# CLINICAL UTILITY OF ELECTRORETINOGRAMS FOR EVALUATING VIGABATRIN TOXICITY IN CHILDREN

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## INTRODUCTION

**BACKGROUND:** Vigabatrin (VGB) is an anti-seizure medication approved for refractory complex epileptic seizures in adults, infantile spasms in children between the ages of 1 month and 2 years old, and refractory complex seizures in patients aged 2 to 10 years old due to tuberous sclerosis. VGB has been implicated in many case reports documenting visual field defects, retinal toxicity, and electroretinogram (ERG) abnormalities. Documented adverse reactions are sporadic and not dose related. Guidelines for visual screening were implemented in response. In non/pre – verbal or uncooperative patients, the manufacturing drug company recommended that testing with ERG should be performed within 4 weeks of beginning treatment to establish a baseline, and regularly thereafter to monitor for visual field defects. Few studies have assessed how clinical management of patients on VGB changes in the face of abnormal screening results.

**STUDY OBJECTIVE:** Given the high cost of ERG screening, risks of general anesthesia, and uncertainty of whether ERG results changes management in these patients, this study sought to determine changes in clinical management in pediatric patients taking vigabatrin in response to electroretinogram (ERG) results.

## METHODS

- A retrospective IRB approved review was conducted on all patients who received full-field ERGs under general anesthesia at the Children's Hospital of Colorado (April 28th, 2009 – January 13th, 2012).
- Normative ERG values were defined by the manufacturer of the ERG machine (Table 1) (UTAS visual diagnostic test system, LKC Technologies). Any ERG metric that did not meet defined LKC normative values was considered abnormal.
- Indications for ERG, change in treatment based on ERG results, age, and gender were collected.
- One single physician who had additional training in ERG interpretation evaluated and interpreted each ERG.
- Analysis consisted of descriptive statistics reported as frequency and percentage.

## RESULTS

- A total of 170 ERGs were performed on 138 patients under general anesthesia. The clinical characteristics of the cohort are shown in Table 1.
- In patients screened specifically for retinal toxicity due to VGB use, 30 ERGs performed on 26 patients were available for analysis.
- Only 2 patients had normal ERGs, while 28 ERGs were abnormal. The patients who had normal ERGs continued taking VGB (Figure 1). Figure 2 illustrates clinical management in response to abnormal results.

**TABLE 1: Clinical Characteristics of the Patients (n = 138)**

| Characteristic | n | % |
|---|---|---|
| **Indication for ERG[a]** | | |
| Vigabatrin | 29 | 21.01% |
| Low vision | 31 | 22.4% |
| Nystagmus | 36 | 26.08% |
| Smith-Lemli-Opitz | 8 | 5.79% |
| Syndrome | 18 | 13.04% |
| Abnormal fundus exam | 15 | 10.86% |
| Other syndrome | 1 | 0.72% |
| Unknown | | |
| **Repeated Subjects** | | |
| Number of patients with multiple ERGs | 24 | 17.3% |
| **Mean ± Standard Deviation** | | |
| Age | 5.19 | ±6.21 |

[a]ERG = Electroretinogram

**FIGURE 1: ERG Results (n = 30)**

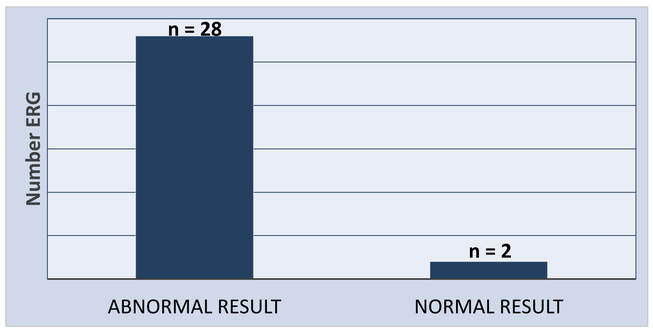
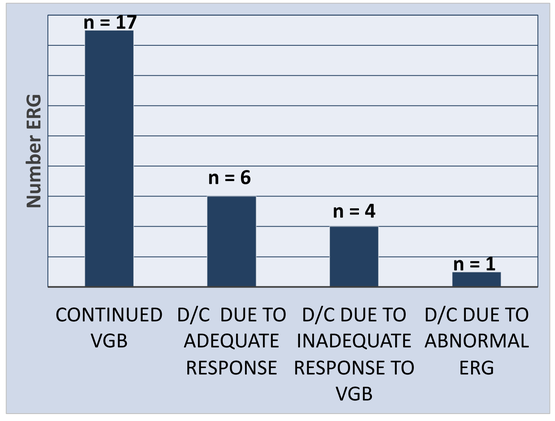



**FIGURE 2: Clinical Management in Response to Abnormal ERG (n = 28)**




[a]D/C = Discontinued

## KEY FINDINGS

- Within our cohort, the majority of patients screened for VGB induced retinal toxicity had abnormal ERG results.
- Only 1 patient stopped taking VGB in response to their abnormal ERG results.

## CONCLUSIONS

- To date, this study quantifies the largest number of decisions made for continuing or discontinuing VGB in response to abnormal ERG screening.
- This study details lack of change in clinical management for patients on VGB in response to abnormal screening results. Our findings suggest that in many of the children on VGB, the medication is continued despite abnormal ERG results.
- Our results further contribute to a growing body of knowledge arguing that ERG should not be used to guide the management of pediatric patients taking VGB.
- Clinicians should engage in conversation with patients and their families on risks and benefits of ERG screening. While not using ERG as a tool for screening might result in missed cases of retinal toxicity, VGB can be a powerful medication for treating irreversible seizure disorders.
- Further studies are needed to investigate the role of retinal imaging techniques in children to evaluate retinal toxicity from VGB.

### DISCLOSURES

The authors have no conflicts of interest.

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