NORTHERN HEALTH RESEARCH CONFERENCE

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Ionizing radiation exposure during pregnancy in C57Bl mice: effects on offspring following birth

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ABSTRACT:
Exposures of the unborn fetus to ionizing radiation largely occur through diagnostic radiography or other low dose radiation exposures (<100 mGy) to the pregnant mother. The "fetal programming" phenomenon, which involves permanent changes in offspring phenotype due to a stress experienced *in-utero* (prior to birth), can result in effects on offspring blood pressure, growth and metabolism. Fetal programming has been reported to involve a mechanism of oxidative stress, and therefore the potential role of prenatal ionizing radiation exposure on offspring health and disease following birth is of relevance, even at low dose radiation exposures. Pregnant wildtype C57Bl/6J mice were irradiated on gestational day 15 with whole-body ^{137}Cs gamma radiation at nominal doses of 5, 10, 50, 100, 300 or 1000 mGy. Post-natal measurements of offspring weight, blood pressure and heart rate were completed weekly until 16 weeks of age. Livers collected from offspring at the end of the study period were analyzed for gene expression changes in various metabolic pathways. Changes in offspring systolic, diastolic and mean arterial blood pressure were not detected. A significant reduction in heart rate and body weight was observed at the highest dose of 1000 mGy in both male and female pups. Changes in gene expression in genes involved in metabolic processes including fatty acid oxidation, gluconeogenesis and oxidative phosphorylation were observed, with changes largely occurring at 1000 mGy. Overall, there was minimal evidence for both whole-animal programming effects as well as gene expression changes, except at the highest tested dose of 1000 mGy. This may provide evidence for a threshold dose response relationship for observed effects, and the need for further investigation into any possible low dose effects.