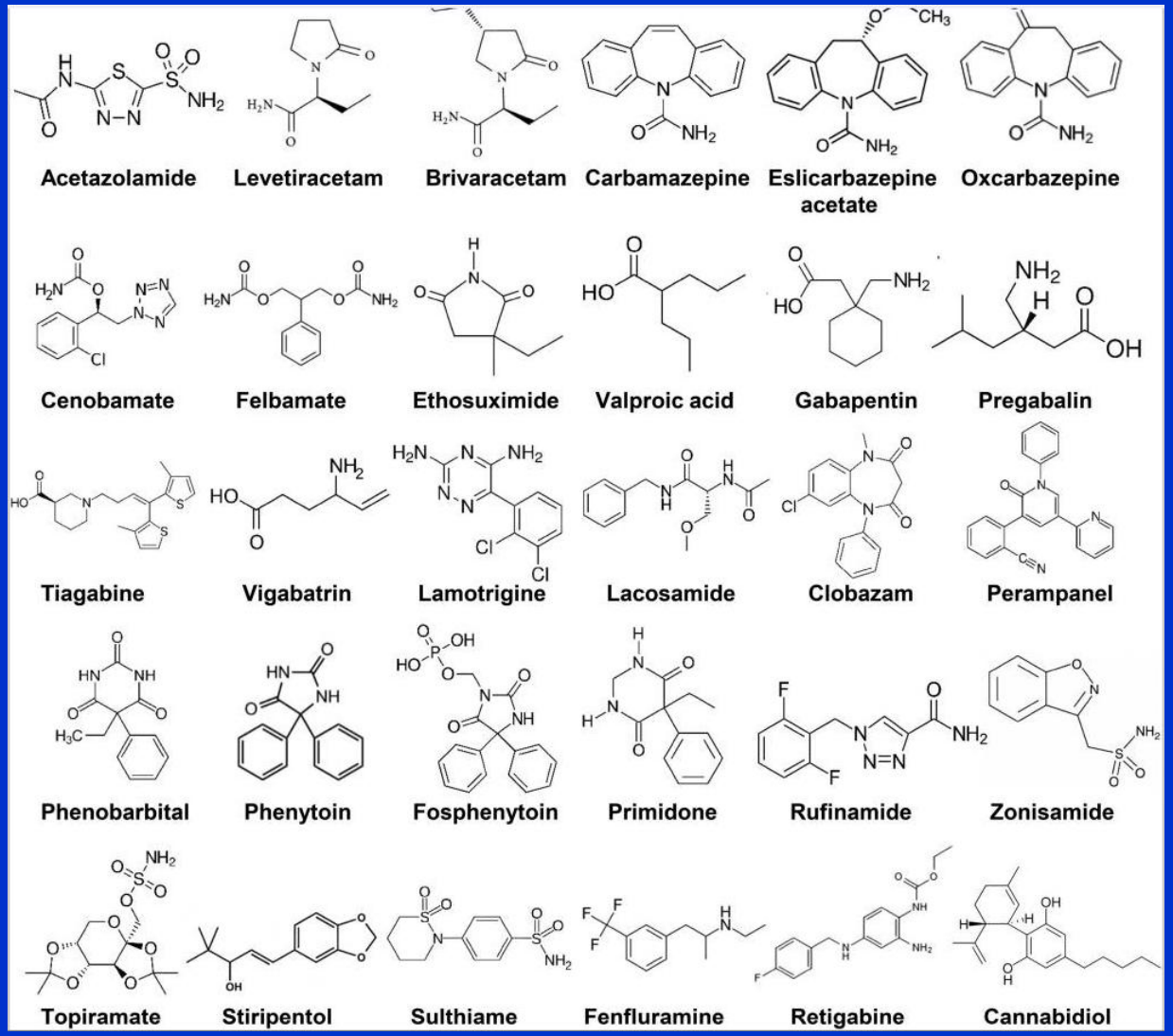
UT Southwestern Medical Center

Antiseizure medications in 2026: Choosing, switching, and monitoring

Alexander Doyle, MD

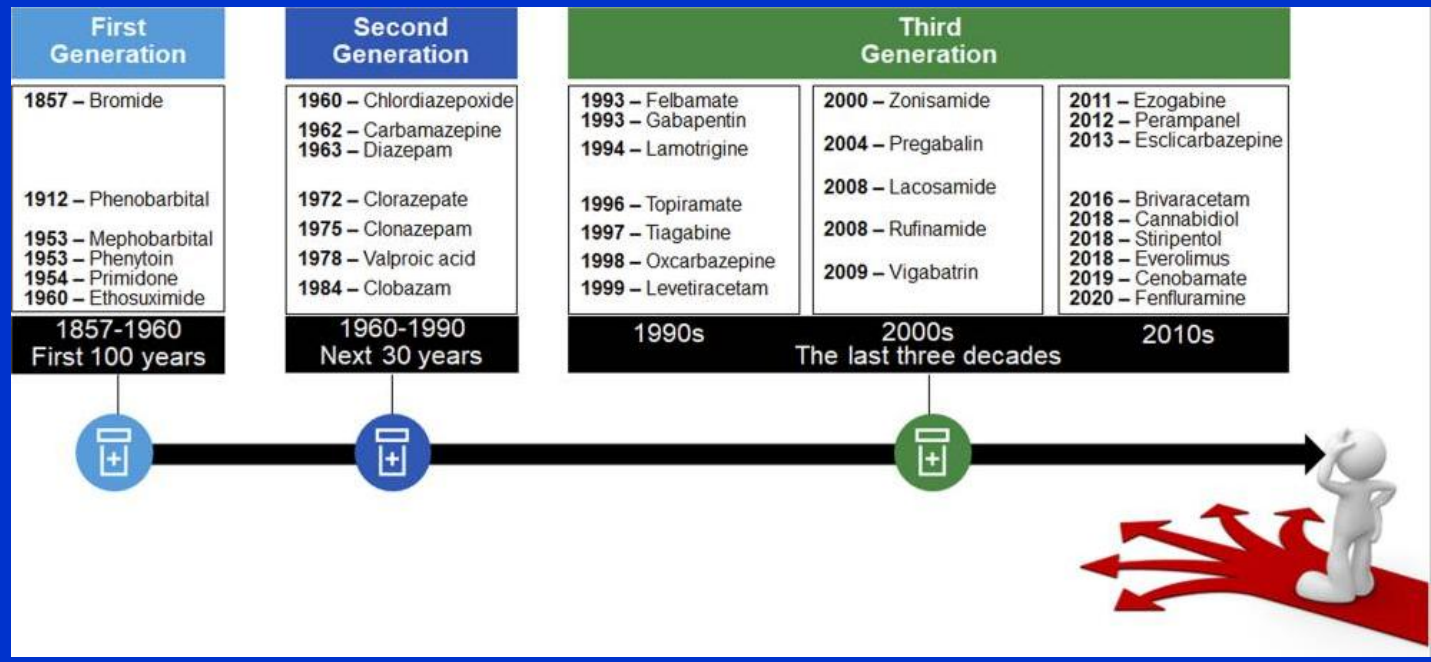
Outline

- When to treat?
- What to choose?
- When to switch?
- How to monitor?
- When to stop?



Introduction

- 150,000 adults present annually with a first unprovoked seizure in the U.S.
  - Traumatic physical and psychological event, social consequences (driving, limitations for employment)
- Epilepsy
  - Recurrent & unprovoked seizures
  - 4th most common worldwide neurological disorder
  - affects 1.1-1.2% of the U.S. population
- Antiseizure medications (ASMs) are the mainstay of treatment
  - Over the last 30 years there has been large increase in number of agents available

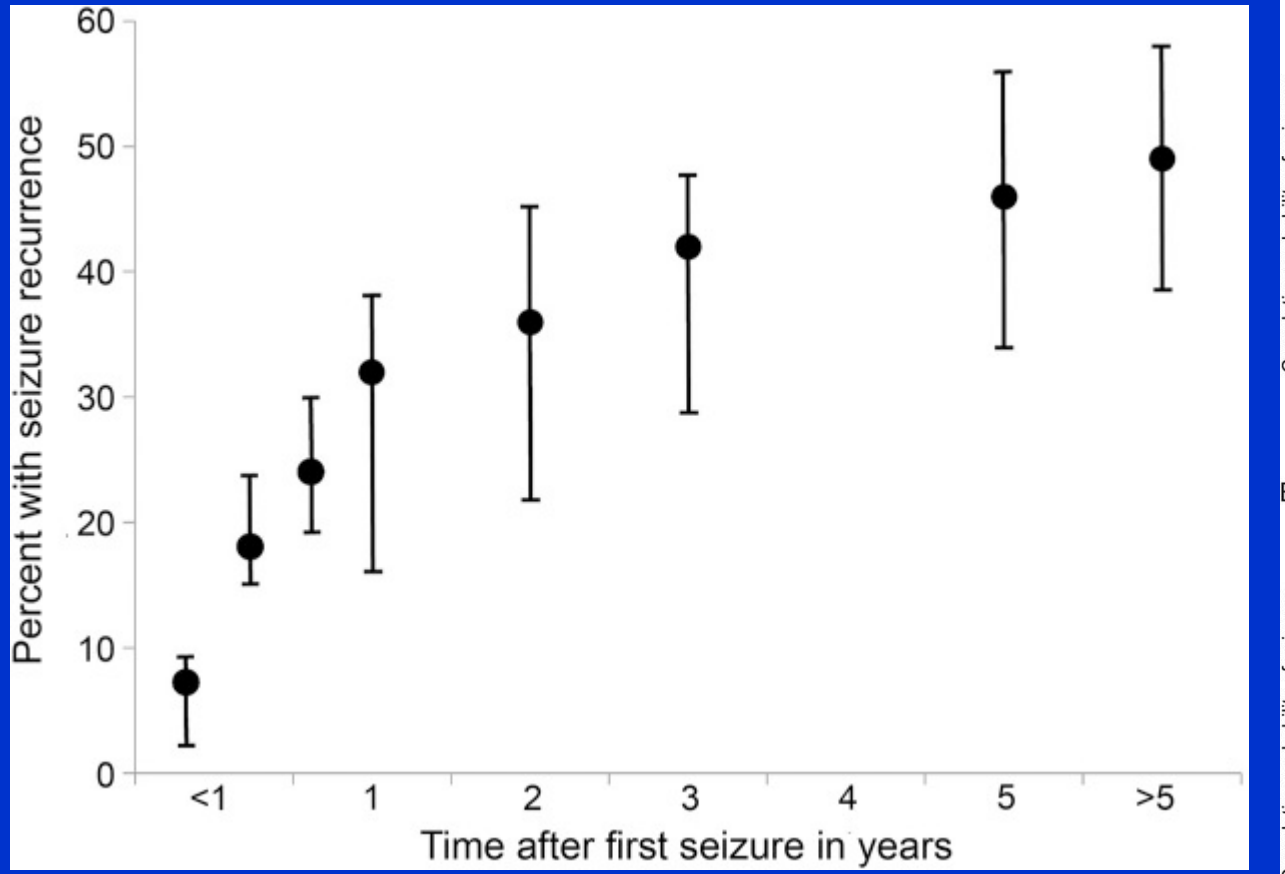


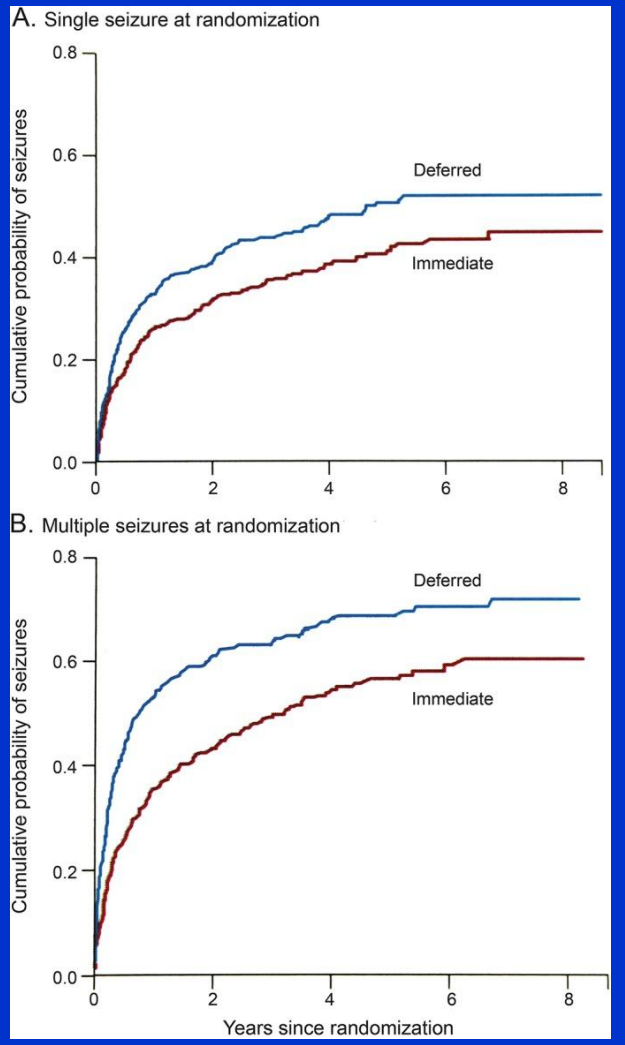
When to treat?

- 2015 AAN/AES guideline
- Adults with unprovoked first seizure have recurrence risk in first 2 years of 21-45% (level A)
- Risk factors associated with increased risk include:
  - Prior brain insult: (stroke, trauma, CNS infection, cerebral palsy, cognitive developmental disability) (level A)
    - Two fold higher risk of seizure recurrence
  - Significant brain imaging abnormality (level A)
  - EEG with epileptiform abnormalities (level A)
  - Nocturnal seizure (level B)
  - Variables not consistently associated with increased recurrence risk:
    - age, sex, family history of seizures, seizure type, and presentation with status epilepticus or multiple (2 or more) discrete seizures within 24 hours with recovery between them
- Immediate ASM therapy is likely to reduce recurrence risk within first 2 years (level B).
  - Reduce absolute risk by about 35%
  - May not improve QOL (level C)
  - Is unlikely to improve long term seizure remission prognosis

Percentages of patients with first seizure experiencing a recurrent seizure over time

great majority of recurrences occurring within the first 1 to 2 years after the initial seizure and the greatest risk in the first year (i.e., 32% at 1 year, compared with just 46% by 5 years





Epilepsy Risk after First Seizure (MESS Score)

MESS prognostic index (Kim 2006, from the MRC Multicentre trial for Early Epilepsy and Single Seizures). Predicts seizure recurrence after a single seizure or early epilepsy and the benefit of immediate antiepileptic treatment.

Used in: Seizures & Epilepsy

Number of seizures (all types) at presentation *

Select...

Neurological disorder (e.g. neurological deficit, learning disability or developmental delay) *

No (0)

Yes (+1)

Abnormal EEG *

No — normal (0)

Yes (+1)

RESULT

Fill 3 more required fields.

Score interpretation

Low Recurrence Risk 0

Single seizure, no neurological disorder, normal EEG. Kim 2006: little benefit from immediate treatment in this group.

→ DVLA: do not drive for 6 months (first seizure); no immediate AED; follow-up neurology within 2 weeks; EEG and MRI brain; safety advice (swimming, heights)

Medium Recurrence Risk 1

2–3 seizures, or a neurological disorder, or an abnormal EEG. Kim 2006: potentially worthwhile benefit from immediate treatment.

→ Discuss AED benefits vs risks with the patient; treat if the patient feels the risk is unacceptable. Common choices: levetiracetam, lamotrigine. Valproate must not be started in anyone under 55 unless two specialists agree there is no alternative (MHRA 2024). DVLA guidance.

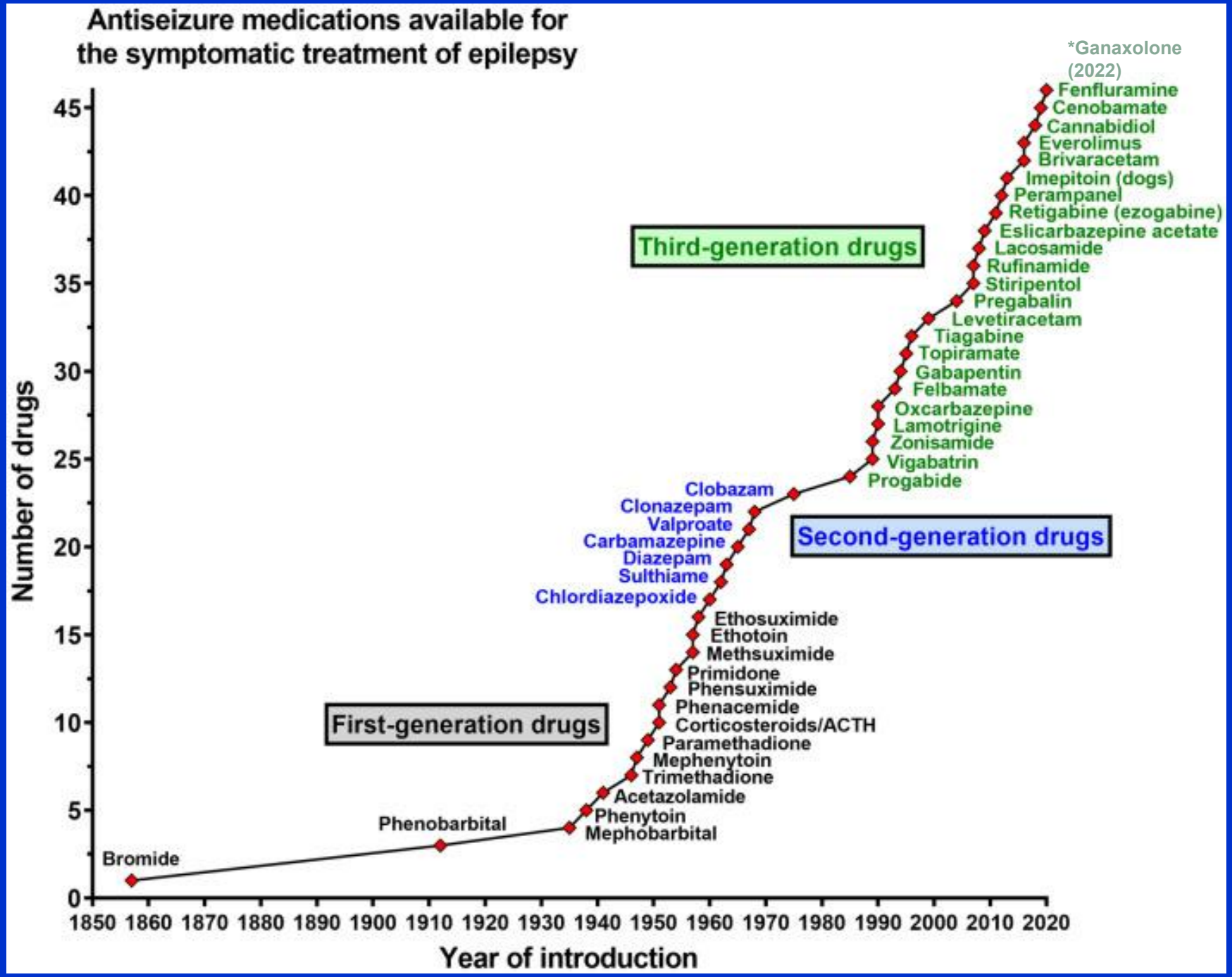
High Recurrence Risk 2–4

Two of these features, or ≥ 4 seizures. Kim 2006: potentially worthwhile benefit from immediate treatment.

→ AED initiation recommended; personalise choice by epilepsy type and comorbidities (valproate only within the MHRA 2024 restrictions); DVLA: 12 months no driving if 2+ seizures; neurology urgently

Interpretation bands for the First Seizure Risk. Apply clinical judgement and local guidance.

What to choose?



Current Antiseizure Meds

- 1st generation
  - Phenobarbital
  - Phenytoin
  - Acetazolamide
  - Corticosteroids /ACTH
  - Primidone
  - Ethosuximide
- 2nd generation
  - Chlordiazepoxide
  - Diazepam
  - Carbamazepine
  - Valproate
  - Clonazepam
  - Clobazam
- 3rd generation
  - Vigabatrin
  - Zonisamide
  - Lamotrigine
  - Oxcarbazepine
  - Felbamate
  - Gabapentin
  - Topiramate
  - Tiagabine
  - Levetiracetam
  - Pregabalin
  - Stiripentol
  - Rufinamide
  - Lacosamide
  - Eslicarbazepine
  - Ezogabine
  - Perampanel
  - Brivaracetam
  - Everolimus
  - Cannabidiol
  - Cenobamate
  - Fenfluramine
  - Ganaxolone

Deciding what ASM to initiate

- Many factors to consider
- Should tailor selection to each individual patient
- Some general recs exist:
  - Some AEDs only effective for partial onset seizures
  - Some AEDs more effective for certain epilepsy syndromes
- Use of combination ASMs
  - Evidence exists for combining two ASMs with different mechanisms of action is associated with greater balance of tolerability and efficacy
  - “Rational Polypharmacy”
    - Combining two sodium channel blockers tends to be associated with higher rates of toxicity

Factors affecting AED selection

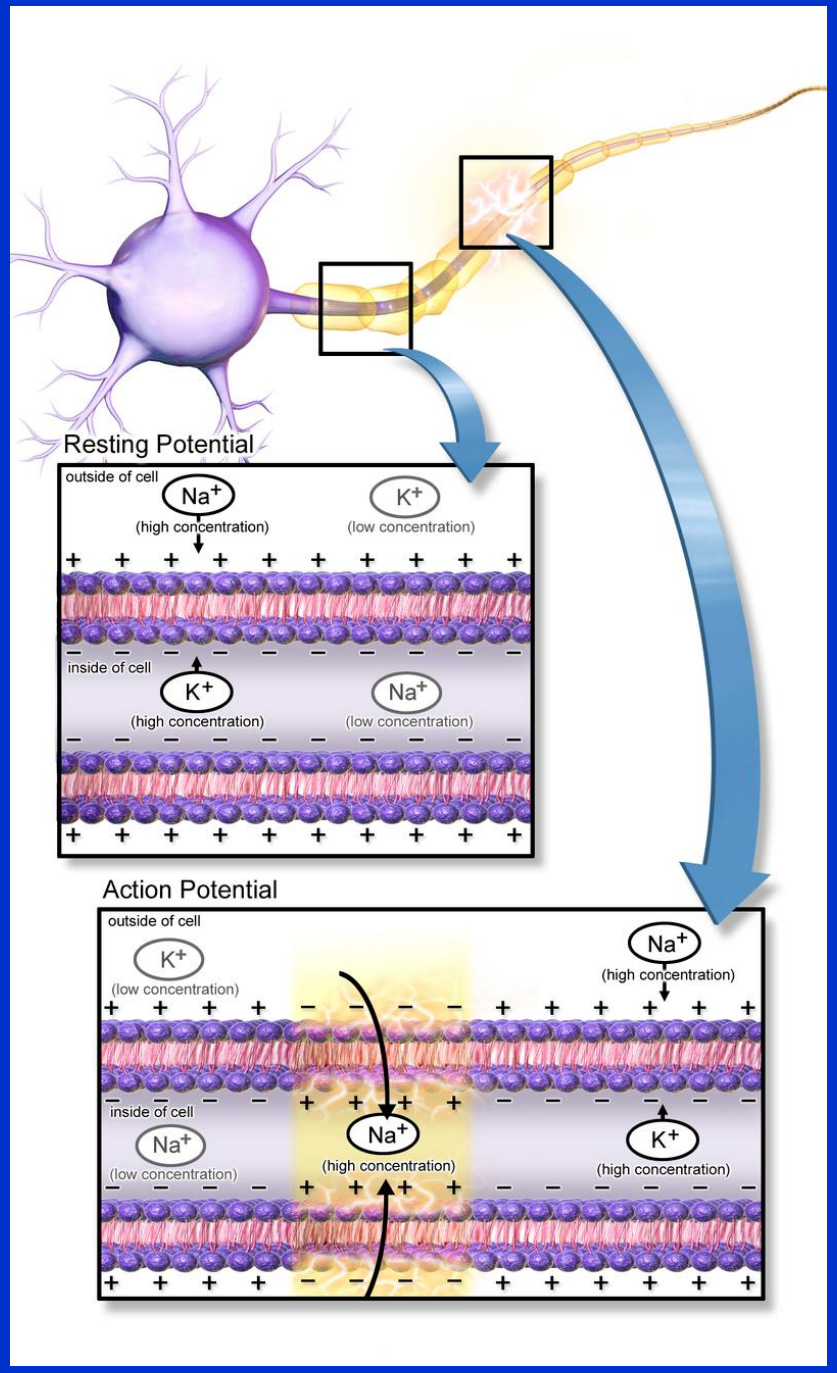
Medication-Related:

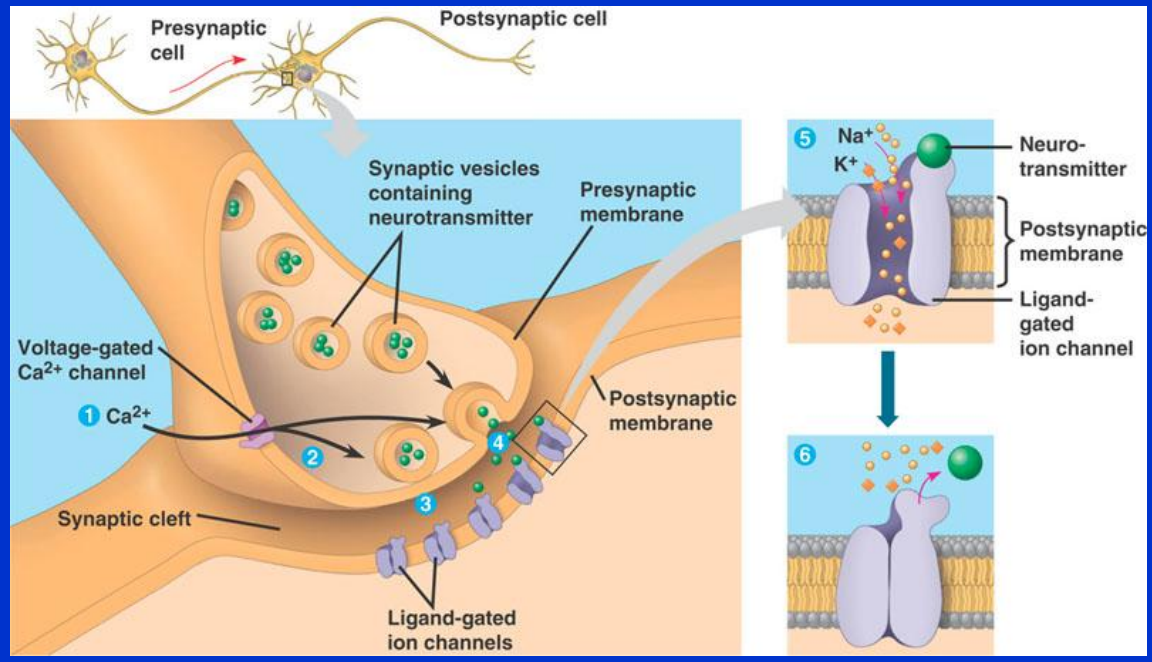
- Potential side effects
- Potential drug-drug interactions
- Safety
- Frequency of administration
- Need for titration
- Available formulations (tablet, liquid, IV)
- Cost and availability
- Mechanism of action
- Requirement for blood monitoring
- Approved indications

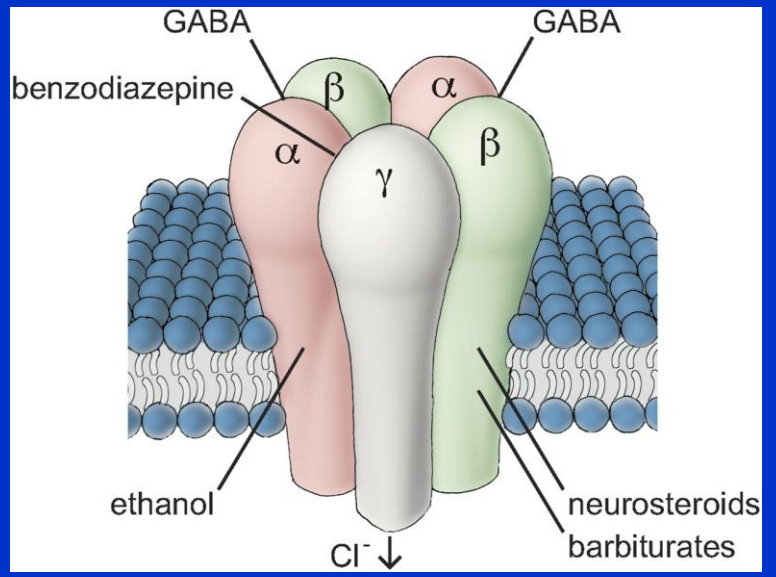
Patient related:

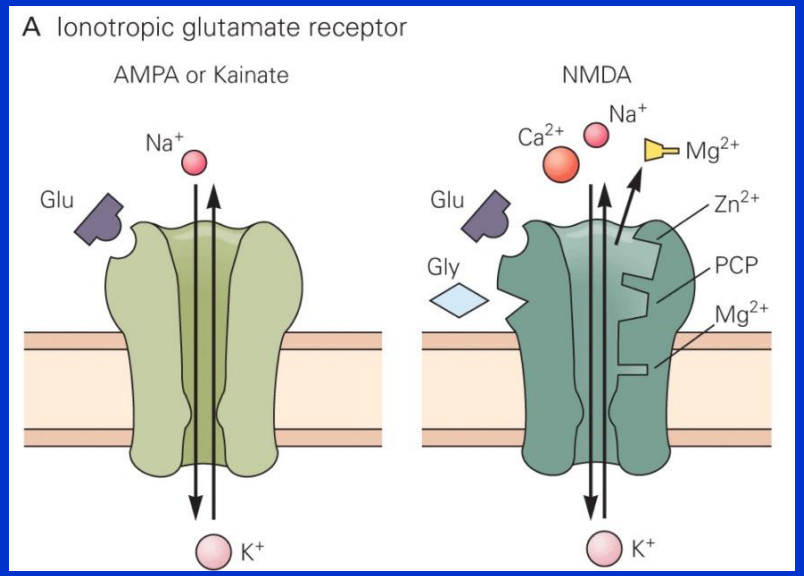
- Seizure type
- Epilepsy syndrome
- Age
- Gender
- Potential reproductive issues
- Medical comorbidities
- Patient acceptance of specific side effects

Brief neurotransmission refresher…



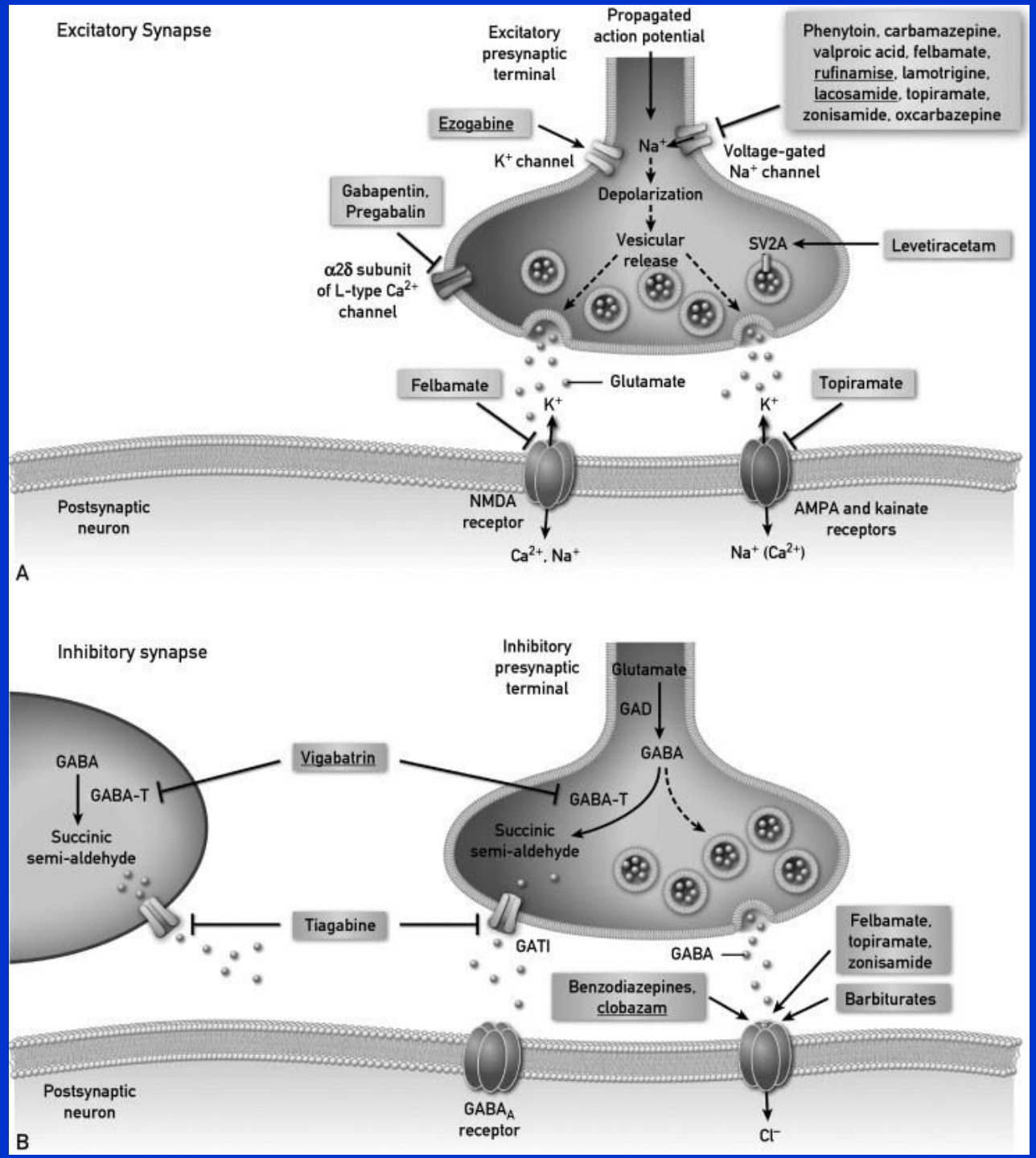






ASM main mechanisms of action:

- Blocking sodium channels
- Blocking calcium channels
- *Activating potassium channels
- Binding synaptic vesicle protein SV2A (inhibiting vesicular release)
- Activating GABA receptors
- Blocking glutamate receptors



ASM Classes and Mechanisms

Mechanism of Action	How It Works	Representative Medications
Voltage-Gated Sodium (Na^+) Channel Blockers	Blocks rapid sodium influx during action potentials, reducing high-frequency repetitive firing.	Phenytoin, Carbamazepine, Oxcarbazepine, Lamotrigine, Lacosamide, Fosphenytoin
Voltage-Gated Calcium (Ca^2+) Channel Modulators	Blocks low-threshold (T-type) or high-voltage activated calcium channels to curb burst firing.	Ethosuximide (T-type), Gabapentin & Pregabalin ($\alpha_2\delta$ subunit), Lamotrigine
GABA-A Receptor Agonists / Enhancers	Potentiates the brain's main inhibitory neurotransmitter (GABA) by increasing chloride influx and hyperpolarizing neurons.	Benzodiazepines (Clonazepam, Diazepam, Lorazepam), Barbiturates (Phenobarbital, Primidone)
GABA Turnover & Metabolism Modifiers	Increases synaptic GABA levels by blocking reuptake or inhibiting its breakdown enzyme (GABA transaminase).	Tiagabine (GAT-1 reuptake inhibitor), Vigabatrin (GABA transaminase inhibitor)
Synaptic Vesicle Protein 2A (SV2A) Binders	Binds to SV2A on synaptic vesicles to modulate the release of neurotransmitters (like glutamate).	Levetiracetam
Glutamate Receptor Antagonists	Blocks excitatory glutamate receptors (AMPA or NMDA), lowering excessive neuronal excitation.	Perampanel (AMPA antagonist), Felbamate (NMDA antagonist / multiple)
Multiple Mechanisms	Combines sodium/calcium channel inhibition with GABA enhancement or other pathways.	Valproate / Divalproex sodium, Topiramate, Zonisamide, Felbamate

AED spectrum of activity

Narrow-spectrum AEDs:

- Carbamazepine~
- Oxcarbazepine~
- Phenytoin*
- Lacosamide*
- Gabapentin~
- Pregabalin~
- Tiagabine~
- Perampanel*
- Rufinamide
- Vigabatrin@
- Ethosuximide

Broad-spectrum AEDs:

- Valproate
- Levetiracetam
- Lamotrigine
- Topiramate
- Zonisamide
- Benzodiazepines
- Felbamate
- Phenobarbital#
- Primidone

Rufinamide is minimally effective against focal seizures, ethosuximide is only approved for absence seizures, *= spectrum not yet fully identified or mixed, ~= may exacerbate some generalized seizures such as myoclonus or absence, @= considered narrow spectrum but exceptionally useful in infantile spasms, #=may trigger absence seizures or worsen Lennox-Gastaut syndrome or myoclonic epilepsies

Adverse reactions to consider

Medication	Important/common adverse effects	Serious or potentially life-threatening reactions
Levetiracetam (Keppra)	Irritability, fatigue, somnolence, dizziness	Depression, aggression, suicidal ideation, psychosis, DRESS, rare cytopenias
Lamotrigine (Lamictal)	Dizziness, diplopia, headache, nausea, insomnia	Stevens-Johnson syndrome (SJS), TEN, DRESS, hemophagocytic lymphohistiocytosis (HLH), aseptic meningitis
Valproate (Depakote)	Weight gain, tremor, hair loss, GI upset, thrombocytopenia	Hepatotoxicity, pancreatitis, hyperammonemic encephalopathy, teratogenicity, thrombocytopenia
Carbamazepine (Tegretol)	Dizziness, diplopia, ataxia, sedation, hyponatremia	SJS/TEN, aplastic anemia, agranulocytosis, hepatotoxicity, DRESS
Oxcarbazepine (Trileptal)	Dizziness, diplopia, fatigue, nausea	Significant hyponatremia, SJS/TEN, DRESS, angioedema
Eslicarbazepine (Aptiom)	Dizziness, somnolence, headache, diplopia	Hyponatremia, SJS/TEN, DRESS, suicidal ideation
Lacosamide (Vimpat)	Dizziness, diplopia, nausea, ataxia	PR prolongation, AV block, atrial arrhythmias, syncope

Medication	Important/common adverse effects	Serious or potentially life-threatening reactions
Topiramate (Topamax)	Cognitive slowing, word-finding difficulty, paresthesias, weight loss	Metabolic acidosis, nephrolithiasis, acute angle-closure glaucoma, oligohidrosis, hyperammonemia (especially with valproate)
Zonisamide (Zonegran)	Weight loss, fatigue, cognitive slowing, paresthesias	Metabolic acidosis, nephrolithiasis, SJS/TEN, DRESS, oligohidrosis, acute kidney injury
Perampanel (Fycompa)	Dizziness, somnolence, fatigue, gait instability	Serious aggression, hostility, homicidal ideation, other behavioral disturbances
Cenobamate (Xcopri)	Somnolence, dizziness, fatigue, diplopia, headache	DRESS, QT shortening, familial short-QT concerns, suicidal ideation
Phenobarbital	Sedation, cognitive slowing, fatigue, ataxia	Respiratory depression, dependence, withdrawal seizures, depression, severe rash
Phenytoin (Dilantin)	Gingival hyperplasia, hirsutism, ataxia, nystagmus, peripheral neuropathy	SJS/TEN, DRESS, hepatotoxicity, blood dyscrasias, osteopenia/osteoporosis
Clobazam (Onfi)	Sedation, fatigue, drooling, constipation	Respiratory depression, dependence, withdrawal seizures, DRESS

Medication	Important/common adverse effects	Serious or potentially life-threatening reactions
Brivaracetam (Briviact)	Somnolence, dizziness, fatigue, nausea	Behavioral disturbances, depression, suicidal ideation, DRESS
Ethosuximide (Zarontin)	GI upset, fatigue, headache, hiccups	SJS/TEN, aplastic anemia, agranulocytosis, lupus-like syndrome
Felbamate (Felbatol)	Insomnia, nausea, anorexia, weight loss	Aplastic anemia, acute hepatic failure
Vigabatrin (Sabril)	Somnolence, fatigue, weight gain, dizziness	Permanent visual field constriction, retinal toxicity, MRI signal abnormalities
Gabapentin (Neurontin)	Somnolence, dizziness, peripheral edema, weight gain	Respiratory depression (especially with opioids/CNS depressants), suicidal ideation
Pregabalin (Lyrica)	Weight gain, edema, dizziness, somnolence	Respiratory depression, angioedema, suicidal ideation
Rufinamide (Banzel)	Nausea, vomiting, fatigue, somnolence	QT shortening, SJS/DRESS, status epilepticus with abrupt withdrawal
Clonazepam (Klonopin)	Sedation, fatigue, cognitive impairment, ataxia	Respiratory depression, dependence, withdrawal seizures

ASM and pregnancy risk

Medication	Approximate MCM risk	Pregnancy safety assessment	Important considerations
Lamotrigine	2–3.1%	**Favorable**	Extensive pregnancy data; serum levels often decrease substantially during pregnancy
Levetiracetam	2–3.5%	**Favorable**	Extensive pregnancy data; serum levels can decrease during pregnancy
Oxcarbazepine	1.5–3.1%	**Favorable**	Good malformation data; monitor sodium and drug levels
Carbamazepine	2.8–5.4%	Intermediate	Neural tube defect risk; dose-dependent malformation risk
Gabapentin	Limited data	Uncertain	Less robust epilepsy-specific pregnancy data
Lacosamide	Limited data	Uncertain	Increasing pregnancy data, but insufficient to establish safety
Zonisamide	Limited data	Uncertain	Possible increased risk of low birth weight
Topiramate	Approximately 4–5%	Avoid if feasible	Oral clefts, fetal growth restriction, and possible neurodevelopmental risks
Phenobarbital	Approximately 6%	Avoid if feasible	Increased cardiac malformation risk
Valproate	Approximately 9–10%	Highest concern	Neural tube defects, cardiac defects, craniofacial abnormalities, lower IQ, and increased autism risk
Phenytoin	Approximately 5–7%	Avoid if feasible	Fetal hydantoin syndrome, craniofacial abnormalities, growth abnormalities

Epilepsy syndromes with specific pharmacologic treatment

Epilepsy disorder / syndrome	First-line treatment	Important treatment considerations
Infantile epileptic spasms syndrome (IESS / West syndrome)	ACTH or high-dose prednisolone; vigabatrin	Vigabatrin is preferred in tuberous sclerosis complex
Dravet syndrome (SCN1A)	Valproate	Add clobazam; stiripentol, fenfluramine, and cannabidiol are important syndrome-specific therapies
Lennox-Gastaut syndrome (LGS)	Valproate	Clobazam, lamotrigine, rufinamide, cannabidiol, and fenfluramine are important adjuncts
Childhood absence epilepsy	Ethosuximide	Valproate if generalized tonic-clonic seizures coexist
Juvenile myoclonic epilepsy (JME)	Valproate	Levetiracetam is a major alternative; avoid carbamazepine and oxcarbazepine
Juvenile absence epilepsy	Valproate	Levetiracetam or lamotrigine are alternatives
Epilepsy with myoclonic-atonic seizures (Doose syndrome)	Valproate	Ketogenic diet is particularly important in refractory cases

Epilepsy disorder / syndrome	First-line treatment	Important treatment considerations
Tuberous sclerosis complex (TSC)	Vigabatrin for infantile spasms	Everolimus is an important targeted therapy for treatment-resistant seizures
GLUT1 deficiency syndrome	Classic ketogenic diet	Treats the underlying cerebral glucose transport deficiency
Pyruvate dehydrogenase deficiency	Ketogenic diet	Targets the underlying metabolic abnormality
CDKL5 deficiency disorder	Ganaxolone	Specifically approved for seizures associated with CDKL5 deficiency in patients aged 2 years and older
Rett syndrome	No established syndrome-specific first-line ASM	Treatment is based on seizure type and EEG
Angelman syndrome	Levetiracetam or clobazam commonly used	Avoid overtreatment of nonepileptic myoclonus
Landau-Kleffner syndrome	Corticosteroids or benzodiazepines	Treatment aims to improve epileptiform activity and language regression
DEE-SWAS / CSWS	High-dose benzodiazepines or corticosteroids	Treatment targets sleep-activated epileptiform activity and cognitive regression
Rasmussen encephalitis	Immunotherapy, particularly corticosteroids or IVIG	Surgical hemispherectomy may be necessary for refractory disease
FIRES	Anakinra or other immunomodulatory treatment in selected cases	Ketogenic diet and aggressive seizure management are important

Considerations in certain medical conditions:

Try to avoid:	Medical condition:	Consider these instead:
• Levetiracetam • Topiramate • Zonisamide • Perampanel	**Severe psychiatric issues**	• Lamotrigine • Valproate • Lacosamide • Carbamazepine
• Gabapentin • Pregabalin • Topiramate • Zonisamide	**Renal failure**	• Lamotrigine • Valproate • Lacosamide • Carbamazepine • Levetiracetam
• Valproate • Felbamate • Phenytoin • Carbamazepine • Phenobarbital	**Hepatic failure**	• Levetircetam • Brivaracetam • Gabapentin • Lamotrigine • Lacosamide
• Lamotrigine • Lacosamide • Carbamazepine • Rufinamide • Phenytoin	**Cardiac disease**	• Levetiracetam • Brivaracetam • Valproate • Topiramate • Zonisamide





ASMs that can be given once daily

- Levetiracetam XR
- Lamotrigine XR
- Eslicarbazepine
- Oxtellar XR
- Zonisamide
- Perampanel
- Divalproex ER
- Topiramate XR
- Phenobarbital
- Cenobamate

Drug (Some personal favorites-old)	Disadvantages	Advantages
Levetiracetam • Binds to synaptic vesicle protein SV2A • Seems to result in nonspecific decrease in neurotransmitter release	• Behavioral changes seen (typically at higher doses ~3000 mg/day) with irritability, aggression, depression, suicidal ideation, and, in extreme cases, frank psychosis.	• It is not an enzyme inducer or inhibitor and has few drug interactions • Broad spectrum • low incidence of congenital malformations
Lamotrigine • Indications: Partial seizures, generalized tonic clonic seizures, generalized seizures of LGS. • Less effective against absence seizures than ETX and VPA • block voltage dependent sodium channels Also inhibits high-voltage activated calcium channels	• Warning: life threatening rash, DRESS syndrome, blood dyscrasias, aseptic meningitis There is a 3-10% risk of allergic rash and a 3 in 1000 risk of Stevens–Johnson syndrome in adults, especially in those taking VPA. • slow titration to reduce the risk of Stevens–Johnson syndrome.	• The excellent side-effect profile and lack of significant CNS- preferred choices in treating elderly patients. • low incidence of congenital malformations • Broad spectrum • Mood stabilizing, and may be mood augmenting in depression.
Lacosamide • MOA: enhances slow inactivation of voltage-gated sodium channels, novel mechanism of action. • Effective for focal seizures and GTCs (not usually effective against absence or myoclonic seizures)	• Dizziness, headache, nausea, diplopia, fatigue • These effects are more likely when used in conjunction with other sodium channel blockers • May prolong PR interval (caution in patients with known conduction problems)	• Favorable pharmacokinetic profile • Generally well tolerated • Can rapidly titrate • IV formulation
Clobazam • GABA-A agonist • only 1,5 benzodiazepine (Referring to the position of nitrogen atoms on heterocyclic ring) • adjunctive therapy for seizures in LGS	• Active metabolite can interact with CYP inhibitors and can result in accumulation and sedation (FEL, CBD, CEN)	• Broad spectrum • Higher binding affinity for GABA-A allow for more anticonvulsant effect with less long term sedation
Zonisamide • Multiple MOA (blocks Na channels, Blocks T-type Ca channels, weak inhibition of carbonic anhydrase	• Sedation, ataxia, dizziness, nausea, agitation, • rash, decreased sweating, weight loss, and a 0.6-4% risk of kidney stones. • Oligohidrosis, hyperthermia, metabolic acidosis occur rarely • Cognitive slowing may be seen particularly at higher doses, less pronounced than with topiramate	• Long half life (60 hrs) (daily dosing) • Broad spectrum

Drug (some personal favorites- new)	Disadvantages	Advantages
Brivaracetam • Approved 2016 • Structural similar to LEV but with higher affinity to SV2A	• Cost • Metabolized in liver • Clearance increased by enzyme inducers • Can increase CBZ epoxide and PHT	• Less risk of irritability and other psychiatric adverse effects compared to LEV
Cenobamate • Approved 2019 • Approved for partial onset seizures in adults Inhibitor of voltage dependent sodium channels May also enhance GABA-A activity • Metabolized by glucuronidation	• Cost • Rare reports of DRESS, caution with hepatic and renal impairment	• Half life 50-60 hrs (once daily dosing) • Efficacy as adjunctive therapy was exceptional (higher seizure freedom rates than any other med in last 30 yrs)
Eslicarbazepine • Approved 2014 • Third generation relative of carbamazepine • Prodrug that is converted to S-licarbazepine (major active metabolite of oxcarbazepine)	• Cost • Dizziness, somnolence, headache, diplopia, nausea, ataxia	• Half life 13-20 hrs, once daily dosing • Less frequent adverse effects compared to OXC • hyponatremia less common
Cannabidiol • Approved 2018 • Approved for treatment of seizures associated with Lennox-Gastaut syndrome and Dravet syndrome, or tuberous sclerosis complex • Cannabinoid component of marijuana plant (No THC) • Mechanism poorly understood	• Cost • Drowsiness, diarrhea, decreased appetite, fatigue, infection, increased LFTs, increases CLB metabolite	• Approved 2018 • Presumed novel MOA • Robust response in some patients

When to switch?

- *Pseudoresitance should first be ruled out*
  - Poor adherence, nonepileptic events, incorrect epilepsy diagnosis, inappropriate medication choice, poor compliance with lifestyle requirements (eg sleep deprivation or heavy episodic drinking)
  - Insufficient dose?
  - Serum concentration may help explore how much flexibility there is in dosing

- 1) If first medication fails because of lack of tolerability:
  - Replace with monotherapy
    - different mechanism of action preferable vs ASM with same MOA and lower likelihood of causing adverse effect

- 2) If first medication fails because of lack of efficacy:
  - Often opt for adjunctive therapy:
  - *but replacement monotherapy is a consideration
    - eg older adults on several other medications, women with childbearing potential, patients with adherence challenges, financial restrictions).
    - Will need combination therapy until effective dose is tolerated.
  - Adjunctive therapy should have alternative MOA and not have negative pharmacokinetic interactions
  - Low threshold to reduce dose of first medication if adverse effects emerge
- If you establish first medication has failed due to lack of efficacy or tolerability, next medicine should:
  - Be effective against the patient's seizure type
  - Should have good safety profile and no adverse effects related to the patient's comorbidities
    - and potentially help with comorbidities if possible (eg TPM with migraines))

Synergistic ASM combinations

- Combination of lamotrigine and valproate has the strongest evidence
- Other potentially favorable combinations include:
  - Lamotrigine and levetiracetam
  - Cannabidiol and clobazam
  - Lamotrigine and topiramate
  - Cenobamate and clobazam

How and what to monitor?

- Drug levels
  - Reference range is not the therapeutic range
  - Range in drug concentrations that is quoted by a laboratory
    - specifies a lower limit below which a therapeutic response is relatively unlikely to occur
    - and an upper limit above which toxicity is relatively likely to occur
  - Effective ASM concentration can vary significantly from patient to patient
  - Treat the patient, not the concentration
  - “individual therapeutic concentration”: identifying steady-state concentration once a patient has been stabilized
  - Check level: concerns with adherence, unexplained change in seizure control, suspected toxicity, drug interaction, pregnancy, organ failure, status
- Blood counts
  - Baseline, then periodic testing in first 6 months, annually once stable
  - High risk ASM: CBZ, VPA, PHT, PHB, FEL
  - Moderate risk: benzos, LTG, OXC
- Liver function
  - Baseline, periodic testing advised esp in first 6 months, then annually once stable
  - High risk: VPA, FEL, CBZ, ACTH, PHT, PHB
  - Moderate risk: LTG, OXC, ESL, TMP, ZNS, LCM
- Renal function
  - particularly for medications that are renally cleared or can cause kidney stones, metabolic acidosis, or renal injury
  - Moderate risk: TPM, ZNS, LEV, GBP, PGB, LCM
- Electrolytes
  - Hyponatremia with CBZ, OXC, ESL
  - After two weeks, then monthly for three months, then annually if stable
- Vitamin D/bone mineral metabolism
  - High risk ASM (PHT, PHB, CBZ, OXC, ESL, PRIM, VPA, TPM, LEV, LTG, ZNS)
  - Obtain baseline and repeat at 3 months, and then annually if stable
  - Bone density screening with prolonged use, postmenopausal women, pts with limited mobility

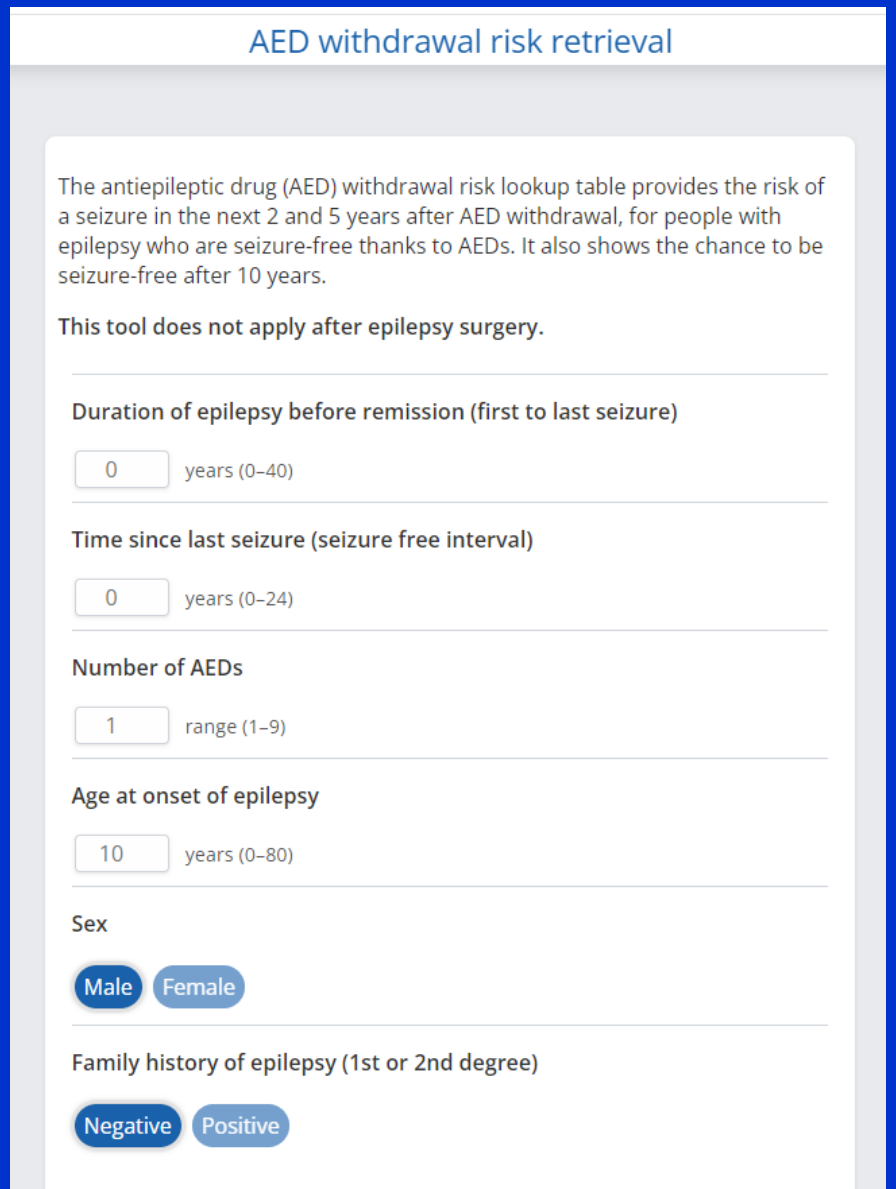
When to stop?

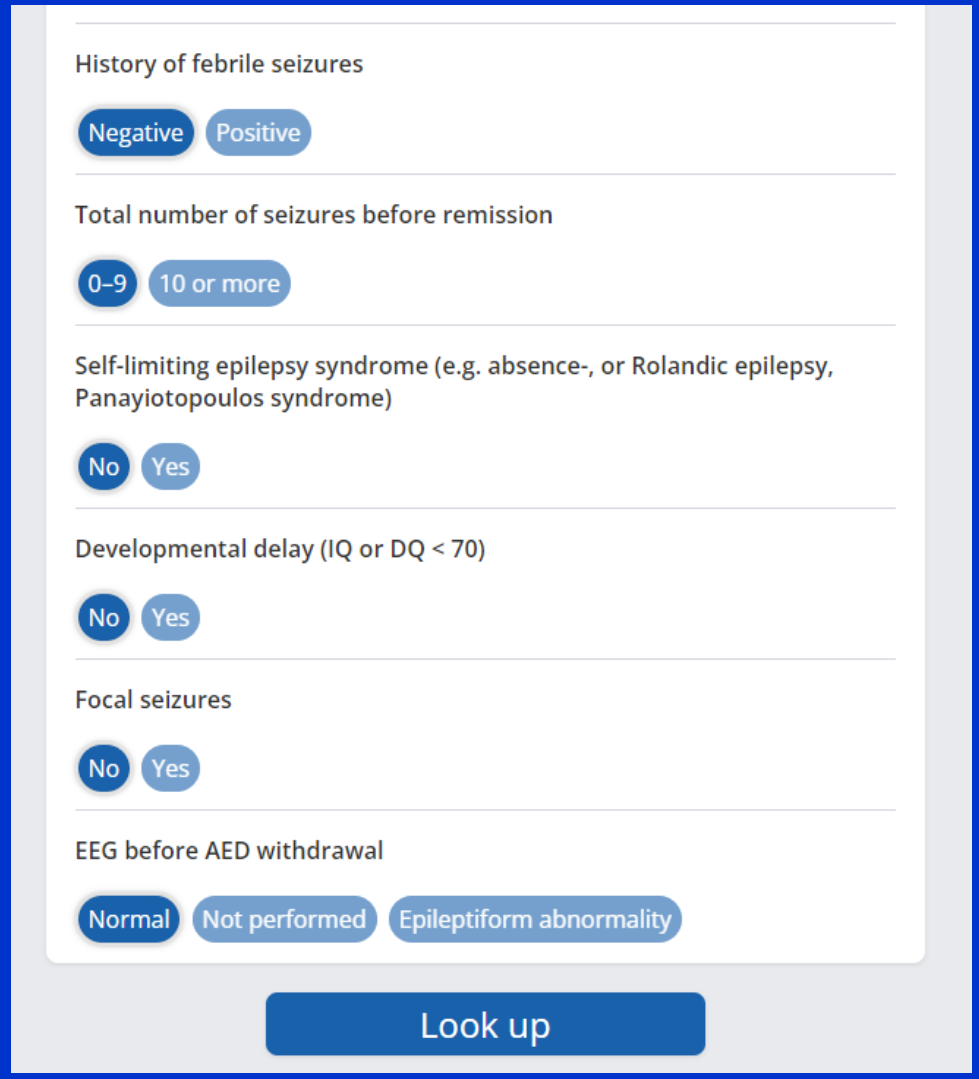
- There is no single seizure-free interval that guarantees it is safe to stop medication
- Several factors to consider

Factor	Implication for withdrawal
Longer duration of seizure freedom	Generally favors consideration
Few seizures before remission	Generally favorable
Seizures controlled with one medication	Often favorable
Epileptiform EEG	Raises concern, though predictive evidence in adults is limited
Structural brain lesion or prior brain insult	May raise recurrence risk
Juvenile myoclonic epilepsy	Particularly high concern for recurrence
Multiple medications needed to achieve control	Often suggests a more difficult-to-control epilepsy
Previous failed withdrawal or seizures during dose red uction	Strong reason for caution

Lamberink AED withdrawal calculator

- https://epilepsypredictiontools.info/aed-withd





AED withdrawal risk retrieval

The antiepileptic drug (AED) withdrawal risk lookup table provides the risk of a seizure in the next 2 and 5 years after AED withdrawal, for people with epilepsy who are seizure-free thanks to AEDs. It also shows the chance to be seizure-free after 10 years.

This tool does not apply after epilepsy surgery.

Duration of epilepsy before remission (first to last seizure)

1 years (0–40)

Time since last seizure (seizure free interval)

10 years (0–24)

Number of AEDs

1 range (1–9)

Age at onset of epilepsy

25 years (0–80)

Sex

Male | Female

Family history of epilepsy (1st or 2nd degree)

Negative | Positive

History of febrile seizures

Negative | Positive

Total number of seizures before remission

0–9 | 10 or more

Self-limiting epilepsy syndrome (e.g. absence-, or Rolandic epilepsy, Panayiotopoulos syndrome)

No | Yes

Developmental delay (IQ or DQ < 70)

No | Yes

Focal seizures

No | Yes

EEG before AED withdrawal

Normal | Not performed | Epileptiform abnormality

2-year seizure recurrence risk	5-year seizure recurrence risk	10-year chance of seizure-freedom (seizure-free for at least 1 year)
27%	35%	>99%

Seizure-freedom is defined as in Lamberink et al. (Lancet Neurology 2017): no seizures in the last year of follow-up after AED withdrawal.

Please note that even after seizure recurrence a patient can become seizure free again. Hence, the chance of seizure freedom at ten years is higher than the chance of not having a seizure recurrence.

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The antiepileptic drug (AED) withdrawal risk lookup table provides the risk of a seizure in the next 2 and 5 years after AED withdrawal, for people with epilepsy who are seizure-free thanks to AEDs. It also shows the chance to be seizure-free after 10 years.

This tool does not apply after epilepsy surgery.

Duration of epilepsy before remission (first to last seizure)

40 years (0–40)

Time since last seizure (seizure free interval)

1 years (0–24)

Number of AEDs

4 range (1–9)

Age at onset of epilepsy

12 years (0–80)

Sex

Male | Female

Family history of epilepsy (1st or 2nd degree)

Negative | Positive

History of febrile seizures

Negative | Positive

Total number of seizures before remission

0–9 | 10 or more

Self-limiting epilepsy syndrome (e.g. absence-, or Rolandic epilepsy, Panayiotopoulos syndrome)

No | Yes

Developmental delay (IQ or DQ < 70)

No | Yes

Focal seizures

No | Yes

EEG before AED withdrawal

Normal | Not performed | Epileptiform abn

2-year seizure recurrence risk	5-year seizure recurrence risk	10-year chance of seizure-freedom (seizure-free for at least 1 year)
>90%	>90%	40%

Seizure-freedom is defined as in Lamberink et al. (Lancet Neurology 2017): no seizures in the last year of follow-up after AED withdrawal.

Please note that even after seizure recurrence a patient can become seizure free again. Hence, the chance of seizure freedom at ten years is higher than the chance of not having a seizure recurrence.



Thank you!