20TH CONGRESS OF THE INTERNATIONAL UNION FOR PURE APPLIED BIOPHYSICS (IUPAB)

50TH ANNUAL MEETING OF THE BRAZILIAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY (SBBQ)

45TH CONGRESS OF BRAZILIAN BIOPHYSICS SOCIETY (SBBF)

13TH BRAZILIAN SOCIETY ON NUCLEAR BIOSCIENCES CONGRESS

PROGRAM AND ABSTRACT BOOK

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Ilustração da Capa: Alexandre Takashi

EB - Photobiology, Optogenetics and Neural Systems

EB.01 - Melanoma cell migration in response to red and near-infrared low-level light

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Cell migration plays an important role in tissue formation and cancer progression. *In vitro* scratch assay has been used for many years to study cell migration to mimic the migration of in vivo cells, and, thus, to evaluate cancer growth. Low-level red and near-infrared light (LLL) can increase normal cell migration. However, the impact of LLL on tumor cells remains unclear. In this work, we aimed to evaluate the effects of a single LLL dose on melanoma cell migration. B16F10 (murine melanoma) cells were cultivated in RPMI medium with 10% of fetal bovine serum until they reached 80% confluency. The cell line was seeded in a 6-well plate at a density of $2x10^5$ cells/well in triplicate at two different moments. A wound scratch was performed to disrupt the confluent cell monolayer with a 10 µL pipette tip. Immediately after the injury, the cells were submitted to the LLL at two distinct wavelengths (660 and 780 nm) provided by a LED and a laser, respectively, delivering 3 different energies (1.3, 3.6, and 6 J) at an irradiance of 4.2 mW/cm^2. The control group was not irradiated. Cells were photographed immediately and at 3, 12, 24, and 36 h after the scratch. The wound closure was measured using ImageJ software. To evaluate the overall migration, we calculated the areas under the curve for each group. Cells exposed to the red laser at 6 J migrated slower than control. In contrast, LLL at 780 nm promoted faster cell migration when irradiated with 3.6 J. These results suggest that low-level LEDs at 660 nm could prevent melanoma progression in higher energies. However, 780 nm should be avoided at middle energies.

Keywords: Melanoma, Photobiomodulation therapy, Scratch-wound assay
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EB.02 - Mechanisms of membrane protection by deuterated PUFA

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Polyunsaturated fatty acids (PUFAs) constitute one of the most abundant and important components found in membrane bilayers. PUFAs stabilize protein complexes and modulate membrane properties, ensuring homeostasis of organelles and cells. However, PUFAs are highly susceptible to oxidative damage through lipid peroxidation (LPO) chain reaction which triggers atherosclerosis, cancer and neurodegenerative diseases. Selective hydrogen replacement of bis-allylic PUFA hydrogens by deuterium offers protection against LPO, but the protection mechanism is not fully understood. To understand the protection mechanism by deuterium substitution, Giant Unilamellar Vesicles (GUV) were prepared with H-Lin-PC, in the presence of small amounts of D-PUFAs. We analyzed photo-induced oxidation in the presence of 1µM of Al(III) Phthalocyanine tetrasulfonic acid chloride. The initial steps of the membrane oxidation, which consists of lipid hydroperoxidation by singlet oxygen, are characterized by fluctuations and area expansion of the GUVs. Membrane permeabilization results from further oxidation steps, forming lipid truncates aldehyds. We show that the presence of 20% of D-PUFA in the 80%of H-Lin-PC matrix of vesicles, prevents substantially the fluctuation/area increase, and the loss of contrast. The presence of tocopherol, following the same proportion of D2-PUFA-PC in H-Lin-PC, is effective in preventing the formation of pores/membrane permeabilization, however it does not inhibit the formation of hydroperoxides, resulting in area fluctuation and increase. These findings demonstrate that a small proportion of D-PUFAs is sufficient for the protection of both contact-dependent and contact-independent oxidation processes. Deuterium reinforced lipids offer membrane protection and the relief of the oxidative stress, mitigating several diseases.

Keywords: Lipid peroxidation, Giant Unilamellar vesicles, Deuterium reinforced lipids
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