PÔSTER - RESUMO - MATERIAIS E BIOMATERIAIS

SILICA-COATED GOLD NANOSTARS AS PHOTOTHERMAL AGENTS FOR COLORECTAL CANCER THERAPY

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Colorectal cancer ranks among the most common cancers worldwide. In 2022, it was the third most incident cancer and the second leading cause of cancer-related mortality, being responsible for more than 900,000 deaths worldwide.1 The scenario tends to worsen, with predictions of an increase of almost 100% in the number of deaths by 2050.2 Traditional treatments consist of chemotherapy and radiotherapy, which can lead to side effects that affect the patient's quality of life. In this context, research into alternative therapies has increased over the years. Photothermal therapy (PTT) has gained attention due to its versatility and capacity to reduce tumors without major side effects, owing to its localized activity. In this study, we aimed to synthesize gold nanostars coated with a silica shell (AuNS@SiO2) and evaluate their potential as a photothermal agent for PTT in colorectal cancer. The AuNS@SiO2 were characterized by UV-Vis spectroscopy, transmission electron microscopy (TEM), dynamic light scattering

(DLS), and zeta potential measurements. The localized surface plasmon resonance (LSPR) peaks were observed at 872 nm and 838 nm for AuNS and AuNS@SiO2, respectively. TEM images revealed that the silica shell increased the diameter of the AuNS from 82.30 ± 13.29 nm to 125.36 ± 17.90 nm. The DLS data showed similar behavior, with the hydrodynamic diameter of the nanoparticles increasing from 104 to 165.7 nm. The zeta potential changed from -41.0 mV to +32.6 mV after silica encapsulation. After characterization, the nanoparticles were applied in PTT experiments using Caco-2 and HT-29 colorectal cancer cells. The effectiveness of the treatment was assessed by MTT assays using dilutions of 1:1, 1:2, 1:4, 1:6, 1:8, and 1:10 (AuNS@SiO2:cell culture medium). The cells were incubated for 1 h, followed by 1 h of irradiation using a BioLambda LED system (810 nm wavelength, light dose of 168.54 J/cm²). Toxicity was observed at concentrations above 1:4 for Caco-2 and above 1:6 for HT-29 cells. Considering the non-toxic concentrations, the effects of irradiation with AuNS@SiO2 were more pronounced at the 1:4 concentration for Caco-2, where cell viability decreased from 94.1% to 63.1%, and at 1:6 for HT-29, showing a decrease from 81.0% to 58.2%. The next steps of the study include investigating changes in cell morphology and elucidating the cell death pathway triggered by photoactivation of the nanostructure. Furthermore, we will functionalize the nanoparticle surface with specific antibodies to increase targeting specificity and enhance the effectiveness of PTT in both colorectal cancer cell lines.

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References

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Palavras-chave: ptt; gold nanostars; caco-2; ht-29; colorectal cancer.