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# Variation in tumour and normal tissue radiosensitivity in patients with breast cancer as detected by the alkaline comet assay

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INTRODUCTION:
For high survival cancers such as breast cancer, the ability to identify radiosensitive patients in advance would allow personalized treatment to lower adverse side effects. The alkaline comet assay appears to be a highly sensitive and reproducible test to measure DNA breaks induced by ionizing radiation.
To date, most studies using the comet assay to assess radiosensitivity in the normal tissue have relied on peripheral blood lymphocytes (PBL). However, it has previously been demonstrated that the comet assay is also capable of detecting instrinsic differences in radiosensitivity between breast cancer cell lines and between cells extracted from tumours of different patients with advanced breast tumours undergoing palliative treatment.

METHODS:
The aim of this study was to evaluate the ability of the alkaline comet assay to detect differences in DNA damage following ex vivo irradiation of normal and tumour cells from different patients with breast cancer. Patients with operable breast cancer were prospectively recruited from the local breast unit. Prior to histopathological fixation, representative samples of tumour and normal breast tissue were extracted from the surgical specimen and cells were submitted to the alkaline comet assay after gamma irradiation at 0, 2, 4, 6, and 8 Gy using standardised protocols with a Raji standardised cell line as reference.

RESULTS:
DNA damage in both normal and tumour cells increased with radiation dose as measured by percentage of tail DNA. The relative increases were greatest at doses of 2 and 4 Gy. Tumour cells had higher baseline levels of DNA damage than normal tissue. There was noticeable inter-patient variability in radiation response. Correlation with acute tissue toxicity after radiotherapy to the breast will be presented.

CONCLUSIONS:
To our knowledge, this is the first study directly assessing breast tumour and normal tissue sensitivity in a standard patient population by means of the alkaline comet assay. The results confirm the potential of the alkaline comet assay to predict tissue radiosensitivity at clinically relevant doses. If validated, it should enable clinicians to determine individual patient and tumour radiosensitivity and thus allow more personalised breast cancer treatment.

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