



# Integrating Continuous Processed EEG into the Medical Record as a Tool to Identify Populations with Altered Anesthetic Requirements

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## Background

Processed EEG (pEEG) is an objective measure of brain activity to aid titration of anesthetics intraoperatively

Recent literature describes its use to guide **anesthetic dosing<sup>1</sup> and help reduce overdose<sup>2</sup>**.

Even when used clinically, pEEG data are not universally recorded continuously in electronic medical records.

## Methods

Identified patients <18 years with pEEG data from the SCH MPOG database.

Variables gathered:

- Average spectral edge frequency (SEF)
- End-tidal sevoflurane
- Tci-modeled propofol concentration during maintenance of anesthesia

Chart reviews performed for outliers with anesthetic sensitivity and plots of anesthetic concentration versus SEF were generated

## Results

We identified **four patients with a Fontan** in the dataset, two with normal anesthetic sensitivity and two without.

Scatter plots (Figure 1) demonstrate **varying susceptibility to anesthetics**.

Table 1: Case details

Case (age in years, ASA status)	Procedure (duration of anesthesia care)	Congenital Defect, Repair	Baseline Saturations	Type of Anesthetic (anesthetic dosing)	Adjuncts used	Pressor / inotrope infusion use?
A (13.4)	Cardiac catheterization, right pulmonary artery stent (251 min)	Hypoplastic left heart syndrome s/p Fontan	87%	Inhaled (EtSevo 0.7-1.5%)	Dexmedetomidine (2.9 mcg/kg), midazolam (0.06 mg/kg IV), hydromorphone (0.03 mcg/kg)	Yes (epinephrine and milrinone)
Ac (16.3)	Cardiac catheterization, rejection surveillance biopsy (114 min)	Pulmonary atresia with history of Fontan s/p heart transplant	94%	Inhaled (EtSevo 2.8-3.1%)	Dexmedetomidine (0.2 mcg/kg)	No
B (12.4)	Cardiac catheterization, superior vena cava stent (249 min)	Hypoplastic left heart syndrome s/p Fontan	77%	Intravenous (propofol range 50-150)	Dexmedetomidine (1.7 mcg/kg), midazolam (0.05 mg/kg IV), fentanyl (1.14 mcg/kg), ketamine (1.13 mg/kg)	Yes (epinephrine)
Bc (13.3)	Cardiac catheterization, evaluation for upcoming heart transplant (306 min)	Heterotaxy and unbalanced AV canal with pulmonary atresia, s/p fenestrated Fontan	84%	Intravenous (propofol range 115-200)	Dexmedetomidine (0.6 mcg/kg), midazolam (0.04 mg/kg IV)	No

\*c denotes age-matched control

\*\*Propofol dosing in mcg/kg/min

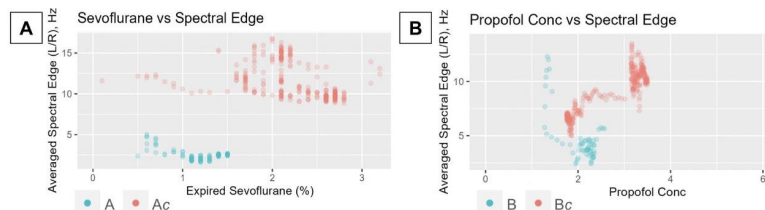
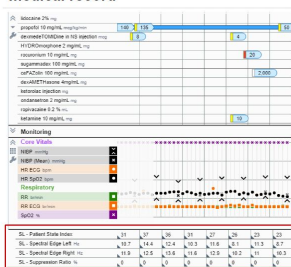


Figure 2: pEEG data in the electronic medical record



## Discussion

This abstract demonstrates the **utility of retrospective medical records analysis** to identify patients that may benefit from adjusted dosing of anesthetic agents based on continuous pEEG data.

**Anesthetic sensitivity amongst patients with Fontans** may occur as single ventricle patients are more likely to have white matter abnormalities.<sup>3</sup>

Targeted use of pEEG introduces **selection bias**; as pEEG becomes used more routinely, this data may allow for more robust analysis and hypothesis generation and testing.

## Conclusion

pEEG data automatically recorded into an electronic anesthetic record alongside anesthetics administered can identify patients with altered anesthetic requirements.

## References

1. Iyer, R. S., et al. 'Implementation of an EEG-guided propofol anes. practice in a large academic ped. hospital: A QI project.' *Ped Anes* 2023
2. Long, M., et al. 'Sevoflurane requirements during (EEG)-guided vs standard anes. care in children: a RCT.' *J Clin Anes* 81 2022: 110913
3. Williamson, B., et al. 'Altered white matter connectivity in children with CHD with single ventricle physiology'. *Sci Rep* 13.1 (2023): 1318