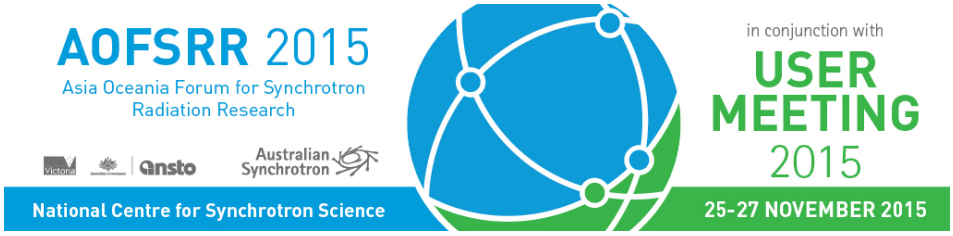

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Local and Abscopal Inflammatory Response to Synchrotron Radiation

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Microbeam radiation therapy (MRT) is a promising modality for administering synchrotron-generated ionizing radiation (IR). Compared to conventionally used broadbeam (BB) radiation, MRT yields improved therapeutic benefits by preserving healthy tissues whilst selectively ablating tumours. By offering beam precision and reduced radiation scattering, the Australian Synchrotron (AS) is ideal for studying non-targeted effects of radiation, such as the bystander and abscopal effect. To establish whether these non-targeted effects depend on the immune system, C57BL/6 mice were irradiated with BB or MRT at the AS. Mice were exposed to 10Gy or 40Gy peak doses in 8x8mm or 8x1mm areas. Irradiated skin and bystander skin and intestine, were collected at 24h and 96h post-irradiation and processed immunohistochemically for apoptotic events and immune response changes in situ, compared to unirradiated control mice.

Activated macrophages and dendritic cells in irradiated skin increased up to 2.1 fold and up to 1.7 fold in bystander skin. Neutrophils increased up to 0.8 fold in irradiated skin and 2 fold in bystander skin. T-lymphocytes showed no significant changes in the irradiated skin, however, increased 2 fold in bystander skin. Apoptotic cells showed no significant changes across any tissue. Intestinal tissue yielded consistent results to bystander skin. Therefore, following pulsed radiation exposure, there is an innate immune response in IR-targeted mouse skin. Whilst, within bystander tissues, there is a response from innate and adaptive immunity. Future experiments aim to study these immune modulators in immuno-compromised mice.

Keywords

Immunology Radiotherapy Immunity MRT IMBL Cell Biology Radiobiology

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