Crowd-sourcing a scientific study to understand autonomic disruption in epilepsy

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What could a wrist-worn sensor, measuring autonomic data and physical activity, tell us about seizures and SUDEP?

There are two main branches of the Autonomic Nervous System, both of which can be measured from the wrist:

- The Sympathetic Nervous System “fight or flight” causes electrodermal activity (EDA) changes in the skin, measured as skin conductance.
- The Parasympathetic Nervous System “rest and digest” is measured from the high frequency component of heart-rate variability.

PGES occurred in 100% of SUDEP cases in the MORTEMUS study [4]. Pediatric [3] and adult [5] studies showed that duration of PGES correlates with EDA.

Respiratory arrest is inducible in humans by electrical stimulation of the amygdala [7]. Amygdala stimulation gives rise to a strong EDA response (Fig 2). Note: a scalp EEG may not register this deep brain activation!

EDA is larger for most GTCs than for most CPS, and is not correlated with length of the seizure or with its motor component [2].

EDA+motion is better than motion alone for automated GTC seizure detection [2]. Also, larger EDA correlates with longer post-ictal generalized EEG suppression (PGES) [3].

It is possible but not proven that autonomic disruption may lead to SUDEP [6].

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References


With gratitude to the Epilepsy Foundation, the Nancy Lurie Marks Family Foundation, the Danny Did Foundation, and the members of the MIT Media Lab consortium for their generous support!