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A comparative study of liver cancer treatment methods using thermal ablation versus gold nanoparticle therapy

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One of the most complex problems over the past decades is clinically approved cancer treatment methods because of the conventional methods side effects such as radiation, chemotherapy, and some medication. Correspondingly, in recent years and since 2010, the diagnosis and treatment of cancer have taken a great deal of interest, especially in the field of designing and developments of inorganic nanoparticles because of its unique properties such as thermal heating ability, surface functionalization, surface plasmon, absorption, and scattering properties. This study aims to compare strategies for using thermal therapy versus gold nanoparticles therapy. COMSOL Multiphysics was used to model both techniques by using electric current and bioheat transfer modules for ablation method and heat transfer in solid module for the gold nanoparticles method to treat a cancerous tumor that was discovered in the liver. This study's results of this computational modeling proved that using gold nanoparticles was examine the effectiveness of these particles as a heat source for hyperthermia in liver cancer therapy without affecting the surrounding natural tissue and damage it. This method can overcome the challenges faced by the ablation treatment method, such as hyperthermia and the inability to heat cancer cells locally and thus, limiting the heat within the tumor circumference very complex and difficult which is affecting the surrounding natural tissue and damage it. In conclusion, COMSOL Multiphysics was a very useful platform for modeling the hyperthermia treatment for cancerous cells necrosis over time.

Biography

Ibtihag holds an MSc degree in Biomedical Engineering with nanotechnology specialization from Sudan University of Science and Technology (SUST). She is a research assistant of the Nanotechnology & Nanomaterial group at SUST and has published and submitted more than 9 papers in reputed journals. Ibtihag research interests include; modeling and designing nanoparticles for controlled release of active components, to engineered the functional characteristics of medicines in order to Improved drug therapeutics efficiency.