# Pitfalls in Convulsive Disorders in Children

**Ahmed Raouf, MD.**

***Prof. of Pediatrics & Pediatric Neurology, ARRC***

***President of Egyptian Society of Child Neuropsychiatry (ESCNP)***

***President Elect of African Pediatric Neurology Association (APNA)***

***EB Member Of International Child Neurology Association (ICNA)***

***email : dr-raouf@hotmail.com***

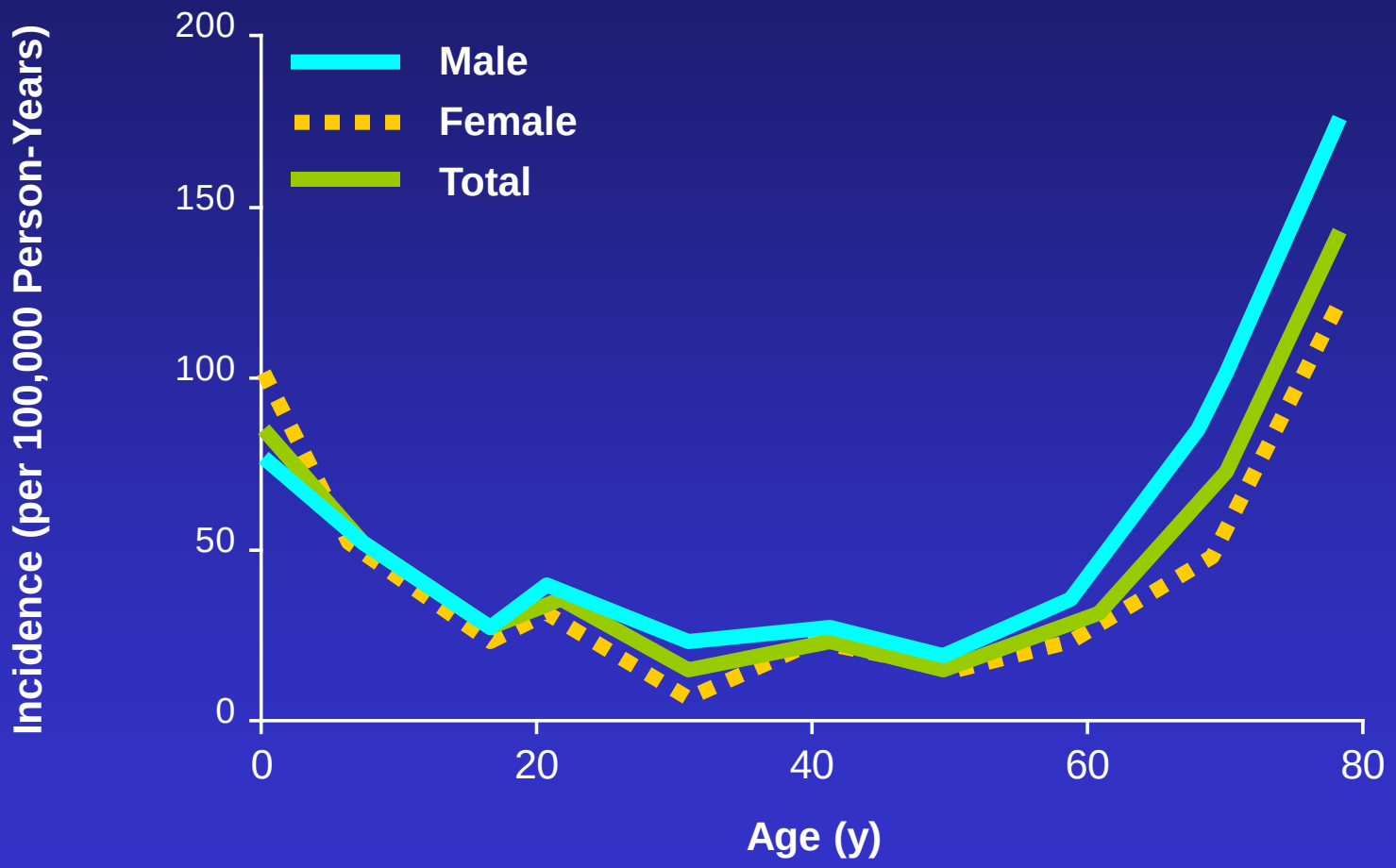
## Definition:

Epilepsy is a disorder of the central nervous system whose symptoms are seizures.

## Epilepsy Syndrome:

A clinical entity with relatively consistent clinical features, including seizure type (s), etiology, EEG features, neurologic status, prognosis, and in some cases response to specific antiepileptic drugs.

# Epilepsy Incidence: 1935 – 1984



# Etiology

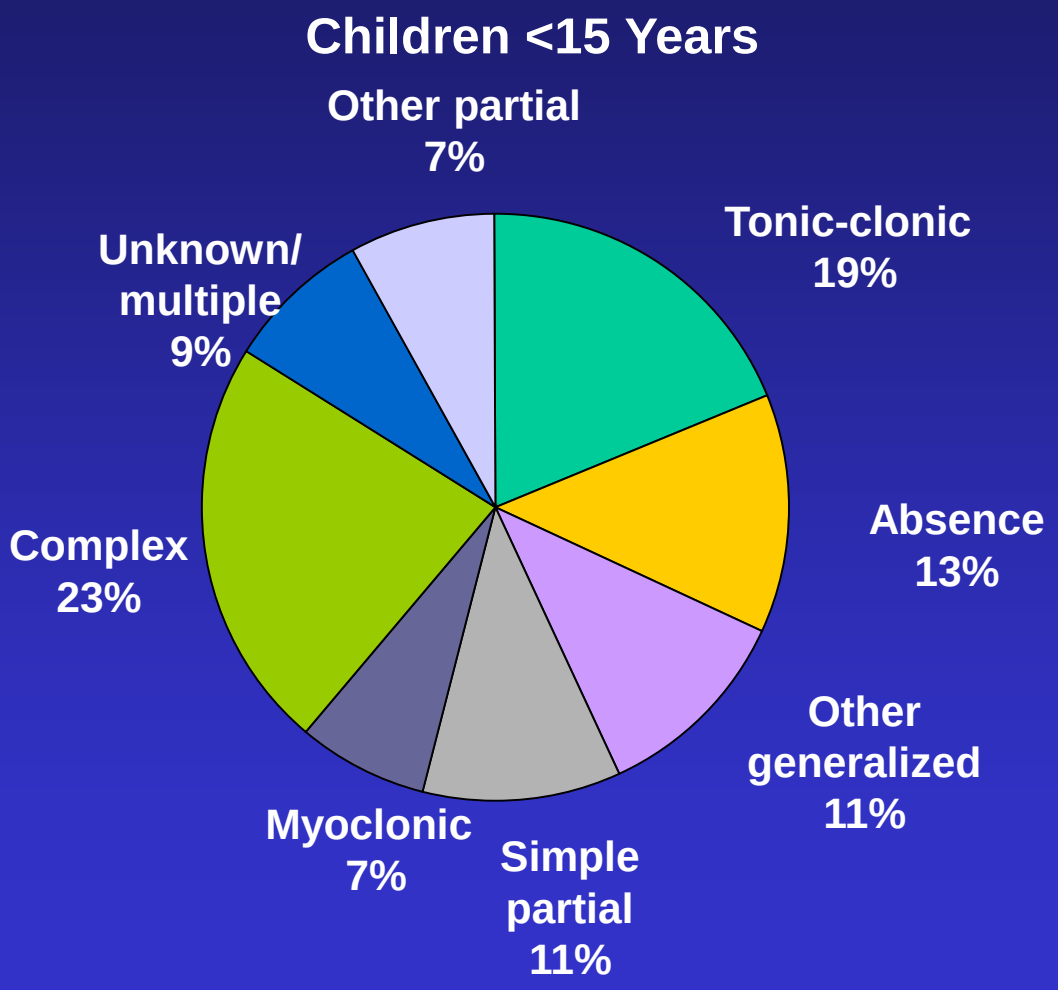
***Most common secondary causes :***

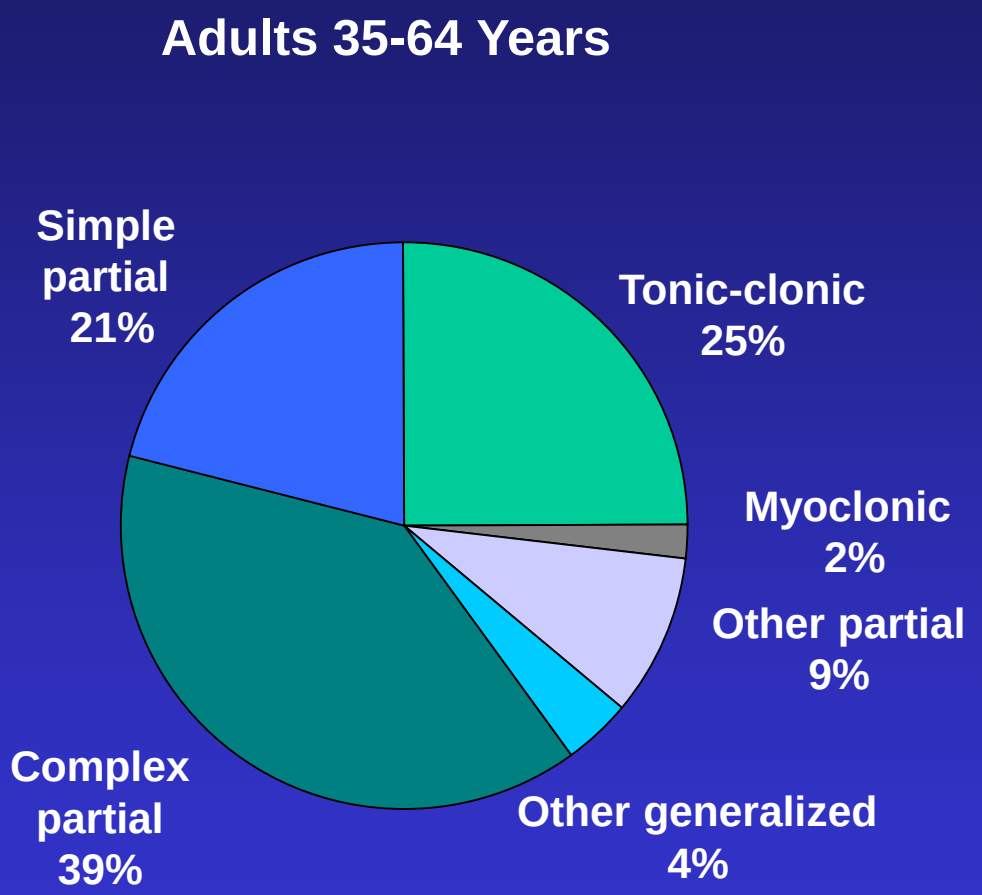
- **Genetic and developmental causes .**
- **Metabolic causes .**
- **Trauma .**
- **Infections .**

# Etiology ( Cont. )

- Infections: systemic (sepsis), CNS, encephalitis, meningitis, febrile convulsion
- Focal infection- abscess
- Head injury
- Structural lesions- space occupying lesion- tumour
- Cerebral infarction, haematoma, intra-ventricular haemorrhage (IVH)
- Hypoxia
- Acidosis
- Metabolic disorders
- Electrolyte imbalances: hypocalcaemia, hypoglycaemia, hyponatraemia, hypernatraemia, dehydration
- Toxic ingestion
- Hypoxic ischaemic encephalopathy (HIE)

# Prevalence of Generalized and Partial Seizures



# Classification

- Seizure type > 4 years.
- Epileptic syndrome < 4 years .
- Age of onset .
- EEG .
- Eitology .

# Classification

***Epilepsy syndrome by usual age of onset in years.***

| Epilepsy syndrome | Age (yrs) at seizure onset |
|---|---|
| Neonatal seizure | (0-1mon) |
| EMEE / EIEE | (0-6 wks) |
| Infantile spasm | (6mon -1) |
| Benign myoclonic epilepsy | (1-2) |
| Simple febrile seizure | (6 mon-5) |
| Lennox – Gastaut syndrome | (1-8) |
| Rolandic epilepsy | (4-19) |
| Childhood absence | (3-7) |
| GTCS on awakening | (6-22) |
| Juvenile absence | (10-15) |
| JME | (13-19) |

# Age of onset and seizure types and epileptic syndromes

**Childhood onset epilepsies encompass all seizure types :**

- Focal seizures with or without loss off consciousness .
- Epileptic spasm
- Typical and atypical absence .
- Myoclonic seizure
- Tonic , clonic , tonic-clonic and atonic seizure .

**Adolescence –onset epilepsies :**

- Partial seizure.
- Myoclonic
- GTCs
- Rarely absence .

**Adult – onset seizure**

- Partial seizure
- GTCS
- Myoclonic

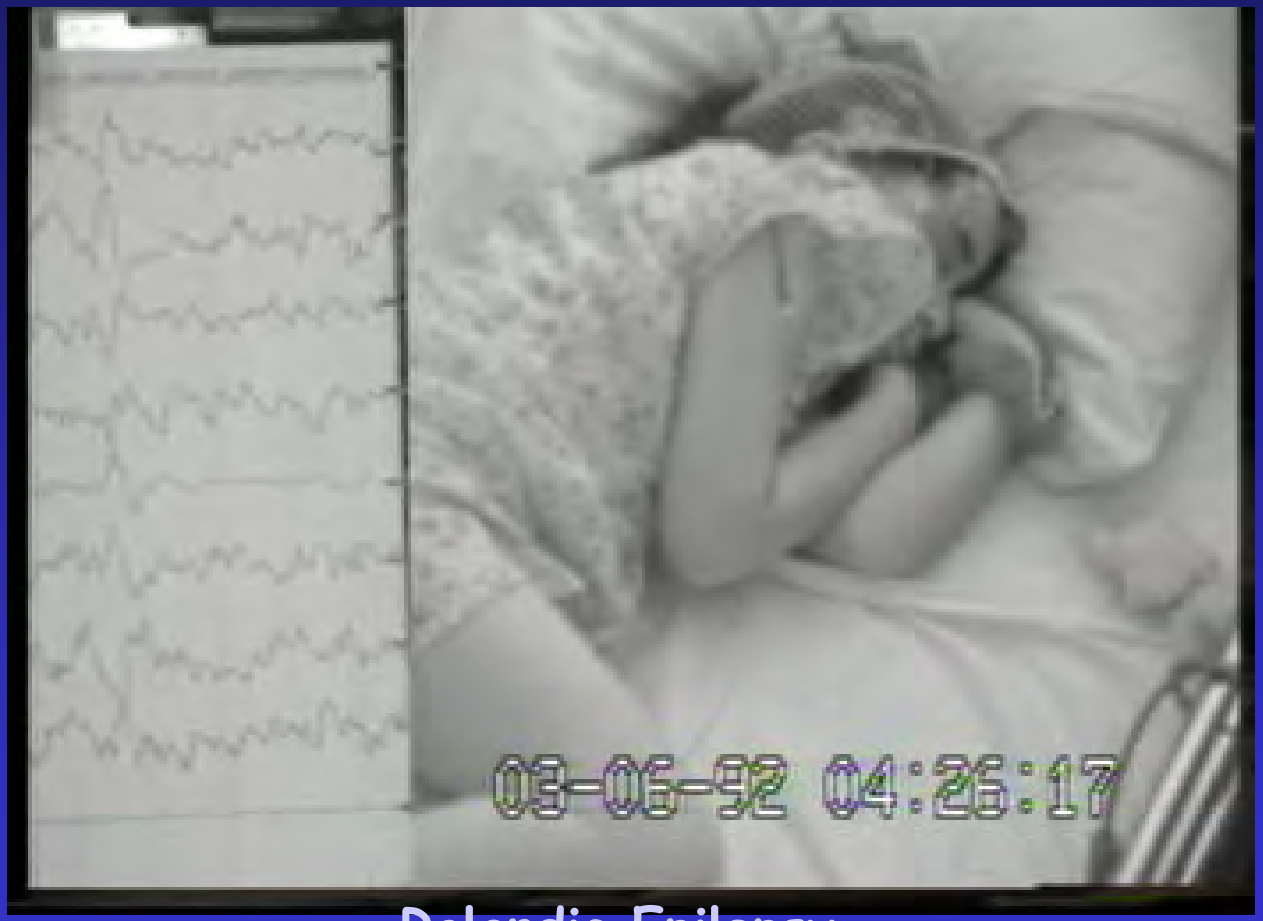
# Diagnosis

- Age of onset .
- Family history.
- Frequency of seizure.
- Type of seizure (description or videotape).
- EEG.
- Neuroimaging.

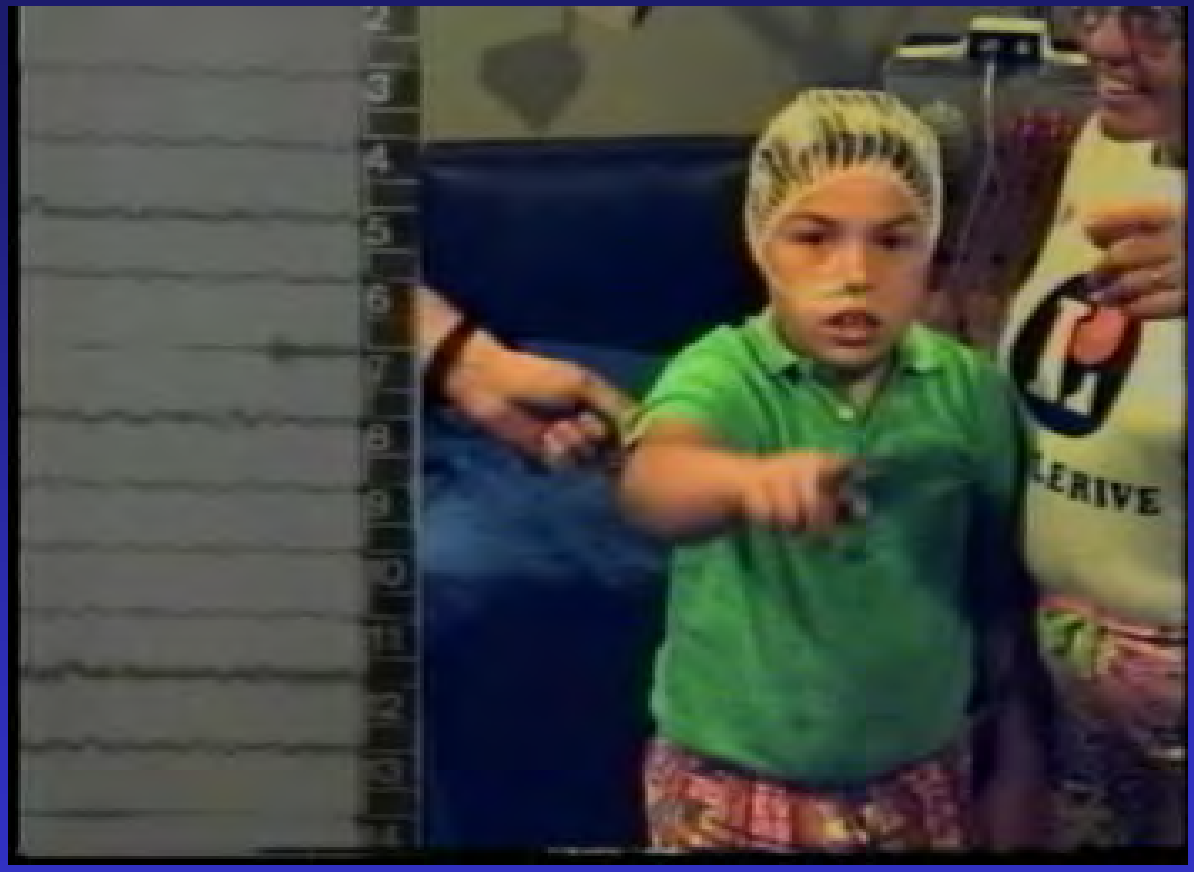

Benign Myoclonic Epilepsy in Infancy

West syndrome

Absence Epilepsy




Rolandic Epilepsy



Lennox-Gastaut Syndrome Atypical absence


Juvenile Myoclonic Epilepsy

# Diagnosis by age of onset

- 1- Absence ,tonic and atonic seizures and infantile spasm are diseases of childhood and not present in adolescence or adulthood .
- 2- Epileptic spasms beyond infancy have quite different presentation .For example , in older children they have mild expression with no obvious effect on cognition .

# Differences in Epilepsy and its management in children .

1- High incidence in children compared to adults .

2- ↑ Incidence of genetic and developmental causes.

3- Epilepsy and AEDs sometimes cause cognitive and behavioral disorders.

4- ↑ Susceptibility to systemic adverse effects

- Skin → CBZ , Lamotrigin
- Hepatic → Valproat.

5- ↑ clearance of AEDs ( 50% in children&100% in infants).

6- ↑ susceptibility to remission e.g. absence , myoclonus ,1ry GTCS

Seizure management
THOSE CHILDREN WITH FIRST TIME ONE, OR NEW SEIZURES.

# Seizure management

- **A - Management of Acute Seizures**
- **THOSE CHILDREN WITH FIRST TIME ONE, OR NEW SEIZURES.**

# Management and goals

**Treatment of a child with seizures requires :**

- **Maintenance of vital functions**
- **Abolition of seizures**
- **Elimination of any precipitating factors**
- **Reversing correctable causes**
- **Following protocols for management is vital**
- **Administer prescribed rectal/buccal/intravenous medication according to clinical service guidelines if required, ensuring the correct dosages are administered, this is according to the hospital guidlines for management of Seizures**

# Management and goals ( Cont. )

**The initial treatment is directed towards:**

- **Maintaining an airway**
- **Supporting breathing and administration of oxygen**
- **Support and maintenance of vital functions**

**A B C**

# STATUS EPILEPTICUS is a *MEDICAL EMERGENCY*

**Definition of status epilepticus**

- **“Any seizure lasting for a duration of at least 30 minutes or repeated seizures lasting for 30 minutes or longer from which the patient does not regain consciousness”.**
- **Rectal diazepam is a safe, simple and effective treatment for pre-hospital management. Paraldehyde can also be used rectally.**
- **Midazolam has recently been found to be more advantageous than diazepam in emergency use as it can be given buccally in a syringe**

# STATUS EPILEPTICUS is a *MEDICAL EMERGENCY ( Cont. )*

- **The initial treatment for status epilepticus is also directed towards:**
- **Maintaining an airway**
- **Administration of oxygen**
- **Administration of rectal/buccal/intravenous medication according to clinical service guidelines, eg . Valium, Phenobarbital, Hydantoin or Depakin**
- **Hydration e.g., intravenous fluids if required.**
- **The child must be closely monitored during administration of intravenous anti-convulsants.**

# STATUS EPILEPTICUS is a *MEDICAL EMERGENCY ( Cont. )*

- Monitor level of consciousness, vital signs of respirations, heart rate, blood pressure and temperature.
- If first-line drugs are ineffective progress to second-line drugs.
- Refer to Neurology Guidelines : 'Treatment of Status Epilepticus in the Infant and Older Child' and 'Status Epilepticus- Clinical Service Guidelines'.
- The child may need respiratory support of intubation and ventilation on a paediatric intensive care unit.
- Outcome is related to aetiology and duration of the status epilepticus.
- Always ensure that the drugs are prescribed by the medical staff and that hospital policy and procedures are followed.

# B - Treatment of epilepsy in children

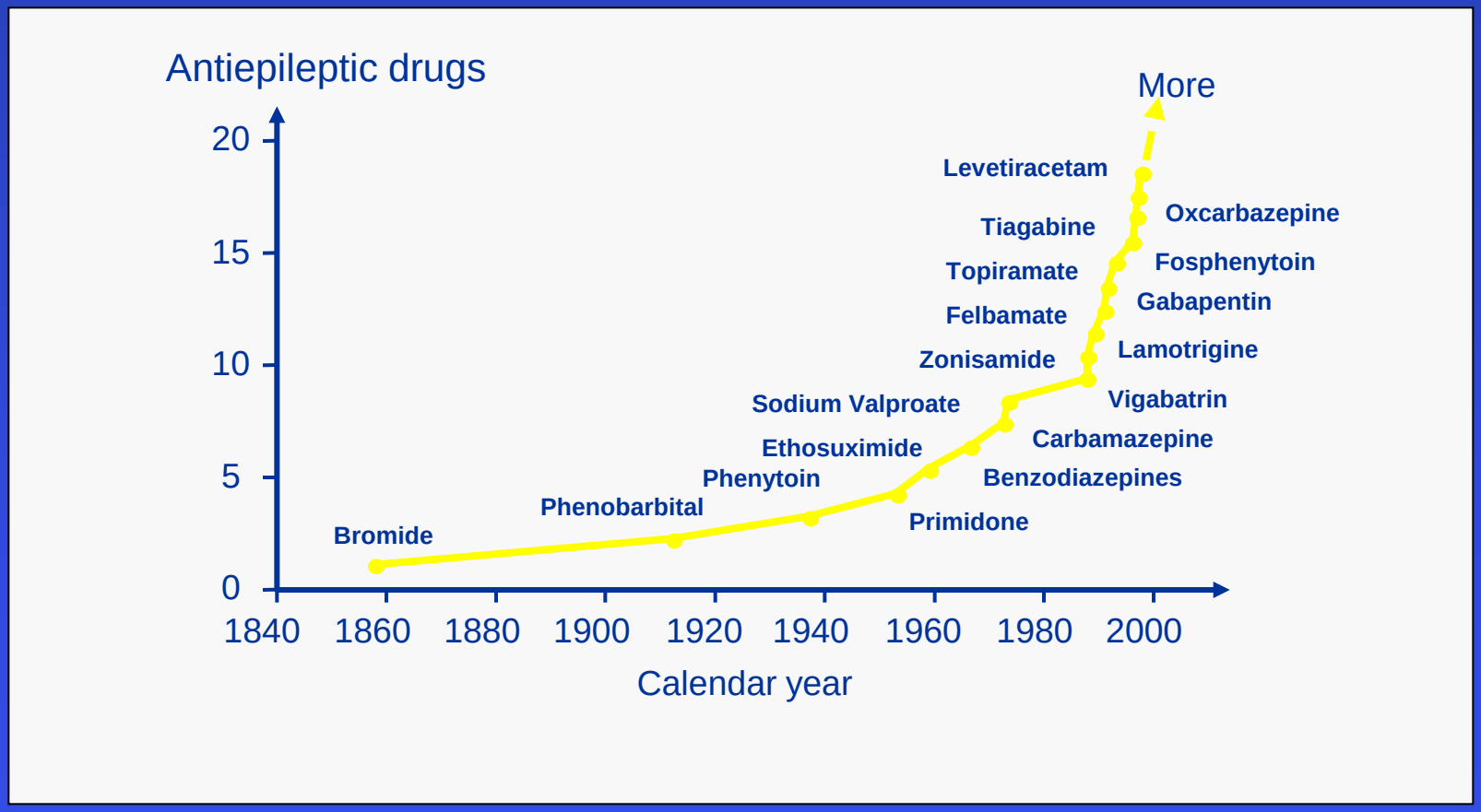
**New cases**

**Pharmacotherapy**
**AED in**
**monotherapy**

**Drug refractory cases**

1- **Pharmacotherapy** (Combination of AEDS)
2- **Non pharmacological ttt:**
   a) Ketogenic diet .
   b) High dose vitamin ( pyridoxin)
   c) Surgery.
   d) Vagus nerve stimulation .

# EVERYDAY TREATMENT OF EPILEPSY Choices and Outcomes



# Choice of AED

1- Seizure type or epileptic syndrome.

2- Etiology .

3- side effects .

4- Co morbid condition .

5- Age and sex.

6- Cost .

# Drug choice by epilepsy syndrome or seizure type

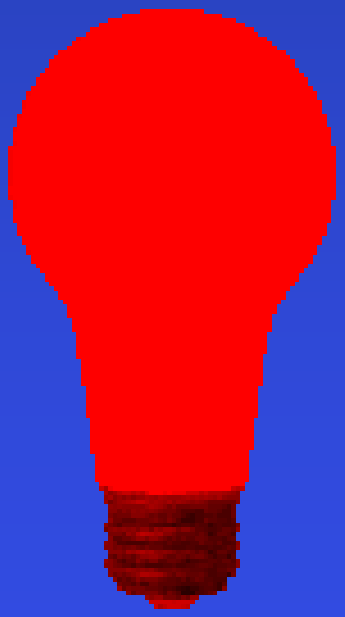
| ***Epileptic syndrome*** | First choice | Second choice |
|---|---|---|
| **BECTS** | **Valproic acid** | **Gabapentin** |
| **Absence** | | |
| **<10 years** | **Ethosuximide** | **Lamotrigine** |
| **>10 years** | **Valproic acid** | |
| **or with GTCS** | **Valproic acid** | **Lamotrigine** |
| **Juvenile myoclonic** | **Valproic acid** | **Topiramate or Clonazepam** |
| **Lennox-Gastaut and releated syndromes** | **Valproic acid** | **Topiramate& Lamotrigine** |
| **Infantile spasms** | **ACTH & Vigabatrin** | **Valproic acid &Topiramate** |
| ***Seizure type*** | | |
| **Focal onset** | **Carbamazepine Oxcarbazepine Valproic acid** | **Lamotrigine Topiramate** |
| **Generalized tonic – clonic** | **Valproic acid** | **Topiramate Carbamazepine &Phenytoin** |

# AEDS that may aggravate some epileptic syndromes

| Drug | Syndrome | Drug | Syndrome |
|---|---|---|---|
| Carbamazepine | •Absence epilepsy<br>•Juvenile myoclonic<br>• Progressive myoclonic<br>•Rolandic epilepsy | Vigabaterin | •Absence epilepsy<br>• Epilepsy with myoclonus |
| Phenytoin | •Absence epilepsy<br>•Progressive myoclonic | Gabapentin | • Absence epilepsy<br>• Epilepsy with myoclonus |
| Benzodiazepines | •Lennox- Gastaut syndrome | Lamotrigine | • Severe myoclonic epilepsy<br>• Juvenile myoclonic epilepsy |
| Phenobarbitone | • Absence epilepsy | | |

# EVERYDAY TREATMENT OF EPILEPSY Antiepileptic drugs

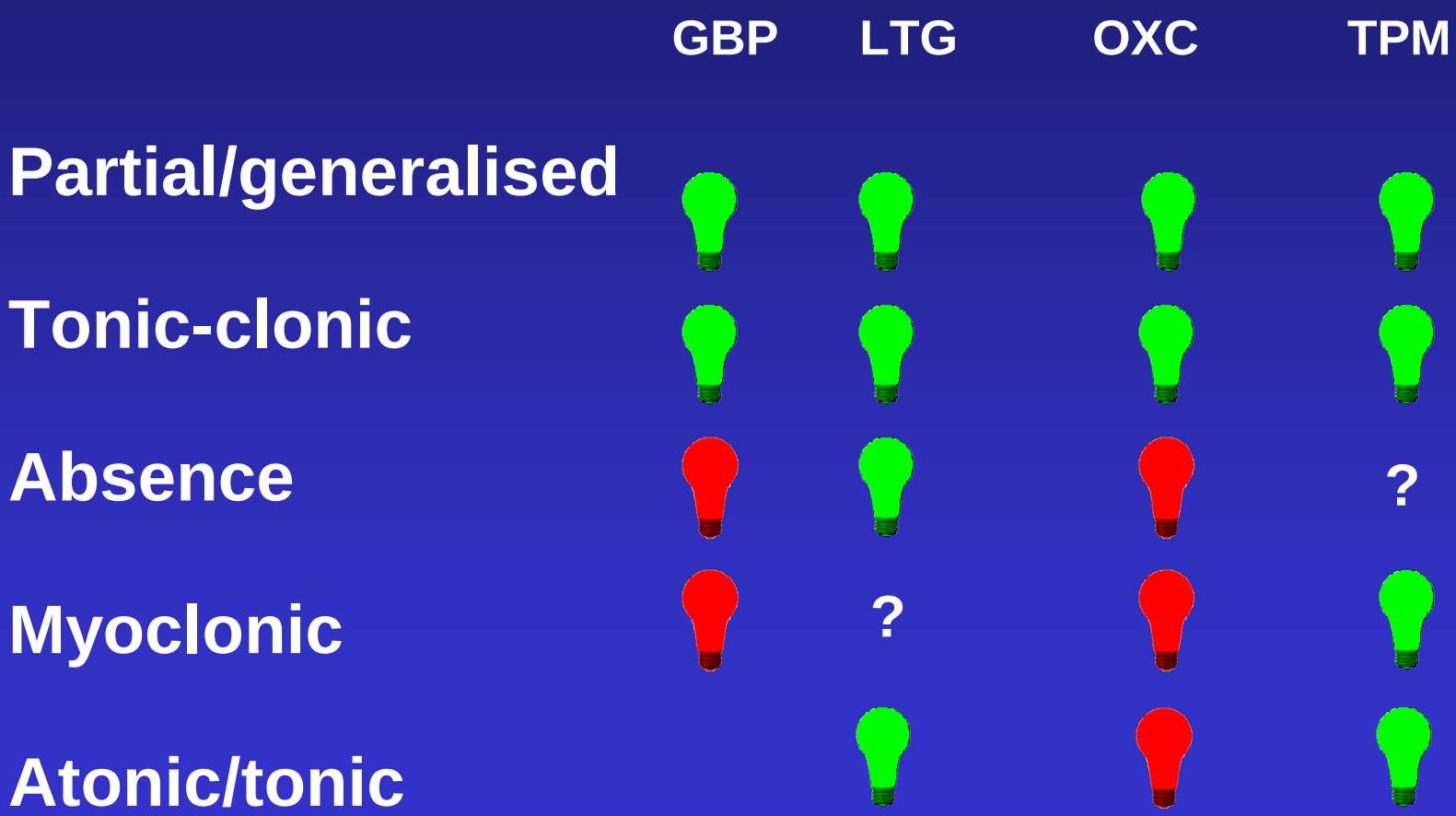
Efficacy



Exacerbation

# ESTABLISHED DRUGS AND SEIZURE TYPES

# NEWER DRUGS AND SEIZURE TYPES



# Choice of AED by etiology

1- Infantile spasms secondary to tuberous sclerosis show best response to vigabetrin.

2- Carbamazepine is highly effective in autosomal dominant nocturnal frontal lobe epilepsy .

# Epileptic syndromes associated with medically refractory seizures in children

- Early myoclonic encephalopathy .
- Early infantile epileptic encephalopathy .
- Infantile spasm .
- Severe myoclonic epilepsy in infancy .
- Myoclonic astatic epilepsy .
- Myoclonic absences.
- Lennox – Gastaut syndrome.
- Continuous spike waves during slow sleep.
- Rasmussen syndromes.

# Choice of AED by side effect

- Children with history of skin rash → avoid Lamotrigine , CBZ .
- Poor weight gain → avoid topiramate , Zonisamide
- Hyperactivity + cognitive impairment → avoid CBZ , PHT , PhB , primidon and gabapentin.
- Language dysfunction or behavioral changes → avoid Topiramat.
- Family history of renal stones → avoid topiramat , zonisamide

# Choice of AED by drug interaction

- Gabapentin has a minimal drug – drug interaction
- Most of conventional AEDs (PHT, CBZ , PhB ) are hepatic enzyme inducers.
- Valproic acid is hepatic enzyme inhibitor .
- New AEDs has benign side effects and minimal pharmacokinetic interactions .

# Choice of AEDs by age and sex

- Serious skin rash are more common in children than adults ( 10 times ) children 1-2 % & adults 0.1%
- Toxic hepatic disorder also may occur with valproic acid in children but not in adults .
- Phenytoin may cause hirshitism , gum hyperplasia and or dysmorphic feature of face , so can be avoided in girls .
- Valproate may cause subfertility in girls .

# Choice of AEDs by comorbid conditions

- 1) Migraine better valproate and gabapentin
- 2) Mood disorder better mood stabilizers :

  Valproate

  Carbamazepine

  Lamotrigine

  Topiramate

# Dose of AEDs

- In general , children require AED doses about 30% higher than adults on a mg/kg basis because faster renal and hepatic clearance .

# Treatment of Intractable Epilepsy

- 20% of patients diagnosed as epilepsy are non epileptic .
- 20% of epileptic patients are refractory to AEDs

1- Drug polytherapy .

2- Ketogenic diet .

3- High dose vitamins .

4- Surgery .

# 1- Polytherapy

- Using drugs with complementary mood of action (GABA ergic , Glutamate antagonist , Na blocker , Ca blockers ).
- Best combination: 1) Valproate + Carbamazepine .
  2) Valproate + lamotrigine
  3) Lamotrigine + Topiramat
- Older agents ( Clobazam and acetazolamide )are useful as adjuvant treatment for cases of refractory epilepsy .
- The triad of sodium valproate + lamotrigine + topiramate can be effective in patients with multiple seizure types.

# 2-Ketogenic Diet .

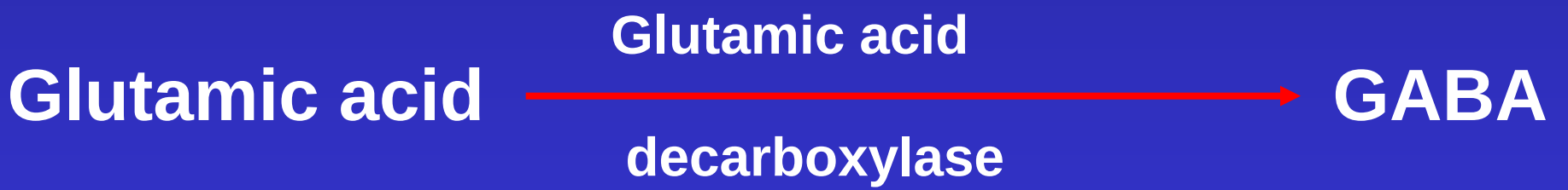
- The diet was once thought to work because of ketosis that is achieved . However , the mechanism of action is unclear
- It is effective in children with very frequent medically intractable seizures in children myoclonic , atonic , absence seizure and infantile spasms .
- Needs :

  1- Admission to hospital

  2- Supervised fasting → starvation & dehydration → ketones in urine → ketogenic diet ( high fat , low protein and carbohydrates + supplement with vitamines and minerals ).

# 3- High dose vitamin therapy ( pyridoxine)

**$B_6$ is Cofactor of glutamic acid decarboxylase .**



# 4- Surgery

A ) Resective surgery :

1- Localization related epilepsy .

2- Refractory seizure .

3- Identified seizure focus

B ) Corpus collosotomy .

C) Vagus nerve stimulation ( VNS) .

# Lost time in epilepsy

**Patients who are treated and controlled sooner have lower chances of developing :**

**1- Resistant disorder ( GTCS) .**

**2- Epileptic encephalopathy .**

**Seizure and / or epileptiform EEG decrease neurological and cognitive development and functioning .**

# Treatment can be withheld without significant risk in children .

1- Single seizure .

2- Febrile convulsions .

3- Rolandic epilepsy .

4- Adolescents with isolated seizure .

# Conclusion

- The aim of treating epilepsy is control of the seizure with full respect of quality of life issues, including maintenance of cognitive functions.
- Some epilepsy syndromes are benign and seizures are known to be rare .In these cases , treatment is often unnecessary .
- Treatment should be started with a broad spectrum agent .
- Early surgery is appropiate in carefully selected patients with focal epilepsy .

# Conclusion ( Contin. )

- In polytherapy , use drugs with complementary mode of action .
- There are specific indications for some syndrome e.g. vigabatrin for infantile spasms and valproate for typical absences or juvenile myoclonic epilepsy .
- There are specific  contraindications , including aggravation of some seizures e.g. carbamazepine or phenytoin in absence seizure , lamotrigin in GME.

## General Information

**Date:** 1 : 3 April, 2015
**Venue:** Helnan Palestine Hotel, Alexandria, Egypt
**Language:** English
**Certificate** of Attendance: Will be available upon request
**Exhibition:** There will be an exhibition of the latest technical equipment and pharmaceutical products at congress hotel
**Abstracts & Presentations:** To be sent as word document size A4 with font (Arial) size (12) on this e-mail:
**abstracts@cme-group.net** maximum by 15/01/2015
(Please write the complete personal contact details in the e-mail)

## Registration Packages

| | Before 15 Feb | After 15 Feb |
|---|---|---|
| Congress Registration | 150 USD | 200 USD |
| Workshop | 50 USD | 80 USD |
| **Packages** | | |
| SGL | 3000 EGP | 3400 EGP |
| DBL | 3800 EGP | 4200 EGP |

## Packages includes

1 Registration for 1 coctor
2 nights' accommodation
1 Accompanying Person in case of DBL
The Above rate excludes Transportation

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