results, mice bearing HCC and injected with BSA NPs encapsulating 5-FU and irradiated with US had the lowest ALT activity and MDA levels, and a significant decrease in ALP activity and AFP expression. Histo-pathological examination (H&E) showed increase in apoptosis, appearance of more or less normal cells and well defined liver cords. Results nominate BSA NPs in combination with a local US irradiation of the tumor to be a powerful new and non-invasive tool of drug targeting and treatment of cancerous tumors.

Biography

Nelly Dabbour is from Alexandria, Egypt. She obtained BSc. in Pharmaceutical Sciences in 2005 from October 6 University, Giza, Egypt. In 2013, she completed MSc. in Applied Medical Chemistry from the Medical Research Institute, Alexandria University, Egypt. The main subject of the thesis was about studying cancer chemistry and Nanomedicine. She attended workshops about preparation and characterization of magnetic and gold nanoparticles in faculty of Medicine, Alexandria University in collaboration with Georgia Tech, USA. She was a volunteer peer reviewer for a short time, and currently she is writing articles to be published soon. By the end of this year, she is planning to start a degree in Drug Discovery & Design and Nanobiotechnology.

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