CONVULSION EPILEPSY

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Causes in different age groups

Neonatal

- birth injury
- Anoxia
- metabolic disorders
  - Hypocalcemia
  - hypoglycemia
  - vitamin B6 deficiency
  - biotinidase deficiency
  - phenylketonuria

Infancy (1–6 months)

- Infantile spasms
- West syndrome
- Congenital male development

Causes in different age groups

Early childhood (6 months–3 years)

- Febrile convulsions
- Infantile spasms

Childhood (3–10 years)

- Infections
- Lennox- Gastaut syndrome
- Idiopathic (Rolandic epilepsy)

Causes in different age groups

Adolescence (10–18 years)

- Idiopathic epilepsy
- juvenile myoclonic epilepsy
- trauma
- drugs

Early adulthood (18–25 years)

- Idiopathic epilepsy
- Trauma
- Neoplasm
- withdrawal from alcohol or other sedative drugs

Causes in different age groups

Middle age (35–60 years)

- Trauma
- Neoplasm
- vascular disease
- alcohol or other drug withdrawal

Late life (over 60 years)

- Vascular disease
- degenerative disease,
- Tumor
- Abscess
- trauma

Causes of generalized tonic–clonic seizures

Drugs

- Antibiotics:
  - penicillin
  - isoniazid
  - metronidazole
- Antimalarials
  - chloroquine
  - mefloquine
- Ciclosporin
- Cardiac anti-arrhythmics
  - lidocaine
  - disopyramide
- Psychotropic agents
  - phenothiazines
  - tricyclic antidepressants
  - lithium
- Amphetamines (withdrawal

Causes of seizures

Metabolic disease

- Hypocalcaemia
- Hyponatraemia
- Hypomagnesaemia
- Hypoglycaemia
- Renal failure
- Liver failure

Toxins

- Organophosphates
- Heavy metals (lead, tin)

Causes of seizures

Infection

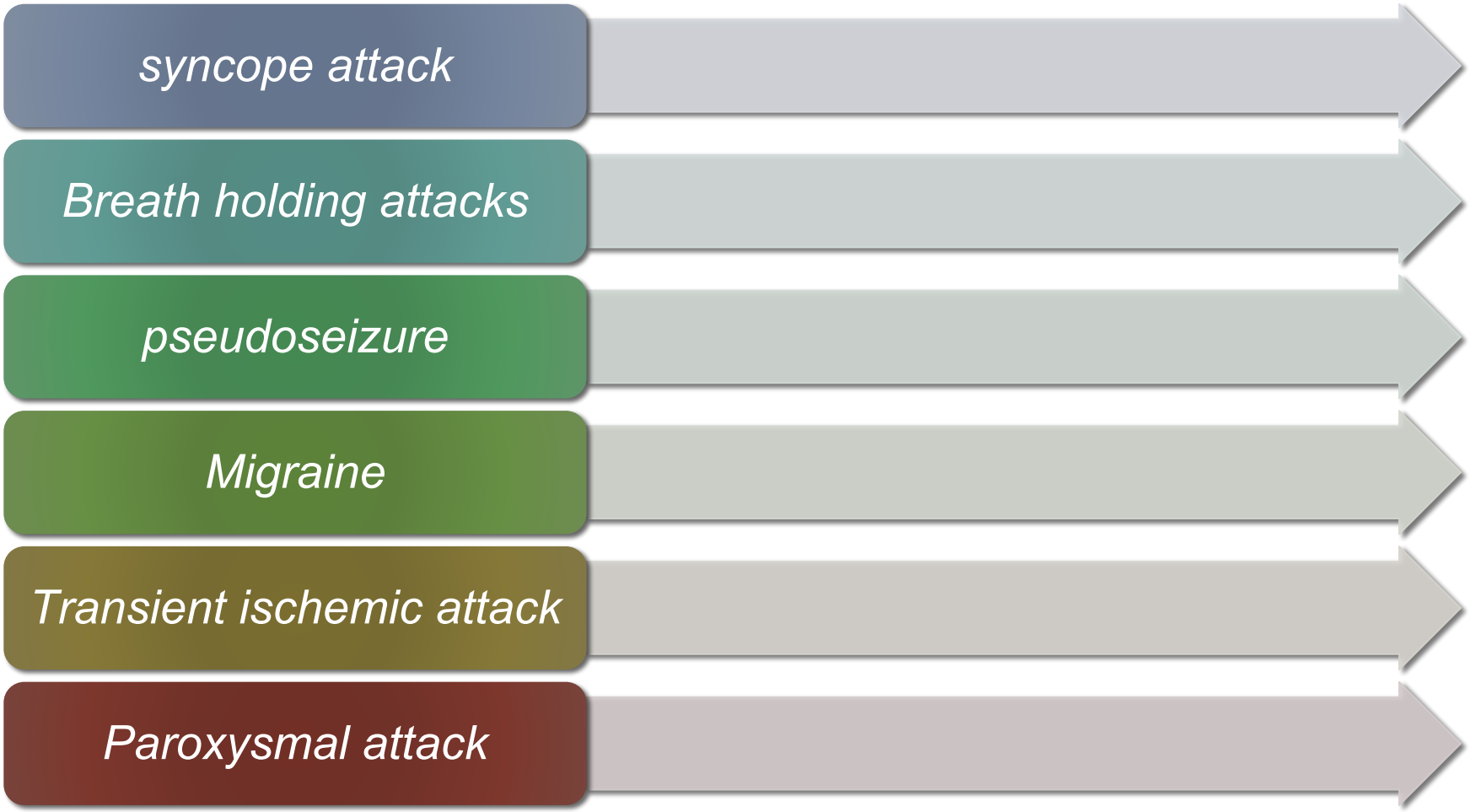
- Meningitis
- Encephalitis
- Cerebral abscess
- Toxoplasmosis
- Cysticercosis
- Tuberculoma
- Subdural empyema
- (HIV)

Inflammatory

- Multiple sclerosis
- SLE
- Sarcoidosis
- Vasculitis

Approach

Determine whether the episode is seizure



syncope attack

Breath holding attacks

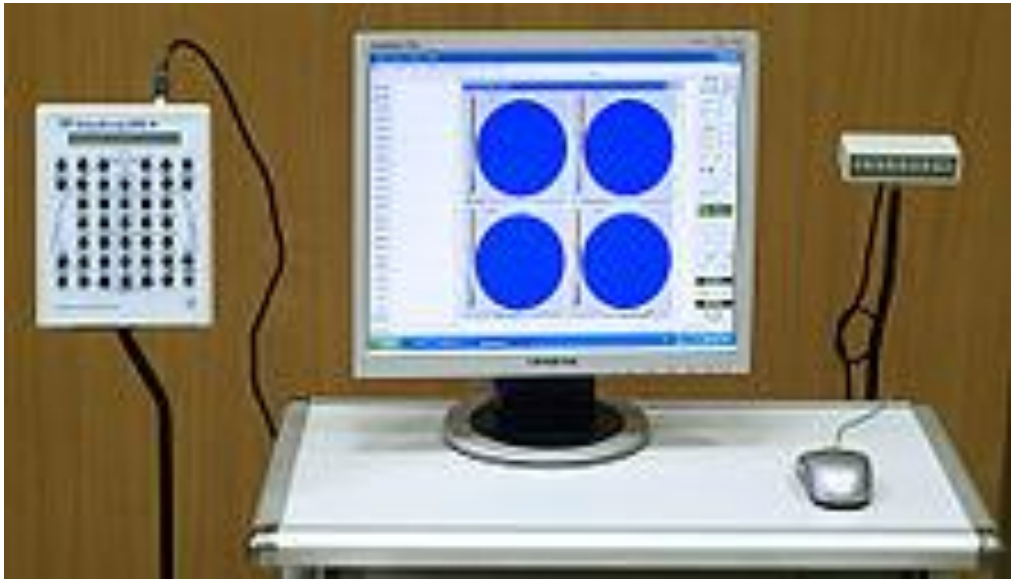
Pseudo seizures

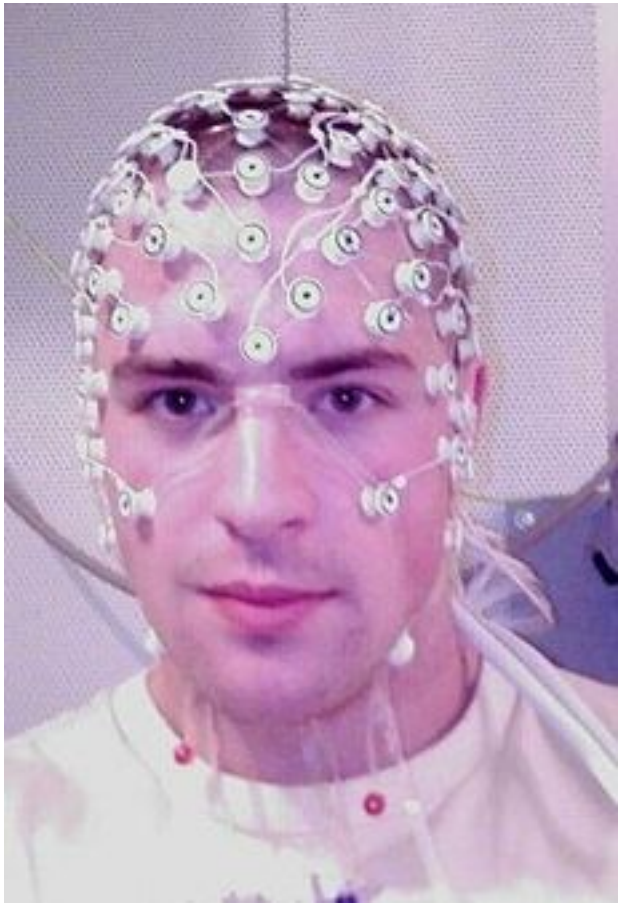
- Its tend to occur in the presence of other people, it precipitated by emotional factors, and prolonged for many minutes or hours.
- Completely asynchronous thrashing of the limbs and repeated side-to-side movements of the head
- Associated with hand-biting, kicking, and pelvic thrusting and opisthotonic arching postures; and screaming or talking during the ictus.
- lacking tongue-biting, incontinence, hurtful falls, or postictal confusion.

Pseudo seizures

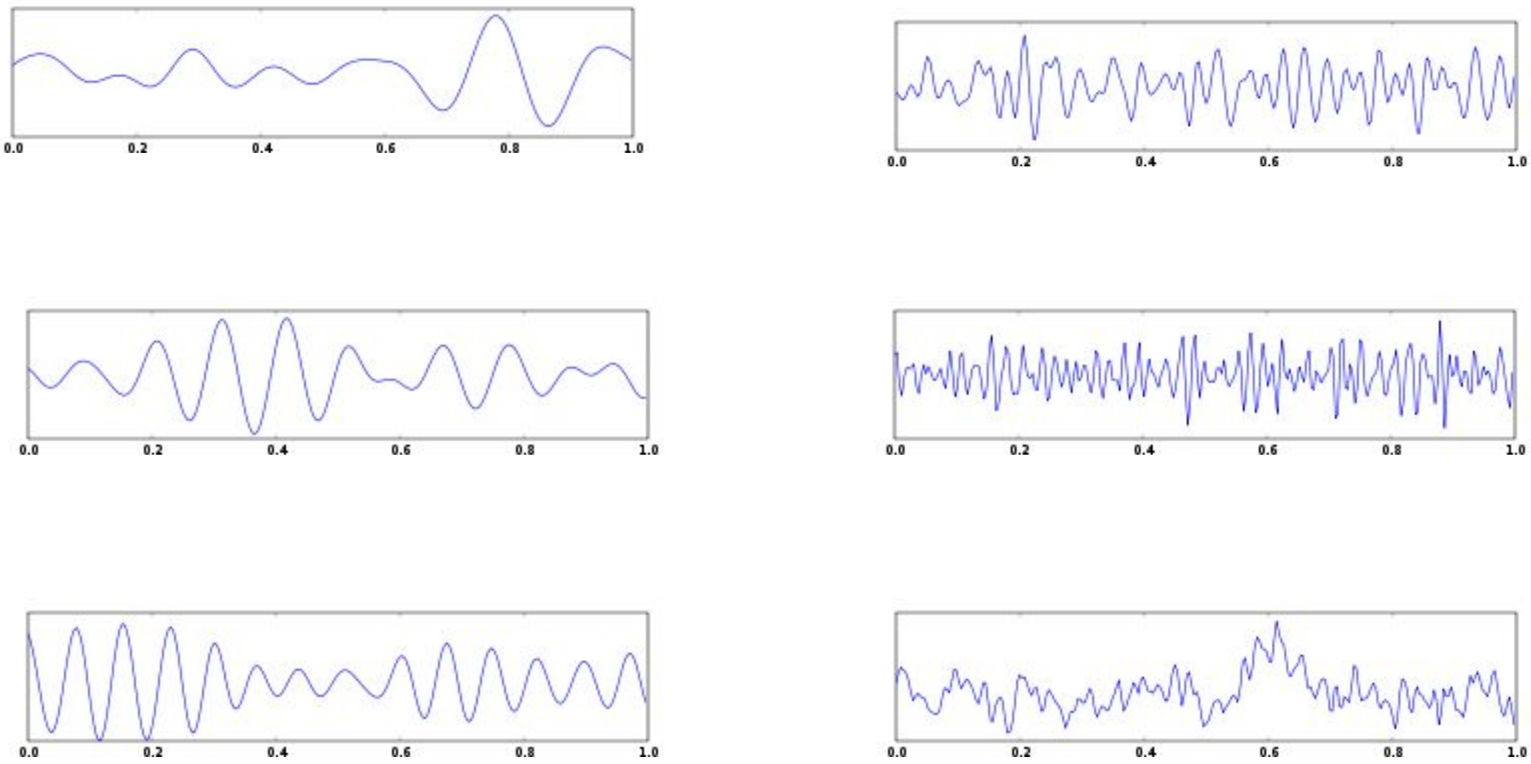
Multiple sclerosis paroxysmal attack

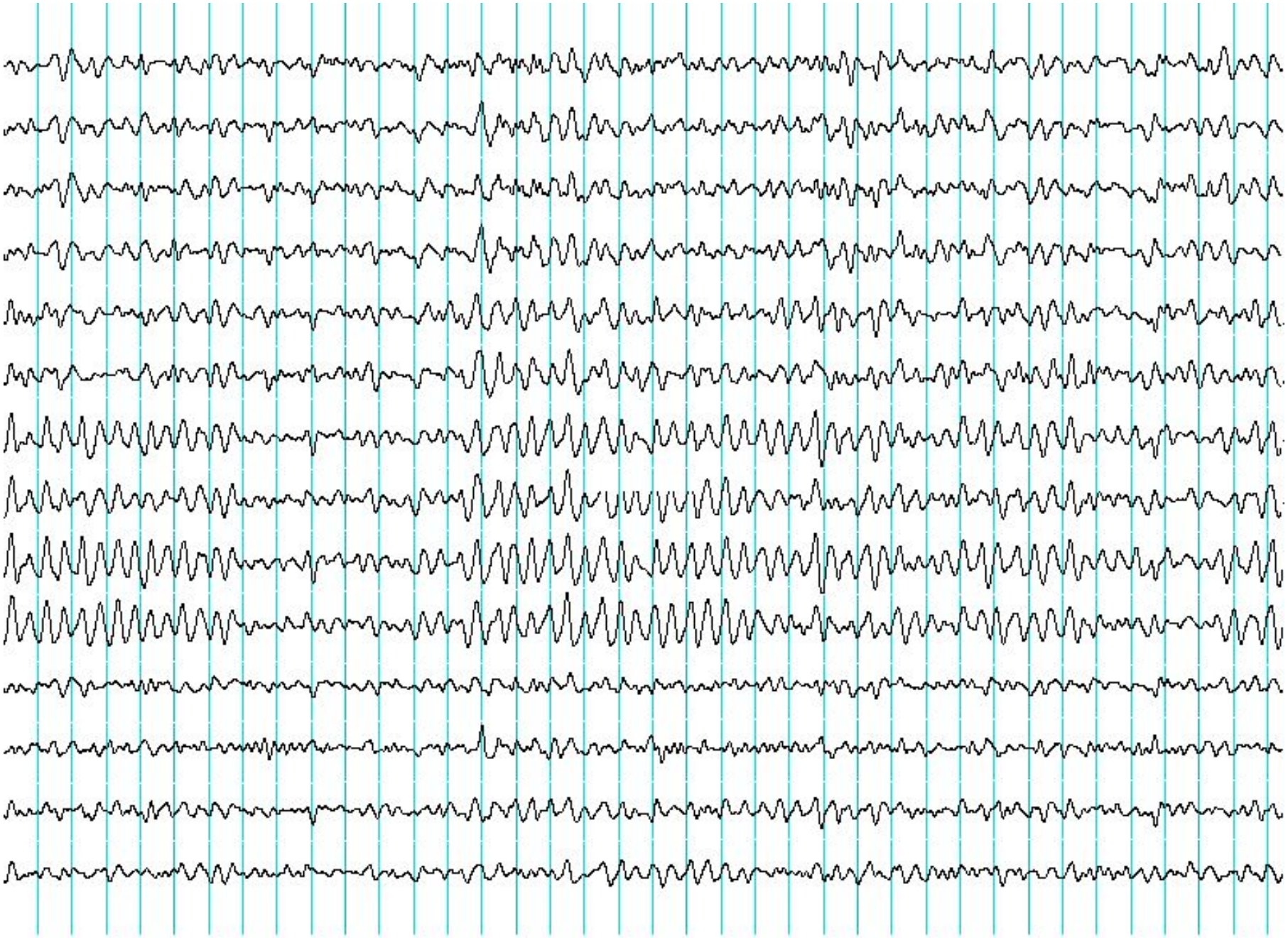
Investigations
EEG





EEG





Investigations

Electroencephalography (EEG) (Standard ,Sleep)

- Determine whether the episode is seizure
- From where is the epilepsy arising

Interictal epileptiform discharges

spike or sharp

spike or sharp wave

spike wave complex

multispike wave complex

focal or diffuse background slowing

Investigations

Imaging Studies: (brain MRI or CT scan)

- To determine structural abnormalities { the cause for a seizure}.

Indications

- epilepsy onset after the age of 16 years
- partial seizures
- focal neurological deficit
- focal EEG findings
- intractable epilepsy.

Investigations

Blood

- CBP, ESR, RBS, Renal function tests, Liver function tests, Serum electrolytes
- Serum levels of anticonvulsants
- Serum prolactin level
- Serum creatine kinase
- Serology for syphilis, HIV, collagen disease

Chest X-ray

CSF examination

first aid for seizures

- Move person away from danger (fire, water, machinery, furniture)
- After convulsions cease, turn person into (semi-prone)
- Ensure airway is clear { do NOT insert anything in mouth}
- If convulsions continue for more than 5 mins or recur without person regaining consciousness, management as status epilepticus
- Do not leave person alone until fully recovered his consciousness (drowsiness and confusion can persist for up to 1 hr)

Initial convulsion management

- ABC
- Secure intravenous access send blood for:
  - Glucose, urea and electrolytes, calcium and magnesium,
  - liver function, anti-epileptic drug levels
  - Full blood count and clotting screen
  - Storing a sample for future analysis (e.g. drug misuse)
- If seizures continue for > 5 mins: give diazepam 10 mg IV (or rectally) or lorazepam 4 mg IV, repeat once only after 15 mins (if no response managed as status epilipticus)
- Correct any metabolic trigger and hyperthermia

Single unprovoked seizure

recurrence at first two years 21 – 45%

No anticonvulsants are recommended

Avoidance of trigger factors

- Alcohol &Drug
- sleep deprivation &Flickering light
- Physical & mental exhaustion
- Infection & Metabolic disease

Anticonvulsants

factors increased recurrence

(2- 2.5 fold)

- FND or abnormal brain MRI
- Abnormal sleep-deprived EEG
- Partial-onset seizure
- Presentation as status epilepticus.
- Strong family history

Treatment of epilepsy

Anticonvulsants (AEDs)

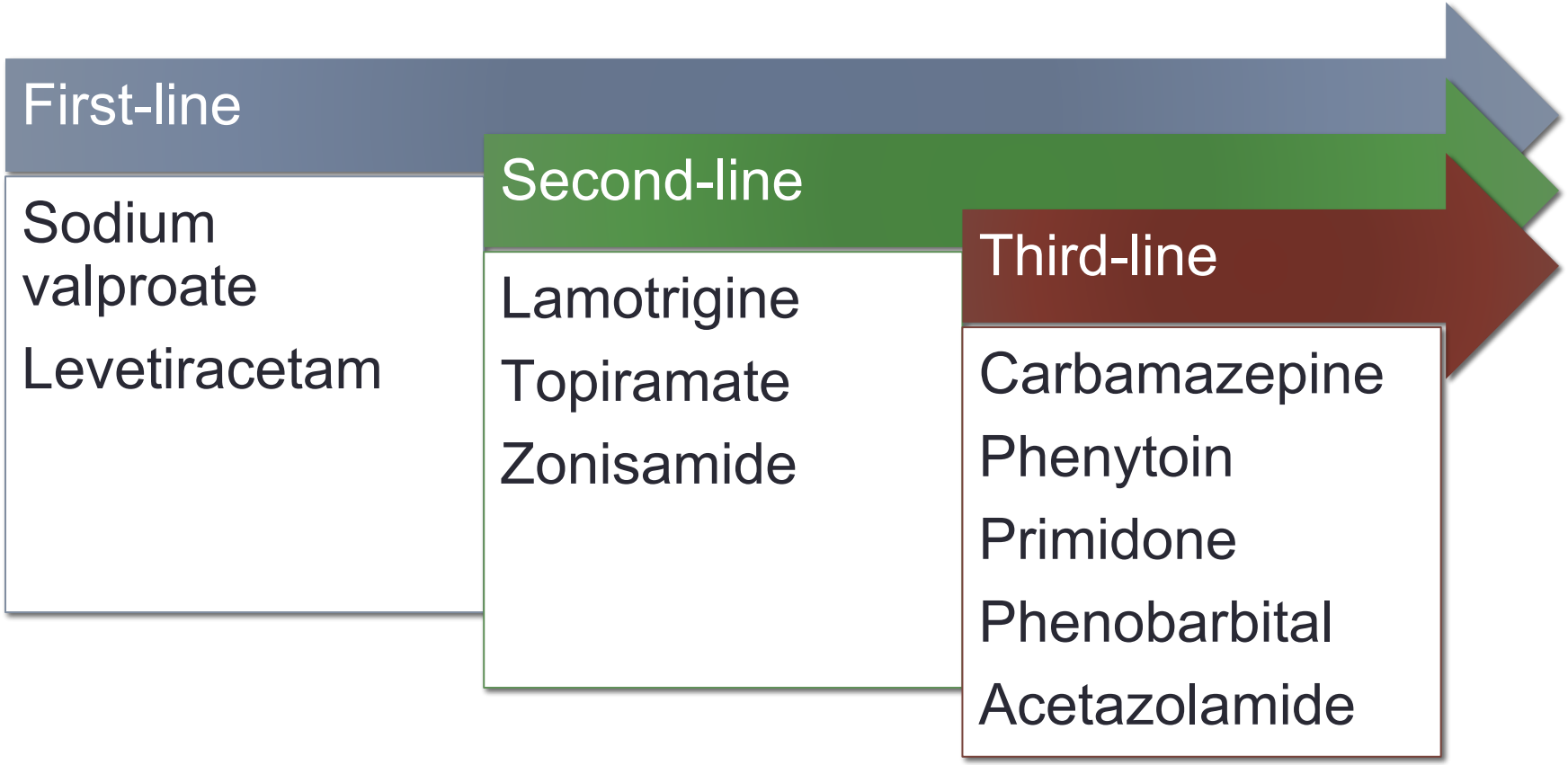
Increase inhibitory neurotransmission in the brain or

Alter neuronal sodium channels to prevent abnormally rapid transmission of impulses.

The goal of treatment is to achieve a seizure-free state without adverse effects.

Monotherapy & lowest dose is important because it decreases the likelihood of adverse effects and avoids drug interactions.

generalized tonic–clonic



Focal onset or secondary GTCS

First-line

- Lamotrigine

Second-line

- Carbamazepine
- Levetiracetam
- Sodium valproate
- Topiramate
- Zonisamide
- Lacosamide

Third-line

- Clobazam
- Gabapentin
- Oxcarbazepine
- Phenobarbital
- Phenytoin
- Pregabalin
- Primidone

Absence

First-line

- Ethosuximide

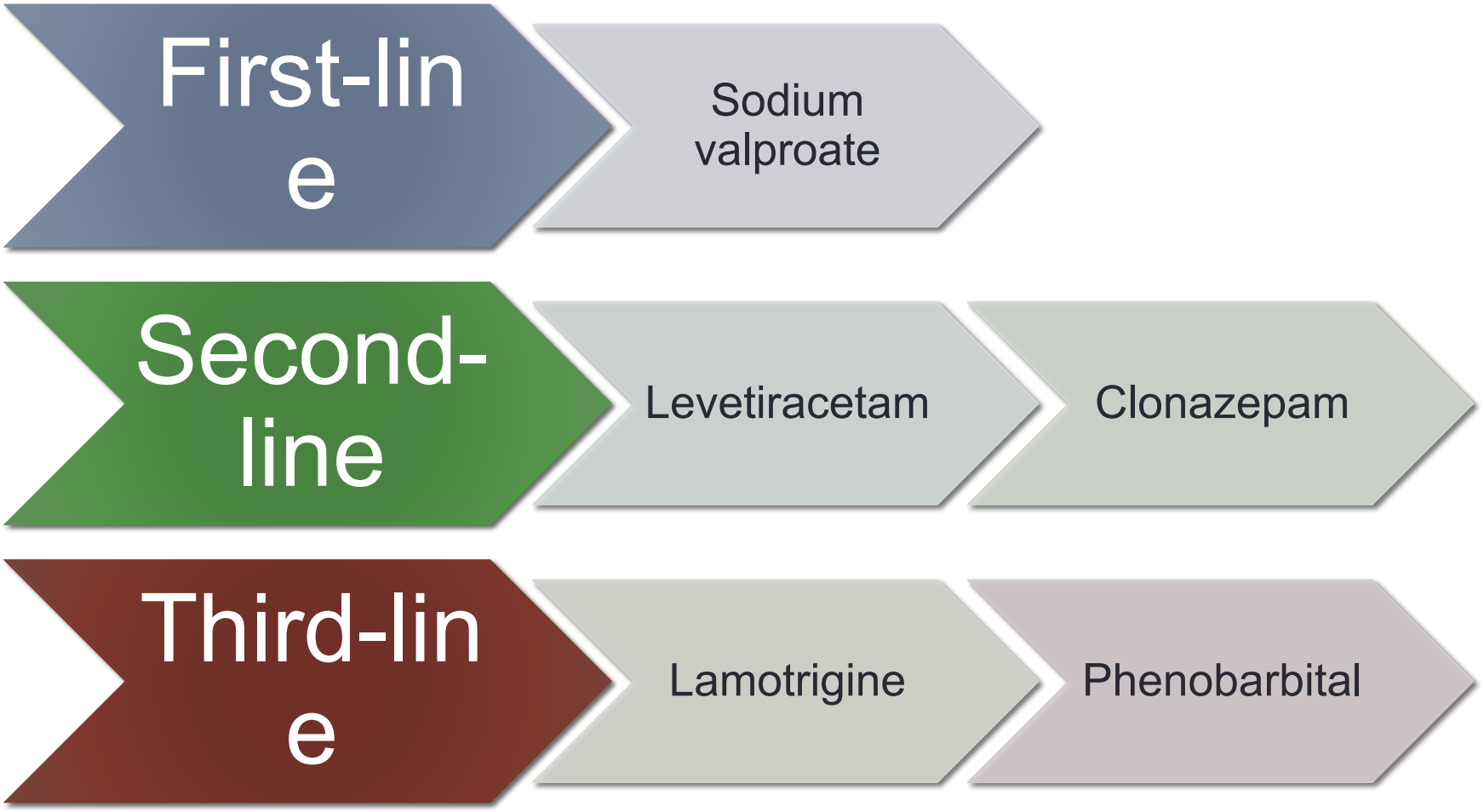
Second-line

- Sodium valproate

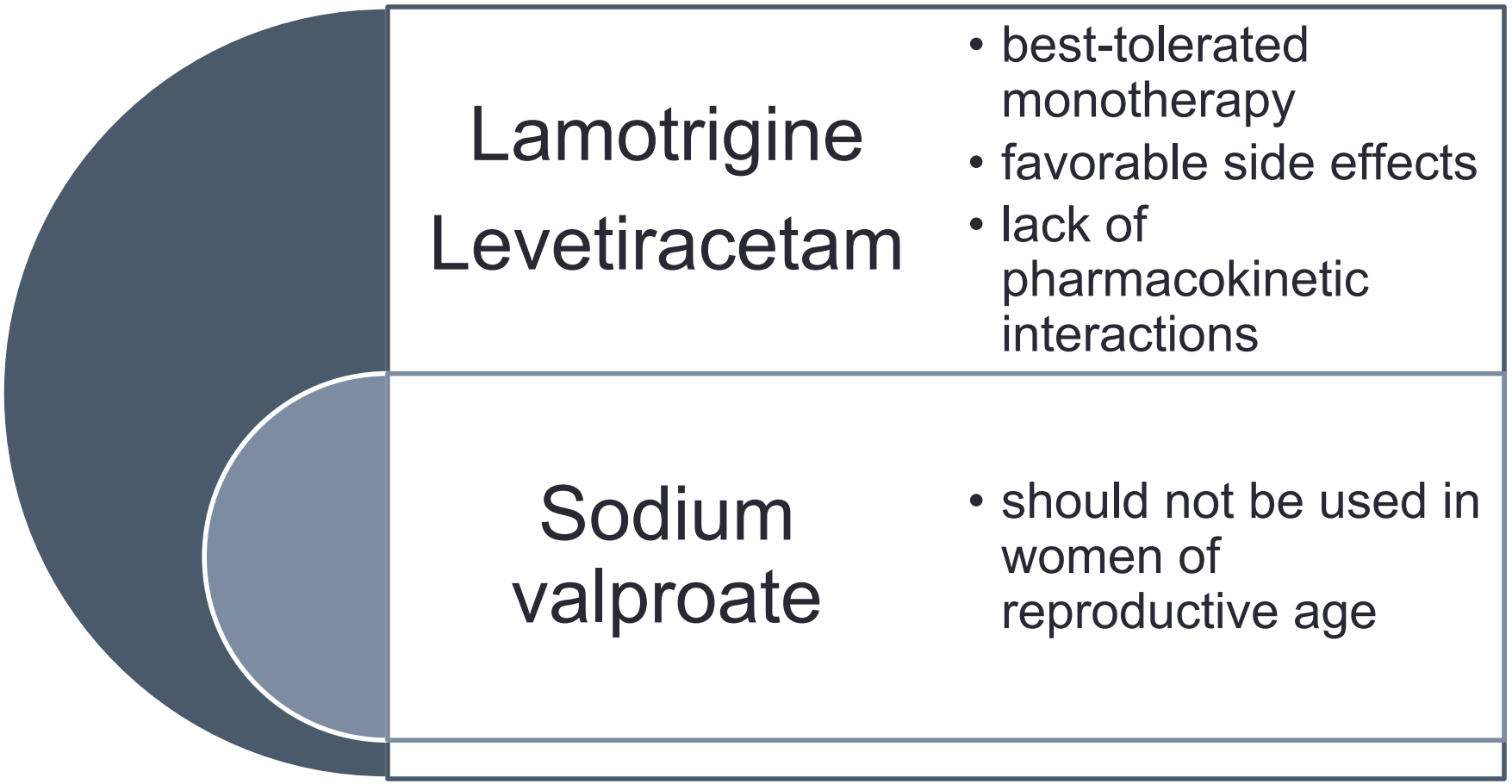
Third-line

- Lamotrigine
- Clonazepam

Myoclonic


First-line
Sodium valproate
Second-line
Levetiracetam
Clonazepam
Third-line
Lamotrigine
Phenobarbital

Anticonvulsants (AEDs)



Guidelines for anticonvulsant therapy

first-line drug

- Start at a low dose
- Use minimum number of doses /day

failure

- second first-line drug
- gradual withdrawal of first

Guidelines for anticonvulsant therapy

second drug fails

- start second-line drug in combination with preferred first-line drug at maximum tolerated dose

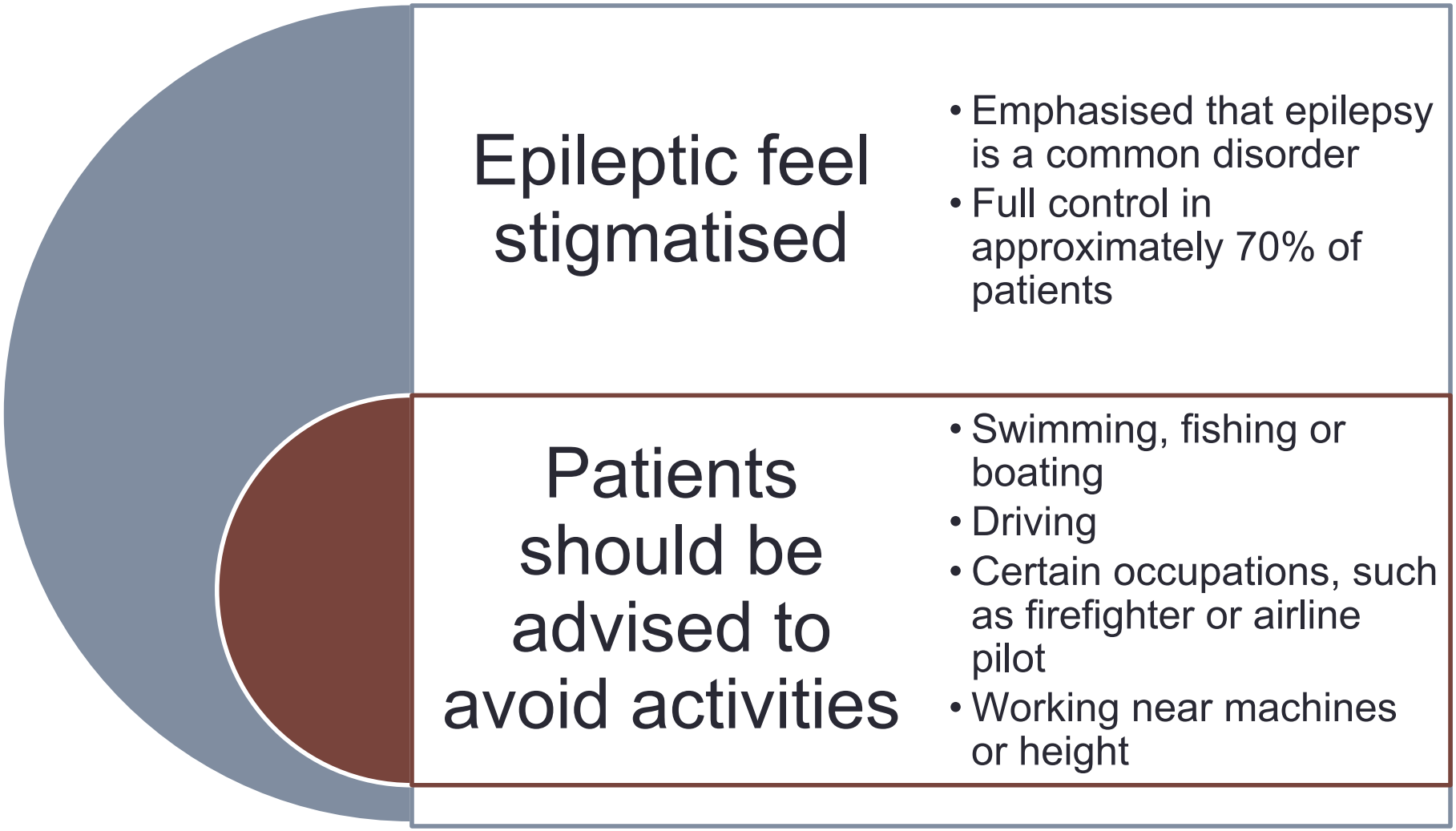
combination fails

- replace second-line drug with alternative second-line drug

combination fails

- check compliance and reconsider diagnosis
- epilepsy surgery

Lifestyle advice



Anticonvulsants

Children	• metabolize the drugs faster • Increase number of doses /day
Elderly	• Slow metabolizing the drugs • Reduce the dose & number of doses /day
birth control pills	• Avoid Carbamazepine, phenytoin, primidone, topiramate, oxcarbazepine and phenobarbitone

Pregnancy & epilepsy

- About 50% of women have no change in seizure frequency or severity during pregnancy
- 25% the frequency increases
- 25% it lessens.

Pharmacokinetic effects of pregnancy:

- carbamazepine levels may fall in the third trimester.
- Lamotrigine and levetiracetam levels may fall early in pregnancy.

Fetal risk

Malformation in the population is around 2–3%

women on anticonvulsants carry 4 – 6% risk of malformation

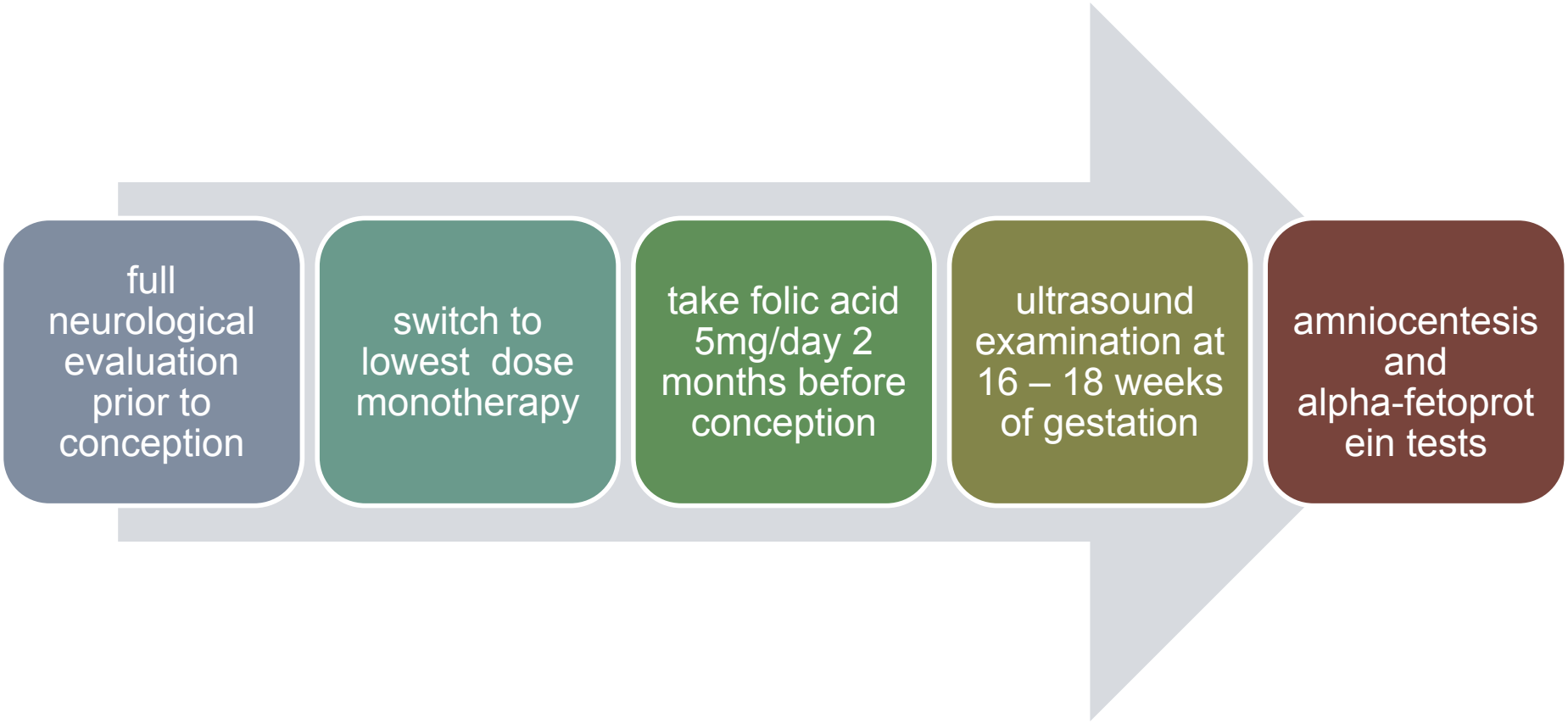
Lowest risk Carbamazepine & lamotrigine

Greatest risk AEDs high dose or polytherapy & Sodium valproate

Malformation

- neural tube defects (e.g., spina bifida)
- cleft palate
- cleft lip
- heart defects

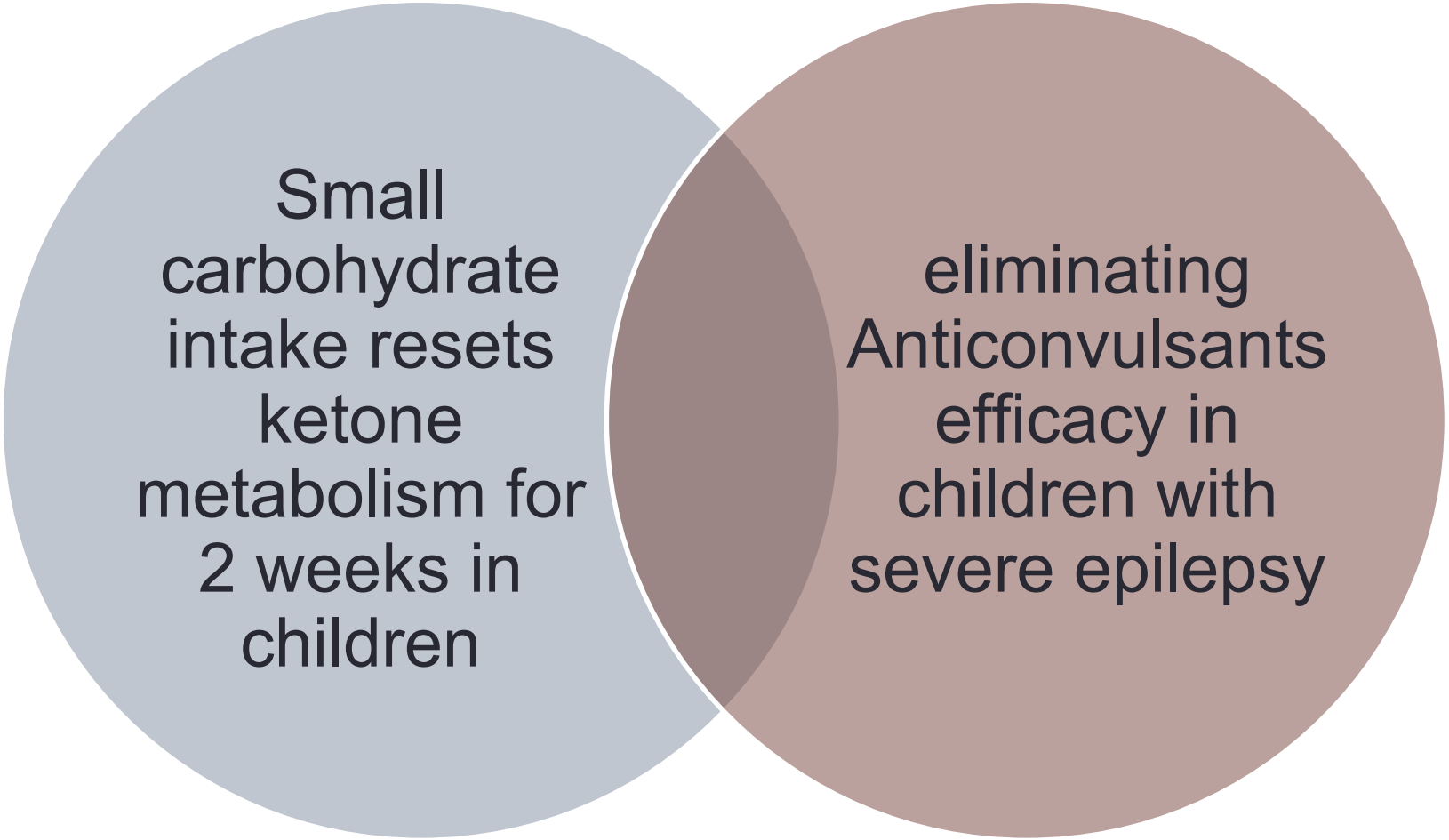
To reduce the risk for malformations



Hemorrhagic disease of the newborn

Anticonvulsants increase newborn bleeding risk.	• Oral vitamin K 20 mg daily to the mother the last month of pregnancy • IM vitamin K 1 mg to the infant at birth.
Anticonvulsants excreted in breast milk	• No adverse effects have been attributed to these small amounts of drug. • Valproate, being highly protein-bound, is absent in breast milk.

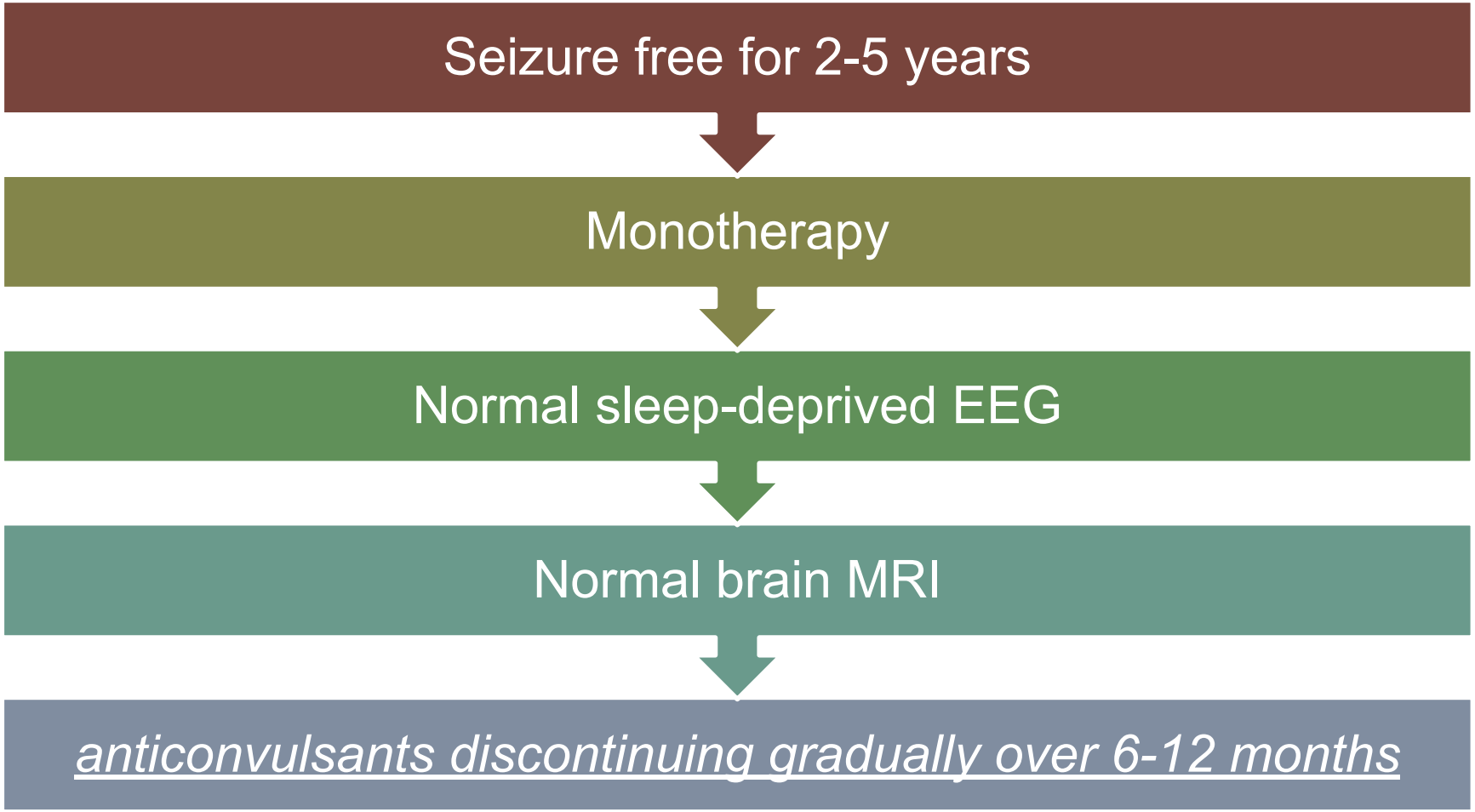
Diet


Small carbohydrate intake resets ketone metabolism for 2 weeks in children
eliminating Anticonvulsants efficacy in children with severe epilepsy

Surgical

- The Vagal Nerve Stimulation is a palliative device approved to treat medically refractory partial-onset epilepsy in adults.
- lobectomy and lesionectomy is indicated in medically refractory partial-onset epilepsy
- Anterior callosotomy indicated for patients with intractable atonic seizures

Discontinuation of anticonvulsants



Status Epilepticus

Any seizure lasting longer than 5 minutes or two or more sequential seizures without full recovery of consciousness between seizures

overall mortality rate was 22%

The seizure activity results in pathologic changes in neurons after 30 minutes; after 60 minutes, neurons begin to die by excitatory neurotransmitters

Status Epilepticus

seizures > 5 mins

- diazepam 10 mg IV or rectally
- lorazepam 4 mg IV

No response

- Phenytoin: 15 mg/kg at 50 mg/min
- Fosphenytoin: 15 mg/kg at 100 mg/min
- Phenobarbital: 10 mg/kg at 100 mg/min
- Valproate IV infusion 25mg/kg at 3-6 mg /kg/min

after 30–60 mins

- Transfer to intensive care for intubation, ventilation and general anaesthesia using propofol or thiopental
- Midazolam infusion (0.2mg/kg, max 10mg)

Status Epilepticus

Cardiac monitor and pulse oximetry Monitor neurological condition, blood pressure, respiration; check blood gases

EEG monitor

Respiratory insufficiency is an indication for intubation from the start

Investigate the cause

- electrolyte, calcium, magnesium, and glucose levels
- CBP and renal function tests
- arterial blood gas analysis
- toxicology screening anticonvulsant levels
- Blood culture and lumbar puncture indicated if an infectious etiology is suspected.

Common causes

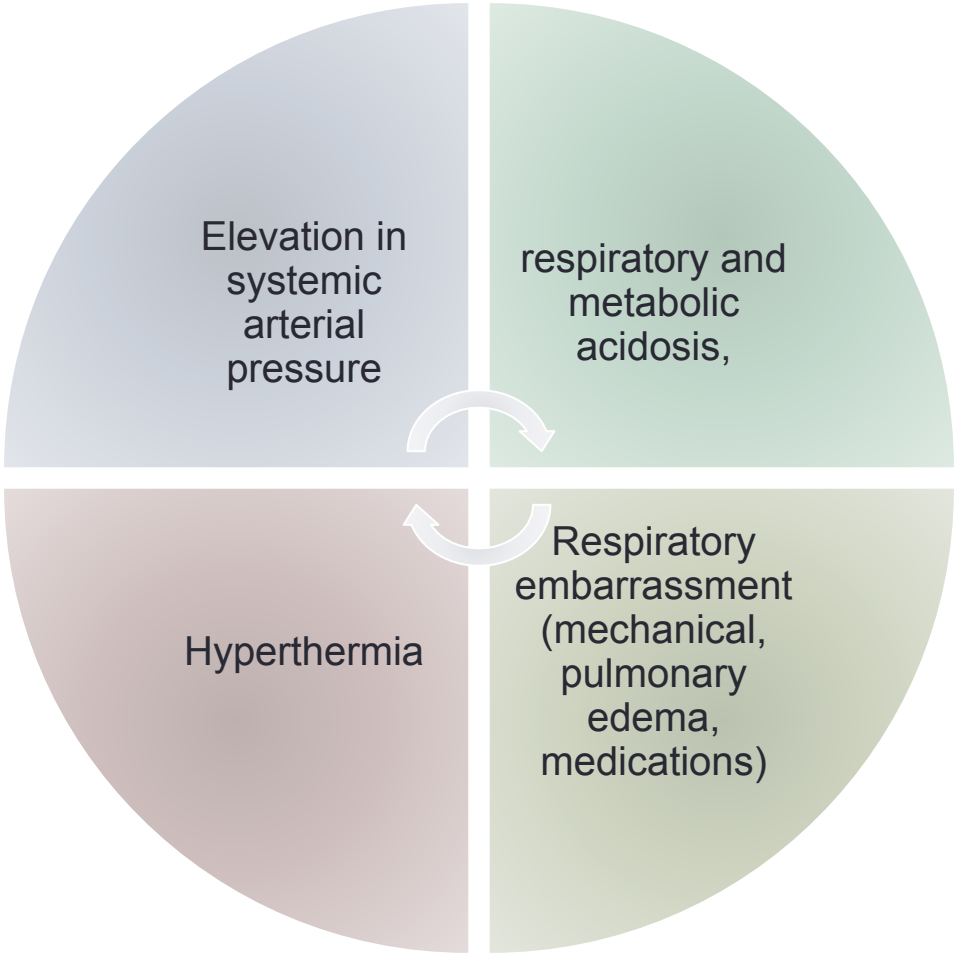
- change in medication or abrupt cessation
- fever (children)
- Stroke & cardiac arrest (adults)
- head trauma
- metabolic & electrolyte disturbances
- CNS infection
- neoplasm.

Once status controlled for 12 hr

Start longer-term anticonvulsant medication with one of:

- Sodium valproate 10 mg/kg IV over 3–5 mins, then 800–2000 mg/day
- Phenytoin give loading dose (if not already used as above) of 15 mg/kg, infuse at < 50 mg/min, then 300 mg/day
- Carbamazepine 400 mg by nasogastric tube, then 400–1200 mg/day

Complications



Epilepsy syndromes

Many patients with epilepsy fall into specific patterns, depending on:

- Seizure type
- Age of onset
- Responsiveness to treatment
- Genetic testing demonstrate similarities in molecular pathophysiology.

Epilepsy syndromes

Childhood absence epilepsy

- Age of onset 4–8 yrs
- Frequent brief absences
- EEG 3/sec spike and wave complex
- Treatment: Ethosuximide ,Sodium valproate, Levetiracetam
- Prognosis: 40% develop GTCS, 80% remit in adulthood

Childhood absence epilepsy

Epilepsy syndromes

Juvenile absence epilepsy

- Age of onset 10–15 yrs
- Less frequent absences than childhood absence
- EEG Poly-spike and wave
- Treatment: Sodium valproate, Levetiracetam
- Prognosis: 80% develop GTCS, 80% seizure-free in adulthood

Epilepsy syndromes

Juvenile myoclonic epilepsy

- Age of onset 15–20 yrs
- GTCS. absences, morning myoclonus
- EEG Poly-spike and wave with photosensitivity
- Treatment: Sodium valproate or Levetiracetam
- Prognosis: 90% remit with AEDs but relapse if AED withdrawn

Juvenile myoclonic epilepsy

Epilepsy syndromes

GTCS on awakening

- Age of onset 10–25 years
- GTCS, sometimes myoclonus
- EEG Spike wave on waking and sleep onset
- Treatment: Sodium valproate or Levetiracetam
- Prognosis: 65% controlled with AEDs but relapse if AED withdrawn

Eclampsia

This syndrome appears during the last trimester of pregnancy: hypertension and convulsions; the latter are generalized and tend to occur in clusters.

The standard practice is to induce labor or perform cesarean section

Manage the seizures by magnesium sulfate 4 g IV over 5 to 10 min followed by a maintenance dose of 5 g every 4 h IM or 1 to 2 g/h IV.