Picture 1: Hans Berger first recorded the electrical activity of the brain through the intact skull and discovered and named the electroencephalogram.

Diagram 1: Diagram of neural structures and pathways.
Classification of Epilepsy

- Generalized
  - Convulsive (grand mal)
  - Nonconvulsive (petit mal)
  - Myoclonic
  - Febrile

- Partial (focal)
  - P. seizures with elementary symptoms
  - P. seizures with complex symptoms
  - P. seizures with secondary generalization
### Complex partial seizures - localization

- **Orbital frontal**
  - Olfactory hallucinations, autonomic phenomena.
- **Anterior temporal, amygdalar**
  - Lip smacking, forced searching, blank staring, epigastric distress, respiratory irregularity.
- **Posterior temporal**
  - Auditory, vestibular, and visual phenomena.
- **Temporal, limbic**
  - Dyssnmonic states (déjà vu, j’amais vu), dream states, mind-body dissociation, fear, panic, and anxiety.

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### Hippocampus

- Fornix
- Amygdala
- Hippocampus
Insights from genetics

- Mendelian inheritance
  - Neonatal convulsions
  - Nocturnal frontal lobe epilepsy
  - Progressive myoclonic epilepsy
  - Cortical malformation syndromes
- Complex inheritance (alters synaptic function, ion channels, neuronal structure)

Most epilepsies
Molecular genetics of idiopathic epilepsies

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mode of Inheritance</th>
<th>Gene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized epilepsy with seizures plus</td>
<td>AD</td>
<td>Na⁺ channel (β1 subunit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Na⁺ channel (α1 subunit)</td>
</tr>
<tr>
<td>Foreign familial neonatal convulsions</td>
<td>AD</td>
<td>K⁺ channel (KCNQ2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K⁺ channel (KCNQ3)</td>
</tr>
<tr>
<td>Autosomal dominant nocturnal frontal lobe epilepsy</td>
<td>AD</td>
<td>nACh receptor subunit</td>
</tr>
</tbody>
</table>

Lord, have mercy on my son, for he is an epileptic and he suffers terribly; for often he falls into the fire, and often into the water, And I brought him to your disciples, And they could not heal him.

– Matthew 17:15-16
Both Pat and Shirley believe that exorcism is a much-too-neglected therapy for the epileptic.

“What we call fits - seizures and epilepsy today” he explained, “Jesus recognized as possession by demons. Jesus saw epilepsy for what it is - the work of Satan.”

– Pat Boone Believes in Miracles
McCalls Magazine, February 1973, p. 122
Pharmacotherapy

- ↓ Burst firing (Na⁺ channel blockade)
  - Phenytoin, Carbamezapine, Felbamate, Topiramate
- ↑ Inhibition (GABA potentiation)
  - Barbituates, Benzodiazepines, Valproate, Gabapentin, Tiagabine, Topiramate
- ↓ Coupling (Glutamate receptor antagonist)
  - Topiramate, Felbamate
Trephination was practiced in the Old and New world 7,000 - 3,000 B.C.

Neuroimaging
Neuroimaging:
mesial temporal lobe sclerosis (Flair)

Neuroimaging: MTS (T2)

Gamma Knife Surgery
Tacuinum sanitatis, 15th century, Rx for insomnia