

2020-21 Principles of Pediatric Clinical Pharmacology – Learning Objectives

10/7/2020: Ontogeny of Drug Biotransformation

Lecture Speaker: Jean Dinh

Learning Objectives:

- Review basic concepts relevant to a discussion of drug biotransformation in a pediatric context
 - Developmental trajectories
 - Regulation of endogenous molecules during growth and development
- Discuss specific Phase 1 and Phase 2 pathways
 - CYP2D6
 - CYP3A4
 - CYP2C19
 - CYP2B6
 - UGT2B7
- Present a basic strategy for investigating a specific drug or drug-related event in children

10/14/2020: Influence of Physiologic Changes in The Developing Gastrointestinal Tract on Drug Absorption & Disposition in Children

Lecture Speaker: Valentina Shakhnovich

Learning Objectives:

- Review developmental changes in the maturing pediatric digestive tract
 - Extrahepatic focus
 - Influence on peroral drug absorption/disposition
 - Implications for rectally-administered drugs
- Discuss influences of diet, disease and the microbiome on drug absorption/disposition
- Provide clinical examples and identify gaps in knowledge

10/21/2020: Ontogeny of Transporters

Lecture Speaker: Saskia deWildt

Learning Objectives:

- Explain the clinical relevance of membrane transporters in pediatric drug therapy and discuss several examples
- Describe transporter specific developmental patterns
- List research approaches for studying pediatric drug transporters
- Identify major challenges in elucidating the human ontogeny of drug transporters

10/28/2020: Pharmacogenomics and Bioinformatics in Drug Discovery

Lecture Speaker: Anil Jegga

Learning Objectives:

- Introduce and give an overview of some of the state-of-art databases and servers that can be used for pharmacogenomics research and drug discovery
- Explain how existing data can be harnessed to “guide” or “inform” translational medicine
- To provide examples of the application of data repurposing for drug discovery

11/4/2020: Pharmacokinetics and Pharmacodynamics of Protein Therapeutics

Lecture Speaker: Bernd Meibohm

Learning Objectives:

- Understand the mechanistic basis for drug disposition of therapeutic proteins and how it differs from traditional small molecule drugs
- Appreciate the impact and challenges of drug-target interaction on drug disposition

- Explain the impact of immunogenicity on the pharmacokinetics (PK) and pharmacodynamics (PD) of therapeutic proteins
- Identify factors in the PK and PD of therapeutic proteins that are modulated by childhood development

12/9/2020: Optimal Study Design in Clinical Pharmacology Research

Lecture Speaker: Dionna Green

Learning Objectives:

- List enrichment strategies that have been utilized in pediatric drug development studies
- Discuss the placebo effect in pediatric patients and why this is a problem in drug development
- Explain how decisions regarding age group breakdown should be made and supported in a drug development program
- Discuss pediatric extrapolation and its role in study planning
- List the major reasons for pediatric study failures and ways to avoid these pitfalls

12/16/2020: Combining “Bedside” and Clinical Research Data to Inform Disease Progression and Outcomes/Biomarker Selection – Learning and Confirming

Lecture Speaker: Diane Mould

Learning Objectives:

- Understand the concept of disease progression versus disease activity
- Review the pharmacology of biologic agents and some of the issues associated with dosing metrics as applied to pediatric patients
- Understand the relationship between PK and PD commonly seen with biologic agents used to treat inflammatory disease
- Understand the concept of using Bayesian adaptive dosing and monitoring of individual PK parameters as a metric of disease activity for biologics

1/6/2021: Metabolomics: Enabling Tools for Precision Medicine

Lecture Speaker: Rima Kaddurah-Daouk

Learning Objectives:

- Recognize metabolomics tools used for classification and subclassification of human diseases.
- Identify how metabolomics data can be used to inform about treatment outcomes and how it complements genomics data.
- Discuss how exposome diet gut microbiome genome and metabolome connect and collectively influence treatment outcomes.

1/13/2021: Pharmaco-omics: Implications for Clinical Pharmacology

Lecture Speaker: Richard Weinshilboum

Learning Objectives:

- Briefly introduce the “omics” techniques being applied to clinical pharmacology
- Provide examples of the application of multiple omics to study drug response phenotypes
- Outline the use of multiple omics data to “guide” or “inform” genomic studies

1/21/2021: Pharmacotherapy of Epilepsy in Children

Lecture Speaker: Tracy Glauser

- Describe the classification of seizure types and epilepsy syndromes and its impact on medication selection for children with epilepsy
- Understand the pharmacokinetic and pharmacodynamic variability associated with antiepileptic medications.
- Understand the importance of clinical pharmacology in medication management and ultimate outcome

1/27/2021: Pharmacologic Management of Neonatal Seizures**Lecture Speaker:** Janet Soul**Learning Objectives:**

- Describe the pathophysiology of acute symptomatic seizures and neonatal-onset epilepsy
- Interpret the evidence regarding the efficacy and safety of anti-seizure medications used currently to treat neonatal seizures
- Describe the treatment of neonatal seizures and epilepsy related to rare neurogenetic and neurometabolic disorders

2/3/2021: Contemporary Pediatric Sepsis from Start to Finish**Lecture Speaker:** Jerry Zimmerman**Learning Objectives:**

- Review the epidemiology and impact of pediatric sepsis
- Discuss novel (pediatric) sepsis diagnostic modalities
- Summarize the treatment approach for sepsis, beginning with the sepsis bundle
- Emphasize the declining mortality, but increasing long-term morbidity around pediatric sepsis

2/10/2021: Pharmacotherapy of Pediatric Critical Care**Lecture Speaker:** Athena Zuppa**Learning Objectives:**

- Understand the impact of critical illness on drug disposition
- Understand how PK modeling techniques can help inform dosing guidance in the population of critically ill children

2/17/2021: Pharmacotherapy to Treat Pediatric Obesity**Lecture Speaker:** Jack Yanovski**Learning Objectives:**

- Describe the limited data supporting the use of anorexiants to treat childhood obesity
- Describe the limited evidence supporting the use of malabsorptive agents to treat childhood obesity
- Describe the limited data evidence supporting the use of therapies that diminish insulin secretion to treat childhood obesity
- Understand the mechanisms of action of new agents approved for use in adults over the past year but not yet studied in pediatric samples

2/24/2021: Developmental Toxicology**Lecture Speaker:** Pertti Hakkinen**Learning Objectives:**

- Be able to discuss what developmental toxicology is and how it compares to reproductive toxicology and developmental pharmacology.
- Become knowledgeable about new tools and approaches being used by toxicologists.
- Become knowledgeable about online sources of information to stay up-to-date.

3/3/2021: Pharmacotherapy of Type 1 Diabetes in Children**Lecture Speaker:** Eda Cengiz**Learning Objectives:**

- Summarize the status of diabetes management in children with type 1 diabetes and basic principles of diabetes pharmacotherapy in the pediatric population.
- Discuss challenges and unmet needs of diabetes pharmacotherapy in children with type 1 diabetes and opportunities to address the unmet needs.
- Review recent advances in pediatric diabetes pharmacotherapy and the impact of diabetes technology in improving treatment of diabetes.

3/17/2021: Pharmacotherapy of Type 2 Diabetes in Youth

Lecture Speaker: Philip Zeitler

Learning Objectives:

- Describe the evidence base for management of glycemic and non-glycemic aspects of type 2 diabetes in adolescents
- Review the various classes of medications available for treatment of type 2 diabetes in youth
- Understand the pros and cons of different treatment approaches for type 2 diabetes in youth

3/24/2021: Pharmacotherapy of Pediatric Heart Failure

Lecture Speaker: Joseph Rossano

Learning Objectives:

- Understand the current knowledge of the pharmacotherapy of pediatric heart failure
- Understand the gaps in knowledge on the pharmacotherapy of pediatric heart failure
- Understand the need for ongoing research in the pharmacotherapy of pediatric heart failure

3/31/2021: Pharmacotherapy of Pediatric Arrhythmias

Lecture Speaker: Santiago Valdes

Learning Objectives:

- Identify the classification and mechanism of action of anti-arrhythmic medications.
- Discuss the choice of anti-arrhythmic medication for different pediatric arrhythmias.
- List adverse effects of the most common anti-arrhythmic medications.

4/7/2021: Extemporaneous Formulations – Growth, Issues, and Solutions

Lecture Speaker: Lisa Ashworth

Learning Objectives:

- Describe the role, importance, growth, and scope of pharmaceutical compounding
- List some of the issues related to pharmaceutical compounding
- Discuss the activities related to addressing these issues
- Explain activities surrounding implementing new compounding laws and regulations
- Detail the unique considerations involved in compounding for pediatric patients

4/14/2021: Drug Delivery Systems in Pediatrics

Lecture Speaker: Catherine Sherwin

Learning Objectives:

- Understand the application of new methods of drug delivery to pediatrics
- Consider the adaptation to pediatrics of new technologies (for example, nanotechnology)
- Review methods of development of pediatric-specific devices
- Discuss issues of IV drug delivery in pediatrics

4/21/2021: Considerations on the Impact of Adolescence on Drug Distribution and Effect

Lecture Speaker: Jeffrey Barrett

Learning Objectives: Pending Speaker Response

4/28/2021: Product Development for Rare Neurogenetic Disorders

Lecture Speaker: Mustafa Sahin

Learning Objectives:

- Review basic principles of pediatric and rare disease product development, with emphasis in neurodevelopmental disorders.

- Review recent advances in our understanding on rare neurodevelopmental disorders such as Tuberous Sclerosis, Rett Syndrome and Fragile X.
- Discuss scientific, clinical and regulatory hurdles to overcome in order bring therapies to the clinic in these rare disorders.

5/5/2021: Parental Permission and Child Assent

Lecture Speaker: Donna Snyder

Learning Objectives:

- Understand elements of informed consent
- Understand reasonably foreseeable risks
- Understand obtaining informed consent/assent from vulnerable subjects
- Understand regulations governing informed consent

5/12/2021: Maximizing Opportunities in an Era of Team Science

Lecture Speaker: L. Michelle Bennett

Learning Objectives:

- Understand some of the key characteristics that contribute to successful scientific team functioning
- Understand the phases of team development
- Understand the importance of trust during team development and maintenance
- Learn about tools to help set expectations and hold team members accountable
- Understand the importance of creating a shared vision for the team
- Understand how values influence end results

5/19/2021: Bridging the Gap - Pediatric and Adult Clinical Pharmacology

Lecture Speaker: Anne Zajicek

Learning Objectives:

- Understand developmental pharmacology changes from neonate, infant, child, and adolescent
- Understand developmental pharmacology changes through the stages of adulthood
- Understand what gaps exist between these two groups, and some bridging steps

5/26/2021: Clinical Applications of Pharmacometrics: Care at the Patient Level

Lecture Speaker: Sander Vinks

Learning Objectives:

- Appreciate that the current drug development process results in doses for average patients but that individualized dosing strategies of drugs in neonates, infants and children are imperative to improve therapeutic response and/or lowering the risk of adverse events.
- Have a better understanding of how state-of-the-art decision support using model-informed precision dosing may improve treatment outcomes by identifying the optimal dose for each individual patient.
- Highlight examples of ongoing model-informed precision dosing studies and development in the pediatric community and at Cincinnati Children's.

6/2/2021: Developmental Pharmacodynamics: The Next Great Information Gap in Pediatric Therapeutics

Lecture Speaker: Gregory Kearns

Learning Objectives:

- Acquire a working understanding of where developmental PD is today and why it must be advanced if we are to improve pediatric therapeutics
- Conceptually understand the framework of experimental approaches used to undertake pediatric PD research
- Understand opportunities for support of research in pediatric PD