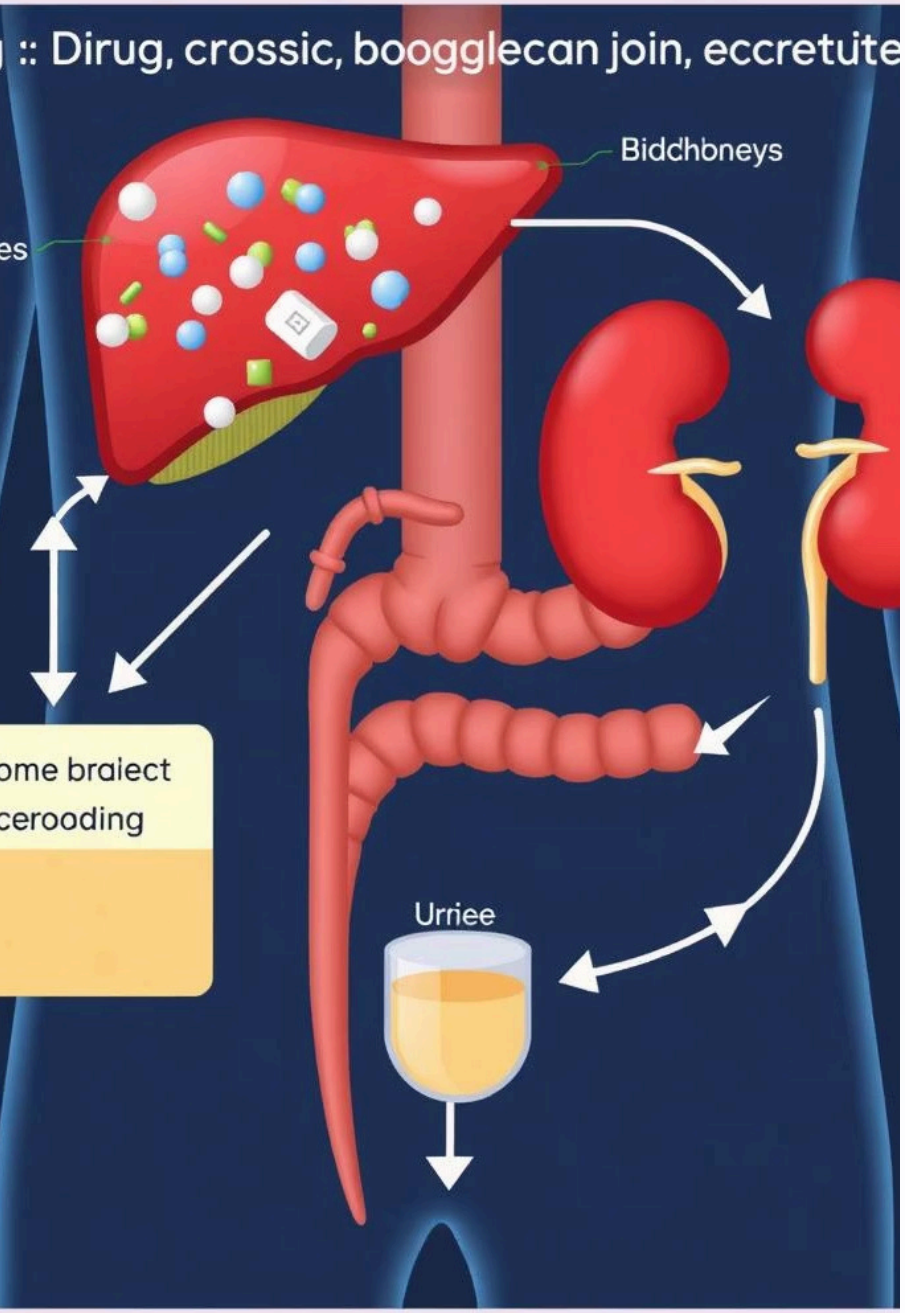
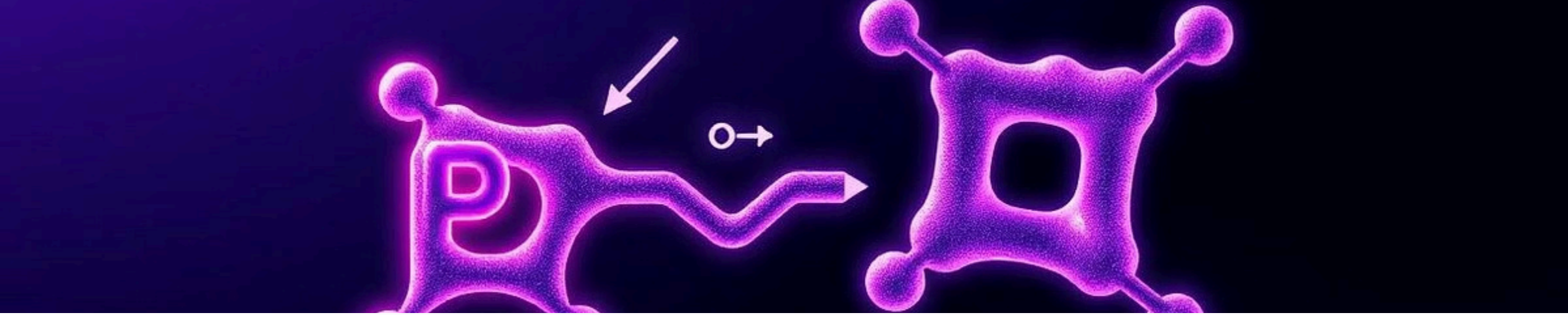


Drug Metabolism and Excretion: Key Concepts

This presentation covers drug metabolic pathways and renal excretion mechanisms. Understanding these helps optimize dosing and minimize toxicity. We'll explore enzyme roles, kidney function, and clinical implications.



Metabolic Pathway Overview

Definition

Metabolic pathways are chemical reactions modifying drugs within the body.

Main site

The liver is the primary location for drug metabolism.

Key enzymes

Cytochrome P450 enzymes drive most metabolic reactions.

Metabolism's Purpose and Effects

Transformation

Drugs become more water-soluble for easier elimination.

Facilitation

Metabolism makes drugs easier to excrete by kidneys.

Variability

Some drugs are metabolized; others excreted unchanged.

Renal Excretion Process

1

Glomerular filtration

Unbound drugs are filtered from blood in the glomerulus.

2

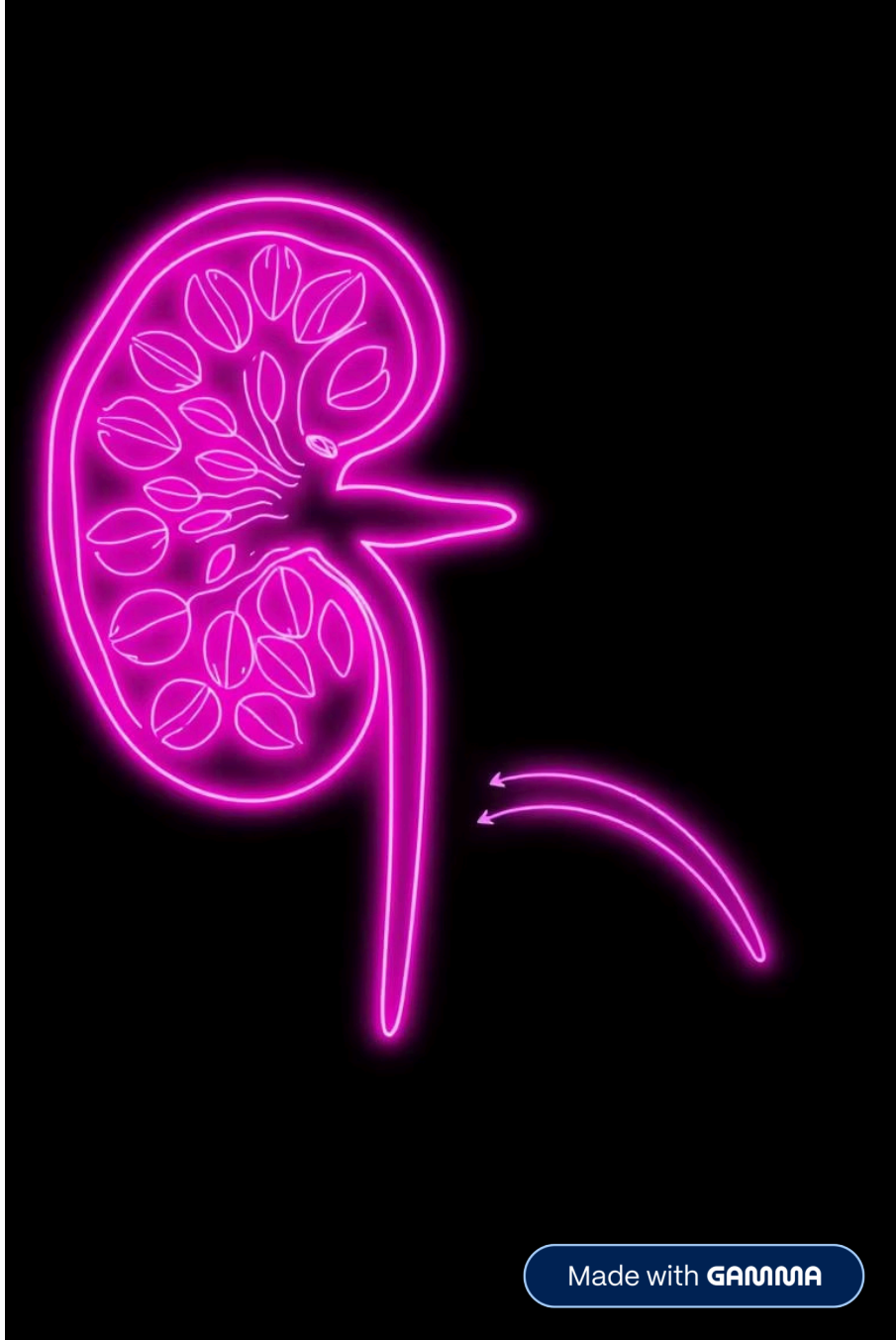
Tubular secretion

Kidney tubules actively secrete drugs into urine.

3

Tubular reabsorption

Some drug molecules are reabsorbed back into bloodstream.



Factors Affecting Renal Excretion

Drug binding

Only free (unbound) drugs are filtered by kidneys.

Drug polarity

Polar, water-soluble drugs are more easily excreted in urine.

Clinical Impact of Kidney Function

Impaired function

Reduces drug elimination efficiency and increases toxicity risk.

Dosing considerations

Adjust doses carefully in renal impairment for safety.

Integration of Metabolism and Excretion

Step 1

Drug is metabolized mainly in the liver.

Step 2

Metabolites become water-soluble for renal elimination.

Step 3

Kidneys filter and excrete the metabolized or unchanged drug.

Key Takeaways and Safety

- Metabolism transforms drugs for elimination.
- Renal excretion depends on drug properties and kidney health.
- Dosing adjustments prevent toxicity in kidney impairment.
- Understanding these processes guides safe pharmacotherapy.