



Contribution ID: 11

Type: Poster

## P55 - Microbeam irradiation to study hypersensitive response of A549 NSCLC cells after low-dose irradiation with low-LET protons

Friday, 11 July 2014 13:00 (1 hour)

Over the past decade, low dose effects of ionising radiation have been highlighted and studied, example include low dose hyper-radiosensitivity (HRS), bystander effect, and adaptive responses. Although these effects are largely reported after X-ray irradiation, it is of great interest to also study them after charged particle irradiation. Such studies can inform a range of separate but interlinked disciplines - radiotherapy, radio-protection and space radiobiology where low doses of high-LET radiation are encountered. In this context, we recently proved that the HRS is found after low dose irradiation of A549 lung cancer cells with X-rays and low-dose-rate beta particles. Recent results indicate that is also observed after irradiation with charged particles. For these, a broad beam was used, leading to an inherent dose error due to the Poisson distribution of the beam. In this case, the probability of a cell being traversed by an ion is related to its surface and the number of incident ions (i.e. the dose) leading to a distribution of dose amongst the cell population. In this context, microbeam facilities are advantageous as every cell can be irradiated with a precise number of ions allowing delivery of exactly the same dose to each cell.

In this work the Wolfson vertical beam line of the University of Surrey is used to irradiate A549 lung cancer cells with a microbeam of 3.8 MeV protons corresponding to a LET of 12 keV/ $\mu\text{m}$ . Clonogenic assays and phospho-histone H3 staining are undertaken to measure the cell surviving fraction and the mitotic ratio for doses ranging from 0.01 to 0.5 Gy. The results are finally compared to the results obtained after broad beam irradiation.

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**Session Classification:** Poster Session with Cheese and Wine