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عنوان مقاله:

Evaluation of Sonochemiluminescence in a Phantom in the Presence of Protoporphyrin IX Conjugated to Nanoparticles

محل انتشار:

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خلاصه مقاله:

Introduction When a liquid is irradiated with high-intensity and low-frequency ultrasound, acoustic cavitation occurs and there are some methods to determine and quantify this phenomenon. The existing methods for performing these experiments include sonochemiluminescence (SCL) and chemical dosimetric methods. The particles in a liquid decrease the ultrasonic intensity threshold needed for cavitation onset. In this study, a new nanoconjugate made up of Protoporphyrin IX (PpIX) and gold nanoparticles (GNP), i.e., Au-PpIX was used to provide nucleation sites for cavitation. The nonradiative relaxation time of PpIX in the presence of GNPs is longer than the similar time for PpIX without GNPs. This effect can be used in medical diagnostic and therapeutic applications. Materials and Methods The acoustic cavitation activity was investigated studying integrated SCL signal in the wavelength range of 400-500 nm in polyacrylamide gel phantom containing luminol using a cooled CCD spectrometer at different intensities of 1 MHz ultrasound. In order to confirm these results, a chemical dosimetric method was utilized, too. Results SCL signal level in gel phantom containing Au-PpIX was higher than the other phantoms. These results have been confirmed by the chemical dosimetric data. Conclusion This finding can be related to the existence of PpIX as a sensitizer and GNPs as cavitation nuclei. In other words, nanoparticles have acted as the sites for cavitation and have increased the cavitation rate. Another theory is that activation of PpIX has produced more free radicals and has enhanced the SCL .signal level

کلمات کلیدی:

Cavitation, Gold Nanoparticles, Polyacrylamide Gel, Protoporphyrin IX, Sonochemiluminescence, Terephthalic Acid

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