CHARACTERIZATION OF THE RADIATION RESPONSE OF SIX HUMAN CELL LINES FOR DEVELOPMENT OF AN *IN VITRO* MULTI-CELL CULTURE SYSTEM

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The challenge in predicting radiation health effects in humans is to understand how cellular responses occurring in a multi-cellular context are integrated to produce an organism response. Experimental designs used to examine radiation effects at the cellular level have typically employed a single cell type, examining various biological endpoints and to this end many signaling pathways and molecules have been implicated in the response to ionizing radiation. We are developing an *in vitro* multi-cell culture system for use as a surrogate for *in vivo* studies and to better approximate the human response to ionizing radiation exposure. Limited by the availability of appropriate animal models and ethical implications of using non-human primates, there is a need to develop a model system which takes into consideration the multi-cellular responses of an organism following radiation exposure. In the body, various cell types with varying kinetic cycles, cellular distribution patterns and post-irradiation responses contribute to the overall response of the system. The multi-cell culture model allows us to examine the radiation response of a system that more closely approximates that of the human immune system. The multi-cell culture system employs trans-well culture inserts that allow the individual cell types to be kept separate from one another while also permitting the free exchange of media, growth factors, cytokines and other soluble peptides across the membrane, mimicking the cross-talk and exchange that might occur within the body. Preliminary investigations focused on the characterization of each of the cell types to be used in the system, including growth kinetics and cellular radiation response. Several biological studies have highlighted the importance of the peripheral inflammatory response following radiation exposure. To evaluate possible biological markers of exposure, cytokine profiles for each of the cell lines were examined following irradiation. Six human cell lines were selected to represent the peripheral circulatory/immune system, including fibroblast, myoblast, endothelial, osteoblast and lymphoblast cells. Future experiments will look at the "systemic" radiation response of these cells when cultured together in the hopes of identifying novel markers of radiation exposure for biodosimetry and triage purposes.