



International Academy of Toxicologic Pathology (IATP)

Applications of In Vivo and Ex Vivo Multimodality Imaging in Toxicologic Pathology

**Satellite Symposium at the ESTP/BSTP Congress
University of Guildford, UK
September 22, 2015**

Overview of Ultrasound Imaging with Correlation to Gross or Histopathology

Kathy Gabrielson, Johns Hopkins University, Maryland

The presentation on ultrasound will emphasize practical examples from cardiovascular toxicity and pharmacological efficacy investigations, cancer xenograft studies and monitoring fetal development with correlation to gross and histopathology. Ultrasound can serve as an important addition to toxicologic pathology by noninvasively and nondestructively providing 2 or 3-dimensional digital data sets, quantitative morphological details, cardiac function data, blood flow and vascular bed assessment. This safe and easy to use tool eventually leads to a more comprehensive assessment of toxicological effects and disease progression with serial imaging assessments, in contrast to end of study conventional histopathology.

In Vivo Optical Imaging: Toxicology and Beyond

Vyacheslav Kalchenko, Weizmann Institute of Science, Israel

This presentation will provide an overview of optical imaging techniques from micron to whole organism levels stressing the benefits and limitations of optical imaging modalities for preclinical applications and animal toxicology studies. In addition to whole body fluorescence and bioluminescence imaging, opto-acoustic imaging, fluorescence molecular tomography and dynamic contrast imaging will be explained with relevant examples for the toxicologic pathologist. Examples of 2D, 3D, and 4D optical images and anatomical and functional images will be presented along with approaches used in image data collection, analysis and interpretation.

Multimodal Molecular Histology in Toxicologic Pathology Investigations

David Bonnel, Imabiotech, France

Toxicity studies need investigations to identify the cause of atypical findings, and more particularly if this is related to drug or its metabolites. Multimagingtm is a new advanced label free approach based on the combination of Mass Spectrometry Imaging (MSI) and classical histology techniques. It provides a quantitative molecular distribution of all detected molecules directly on tissue sections. This multimodal molecular histology approach supports drug safety studies by following targeted molecules such as drugs and their related metabolites (targeted analysis) or by identifying new toxicity markers (untargeted analysis). The presentation will emphasize examples of this approach for toxicologic pathology investigations.

The Utility of Compact MRI for Assessment of Phenotypes and Therapeutic Efficacy

Yael Schiffenbauer, Aspect Imaging and Abraham Nyska, Israel

The presentation dealing with compact MRI will emphasize, through practical examples from pharmacological efficacy investigations, target organ toxicity, and carcinogenicity studies, how this technology can serve as an important adjunct to toxicologic pathology by nondestructively providing 3-dimensional (3-D) digital data sets, detailed morphological insights, and quantitative information. This safe and easy to use tool eventually leads to a more comprehensive assessment of toxicological effects and disease progression, in contrast to the limited number of 2-dimensional (2-D) tissue slices afforded by conventional histopathology.

Nuclear Imaging in Cancer Studies with Correlation to Gross and Histopathology

Kathy Gabrielson, Johns Hopkins University, Maryland

This presentation on nuclear imaging will emphasize examples of molecular imaging different types of cancers, with comparisons to gross, histopathology and optical imaging. In the cases reviewed, an imaging plasmid is injected into the mouse and is activated in cancer cells due to a cancer specific promoter driving thymidine kinase followed by SPECT imaging. Examples of plasmid delivery with luciferase will be presented for comparison overlooking the advantages and disadvantages of these two imaging modalities in molecular imaging cancer cells. Conventional histopathology is used to validate the images in this novel method that is still in development in animal models.