I.05 - Photobiomodulation Therapy as a Radiosensitizer for Triple-Negative Breast Cancer

Camila Ramos Silva [1], Saulo de Toledo Pereira[1], Lucas Ramos de Pretto[1], Anderson Zanardi de Freitas[1], Martha Simões Ribeiro[1]
[1]Centro de Lasers e Aplicações, Instituto de Pesquisas Energéticas e Nucleares (São Paulo, Brazil)

INTRODUCTION: Radiotherapy (RT) is an essential cancer treatment and is estimated that approximately 52% of oncological patients will be submitted to this technique once. However, some tumors, such as triple-negative breast cancer (TNBC), present radioresistance, demanding high doses of ionizing radiation (IR) and a prolonged period of treatment, which contributes to secondary malignancies due to deposition of dose in organs at risk and several side effects. Moreover, this subtype of cancer shows a high incidence of metastasis and decreases the survival expectancy of the patient. Thus, the search for new agents that can act as a radiosensitizer to improve the RT effects has been growing. Conversely, photobiomodulation therapy (PBM), which is a promising therapy with increasing adhesion in clinical practice, has been used to mitigate the adverse effects of RT. Indeed, recent studies have associated PBM with RT to combat cancer. OBJECTIVES: In this study, we used TNBC-bearing mice as a radioresistant cancer model to verify if PBM could act as a radiosensitizer MATERIALS AND METHODS: PBM was applied in two different protocols before the RT with a high dose (60 Gy fractioned in 4 sessions). We evaluated the tumor volume progression, animal clinical evolution, lung metastases by optical coherence tomography, and animal survival DISCUSSION AND RESULTS: Our data indicate that PBM before each RT session arrested the tumor volume, improved the clinical signals of the animals, reduced the nodules in the lung, and extended animal survival. CONCLUSION: In the light of the knowledge gained, our data indicate that PBM could act as a radiosensitizer.
Keywords: phototherapy, radiomodifier, combined therapy

I.06 - Multimodal nanosystem with magneto-optical properties functionalized with Cramoll lectin for biosensing

Weslley Felix de Oliveira [1,2], Mariana Cabrera[3], João Victor Lima[2], Luana Coelho[1], Giovannia Pereira[3], Beate Santos[4], Paulo Cabral Filho[2], Adriana Fontes[2], Maria Tereza Correia[1]
[1]Departamento de Bioquímica, Universidade Federal de Pernambuco (Pernambuco, Brasil), [2]Departamento De Biofísica E Radiobiologia, Universidade Federal De Pernambuco (Pernambuco, Brasil), [3]Departamento de Química Fundamental, Universidade Federal de Pernambuco (Pernambuco, Brasil), [4]Departamento de Farmácia, Universidade Federal de Pernambuco (Pernambuco, Brasil)

INTRODUCTION: Magneto-optical nanomaterials are gaining prominence for biological applications. These nanosystems can be prepared through the conjugation of quantum dots (QDs) with superparamagnetic iron oxide nanoparticles (SPIONs), enabling to combine advantages of the superparamagnetic behavior of SPIONs and the unique fluorescent characteristics of QDs. Furthermore, these bimodal nanosystems can become biospecific when conjugated to biomolecules, such as Cramoll, a glucose/mannose-binding lectin extracted from *Cratylia mollis* seeds. OBJECTIVES: The study aimed to conjugate the Cramoll with the nanosystem composed of QDs and SPIONs and apply it as a biosensing platform using the glycoprotein fetuin as an analyte model. MATERIALS AND METHODS: Carboxylated QDs were covalently conjugated to amine-coated SPIONs, and then this bimodal nanosystem was conjugated with Cramoll. The optical properties and the zeta potential (ζ) of nanosystems were evaluated. Candida albicans yeasts were incubated with the nanosystem and analyzed through fluorescence microscopy and flow cytometry to evaluate the specificity/efficiency of the nanoprobe. Fetuin detection was performed by fluorimetry. DISCUSSION AND RESULTS: The QD absorption band was absent in the supernatant of the bimodal nanosystem, indicating effective conjugation with SPIONs. There was a redshift in the maximum emission of the bimodal nanosystem with respect to bare QDs; lectin conjugation did not cause a spectral shift. The multimodal nanoprobe had a lower ζ than the bimodal nanosystem. Approximately 90% of yeast cells were homogeneously labeled by the multimodal nanoprobe and after inhibition with methyl-α-D-mannopyranoside there was a considerable labeling reduction, indicating specificity. When incubated with different concentrations of fetuin (0.675-10.8 mg/mL), a linear decay in the fluorescence intensity was identified. Incubation with bovine serum albumin (control) did not significantly decrease the fluorescence intensity, and the new nanoprobe also detect fetuin previously diluted in serum. CONCLUSION: The obtained multimodal system showed specificity and effectiveness as well potential for use as a biosensing platform.
Keywords: iron oxide nanoparticle, lectin, quantum dot
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