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104 Exposure to Environmental Pollutant GenX Chemical Modulates Innate and Adaptive Immunity Genes in Cow Neutrophils. Sarah Adjei-Fremah[1], Priyanka Pande[2], Mulumebet Worku[2], Sowmya Jagana[2], Sree Navya Inupala[2], Therese Sabater[2], Dongyang Deng[2], Md Rasel Uzzaman[2], [1]*Winston-Salem State University,* [2]*North Carolina A&T State University*

Abstract: GenX is an environmental contaminant with wide industrial use and found in drinking water. These chemicals have high bioaccumulation and cause adverse health effects in animals and humans. Previous study has shown that pre GenX perfluoroalkyl/polyfluoroalkyl substances (PFAS) and GenX affect immune cells but there is limited study on their impact on innate immune cells (neutrophils) in livestock, such as cows. This study evaluated the effect of GenX exposure on innate and adaptive immune response gene transcription in bovine neutrophils ex vivo. Whole blood was collected using Acid citrate dextrose as a coagulant from cows (n = 5). Neutrophils were isolated using differential centrifugation and hypotonic lysis of red cells. Isolated neutrophils were treated with GenX (100 ng), or untreated (control group) for hour at 37°C, 5%CO_2 and 85% relative humidity. After treatment, total RNA was extracted using Trizol reagent, reverse transcribed to cDNA, and quantitative PCR was performed using the innate and adaptive immunity RT2 profiler array (Qiagen) with 84 genes. The qPCR data were analyzed using Livak's method to calculate fold change (FC) in gene expression between GenX-treated and control neutrophils, and FC >2, ($p < 0.05$) was considered significant. Normalization of data was performed with GAPDH and Beta Actin as an internal control. Out of the 84 genes tested, 78 were expressed, 25 were upregulated and4 were downregulated, in response to GenX exposure. Exposure to GenX upregulated the expression of TLR8 (FC = 24.75), NOD2 (FC = 7.65), STAT1 (FC = 49.35), HLA-A (FC = 14.07), and NKB1A (FC = 16.52). Treatment with GenX decreased the expression TICAM1 (FC = -2.30), CD86 (FC = -2.27) and RAG1 (FC = -2.50). These results indicate that GenX exposure can activate and modulate the expression of innate and adaptive immune response genes in cow neutrophils. STAT1 is involved in transcriptional regulation and activation of TLR7/8 shifts neutrophil function from phagocytosis to NETosis. Thus, the mechanism of action of GenX on identified gene targets and their function and possible animal health consequences warrants further study.

Keywords: GenX chemical, immunity, genes