

Manhai Long  
Vennelyst Boulevard 6  
8000 Aarhus  
Denmark  
Email: ml@mil.au.dk

### **Relation between serum xenobiotic induced receptor activities and DNA damage and sperm apoptotic markers in European and Inuit populations**

Manhai Long\* (Unit of Cellular & Molecular Toxicology, Department of Environmental and Occupational Medicine, Institute of Public Health, University of Aarhus, Denmark), Alessanda Stronati (Laboratory of Applied and Molecular Genetics, Institute of Biology and Genetics, Marche Polytechnic University, Ancona, Italy), Davide Bizzaro (Laboratory of Applied and Molecular Genetics, Institute of Biology and Genetics, Marche Polytechnic University, Ancona, Italy), Tanja Krüger (Unit of Cellular & Molecular Toxicology, Department of Environmental and Occupational Medicine, Institute of Public Health, University of Aarhus, Denmark), Gian-Carlo Manicardi (Laboratory of Genetics, Department of Agricultural Sciences, University of Modena and Reggio Emilia, Reggio Emilia, Italy), Philip S. Hjelmberg (Unit of Cellular & Molecular Toxicology, Department of Environmental and Occupational Medicine, Institute of Public Health, University of Aarhus, Denmark), Marcello Spanò (Section of Toxicology and Biomedical Sciences, BIOTEC-MED, ENEA Casaccia, Rome, Italy), Alexander Giwercman (Fertility Centre, Malmö University Hospital, Lund University, Malmö, Sweden), Gunnar Toft (Department of Occupational Medicine, Aarhus University Hospital, Aarhus, Denmark), Jens Peter Bonde (Department of Occupational Medicine, Aarhus University Hospital, Aarhus, Denmark), Eva C. Bonefeld-Jorgensen (Unit of Cellular & Molecular Toxicology, Department of Environmental and Occupational Medicine, Institute of Public Health, University of Aarhus, Denmark)

Background: Persistent organic pollutants (POPs) can interfere with hormone activities and are suspected as endocrine disrupters involved in disorders e.g. reproductive disorders.

Aim: We investigated the possible relation between the actual integrated serum xenoestrogenic, xenoandrogenic and aryl hydrocarbon receptor (AhR) activities and the sperm DNA damage and sperm apoptotic markers of 262 adult males (54 Inuits from Greenland, 69 from Warsaw (Poland), 81 from Sweden and 58 from Kharkiv (Ukraine) exposed to different levels of POPs.

Methods. Xenobiotic induced receptor activities were determined by receptor mediated luciferase reporter gene expression. Sperm DNA damage was measured using Terminal deoxynucleotidyl Transferase-driven dUTP Nick Labelling assay (TUNEL) and pro-apoptotic (Fas) and anti-apoptotic (Bcl-xL) markers were determined by immune methods. Results and Discussion: Different features of xenobiotic induced receptor activity in serum and sperm DNA fragmentation and apoptotic markers existed between the Inuits and European Caucasians. Negative correlations between xenobiotic induced receptor activities and DNA damage were found for Inuits having relatively lower xenoestrogenic, lower dioxin-like activity and lower sperm DNA damage, but higher xenoandrogenic activity. In contrast, in the European groups xenobiotic induced receptor activities were found to be positively correlated to the DNA damage. Further research must elucidate whether altered receptor activities in concerted action with genetic and /or nutrient factors may have protecting effect on sperm DNA damage of the Inuit population.