DNA REPAIR GENES EXPRESSION ANALYSIS OF ACUTE DOSE CHARGE PARTICLE RADIATION.

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Abstract: The space radiation environment consists of trapped particle radiation, solar particle radiation and galactic cosmic radiation (GCR) with protons being the most abundant particle type. During the mission to Moon or to Mars, constant exposure to GCR and occasional exposure to particles emitted from solar particle events (SPE) are the major health concerns for astronauts (1). A number of radiation biomarkers have been developed and are currently in use but none are entirely satisfactory for the application to all potential exposure situations (2). Therefore, in order to determine health risks during space missions, understanding of cellular response to proton exposure is of primary importance (1). We investigated gene expression changes induced by positively charged particle in four categories i.e. 0 Gy, 0.1 Gy, 1.0 Gy and 2.0 Gy in nine different DNA repair genes from testes of mouse using qPCR analysis. We used the testis tissue of irradiated mice as testis is a site of extensive proliferation, differentiation, and apoptosis which makes the testes an excellent model to study apoptotic machinery (3). We selected DNA repair genes on the basis of their known functions. These genes include ERCC1 (5' incision subunit, DNA strand break repair), ERCC2 (opening DNA around the damage, Nucleotide Excision Repair (NER), XRCC1 (5' incision subunit, DNA strand break repair), XRCC3 (DNA break and cross-link repair), XPA (Binds damage DNA in preincision complex), XPC (damage recognition), ATA or ATM (activates check point signaling upon double strand breaks), MLH1 (post-replicative DNA Mismatch repair) and PARP1 (Base Excision Repair). Our results demonstrate that ERCC1, and PARP1 and XPA genes showed no change at 0.1 Gy radiations, up regulation at 1.0 Gy radiation (1.09 fold, 7.32 fold, 0.75 fold respectively) and huge increase in gene expression at 2.0 Gy radiations (4.83 fold, 57.58 fold and 87.58 fold respectively). Other genes like ATA, XRCC3, and XRCC1 didn't express at 0.1 Gy and 1.0 Gy radiations but showed up regulation at 2.0 Gy radiations (2.64 fold, 2.86 fold and 0.65 fold respectively). We didn't observe any change in gene expression in rest of three genes (XPC, ERCC2 and MLH1) 0.1 to 2.0 Gy radiations.

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