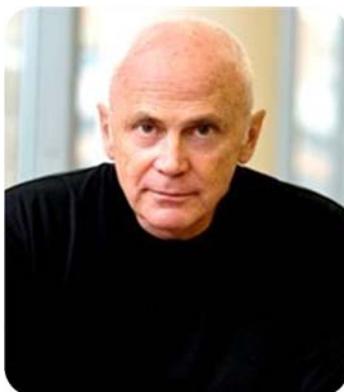


“Honorary Biomedical Sciences & Health Information Lecture Series”



ENDOCRINE DISRUPTING ENVIRONMENTAL CHEMICALS ALTER DIFFERENTIATION OF ADULT HUMAN STEM CELLS

A Distinguished Lecture

By

Dr. John A. McLachlan

*Professor, Departments of Pharmacology, Ecology and Evolutionary Biology
Tulane University, New Orleans, LA 70112, USA*

Abstract: Endocrine disrupting chemicals (EDC) comprise a class of environmental agents that mimic or block hormones involved in homeostasis and reproductive function in many classes of vertebrates including humans. The most prominent hormonal activity expressed among environmental chemicals is that of the female sex hormone, estrogen. Many chemicals of diverse structures have been reported to be estrogenic. Among these, the globally persistent chlorinated pesticides, like DDT and methoxychlor, and the ubiquitous component of plastics, bis-phenol A (BPA) have been of concern both for human exposure as well as documented adverse effects on reproduction and development in humans and wild life. Studies in our lab have focused on the signaling mechanisms that environmental chemicals share with estrogens at the cellular and molecular levels. Furthermore, we have demonstrated that estrogenic chemicals alter cell differentiation through several epigenetic pathways resulting in delayed changes in cell fate and subsequent long-term changes in various organs and organ systems. Recently we have studied the functional change in cells associated with environmental signaling molecules through the use of adult human stem cells that retain the ability to differentiate along defined routes. Thus, we have studied the mechanisms whereby DDT and some of its congeners alter gene expression and cell fate of adult human mesenchymal stem cells. Moreover, we looked at BPA as a differentiation signal in human adipose stromal/stem cells (ASC) since BPA levels in humans have been associated with obesity later in life. The ACS system was further used to evaluate the differentiation altering properties of various BPA analogs. The use of adult stem cells provide a model system to understand the mechanisms for induction of long term defects in differentiation as well as highlighting possible alterations in the adult stem cell population itself.

Key words: endocrine disruption, EDC, chlorinated hydrocarbons, bis-phenol A (BPA), estrogen signaling, human stem cells, whole genome RNA-sequencing

Acknowledgements: This research was supported in part by a grant from the National Science Foundation (Grant number DBI-0829236) to JAM