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N03 ANTIEPILEPTICS

PREDICTIVE VALUE OF THE ARCTIC SCORE AND ESTIMATED GLOMERULAR FILTRATION RATE EQUATIONS ON LEVETIRACETAM PLASMA CONCENTRATIONS IN CRITICALLY ILL NEUROTRAUMA PATIENTS

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BACKGROUND AND IMPORTANCE

Achieving optimal drug exposure can be challenging in neurocritical patients with **augmented renal clearance (ARC)**

AIM AND OBJECTIVES

To evaluate the accuracy of the **Augmented Renal Clearance in Trauma Intensive Care (ARCTIC)** score and different **estimated glomerular filtration** rate (eGFR) equations in predicting the variability of **levetiracetam plasma trough concentrations (CpLEV)** in critically ill patients.

MATERIAL AND METHODS

Observational study in neurocritical patients ⇢ **levetiracetam treatment + assessment of CpLEV**

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eGFR was calculated using several equations: CKD-EPI, MDRD-6, and Cockcroft-Gault (C-G)

Therapeutic range of levetiracetam: 10-40 µg/mL (internal protocol)

ARCTIC score ≥6 was used to predict ARC

Statistical analyses included ANOVA, Fisher-Snedecor F-distribution, and multivariate logistic regression (SPSS® v25)

RESULTS

46 critically ill patients (34 males, 74%)
Age: mean 56 years (range: 20-85)
BMI: mean 27 kg/m² (range: 15-38)

Levetiracetam doses

- 500 mg/BID: 10 patients (22%)
- 1000 mg/BID: 28 patients (61%)
- 1500 mg/BID: 8 patients (17%)

eGFR estimations

CKD-EPI: Mean 106 (SD:31) mL/min/1.73m²

MDRD-6: Mean 135 (SD:65) mL/min/1.73m²

Cockcroft-Gault (C-G): Mean 114 (SD:50) mL/min/1.73m²

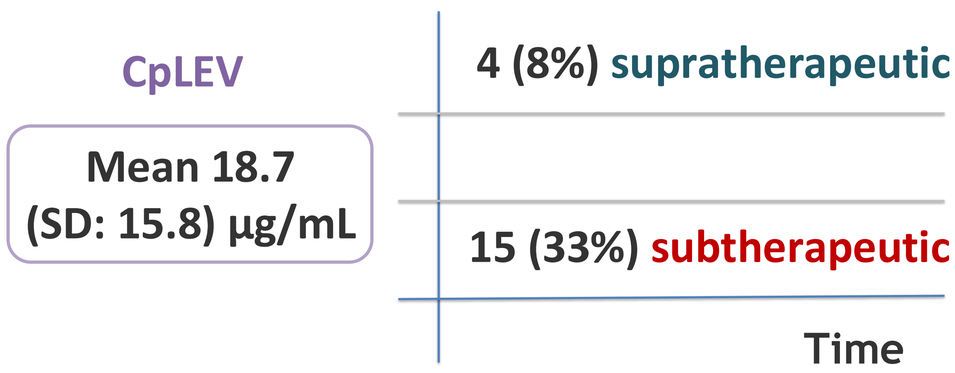
Analyzed covariates

Age | Sex | BMI | Administration route | Dose | eGFR

- **Dose** (p<0.001) and **eGFR** (p<0.002) significantly affected **CpLEV**

GFR contribution to CpLEV variability:

- CKD-EPI: 26.3%
- MDRD-6: 22.3%
- C-G: 23.2%



Probability of SUBtherapeutic CpLEV:

- **eGFR >115 mL/min (CKD-EPI):** Sensitivity 83.3%, Specificity 62.5% **(p=0.002)**
- **ARCTIC Score ≥6**: Sensitivity 76.0%, Specificity 42.9% (p=0.174)

CONCLUSION AND RELEVANCE

✓ **CKD-EPI** is the eGFR equation that most accurately explains the **variability in CpLEV.**

✓ A significant percentage of patients had **subtherapeutic CpLEV values**, which correlated well with an **eGFR>115 ml/min according to CKD-EPI**.

✓ The **clinical utility of ARCTIC score predicting subtherapeutic CpLEV remains limited**, although it suggests a possible association.