**The Pseudo Pelger-Hüet Cell – From Bats to Humans and Everything in Between**

Ronald Goans[1], Carol Iddins[2] (REAC/TS), Richard Toohey[3] (MJW Corporation), Stacey McComish[4] (USTUR), Sergei Tolmachev[4] (USTUR), Nicholas Daniak[2] (REAC/TS)

*[1]MJW Corporation, USA; [2] Radiation Emergency Assistance Center/Training Site (REAC/TS), USA; [3]MH Chew and Associates; [4]United States Transuranium and Uranium Registries, USA*

The Pelger-Hüet anomaly (PHA) has been recently described as a novel, semi-permanent, radiation-induced biomarker in circulating neutrophils, and it appears to be a surrogate for radiation dose to bone marrow. The PH cell, described by Pelger (1928) and Hüet (1931), is a bi-lobed neutrophil characterized by a thin chromatin bridge. In humans, PHA derives from an autosomal dominant mutation on the long arm of chromosome 1, 1q42.12. PHA is seen by physicians treating patients with leukemia and also as a reaction to certain drugs. Our work is the first to show that the anomaly is observed in human radiation exposure. PHA is also seen in animals (dogs, cats, horses, bats) and a recent Ph.D. thesis examined PHA in bats living in low and high radiation background areas in a monazite cave. In this presentation, we will summarize animal research, our analysis of the 1958 Y-12 cohort, the 1971 CARL $^{60}$Co accident, and a collaborative effort with the U.S. Transuranium and Uranium Registry (USTUR). In the USTUR study, we have examined PHA in peripheral blood slides from a cohort of 166 former radium dial painters. Members of this radium dial painter cohort had ingestion of $^{226}$Ra and $^{228}$Ra at an early age (average age 20.6 ± 5.4 y; range 13-40 y) during the years 1915-1950. In the context of these experiments, Receiver Operating Curve (ROC) methodology can be used to evaluate the PHA% as a binary laboratory test to determine whether there is dose to bone marrow. A cut-point of 5.74% PHA is found for identification of the dose category (AUC 0.961, sensitivity 97.8%, specificity 74.2%, PPV 94.3% for the USTUR dataset). PHA from peripheral blood is therefore a reasonable dose surrogate for dose to bone marrow. Acknowledgements: this work was supported by the U.S. Department of Energy under contract number DE-AC05- 06OR23100 with Oak Ridge Associated Universities and award number DEHS0000073 to Washington State University.

USTUR-0482A-17