Risky business: The science and art of radiation risk communication in the high risk context of space travel

Successfully communicating the complex risks associated with radiation exposure is a difficult undertaking; communicating those risks within the high-risk context of space travel is uniquely challenging. Since the potential risks of space radiation exposure are not expected to be realized until much later in life, it is hard to draw comparisons between other spaceflight risks such as hypoxia and microgravity-induced bone loss. Additionally, unlike other spaceflight risks, there is currently no established mechanism to mitigate the risks of incurred radiation exposure such as carcinogenesis. Despite these challenges, it is the duty of the Space Radiation Analysis Group (SRAG) at NASA's Johnson Space Center to provide astronauts with the appropriate information to effectively convey the risks associated with exposure to the space radiation environment. To this end, astronauts and their flight surgeons are provided with an annual radiation risk report documenting the astronaut's individual radiation exposures from space travel, medical, and internal radiological procedures throughout the astronaut's career. In an effort to improve this communication and education tool, this paper critically reviews the current report style and explores alternative report styles to define best methods to appropriately communicate risk to astronauts, flight surgeons, and management.