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Population pharmacokinetic meta-analysis and dosing recommendation of meropenem in critically ill patients receiving continuous renal replacement therapy

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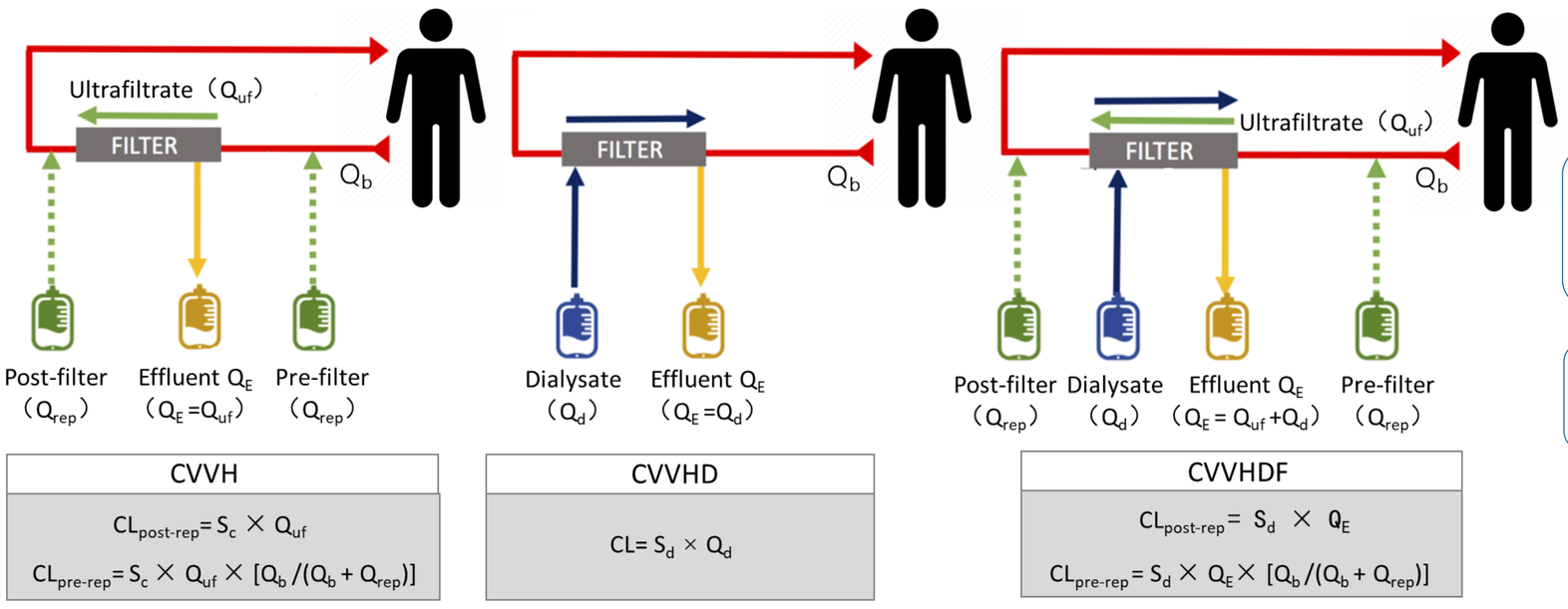
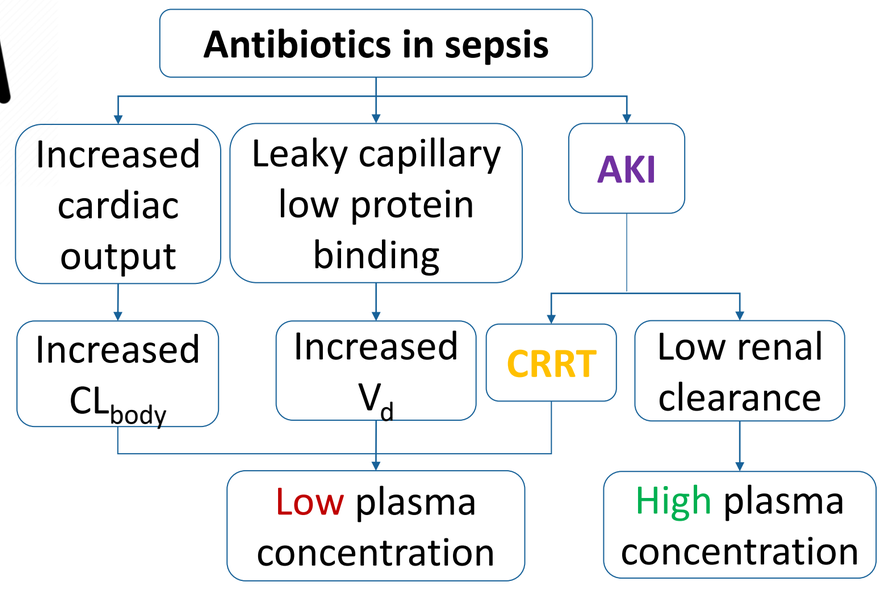
Lack of drug dosing guidelines for critically ill patients receiving continuous renal replacement therapy (CRRT)

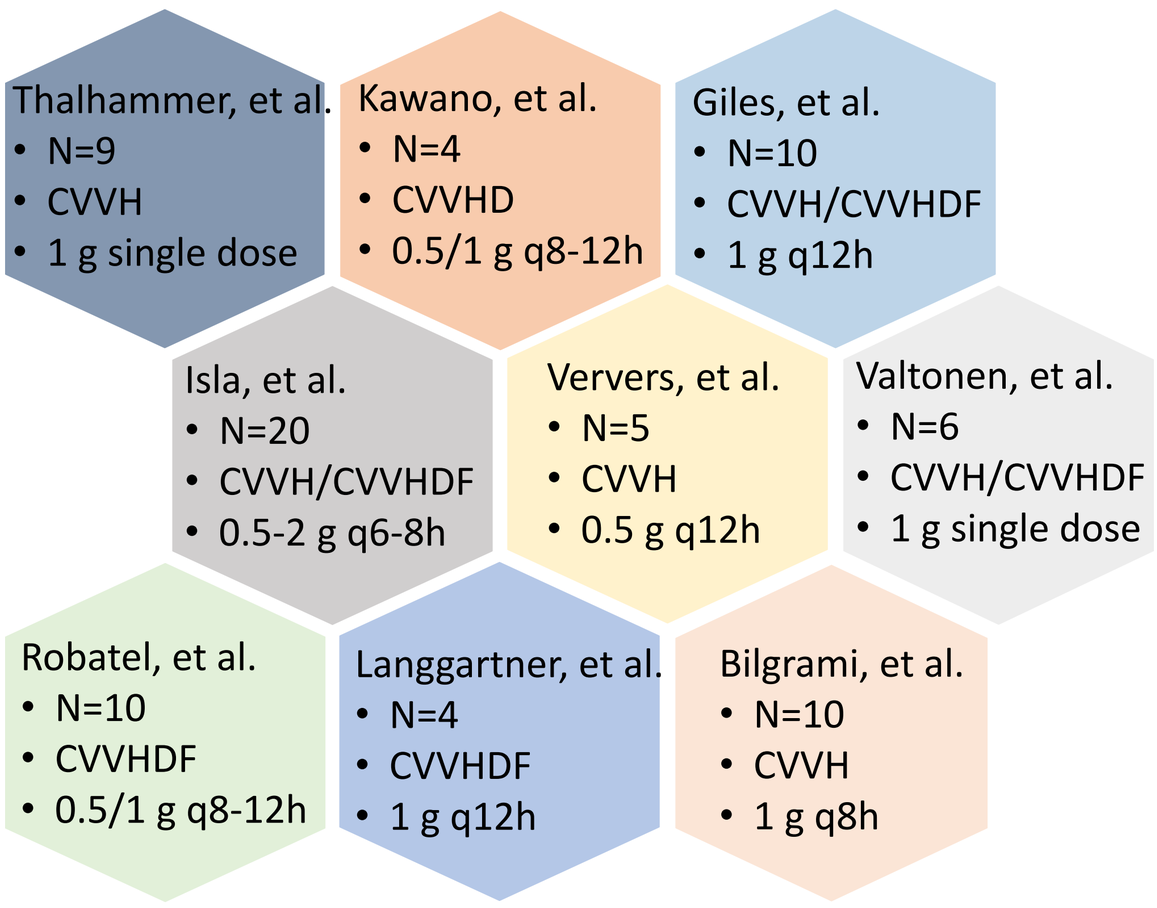


Extracorporeal clearance of different CRRT modalities (CL_{CRRT}) mainly depends on the effluent flow rate (Q_E , also termed as CRRT dose).

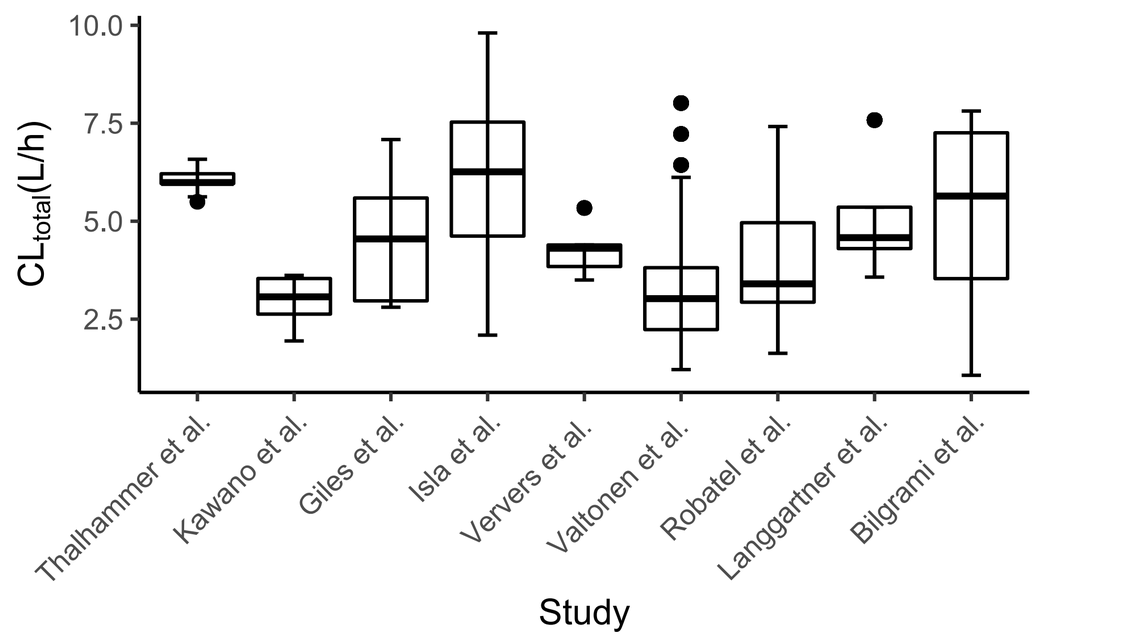


The pharmacokinetics (PK) of an antibiotic is altered by the pathophysiological state and CRRT.

Population pharmacokinetic meta-analysis of meropenem: data source and main findings



Included published PK studies for present population PK meta-analysis of meropenem in CRRT patients. (501 observations from 78 patients)



$$CL_{total}(L/h) = \left(\theta_{CL_{body}\,(non-trauma)} \text{ or } \theta_{CL_{body}\,(trauma)}\right) \times exp^{\eta_{CL_{body}}} + CL_{CRRT}$$

- Non-trauma patients: considerable discrepancy in total clearance (CL_{total}) was found among the studies (median CL_{total} ranged from 3.06 to 6.07 L/h);
- Trauma patients: typical CL_{total} (62.7 L/h) in trauma patients was increased by 20-fold compared to non-trauma patients.

Meropenem dosing recommendation

Non-trauma CRRT patients: 1 g q6h by short-term infusion, 1 g q8h by prolonged infusion, or 2-4 g q24h by continuous infusion; Trauma CRRT patients: 3-4 g q24h by continuous infusion