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The effect of increasing radiation doses on normal & malignant cell migration

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The aim of the project is to investigate how normal and malignant cell migration is influenced by conventional radiotherapy doses as well as by experimental treatments such as microbeam radiation therapy (MRT). Radiation-induced tumor cell migration is a recognized phenomenon that can occur when cells are sub-lethally irradiated. Our group previously demonstrated that tumor cells showed extensive migration 24 hours post-MRT.
We irradiated well chamber slides containing cultured normal and malignant cells with a range of doses (2, 5, 10Gy) using a
conventional, Cobalt- 60 source. We used time-lapse microscopy (live cell imaging) and image processing techniques to track fluorescently-labelled cells for up to 24 hrs post-RT.
Statistical analysis of the live cell microscopy data showed there was a notable change in the vector displacement when cells were irradiated with increasing doses of conventional radiation. The observed changes in cell movement may be due to asynchronous cell cycling and proliferation, subsequently dampened with increasing dosages of radiation. We noted a bi-phasic response in some cases with the initial 'hit' of radiation generating an immediate response which switches over to a longer-term response when the damage finally takes its toll on the cells and they slow
down to die.
The cells' migratory capacity was clearly affected or modulated by the conventional
radiation doses. This modulation could be important for MRT studies since the low, 'valley' dose may leave cells sub-lethally irradiated.

Keywords or phrases (comma separated)

microbeam radiation therapy, cell migration

Summary

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