The future of epilepsy research enabled by data

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Past funding: NIH, BIDMC Neurology.

Advisory boards: Magic Leap, EpilepsyAI.

None of the above relates to the present talk.

Disclosures



- Clinical trial enhancement
- Seizure clustering
- Seizure susceptibility
- Seizure cycles
- Seizure forecasting
- What's next?

Outline



https://sites.google.com/site/isdchome/



Trial analysis (in brief)

- Placebo response can be produced from ups and down of seizure frequency alone
- Placebo outcome can be anticipated by trial design
- Computational models based on seizure data can reproduce trial results
- Models can predict trial efficiency based on patient diaries BEFORE the drug is given



Goldenholz 2017 Seizure



Goldenholz 2017 Annals Clin Trans Neuro



Romero 2020 Epilepsy Research



Romero 2020 Epilepsia



Seizure cycles





Baud et al 2018, Nat Communications

Karoly et al, Lancet Neuro 2018

ClusterCalc™ Personalized cluster definition







N=1748 38-60% clusters are due to chance ClusterCalc seizures in 27% Some clusters can be missed

Chiang et al Epilepsy Research 2020



Seizure susceptibility

Bayesian mixed effects hidden Markov model for zero inflated count data





Chiang et al Epilepsia Open 2018

"EpiSAT...similar to ... specialized providers, but with improved accuracy and reliability"

Patient 4

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Example: Seizure forecasting



Seizure Tracker® be aware. track it.



N= 5419 AUC=86% BSS = 0.27

Goldenholz et al Annals of Neurology 2020



What's next?

- More data:
 - EHR/Mobile
 - Wearable devices
 - Implants













- More connected:
 - To entire patient
 - To doctor
 - To other patients like me





- More Al:
 - Sooner diagnosis
 - Personalized treatment
 - Early warnings









What is coming next?

• More data: • More connected: • EHR/Mobile • Wearable devices • To doctor • Implant

• To entire patient

• To other patients like me

• More Al:

Sooner diagnosis

• Tailored treatment

• Early warnings



Continue the conversation...



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