Epilepsy and it's Relation to Stroke

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June 20, 2022

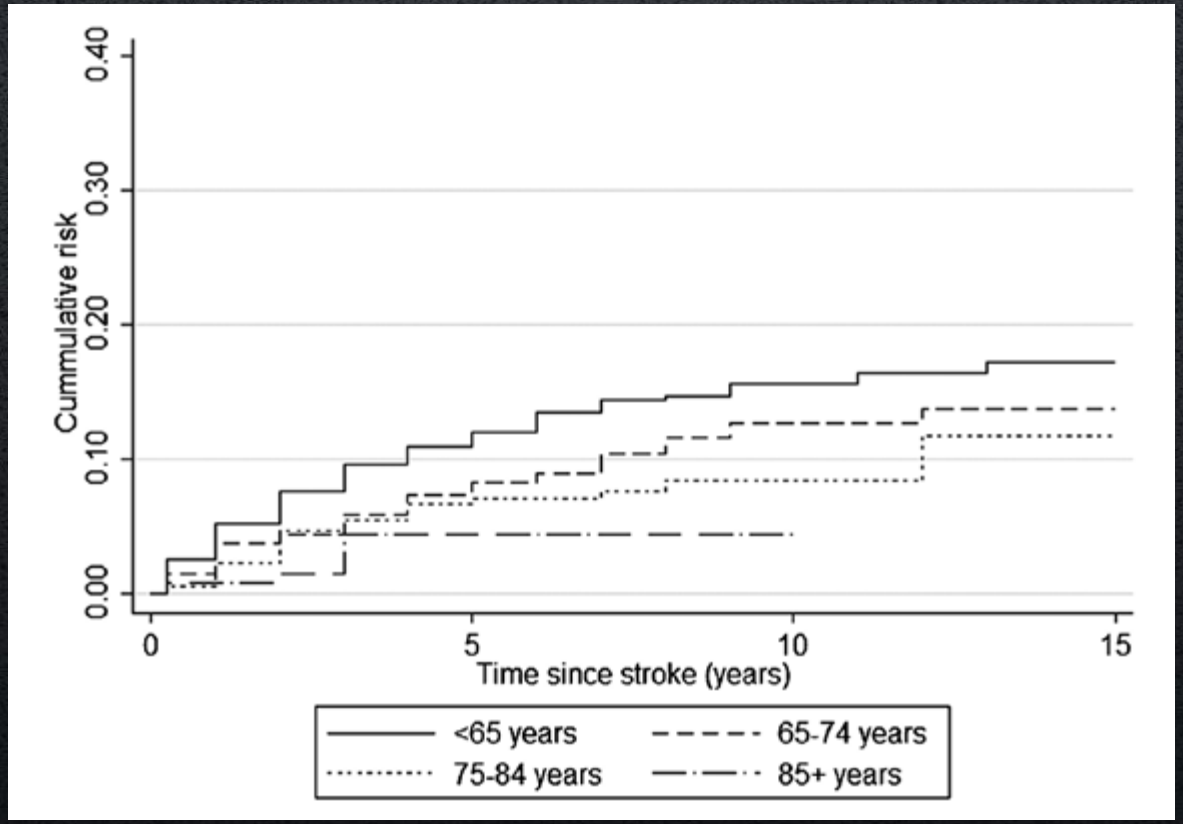
Disclosure

- Research grant (not relevant to this talk)
  - Xenon pharmaceuticals
  - Otsuka pharmaceuticals

Epidemiology

- Stroke
  - Most common cause of seizures in elderly
  - Most common etiology of acquired epilepsy in high-income countries
- Incidence of post-stroke epilepsy
  - >6% in population-based studies
  - >15% in single center studies
  - >12% in hemorrhagic stroke
  - Risk is highest during the 1st year post-stroke
    - ~85% the 1st seizure happens within the first 2 years post-stroke

Epidemiology



Graham et al, Stroke. 2013 Mar;44(3):605-11

Importance

- Seizures shortly after stroke
  - Increased metabolic demand → increase infarct size, and outcome
- Seizure
  - Injury
  - Cognition
  - Ability to work & drive
  - QOL

Classification

ILAE OFFICIAL REPORT

A practical clinical definition of epilepsy

*Robert S. Fisher, †Carlos Acevedo, ‡Alexis Arzimanoglou, §Alicia Bogacz, ¶J. Helen Cross, #Christian E. Elger, **Jerome Engel Jr, ††Lars Forsgren, ‡‡Jacqueline A. French, §§Mike Glynn, ¶¶Dale C. Hesdorffer, ##B.I. Lee, ***Gary W. Mathern, †††Solomon L. Moshé, ‡‡‡Emilio Perucca, §§§Ingrid E. Scheffer, ¶¶¶Torbjörn Tomson, ###Masako Watanabe, and ****Samuel Wiebe

Epilepsia, 55(4):475–482, 2014
doi: 10.1111/epi.12550

Classification

- ILAE task force
  - Epilepsy is a disease of the brain defined by any of the following
    - At least 2 unprovoked seizures more than 24 hours apart
    - 1 unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk after 2 unprovoked seizures (at least 60%), occurring over the next 10 years
    - Diagnosis of an epilepsy syndrome

Classification

- Acute symptomatic (early) seizures
  - Within 7 days post-stroke
  - Usually related to toxic/metabolic effects of stroke
    - Provoked seizures
- Remote symptomatic (late) seizures
  - Unprovoked seizures 1 week after stroke
- Risk of subsequent unprovoked seizure after
  - Acute symptomatic seizure → ~30%
  - Remote symptomatic seizure → >60% (%72 in 10 years)

Risk Factors

- Risk factors for post-stroke epilepsy
  - Acute symptomatic seizure
  - Cortical involvement
  - Stroke severity
  - Young age
  - Type (hemorrhagic > ischemic)
  - Co-morbidities (inconsistent data)
    - DM, HTN, HLPD, Depression, Dementia

Risk Factors

- Associate between reperfusion therapies and seizures
  - Inconsistent data
- Imaging (MRI, CT)
  - Involvement of cortex
  - Subcortical strokes
  - Involvement of anterior circulation, specifically MCA
  - Uncommon if infra-tentorial structures are affected
  - Size of the lesion
    - Lesions > 70 ml → increase the risk by 4-fold

Risk Factors

Prediction of late seizures after ischaemic stroke with a novel prognostic model (the SeLECT score): a multivariable prediction model development and validation study

Marian Galovic, Nico Döhler, Barbara Erdélyi-Canavese, Ansgar Felbecker, Philip Siebel, Julian Conrad, Stefan Evers, Michael Winklehner, Tim J von Oertzen, Hans-Peter Haring, Anna Serafini, Giorgia Gregoraci, Mariarosaria Valente, Francesco Janes, Gian Luigi Gigli, Mark R Keezer, John S Duncan, Josemir W Sander, Matthias J Koepp, Barbara Tettenborn

Lancet Neurol 2018; 17: 143–52

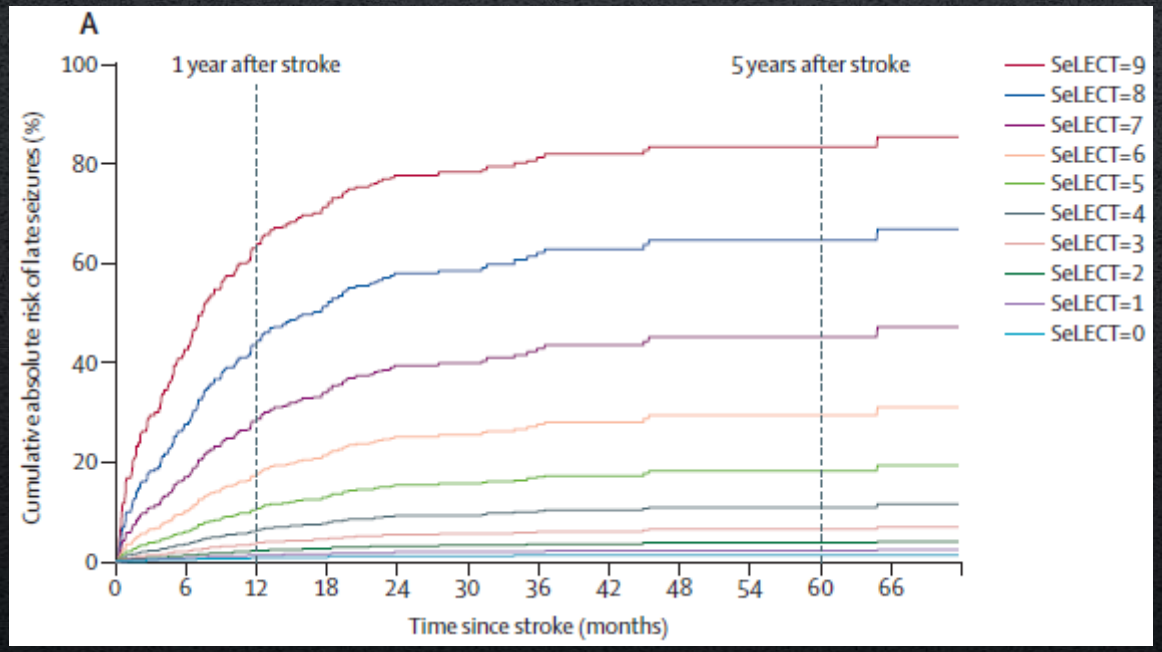
Risk Factors

	SeLECT score (points)
(Se) Severity of stroke	
NIHSS ≤3	0
NIHSS 4–10	1
NIHSS ≥11	2
(L) Large-artery atherosclerosis	
No	0
Yes	1
(E) Early seizure (≤7 days)	
No	0
Yes	3
(C) Cortical involvement	
No	0
Yes	2
(T) Territory of MCA	
No	0
Yes	1

To calculate an individual's SeLECT score, the points associated with each predictor can be added to obtain the total risk score. As an example, a person who has a stroke with initially 12 points on NIHSS due to large-artery atherosclerosis, no early seizures, and with infarction involving the cortex in the MCA territory, will have a risk score of 2 + 1 + 0 + 2 + 1=6 points. According to figure 3, 6 points corresponds to a late seizure risk of 18% within 1 year and of 29% within 5 years after stroke. NIHSS=National Institutes of Health Stroke Scale. MCA=middle cerebral artery.

Table 4: Calculation of the SeLECT score

Risk Factors



Risk Factors

The CAVE Score for Predicting Late Seizures After Intracerebral Hemorrhage

Elena Haapaniemi, MD; Daniel Strbian, MD; Costanza Rossi, MD; Jukka Putaala, MD; Tuulia Sipi, MB; Satu Mustanoja, MD; Tiina Sairanen, MD; Sami Curtze, MD; Jarno Satopää, MD; Reina Roivainen, MD; Markku Kaste, MD; Charlotte Cordonnier, MD; Turgut Tatlisumak, MD; Atte Meretoja, MD

Stroke. 2014;45:1971-1976.

Risk Factors

	Points
Cortical involvement	
No	0
Yes	1
Age	
≥ 65 years	0
< 65 years	1
Haemorrhage volume	
≤ 10 mL	0
> 10 mL	1
Acute symptomatic seizure	
No	0
Yes	1

CAVE score	Seizure risk	
	Derivation	Validation
0 points	0.6%	3.1%
1 point	3.6%	5.0%
2 points	9.8%	15.8%
3 points	34.8%	13.5%
4 points	46.2%	37.5%

EEG

- Ictal and interictal discharges
  - 7-8%
  - Higher in studies that used VEEG
    - ~17% in ICU setting
- No consistent data available on the predictive role of EEG in post-stroke epilepsy

Management

- Acute symptomatic seizure
  - No ASM
  - Treatment of early seizures or epileptic discharge on EEG may be reasonable with decreased brain perfusion
    - Brain edema, vasospasm after SAH, hemodynamically unstable stenosis
    - Recent surgery or trauma
    - Little evidence to support preventive treatment

Management

- Remote symptomatic epilepsy
  - Start ASM
  - Living situation, liver and renal function, body weight, bone health
  - Side effect profile
  - Comorbidities, co-medications
  - No clear data on the choice
  - About 2/3 of patients achieve seizure freedom with 1 ASM

Management

- Withdrawal of ASM
  - Increase risk for relapse in lesional epilepsy
  - In general (not specific to stroke) favoring good outcome
    - Shorter duration of epilepsy before remission
    - Longer seizure free interval before withdrawal
    - No developmental delay
    - Normal EEG before withdrawal
  - Possibly affecting outcome
  - Presence of a lesion
  - For those who have been on ASM after acute symptomatic seizure
    - 1 week to 3 months