Chemoprevention provides an attractive pharmacological countermeasure strategy to carcinogenic ionizing radiation exposures that may occur during travel in space. The strategy is based on blocking or reversing specific cellular pathways to cancer early, during preclinical stages of cancer development. Since clear links have been established between breast cancer and radiation exposure in humans, we developed a sensitive animal model in which to examine chemoprevention of mammary tumors that develop following whole body exposure to iron ions (Brookhaven National Laboratory), protons (Loma Linda University), and photons in rats. Tamoxifen, the widely prescribed, prototypic selective estrogen receptor modulator was chosen for initial studies to establish proof of principle in using pharmaceutical chemoprevention as a countermeasure to proton and iron ion-induced cancer. Initial studies established the carcinogenic effects of various doses of iron ions or protons and compared the effects to photon exposure. The effects of these radiation exposures are reported in another abstract (Dicello et al). In subsequent studies thirty days following exposure to radiation, exposed animals were divided into two groups. One group received tamoxifen chemoprevention and the other group was the control group. In these lifetime studies that are still in progress, tumors are removed surgically and analyzed once they are detected during the aging process. We will provide an update on the continuing studies examining the effectiveness of tamoxifen chemoprevention as a countermeasure to the carcinogenic effects of exposure to iron ions and protons as young adults. Both short term and long term effects on carcinogenesis are being analyzed. The findings have relevance to countermeasures for the types of radiation likely to be encountered during space travel.