

# Epilepsy and Learning Ability in Children

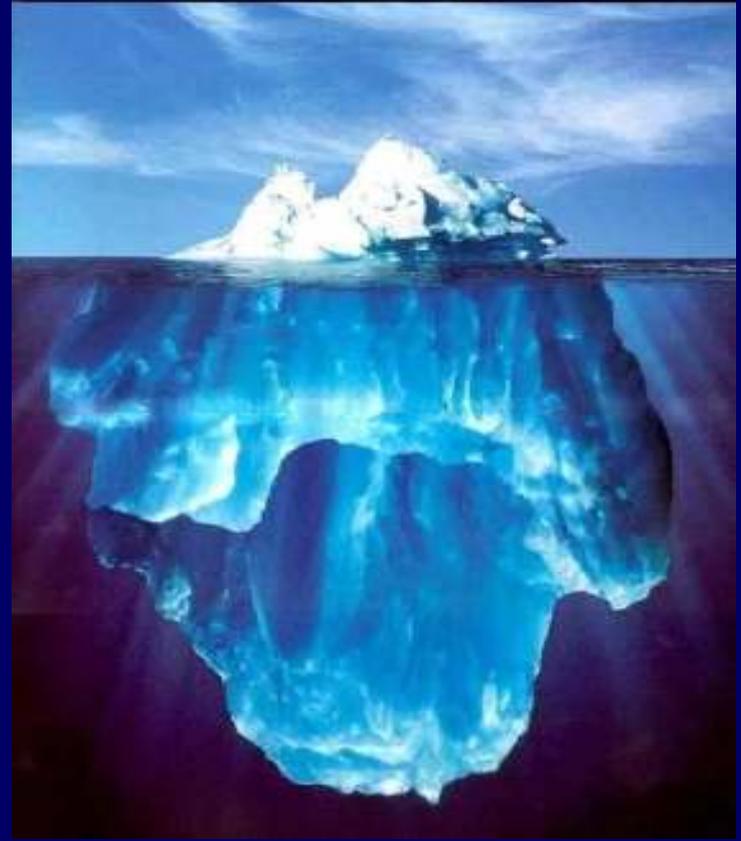


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# Introduction

- ◆ Learning and behaviour problems - 'hidden dysfunction in childhood epilepsy'
- ◆ Known that there is a complex interplay between learning ability and epilepsy
- ◆ Relationships are underexplored or ignored



# How common are learning difficulties in epilepsy?



Large proportion of children with epilepsy have schooling difficulties:

- around 50% but less than 1% attend special schools  
*(Ross et al 1980, Sillanpää, 1999)*
- 82% attending mainstream schools but 53% reviewed by school psychological services because of schooling difficulties
- 36% functioning in the MR range, 12% Slow range  
*(Soler, Aguis Muscat, 2000)*

# Causes of LD in epilepsy - complex interactions

- ◆ Epilepsy variables: severity, frequency, age at onset, type of epileptic syndrome.
- ◆ Underlying aetiology
- ◆ Antiepileptic Drugs (AEDs)
- ◆ Social factors
- ◆ Genetic factors
- ◆ Child and Parent adjustment



# Definitions & Classification



**Epilepsy:** 2 or > spontaneous seizures

- Seizure types

- Focal: generated from a focus
- Generalized: generated throughout
- Mixed: both types

- Cause

- Idiopathic (unknown and neuro normal)
- Symptomatic (known cause)
- Cryptogenic (unknown but abnormal neuro examination)

# Definitions



**Learning / Cognitive function:** ability of the human brain to process information coming from the outside and internal world, and consequently to program the most opportune behaviour

– *Important functions*

- **vigilance:** ability to remain in contact with the outside world
- **attention:** ability to select and focus information
- **memory:** ability to memorize data

# Concepts of learning in epilepsy



- ◆ **Learning Disability (Mental Retardation):** reduced (<70) IQ as measured by the WISC-R and significant limitations in adaptive and social functioning (DSM-IV)
- ◆ **Learning disorders:** significant disturbance in academic achievement or daily living activities that require reading, maths or writing skills (DSM-IV)

# Types of Learning Difficulties

- ◆ **Underachievement in comparison to IQ in specific areas**

**Reading**

**Writing**

**Arithmetic**

**Comprehension**

**Combination**



# Practical approach to Learning Disorders (LD)



## Two main categories:

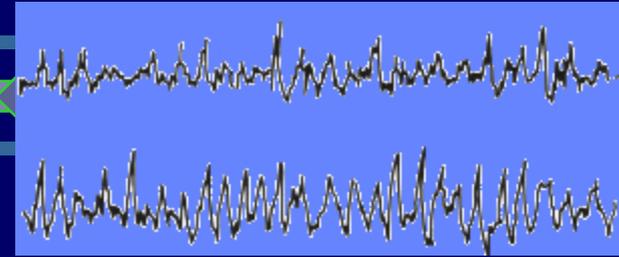
**Permanent:** brain damage or dysfunction leading to permanent learning impairment

- Often in children with *epilepsy-plus*

**State Dependent:** (potentially treatable and reversible)

- depends on the state of the individual at the time; epilepsy itself, effect of Rx, mood disorders, low self esteem or reduced learning opportunities .
- Often in children with *epilepsy - only*

# Types of State Dependent LD



## ◆ Epilepsy Induced

- Continuous abnormal EEG discharges with subtle seizures especially at night
- Transient Cognitive impairment: (TCI) short-lived focal / generalized interictal epileptiform discharges in between obvious fits
- Very frequent seizures with little time for recovery: postictal state

## ◆ Drug induced

- Direct: sedation
- Indirect- diplopia, tremor, unsteadiness

# Epilepsy induced LD

## Neuropsychological Testing

### ◆ Idiopathic / Cryptogenic Epilepsy vs Controls

- ↓ attention capacity - attention deficit
- memory - ↑ demand on working memory
- ↓ visuomotor
- ↓ speed of information processing
- language area



### ◆ Transient Cognitive Impairment (TCI)

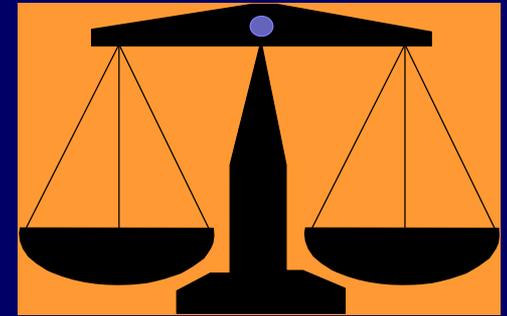
Abnormal testing during interictal epileptiform discharge

R foci: ↓ spatial tasks

L foci: ↓ verbal tasks

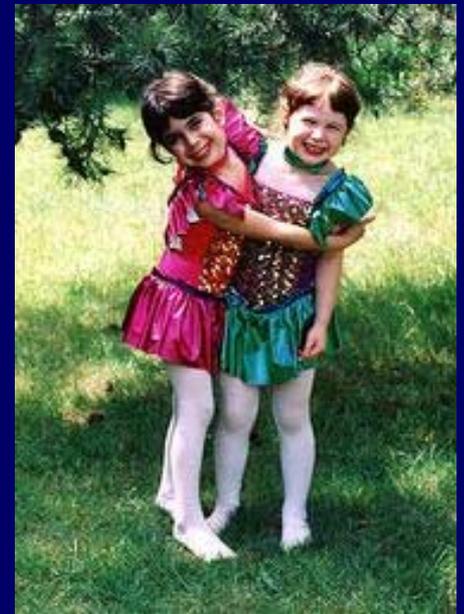
# Drug induced State Dependent LD

- ◆ **LGT, CBZ: less reports as affecting learning**
  - ◆ **PB, BZD: may alter attention**
  - ◆ **TPM: high doses may alter attention**
- BUT**
- ◆ **AEDs may improve learning by reducing the number of EEG discharges or seizure frequency.**



# Clinical Recognition

- ◆ Sudden deterioration in academic achievement
- ◆ Loss of skills
- ◆ Abnormal behaviour
  - autistic-like, ADHD
- ◆ Variable daytime performance:  
daytime sleep



# Implications

- ◆ **Service managers and providers - health, education and social services**
- ◆ **Simply 'dishing out the drugs' to the child with epilepsy will no longer do**
- ◆ **Recognition potential reversibility of LD**
- ◆ **Need careful interdisciplinary assessment and follow up**
- ◆ **Appropriate support**



# Conclusion

Learning and behaviour problems must not be hidden or ignored.

