TWO-DAY COURSE, Saturday and Sunday
03 DMPK: Experimentation and Data Interpretation

Instructors

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Mass spectrometry has become the dominant tool throughout the drug discovery / development continuum. This short course will provide a thesis on mass spectrometry in drug metabolism, pharmacokinetics (DMPK), and pharmacodynamics (biomarker) in support of R&D and the registration process. The course will use case studies to focus on the "why" and "how" knowledge base with regard to the use of mass spectrometry to measure ***small molecule drugs***, ***biologics, and their conjugates*** in the discovery and development phases. Contents will include an introduction to the concepts / principles of DMPK, an overview of drug discovery / development processes, regulatory submission requirements, and common practices in DMPK studies. Current mass spectrometry technologies applied in ADME screening in lead optimization, drug quantification in PK studies, drug metabolite identification in animals and humans, as well as GLP bioanalysis quantification in clinical and toxicology studies will be discussed along with updated industry practices for experimental design, data interpretation, and data reporting. Practice sessions will be given to reinforce data analysis techniques learned in class.

Major topics covered in this course

Basic DMPK concepts applied in pharmaceutical research: This portion will include principles of pharmacokinetics, introduction of First in Human Clearance and Volume of Distribution prediction, common metabolic reactions and metabolites and metabolizing enzymes and associated drug-drug interactions.

Role of DMPK in drug discovery and development: This portion will provide an overview of various types of drug metabolism and bioanalytical studies throughout the life time of a drug candidate.

ADME screening and characterization in lead optimization and clinical candidate selection:
This portion will cover LC/MS assays for in metabolic stability, CYP inhibition, induction and reaction phenotyping as well as in vitro absorption assays and transporter DDI studies. Balanced focus will be given on analysis techniques, workflows, and decision making.

Drug metabolite profiling and identification in drug discovery and development: This portion will cover basic concepts of drug metabolite identification (Met ID) including LC/MS workflow and mass spectral interpretation. Typical Met ID experiments will be discussed in detailed such as metabolic soft-spot identification and reactive metabolite screening in drug discovery, and metabolite identification in humans in drug development. Focus will be given on applications of a variety of MS techniques to metabolite detection and characterization, including high-resolution MS and Q-trap instruments

Quantitative analysis of drug candidates and their metabolites *in vitro* and *in vivo* by LC/MS: This portion will cover science, technique, regulation and compliance of bioanalysis, sample preparation, and LC/MS/MS technologies for quantification in preclinical and clinical studies. Quantification of protein and conjugate drugs by LC/MS also will be discussed. Focus will be placed on LC and MS technology and technique.

Applications of LC/MS in analysis of biologics and biomarkers: This portion will cover recent applications of LC/MS in quantification of protein therapeutics and biomarkers as well as study of biotransformation / disposition of antibody-drug conjugates for characterization of ADME / PK of biologics and PK/PD of small molecule drugs.