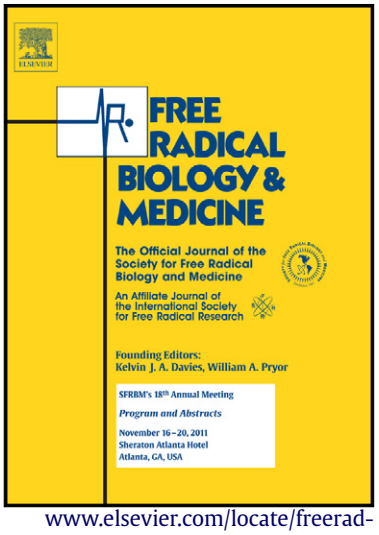

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www.elsevier.com/locate/freeradbiomed

PII: S0891-5849(13)00368-7
DOI: http://dx.doi.org/10.1016/j.freeradbiomed.2013.07.024
Reference: FRB11665

To appear in: *Free Radical Biology and Medicine*

Received date: 28 February 2013
Revised date: 16 July 2013
Accepted date: 16 July 2013

Cite this article as: Winnie Wai-Ying Kam, Richard B. Banati, The Effects of Ionizing Radiation on Mitochondria, *Free Radical Biology and Medicine,* http://dx.doi.org/10.1016/j.freeradbiomed.2013.07.024

The Effects of Ionizing Radiation on Mitochondria

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Abstract

The current concept of radiobiology posits that damage to the DNA in the cell nucleus is the primary cause for the detrimental effects of radiation. However, emerging experimental evidence suggests that this theoretical framework is insufficient for describing extra-nuclear radiation effects, particularly the response of the mitochondria, an important site of extra-nuclear, coding DNA. Here, we discuss experimental observations of the effects of ionizing radiation on the mitochondria at (1) the DNA and (2) functional levels. The role of mitochondria in (3) oxidative stress and (4) late radiation effects are discussed.

In this review, we summarize the current understanding of targets for ionizing radiation outside the cell nucleus. Available experimental data suggest that an increase in the tumoricidal efficacy of radiation therapy might be achievable by