

# ERTAPENEM-INDUCED NEUROTOXICITY: ROLE OF PLASMA CONCENTRATION MONITORING

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## BACKGROUND AND IMPORTANCE

- Carbapenems, such as ertapenem, are beta-lactam-type antibiotics used to treat a wide variety of infections.
- **Neurological disorders have been observed in patients during ertapenem treatment**
- Factors that contribute to this toxicity are not well defined and ertapenem plasma levels have not been taken into account.

## AIM AND OBJECTIVES

Evaluate the relationship between ertapenem plasma concentrations and ertapenem-induced neurological toxicity.



## MATERIAL AND METHODS

COHORT STUDY → TERTIARY CARE MEDICAL CENTER → OCTOBER 2019 - FEBRUARY 2021

Adult patients treated with ertapenem → minimum period of 72 hours → at least one concentration determination.

Favoring those with old age and comorbidities. Critical patients were excluded.

Modified KARCH-LASAGNA algorithm

Establish and categorize the relationship between ertapenem use and the appearance of any clinical signs or symptoms that might indicate neurotoxicity.

SCORE ≥ 6

NEUROTOXICITY

- High-resolution liquid chromatography system + UV/visible detector → analyze ertapenem blood samples.
- Non-parametric tests were performed to search for any difference between groups (neurotoxicity/non-neurotoxicity patients)

## RESULTS

102 (53% male) patients. Median age of 72 years.

Ertapenem plasma concentration was analyzed at a mean of 6.4 days ( $\pm 4.1$ ) since starting antibiotic administration.

- 13/102 patients (12.7%) presented **neurological disorders** during ertapenem treatment, mainly:

- Confusional state
- Drowsiness.

- We noted **3 cases of hallucinations** as well as 1 patient who presented epileptic seizure and finally died.

- Mean **ertapenem blood concentration** in patients who experienced neurotoxicity was 32.16 mcg/ml (95% CI 8 to 56.3) versus 14.63 mcg/ml (95% CI 11.4 to 17.8) for those who did not present.

- **A statistically significant difference was observed in the median ertapenem blood concentration between the two groups (18.66 mcg/ml neurotoxicity group versus 9.7 mcg/ml control group; p= 0.014).**

## CONCLUSION AND RELEVANCE

**The group of patients who presented neurological disorders had higher concentrations of ertapenem.**

Therapeutic drug monitoring can help identify those patients with high risk for neurotoxicity.

More studies are needed to define which patients could obtain the greatest benefit from a close control of ertapenem blood concentration in order to prevent this neurotoxicity.

