

# **Making Anti-Epileptic Drugs work for all those who need them**

**Reducing ER visits and helping Medicare / Medicaid budget**

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# Problem overview

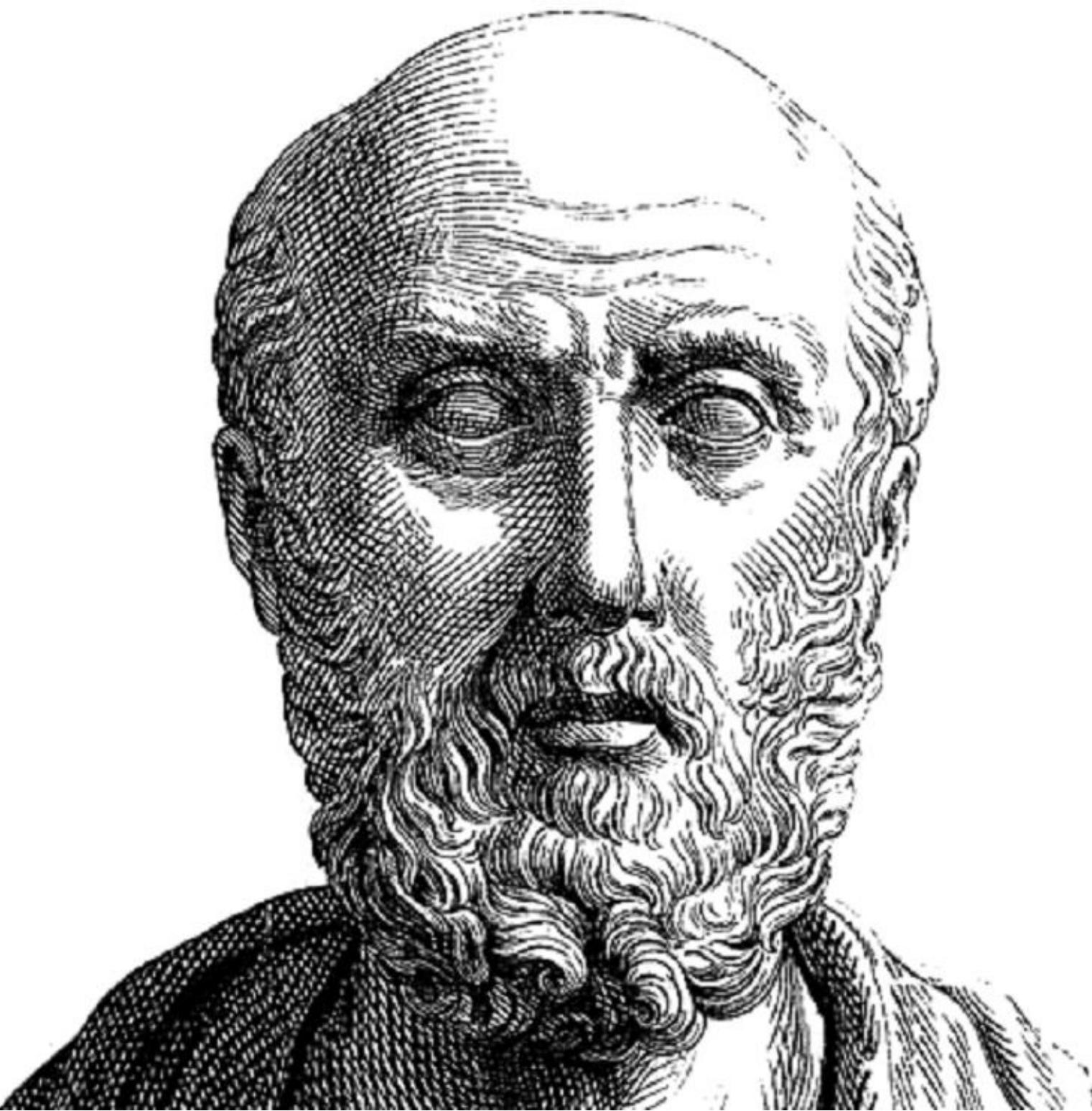
## Population impacted

- 1-2 % of general population suffer from Epilepsy
- 3 Millions of patients in the US
- Causes vary: injuries, tumors, etc.
- Historical records of people with Epilepsy since Ancient Greece
- First medication: Ketogenic Diet
- As of 2020, we have many more medications (not only to treat Epilepsy)

# Historical records of humans dealing with epilepsy



Fyodor Dostoyevsky, 1821–1881



Hippocrates - first doctor to treat epilepsy, ~ 400 BC



Prince Erik, Swedish and Norwegian Prince, 1889-1918

# **Medications are available developed, but how are they working for different people?**

**Dataset available thanks to Professor Tatonetti's lab at Columbia University**

- Data source used: <http://tatonettilab.org/resources/nsides/>
- Dataset not focused on people with epilepsy, but on all patients treated at CU MC
- Allows us to explore what anticonvulsants are patients taking, and how are they responding to them

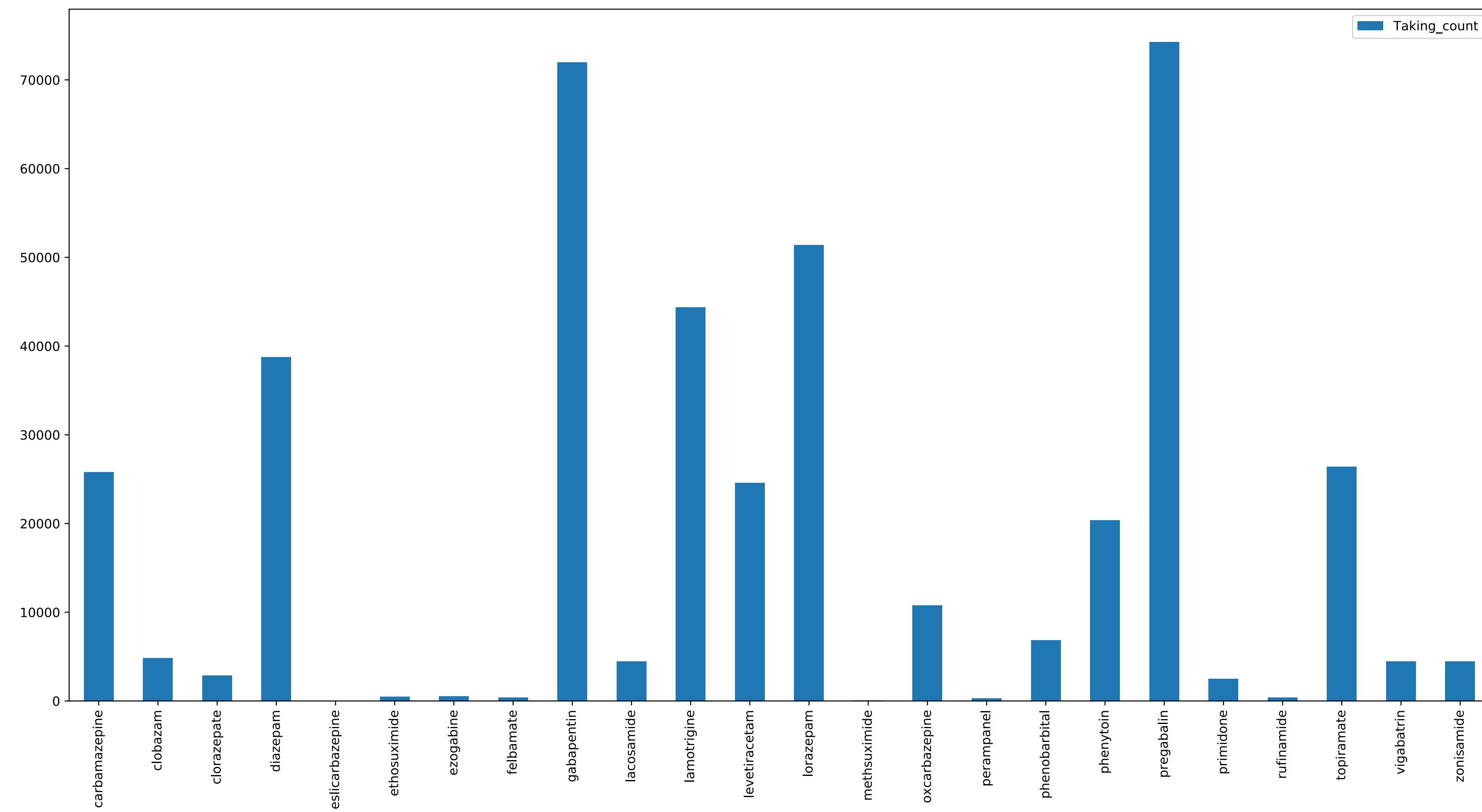
# Questions that we can start answering

1. Which medications cause non-epileptic patients to have seizures?
2. Which anticonvulsants are the most and least efficient?
3. Which anticonvulsants' side effects are hormonal?
4. Which medications interact with anticonvulsants?

**For questions 1, 2, 4, please see iPython notebook with the complete analysis (also stating assumptions of the analysis and possible limitations)**

# Medications prescribed to prevent seizures

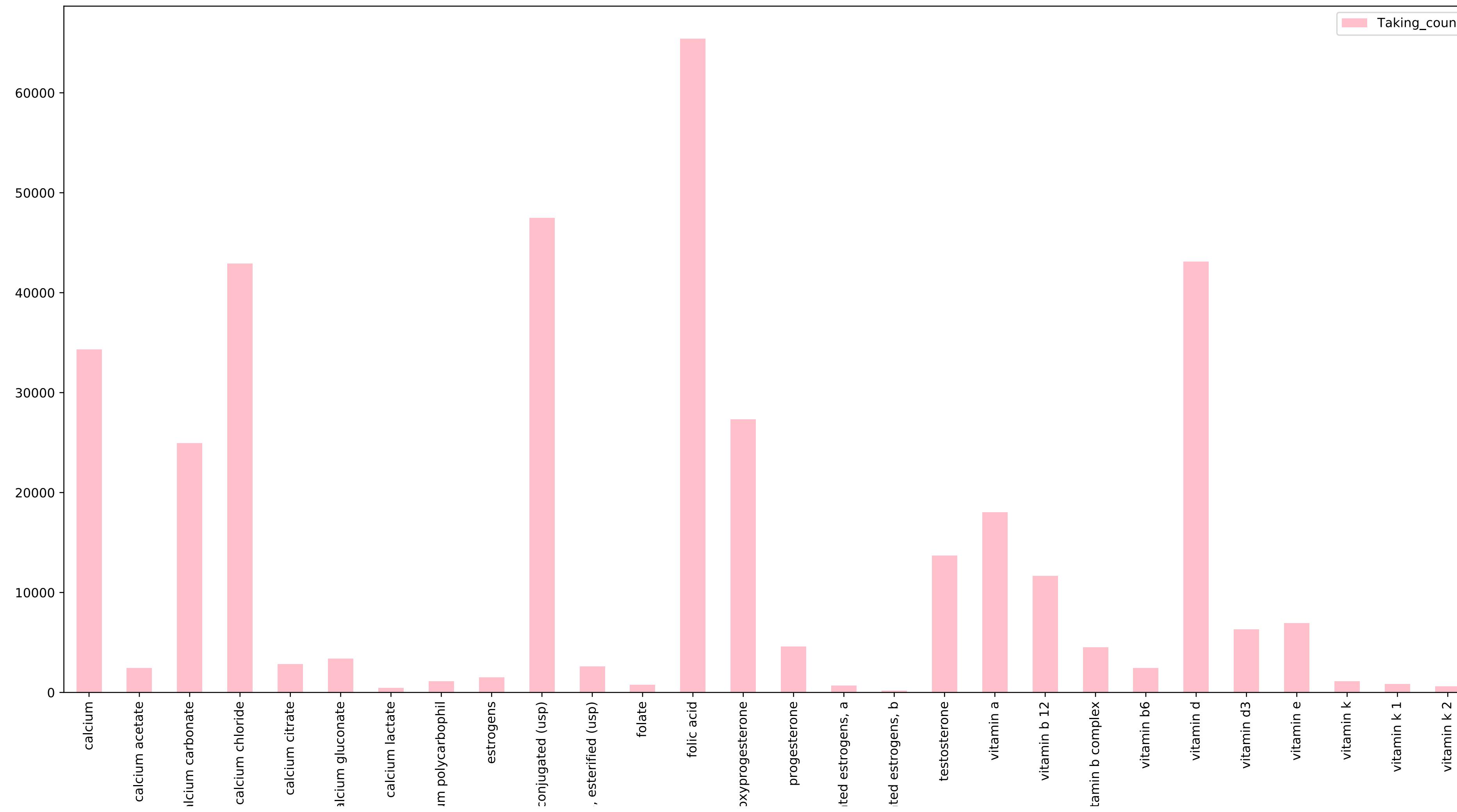
## Most commonly used anticonvulsants



**Fatigue, sleepiness, or strange mood swings are accepted as unavoidable side effects of anticonvulsants. For some adult epilepsy patients, they may even be a reason why they are hesitant to take the medications. Yet, this problems may be solved by helping patients get their hormones back in balance.**

# Supplements for Epilepsy patients

## Most commonly prescribed from patients taking AEDs



# Conclusions

## Based on this dataset:

- The most common deficiencies among patients with seizures are folic acid, calcium in various forms, vitamin D, and estrogens / progesterone.
- These hormones are particularly important for regulating blood levels of vitamin D and calcium among female patients, so it is not surprising that we find that many epilepsy patients who happen to be female need these supplements.
- There has been other research done on this, with findings that female patients can end up overmedicated (in general): <https://bsd.biomedcentral.com/articles/10.1186/s13293-020-00308-5>
- With our current level of knowledge, we can see that we could improve monitoring hormonal levels of patients taking anticonvulsants, to reduce the number of medications that female patients have to take.

**Thank you!**