

# ***Radiation and Immunology***

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***Radiation and Immunology*** is intended to provide an overview of the effects of radiation on the immune system whose cells have long been recognized as amongst the most sensitive to radiation exposure and serve as common models for cytogenetic and mutational studies. The presentation begins with an introduction to the immune system's anatomy and cellular composition. The thymus, spleen, lymph nodes and bone marrow are identified as the major anatomical structures and the various classes of lymphocytes are briefly reviewed. The sequence of events in an immune response are then introduced to show the roles of inflammation, phagocytic cells and components of innate immunity. Then the primary and secondary responses of adaptive or acquired immunity are illustrated.

Following the introduction, the significance of radiation exposure to humans and animals is evaluated. Changes in immune system cellular composition are discussed following exposure to high LET radiation for both circulating cells and those resident in major lymphoid organs. The relative radiosensitivities of different lymphoid cells are illustrated along with the time course of cell elimination and repopulation. Then several aspects of immune function are discussed including disturbances to the cytokine communication network, phagocytosis, oxidative burst and antigen presentation.

Finally, the complex dose response in the low dose regime is illustrated. While at high doses immunosuppression is observed, at very low doses there may be an enhancement of immune function associated with the concepts of hormesis or radioadaptation. This unusual dose - response complicates estimates of human risk to space radiation exposures which overlap the transition region from immune enhancement to immune suppression.