Module WB2653

Neonatal Pharmacology-Aligning Dose, Concentration, and Response for Optimal Outcomes

Objectives

- State the principles of pharmacokinetics (PK) and pharmacodynamics (PD) that guide individual dosing with the goal of providing drug exposures seeking best clinical outcomes with the lowest risk of adverse effects
- List the four basic principles of drug disposition throughout the body and recognize the impact of developmental pharmacology and patient-specific physiology on these principles
- Recall the pharmacokinetic models involving first-order and zero-order kinetic properties that describe the concentration of drug over time
- Outline the important developmental and pathophysiologic factors that impact pharmacokinetics
- Describe the three PK/PD exposure targets that guide effective treatment especially in regard to antimicrobial drugs

Content Outline

1. Principles of Pharmacokinetics and Pharmacodynamics Related to Neonates
    - 1.1 Drug disposition as an explanation of drug exposure over time
        - 1.1.1 Drug absorption and route of administration
        - 1.1.2 Distribution and volume of distribution (Vd)
        - 1.1.3 Metabolism or biotransformation
        - 1.1.4 Excretion via kidneys and liver
        - 1.1.5 Impact of drug disposition on PK of neonatal drugs
    - 1.2 Concentration of drugs over time described by PK models
        - 1.2.1 First-order and zero-order kinetic properties
    - 1.3 Important factors impacting pharmacokinetics in neonates
        - 1.3.1 Alterations in PK profiles during therapeutic hypothermia
    - 1.4 Basic PK calculations in various situations and circumstances
    - 1.5 Overview of pharmacodynamics
        - 1.5.1 PK and PD relationships and exposure targets for optimal antimicrobial treatment

Reading Material Resources

Module WB2653: Neonatal Pharmacology-Aligning Dose, Concentration, and Response for Optimal Outcomes is based on the resource listed below. A copy of the resource is included with the module.

Chapter 47, Pharmacokinetics in Neonatal Medicine, Hornik CD and Wade KC in *Fanaroff and Martin's Neonatal-Perinatal Medicine, Twelfth Edition*, 2025, Elsevier, 786-801