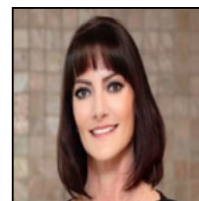


Nanoparticle Mediated Drug Delivery Using Photodynamic Therapy for the Erradication of Lung Cancer Stem Cells

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Abstract

Cancer stem cells (CSCs) are implicated in the increase of lung cancer mortality rates. They contribute to cancer recurrence and tumor growth through inhibition of drug-induced cell death, decreasing the efficiency of generic cancer therapy as well as photodynamic therapy (PDT). PDT can be improved to successfully treat lung cancer by using nanoparticles to mediate photochemotherapeutic compound delivery and retention in tumor tissue. By combining antibodies (Abs) to the nanoparticle-drug conjugate, targeting of tumor tissue is enhanced. In this study, a nano-bioconjugate (NBC) was constructed, using a photosensitizer (PS) (AIPcS4Cl), AuNPs and Abs. The NBC was characterized, using spectroscopy and the photodynamic cell death induction was determined using biochemical assays 24 h post-irradiation. Results indicated successful conjugation of the nanocomposite. Localization of the NBC was observed in integral organelles involved in cell homeostasis. Biochemical responses of lung CSCs treated with AIPcS4Cl-AuNP and AIPcS4Cl-AuNP-Ab showed significant increase cell toxicity and death, compared to free AIPcS4Cl.

Biography

Prof Heidi Abrahamse completed her PhD in Molecular biology and Biochemistry at the University of the Witwatersand, South Africa in 1996. She is the director of the Laser Research Centre at University of Johannesburg and holds a prestigious South African Research Chair in Laser Applications in Health from the Department of Science and Technology and the National Research Foundation. She has published over 185 accredited international full articles in peer reviewed journals and been cited 3863 times with a Scopus H-index of 30. She is on the editorial boards of several journals and won the highly acclaimed Humanitarian award from the International Photodynamic Association recognizing those who have made selfless efforts and personal sacrifices to enhance and promote the science of Photodynamic therapy in 2019.

Publications

1. Potential of Photobiomodulation to Induce Differentiation of AdiposeDerived Mesenchymal Stem Cells into Neural Cells, September 2020, DOI: 10.2174/1574888X15999200918095834
2. Identifying Plant-Based Natural Medicine against Oxidative Stress and Neurodegenerative Disorders, September 2020, Oxidative Medicine and Cellular Longevity, DOI: 10.1155/2020/8648742
3. Advancement of Nanobiomaterials to Deliver Natural Compounds for Tissue Engineering Applications, September 2020, International Journal of Molecular Sciences 21(18), DOI: 10.3390/ijms21186752



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