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PLGA nanocomposites loaded with verteporfin and gold nanoparticles for enhanced photodynamic therapy on cancer cells

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PLGA nanocomposites were developed by incorporating a photosensitizer, verteporfin and gold nanoparticles into this polymeric matrix and utilised for enhanced photodynamic therapy on cancer cells. Both enhanced fluorescence and $^1\text{O}_2$ generation from verteporfin were observed in this new formulation under both 425 nm LED and 405 nm laser illumination. A maximum enhancement factor of 2.5 for fluorescence and 1.84 for $^1\text{O}_2$ generation was obtained when the molar ratio of gold: VP was 5:1 and excited at 425 nm, compared with PLGA doped with verteporfin alone. The experiment results could be explained by the local electric field enhancement of gold nanoparticles. Furthermore, improved therapeutic efficacy in human pancreatic cancer cells, PANC-1, was also demonstrated by using this new formulation following light exposure, indicating the utility of these nanocomposites in enhanced photodynamic therapy.

Biography

Wei Deng received her PhD degree in Chemistry with Nanotechnology background at Macquarie University, Australia in 2012. She was rewarded with a highly competitive Fellowship (Discovery Early Career Research Award) from the Australian Research Council in 2012. She is now a Research Fellow at the Centre of Excellence in Nanoscale Biophotonics, Macquarie University. Her research fields are mainly focused on biomedical applications of liposomes and polymer nanoparticles, in particular, light (or X-ray)-controlled drug/gene delivery systems in cancer treatments.

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