Renal Pharmacotherapy: Clearance Adjustments & Dialysis Removal Dynamics (Clinical Treatise 2020)

Por Cristiano Ricardo · Publicado em 14/10/2020

University clinical pharmacology treatise by Prof. Cristiano Ricardo on renal pharmacotherapy: clearance adjustments & dialysis removal dynamics (Clinical Nephropharmacology & Renal Dosing), featuring mathematical PK/PD modeling, clinical cases, and colorful schematics.

Versão online e eventuais atualizações:
https://cristianoricardo.com/post/renal-pharmacotherapy-clearance-adjustments-dialysis-removal-dynamics-2020-10-14

Clinical Nephropharmacology & Renal Dosing · Clinical Pharmacology & Pharmacotherapy

Renal functional decline impairs the clearance of water-soluble active compounds and their metabolites, necessitating individual mathematical dose reductions.

Pharmacological Mechanism & Kinetic Schema

Cockcroft-Gault Equation
CrCl = [(140-age)·weight] / (72·Scr)
Multiply by 0.85 for female patients
FDA reference benchmark for drug labeling

Dose Adjustment Strategies
1. Interval Extension: Dose constant, ? ?
2. Dose Reduction: ? Dose, ? constant
Dialysis Clearance: Check protein binding!

Glomerular Filtration Rate Assessment: Cockcroft-Gault vs CKD-EPI

While CKD-EPI is preferred for staging chronic kidney disease, the Cockcroft-Gault equation remains the regulatory gold standard referenced across FDA and EMA drug labeling. Using unadjusted serum creatinine in elderly sarcopenic patients severely overestimates actual clearance, leading to hazardous drug overdosing.

Interval Extension vs Dose Reduction Strategies

For concentration-dependent antimicrobials (e.g., Fluoroquinolones, Aminoglycosides), extending the dosing interval (tau) preserves high peak concentrations essential for bactericidal efficacy. For time-dependent agents (e.g., Beta-lactams), decreasing individual

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doses while maintaining dosing frequency ensures serum levels remain continuously above the bacterial MIC.

Pharmacokinetic Dialyzability in Renal Replacement Therapy

A drug is dialyzable via standard intermittent hemodialysis only if it possesses low molecular weight (< 500 Da), high water solubility, low protein binding (< 80%), and a small volume of distribution (< 1 L/kg). Highly bound drugs require supplementary post-dialysis dosing only if cleared by continuous venovenous hemodiafiltration (CVVHDF).

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