NCTR Quarter Page

DHHS / FDA
National Center for Toxicological Research

Systems Toxicology Director


Donna Mendrick, Ph.D.

NCTR welcomes Dr. Donna Mendrick as the Director of the Division of Systems Toxicology. The Division develops new technologies, facilitates the integration of data from multiple technology platforms in support of FDA's Critical Path Initiative and regulatory activities, and houses several Centers of Excellence including the Centers for Functional Genomics, Proteomics, Metabolomics, Hepatotoxicity, and Toxicoinformatics. The Division's goal is to provide leadership, technical expertise, and guidance for the inclusion of omics (genomic, transcriptomic, proteomic, and metabolomic) and *in silico* data into the regulatory-review process.

Dr. Mendrick earned her Ph.D. at State University of New York at Buffalo and completed her Postdoctoral Fellowship at Harvard Medical School. Dr. Mendrick previously served as Vice President of Gene Logic where she developed a large reference database employing reference drugs and chemicals using *in vivo* studies in rats and dogs and *in vitro* approaches in primary rat and human hepatocytes, and developed predictive toxicogenomic approaches useful for preclinical and clinical genomics research.

NCTR/ARL Nanotechnology Core Facility

NCTR and the Office of Regulatory Affair's Arkansas Regional Laboratory (ARL) are creating a Nanotechnology Core Facility to support nanotechnology toxicity studies, develop analytical tools to quantify nanomaterials in complex matrices, and develop procedures for characterizing nanomaterials in FDA-regulated products. The facility will be located at the FDA's Jefferson Laboratories with a goal to meet the needs of NCTR (which conducts toxicological studies to understand the toxicity and biological impact of nanoscale materials in animal systems) and ARL (which monitors nanoscale materials in FDA-regulated products).

Nanotechnology, the manipulation of material at dimensions between 1 and 100 nm (0.001 to 0.1 micrometer), is a challenging scientific area where specific tools are needed to characterize and detect the nanoscale materials. Many conventional detection methods do not allow scientists to analyze or confirm the size and properties of these materials in FDA-regulated products. Recent advances have allowed scientists the ability to visualize, manipulate, and control matter of this size. The FDA has already reviewed and approved some nanotechnology-based products, and expects a significant increase in the use of nanoscale materials in drugs, devices, biologics, cosmetics, and food. Through the NCTR/ARL Nanotechnology Core Facility, ARL and NCTR are working together to translate methodologies to detect nanoscale materials in toxicological studies to the detection of nanoscale materials in biological samples of FDA-regulated products.

Electronic Imaging in Pathology Review

An ongoing need for a cost-effective method to archive images of pathology data while providing scientists the ability to concurrently review the data has existed for years. NCTR scientists have developed and validated methods for state-of-the-art electronic imaging technology, which allows multiple pathologists to review the same image from off-site locations using identical PC/notebooks, monitors, and software specifically designed for this purpose. Slides are converted to electronic images and stored on a secure server. This technology allows multiple FDA reviewers to review slides in real time while providing consultative expertise from remote sites—resulting in a significant savings of time and resources.

MicroPET Imaging Center

NCTR scientists recently completed trial experiments in the new MicroPET Imaging Center investigating whether, early in development, anesthetic exposures alter patterns of normal programmed cell death. PET (positron emission tomography) is a clinical noninvasive imaging tool used for monitoring and detecting toxicological events of several diseases (such as several cancers, coronary artery disease, Alzheimer's, Parkinson's, and epilepsy) at the molecular level before anatomical changes may be apparent. The microPET provides this very-high-quality imagery in small animals and may provide direct links to clinical applications.

Publications Recently *Accepted* in Nationally Recognized Scientific Journals

Antunes, A.M., Duarte, M.P., Santos, P.P., Gamboa Da Costa, G., Heinze, T.M., Beland, F.A. and Marques, M.M., (2008), Synthesis and characterization of DNA adducts from the HIV reverse transcriptase inhibitor nevirapine, *Chemical Research in Toxicology,* 21:1443-1456.

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Desai, V.G., Lee, T., Moland, C.L., Branham, W.S., Von Tungeln, L.S., Beland, F.A. and Fuscoe, J., Effect of short-term exposure to zidovudine (AZT) on the expression of mitochondria-related genes in skeletal muscle of neonatal mice, *Mitochondrion*.

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Ferguson, S.A., Paule, M.G. and Howard, P., (2008), Female mini-pig performance of temporal response differentiation, incremental repeated acquisition, and progressive ratio operant tasks, *Behavioural Processes*.

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Mendoza, M., Burns, T.L. and Jones, M.P., Case-deletion diagnostics for maximum likelihood multipoint quantitative trait locus linkage analysis, *Human Heredity*.

Pogribny, I.P., Karpf, A.R., James, S.R., Melnyk, S.B., Han, T. and Tryndyak, V.P., (2008), Epigenetic alterations in the brains of Fisher 344 rats induced by long-term administration of folate/methyl-deficient diet, *Brain Research*, 1237:25-34.

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Rafii, F. and Park, M., (2008), Detection and characterization of an ABC transporter in *Clostridium hathewayi*, *Archives of Microbiology,* 190:417-426.

Reynisson, J., Stiborova, M., Martinek, V., Gamboa Da Costa, G., Phillips, D.H. and Arlt, V.M., (2008), Mutagenic potential of nitrenium ions of nitrobenzanthrones: correlation between theory and experiment, *Environmental and Molecular Mutagenesis*.

Schnackenberg, L., Kaput, J. and Beger, R., (2008), Metabolomics: a tool for personalizing medicine?, *Personalized Medicine,* 5(5):495-504.

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CONTACT INFORMATION: THE *NCTR QUARTER PAGE* IS PUBLISHED FOUR TIMES A YEAR. FOR MORE INFORMATION ABOUT NCTR, CONTACT DR. WILLIAM SLIKKER, NCTR DIRECTOR, AT WILLIAM.SLIKKER@FDA.HHS.GOV OR [870] 543-7517.

DHHS/FDA/NCTR
3900 NCTR Road
Jefferson, AR 72079

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