

# Rapid Symptomatic Improvement of Encephalopathy From Valproic Acid Toxicity After Short Course of Intravenous Carnitine

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## Introduction

- Valproic acid (VPA) is used as therapy in seizures, mania and migraines.
- Toxicity from  $\beta$ -oxidation and carnitine depletion manifests as hyperammonemic encephalopathy and is treated with L-carnitine.
- Treatment of VPA toxicity with L-carnitine may produce a rapid improvement in symptoms as well as serum ammonia concentrations

## Case Series

- 23-year-old schizophrenic male was started on 500 mg extended release VPA daily during inpatient psychiatric hospitalization. Two days later his dose was increased to 1500mg daily. He presented on day 8 for lethargy.
- Vital signs were normal and physical exam was notable for somnolence and upper extremity tremors. The patient was intubated and treated with L-carnitine.
- He had a rapid improvement in ammonia concentration and mental status within 12 hours, and was discharged with further psychiatric care.

- 37-year-old bipolar male presented with stupor on day 10 of treatment with extended release VPA 1500mg.
- Vital signs were normal and physical exam was notable for dilated pupils, somnolence, and intermittent lower extremity myoclonus.
- He was treated with L-carnitine and had a rapid improvement to baseline mental status within 3 hours. He was continued on L-carnitine overnight and evaluated for alternate causes of encephalopathy.
- VPA and ammonia concentrations for both patients are presented in the tables. Head CT, metabolic panel, and transaminases were within normal limits for both. MRI and EEG were within normal limits for the second patient.

## 23-year-old Valproic Acid & Ammonia Concentrations

	3 Hours Prior To Arrival	ED Arrival	12 Hours	36 Hours
Valproic Acid ( $\mu\text{g/mL}$ )		129	86	36
Ammonia ( $\mu\text{mol}$ )	434	>700	78	82

## 37-year-old Valproic Acid & Ammonia Concentrations

	3 Hours Prior To Arrival	ED Arrival	24 Hours	36 Hours
Valproic Acid ( $\mu\text{g/mL}$ )		104	38	18
Ammonia ( $\mu\text{mol}$ )	150	172	35	13

## Discussion

- Valproate-induced hyperammonemic encephalopathy is a well-described side effect of this medication.
- The estimated time frame for normalization of ammonia concentrations and improvement of CNS function after carnitine administration is unknown.
- Our patients showed 10-fold & 5-fold reductions in ammonia concentrations less than 12 hours (Patient #1) and 24 hours (Patient #2) after antidote therapy, and demonstrated a rapid CNS recovery to baseline.
- Use of L-carnitine for treatment of VPA toxicity can result in the rapid improvement of encephalopathy and hyperammonemia.