Health Outcomes of PFAS Exposure Through Genetics and Environmental Interactions in Heterogenous Stock Founder Rats

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Per-and poly-fluorinated alkylated substances (PFAS) are manufactured chemicals comprised of strong carbon fluorine bonds which have hydrophobic and lipophobic properties. Perfluorooctane Sulfonate (PFOS) is a type of PFAS which is used in industry as a component in food wrappers, fire-fighting foam, sweat-proof clothing, and cosmetics. PFOS is also an Endocrine-Disrupting Chemical (EDC) linked to Metabolic Syndrome (MetS), which is an association of disorders including obesity, hypertension, insulin resistance, and dyslipidemia. Heterogeneous Stock (HS) Rats are an outbred population-based model used in previous gene by environment studies due to their phenotypic and genetic diversity. We hypothesize that chronic PFOS exposure will alter the risk of MetS and endocrine disruption in HS founder rats through a strain- and sex-dependent fashion. Using seven of the inbred HS founder rat strains (ACI, BN, BUF, F344, M520, MR, and WKY), male and female rats were given a control diet or a diet containing 30mg/kg of PFOS for 12 weeks; measures of food/water consumption and fecal/urine excretion, body weight/growth and body composition were performed, along with glucose tolerance, plasma lipids, and tissue collection at euthanasia.

There was no difference in food consumption between controls and PFOS exposed rats for any of the strains in either sex. Despite this, both males and females exposed to PFOS in all strains showed a decrease in body weight compared to the control diet group. Among the additional phenotypes measured, percent body fat, triglycerides, cholesterol, and tissue weights, it is clear that there are strain and sex variations suggesting that chronic exposure of PFOS leads to possible endocrine disruption and risk of developing MetS. Because our studies show that the physiological effects of PFOS exposure is influenced by the genetic background of the HS founders, we plan to study PFAS-exposed HS rats to identify associated genetic risk factors.