# Determination of human breast cancer cells viability by near infrared spectroscopy

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Near infrared spectroscopy (NIRS) was employed to qualify and quantify on survival, the injury rate and apoptosis of the human breast cancer cell line MCF-7 cells. MCF-7 cells were cultured in RPMI medium supplemented with 10% FCS in a 95% air and 5% $CO_2$ atmosphere at 37· €. For the viable cells preparation, cells were de-touched by 0.1% of trypsin treatment and washed with RPMI supplemented with 10% FCS medium by centrifugation at 1000 rpm for 3min. For the dead cells preparation, cells were de-touched by a cell scraper. The cells were counted by a hemacytometer, and the viability was estimated by the exclusion method with trypan blue dye. Each viable and dead cells were suspended in PBS (phosphate bufferred saline) or milk at the cell density desired. For the quantitative determination of cell death by measuring the LDH (lactate dehydrogenase) activity liberated from cells with cell membrane injuries, LDH-Cytotoxic Test Wako (Wako, Pure Pharmaceutical Co. Ltd., Japan) was used. We found that NIRS measurement of MCF-7 cells at the density range could evaluate and monitor the different characteristics of living cells and dead cells. The spectral analysis was performed in two wavelength ranges and with 1, 4, 10 mm pathlength. Different spectral data pretreatment and chemometrics methods were used. We applied SIMCA classificator on spectral data of living and dead cells and obtained good accuracy when identifing each class. Bigger variation in the spectra of living cells with different concentrations was observed when compared to the same concentrations of dead cells. PLS was used to measure the number of cells in PBS. The best model for measurement of dead cells, as well as living cells, was developed when raw spectra in the 600 – 1098 nm region and 4 mm pathlength were used. Smoothing and second derivative spectral data pretreatment gave worst results. The analysis of PLS loading explained this result with the scatter effect found in the raw spectra and increased with the number of cells. Calibration for cell count in the 1100 – 2500 nm region showed to be very inaccurate.