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Dr. Michael J. Plewa is University Scholar and Professor of Genetics in the College of Agricultural, Consumer and Environmental Sciences at the University of Illinois. He is also an investigator with the NSF Center WaterCAMPWS Program in the College of Engineering. He has an international reputation for research and teaching in environmental and molecular mutagenesis and he has published 185 scientific papers and reports. His current research interests include the isolation and chemical characterization of antimutagens and anticarcinogens from commercial agricultural by-products, the impact of hydrogen sulfide and diet on the initiation of colon cancer, and the calibration of cytotoxic, genotoxic and toxicogenomic responses induced by drinking-water disinfection by-products. His first sabbatic was at the Biology Division at Oak Ridge National Laboratory during 1985. In 1986 he was awarded the title of University Scholar as a distinguished faculty member of the University of Illinois. In 1991 Dr. Plewa was awarded a Distinguished Professor Lectureship from the University of Manitoba Board Of Regents. That same year Dr. Plewa was named a Visiting Scientist at the Academy of Sciences of the Czech Republic. In 1992 93 he was a Visiting Scientist at the National Institutes of Health. In 1993 Dr. Plewa was named a J. William Fulbright Senior Scholar, by the Board of Foreign Scholarships and the U.S. Information Agency; he continued research with colleagues in Prague. In 1997 Dr. Plewa was named as a Kyoto University Scholar in the Faculty of Engineering. This award was provided by the Japan Ministry of Education, he conducted research and delivered lectures throughout Japan and he has continued his scholarly contacts at Kyoto University. In 1998 Dr. Plewa was awarded a William and Flora Hewlett International Research Grant to develop a new environmental program with the Academy of Sciences of the Czech Republic. Dr. Plewa served as a Councilor, member of the Executive Board and was twice elected as the Treasurer of the Environmental Mutagen Society. Dr. Plewa has a highly rated teaching program and he was appointed to the College of ACES Teaching Academy of Excellence. His teaching recognition includes the Broadrick-Allen Award for Excellence in Honors Teaching from the Campus Honors Program and the University of Illinois Campus Award for Excellence in Guiding Undergraduate Research. In 2002 he was named a distinguished member of the National Society of Collegiate Scholars. Dr. Plewa received the 2003 Illinois State University Alumnus Achievement Award. In 2008 Dr. Plewa was elected as President of the UIUC Chapter of the Phi Kappa Phi Honor Society. He is the President-Elect and the 2009 Program Chair for the 40th annual meeting of the Environmental Mutagen Society.

ABSTRACT

"Water Micropollutants: In Vitro Mammalian Cell Toxicology to Human Toxicogenomics"

In order to directly compare the toxicity of important environmental micropollutants including classes of drinking water disinfection by-products (DBPs) and complex mixtures, we developed and calibrated in vitro mammalian cell cytotoxicity and genomic DNA damage assays. This mammalian cell toxicological database was built upon the data from the U.S. EPA SAR study and the U.S. EPA Nationwide Occurrence Study. Mammalian cell (Chinese hamster ovary cell line AS52) cytotoxicity and genotoxicity data provided a rank ordering of the relational toxicities of regulated and emerging DBPs and related agents both within an individual chemical class and among classes. We quantitatively analyzed individual DBPs from the major DBP classes and their rank order for cellular cytotoxicity and genotoxicity. For chronic cytotoxicity the descending rank order was: haloacetaldehydes > haloacetamides > halonitromethanes > haloacetonitriles > >2C-haloacids > haloacetic acids > halomethanes. For the induction of genomic DNA damage the descending rank order was: haloacetonitriles > haloacetamides > halonitromethanes > haloacetaldehydes > haloacetic acids > >2C-haloacids > halomethanes. With over 70 DBPs analyzed, the comparative toxicity of iodo- > bromo- >> chloro-DBPs was demonstrated across different structural DBP classes. Nitrogen-containing DBPs (N-DBPs) were substantially more toxic compared to carbonaceous DBPs (C-DBPs). These results are important in light of the increasing occurrence of iodinated-DBPs and N-DBPs resulting from the use of alternative disinfectants, from compromised source waters and pharmaceutical contamination. This work has been expanded to include comparative toxicogenomics of DBPs in normal, non-transformed human embryonic cells. Our data demonstrate the impact of DBPs at low, non-toxic concentrations on the expression of genes that control pathways of DNA damage/repair and human toxic responses. The results demonstrate that specific, temporally-dependent pathways are involved in the response of human cells to DBPs.