MONITORING OF THE PHYSICAL-CHEMICAL PARAMETERS IN THE MICROENVIRONMENT OF PBMCs and MDAMB CELL CULTURES AFTER RADIATION EXPOSITION.

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Radiological in vitro studies have often displayed a correlation between absorbed doses, linear energy transfer (LET) and cell viability after radiation therapy (RT) time and dose kinetics. Some of these studies display genetic and metabolic alterations as a function of the aforementioned variables. Objective. Our goal was to monitor physical-chemical parameters (temperature and pH) in peripheral blood mononuclear cells (PBMC) and MDAMB cells to assess and establish the degree of correlation between the biological changes produced by ionizing radiation and those physical-chemical altered patterns, possibly due to the increase of the radio-induced metabolic-activity. Materials & Methods. Irradiated (IR) and non-irradiated (NIR) groups were set. The irradiation was performed by a Cs-137 point-source at doses of 2 Gy. A time kinetic monitoring was established on the harvesting cultures, in which the morphological analysis was performed. The temperature and pH measurements in the culture were monitored in real-time through an interface designed in the LabView program and intercommunicated with an Arduino-Uno card. The thermocouple was a K-type and the pH sensor developed by manufacturing. Results. PBMC cells are sensitive to radiation and show a decrease in cell viability after the dose exposition. The tumor cell viability decreases and later increase for the applied dose. The continuous profiles of temperature and pH in cell cultures as a function of time-kinetics evaluated previously and after exposition were presented, depicting non-linear behavior. Conclusion. It was possible to establish a correlation between the physical-chemical profiles and the metabolic alterations in the two cell cultures before and after the exposition. The temperature and pH monitoring by using the Arduino-Uno data acquisition card in our in vitro cellular model is a low-cost system that provides the correlation of physicochemical data with the complex biological processes developed in the RT field.