Public Abstract
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Title:DESIGN AND TESTING OF OPTIMAL PERSONAL PROTECTIVE EQUIPMENT FOR HIGH ENERGY RADIATION ON EARTH AND BEYOND

This research investigated optimized personal protective equipment for two extreme environments: nuclear or radiological incidents; and a deep space exploration. Both solutions utilize selective shielding of organs, tissues, and stem cell niches which are most sensitive to radiation damage to maximize shielding efficiency. This is accomplished by allocating the shielding over the surface of the body in a variable thickness architecture which is inversely related to the radio-density of the intervening tissues between the shielding and the organ, tissue, or stem cell niche being targeted for protection. This structural design of shielding placed adjacent to the area of the body being protected and being of a variable thickness which augments the self-shielding of the body at each point on the surface provides the function of optimized use of shielding material to reduce the absorbed doses to the organs, tissues, or stem cell niches targeted for protection. Both experiments and computerized simulations were done to assess the efficacy of the equipment with very promising results in terms of tissue specific dose reduction in both cases suggesting that this equipment will lead to highly enhanced survival for both nuclear first responders and astronauts exploring deep space.