# What is epilepsy? - Improving our Knowledge

Brian Neville

Caritas Malta Epilepsy

20.02.10

NCYPE

The National Centre for Young People with Epilepsy

Great Ormond Street Hospital

NHS

Institute of Child Health

The child first and always

# Aims.

- Is the diagnosis epilepsy?
- Pharmacological treatment
- What are the emergencies in childhood epilepsy?
- Disability in childhood epilepsy.
- Educational and social support issues.
- Rare disorders/parent support groups

# Epilepsy

Epileptic seizures – transient clinical events arising from:

- Abnormal excessive activity of cerebral neurons.
- Usually brief
- Stereotyped
- Wide range of motor and behavioural phenomena
- Fundamentally clinical.

Epilepsy = proneness to recurrent epileptic seizures.

(febrile seizures)

# Misdiagnosis of epilepsy

Up to 30%

Reflex asystole

Blue breath holding attacks. +20+otherS

- Provocation
- Stereotyped
- No response to AEDs
- Otherwise normal

‘Absences’

Second intent: not responsive to 2 AEDs

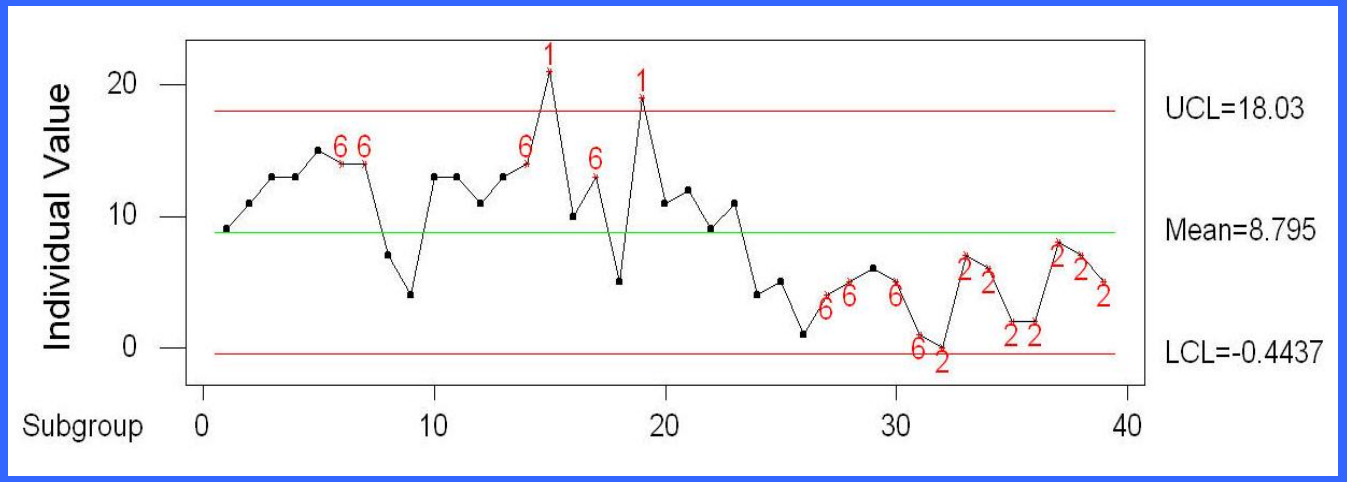
# Response to AEDs

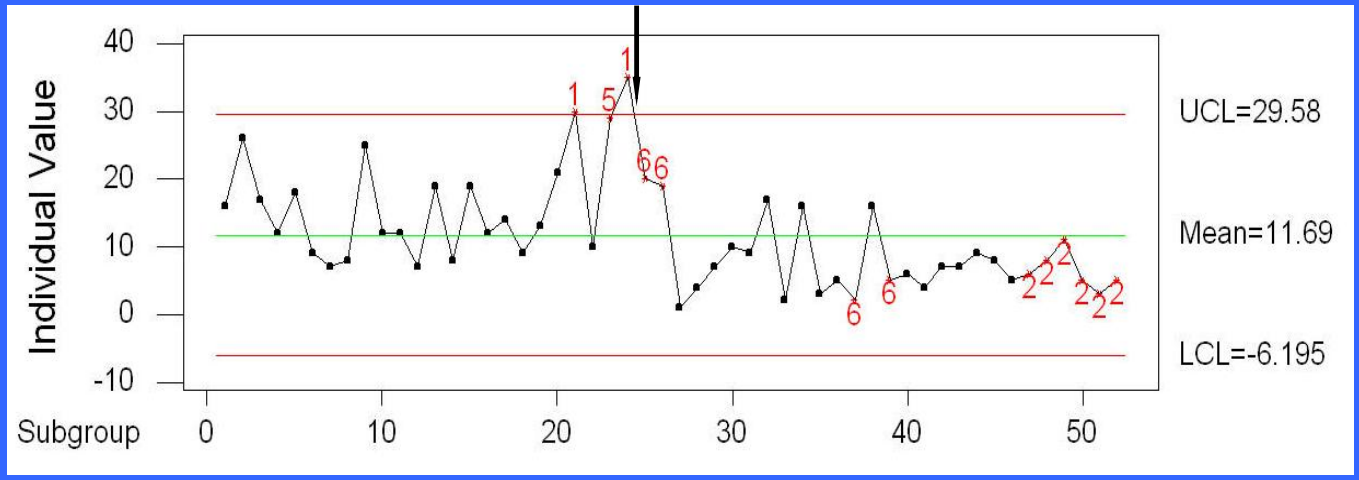
- Seizure relief
- 50-60% seizure free longterm? More
- Regulatory studies
- 20-30 AEDs
- Expectation of seizure relief
- Fluctuating disorder
- No response to 2=review the diagnosis

**TABLE 2.** SUCCESS OF ANTIEPILEPTIC-DRUG REGIMENS IN 470 PATIENTS WITH PREVIOUSLY UNTREATED EPILEPSY.

| VARIABLE | No. (%) |
|---|---|
| Response to first drug | 222 (47) |
| Seizure-free during continued therapy with first drug | 207 (44) |
| Remained seizure-free after discontinuation of first drug | 15 (3) |
| Response to second drug | 61 (13) |
| Seizure-free during monotherapy with second drug | 41 (9) |
| Remained seizure-free after discontinuation of second drug | 20 (4) |
| Response to third drug or multiple drugs | 18 (4) |
| Seizure-free during monotherapy with third drug | 6 (1) |
| Seizure-free during therapy with two drugs | 12 (3) |
| Total | 301 (64) |

Kwan. NEJM; 2000


Individual Value
20
10
0
Subgroup
0
10
20
30
40
UCL=18.03
Mean=8.795
LCL=-0.4437


Individual Value
40
30
20
10
0
-10
Subgroup
0
10
20
30
40
50
UCL=29.58
Mean=11.69
LCL=-6.195

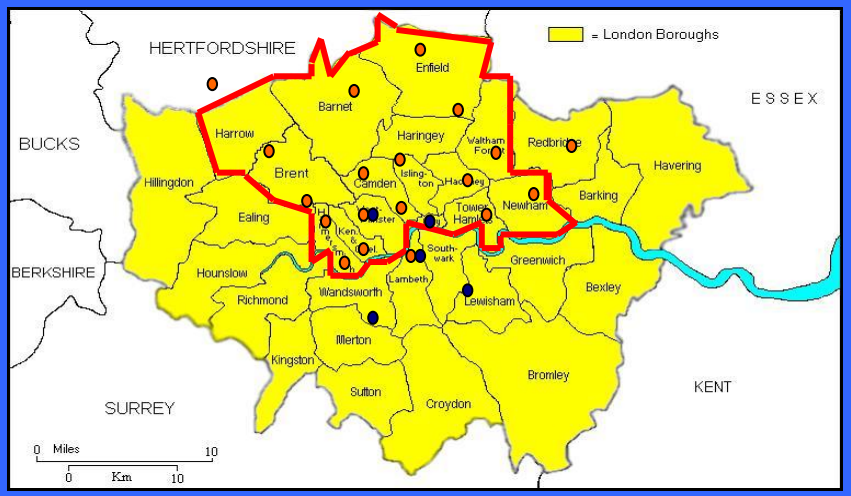
(R C Scott)

# Emergencies of childhood epilepsy

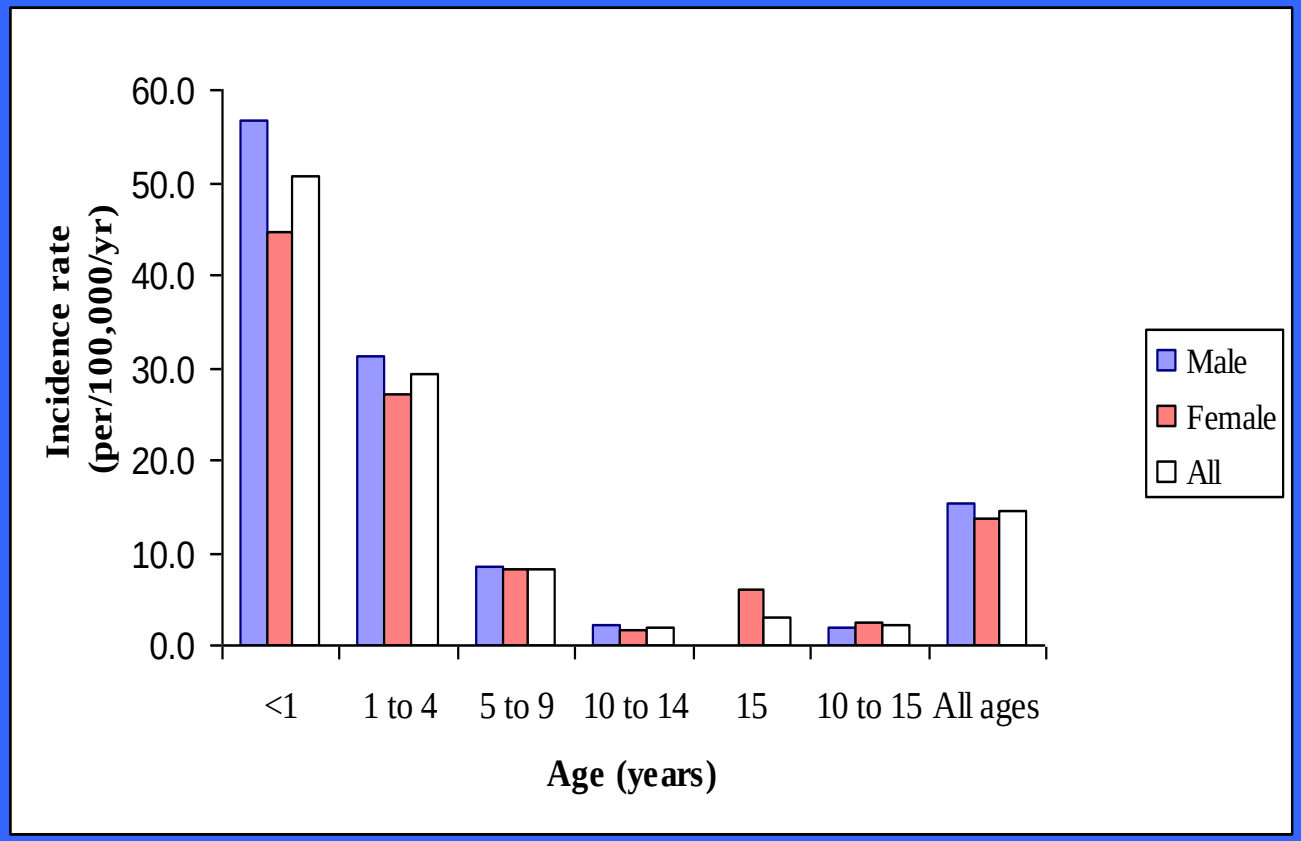
- Convulsive status epilepticus
- Presentation of acute illness – meningitis
  - metabolic disturbance
  - head injury
- Onset of regressive epilepsy e.g. infantile spasms
- Psychological withdrawal/school failure

# NLSTEPSS

**N**orth **L**ondon convulsive **ST**atus **EP**ilepticus in childhood **S**urveillance **S**tudy

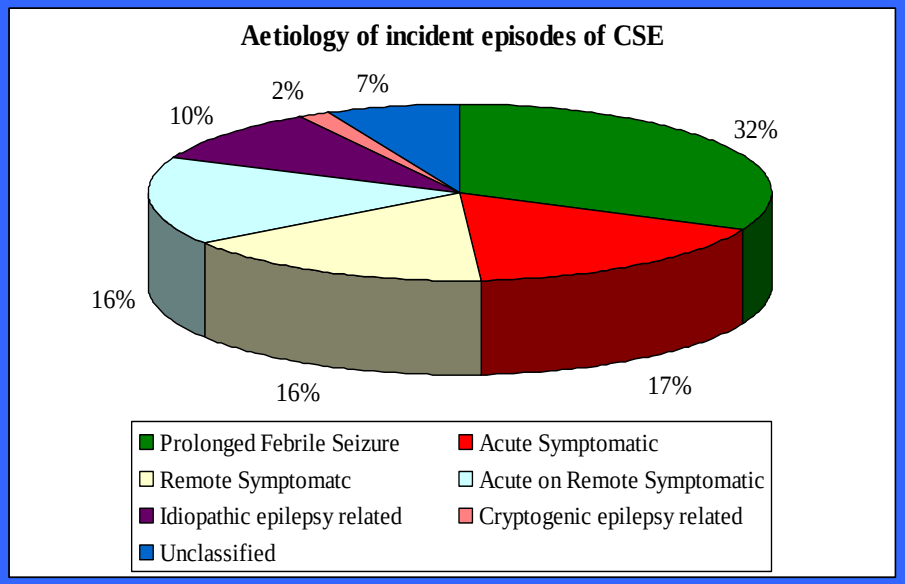


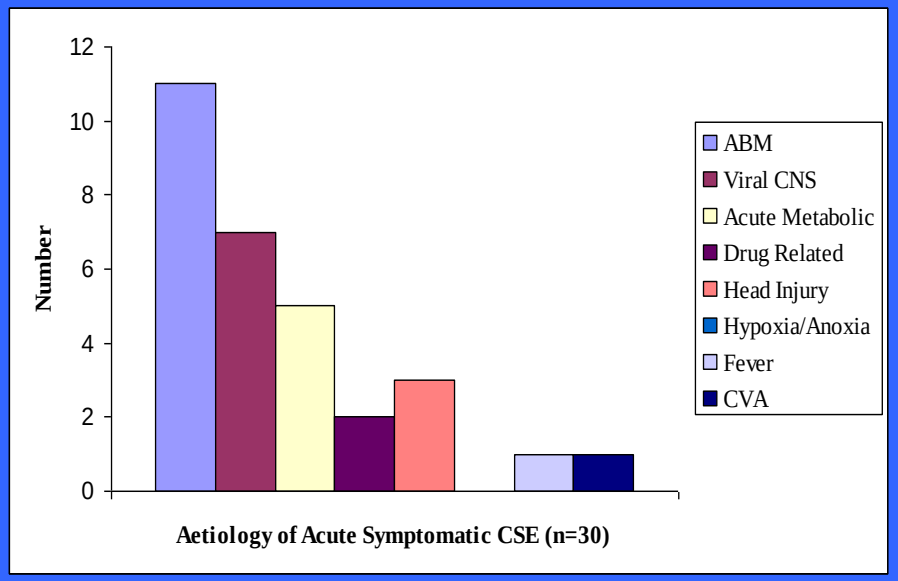
# Gender and age-specific incidence




NLSTEPSS
North London convulsive STatus EPilepticus in childhood Surveillance Study

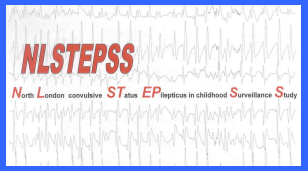
# Aetiology


Aetiology of incident episodes of CSE
2%
7%
10%
32%
16%
16%
17%
Prolonged Febrile Seizure
Acute Symptomatic
Remote Symptomatc
Acute on Remote Symptomatic
Idiopathic epilepsy related
Cryptogenic epilepsy related
Unclassified


Number
12
10
8
6
4
2
0
ABM
Viral CNS
Acute Metabolic
Drug Related
Head Injury
Hypoxia/Anoxia
Fever
CVA
Aetiology of Acute Symptomatic CSE (n=30)

# Incidence CSE with fever (n=95)

- Acute bacterial/viral CNS infection 19% (95% CI 11– 27%)
- 11 (12%, 95% CI 6-18%) had ABM
  - 6 males, median age 0.6 yrs (range 0.1-3.9 yrs)
  - Preliminary report *(Chin et al 2005)*
- 7 (8%, 95% CI 2-13%) had a viral CNS infection
  - 3 males, median age 1.2 yrs (range 0.6-8.7 yrs).
- Focal features more common with acute CNS infection than with PFC (8/18 vs 12/56 respectively, p = 0.06).



# Respiratory depression and doses of benzodiazepines

| Doses of Benzodiazepine | Respiratory Insufficiency No | Yes | Total |
|---|---|---|---|
| 1 or 2 | 50 | 29 | 79 |
| > 2 | 44 | 53 | 88 |
| Total | 94 | 82 | 176 |

*($\chi^2$ = 3.97, p= 0.046).*

# Pre-hospital treatment

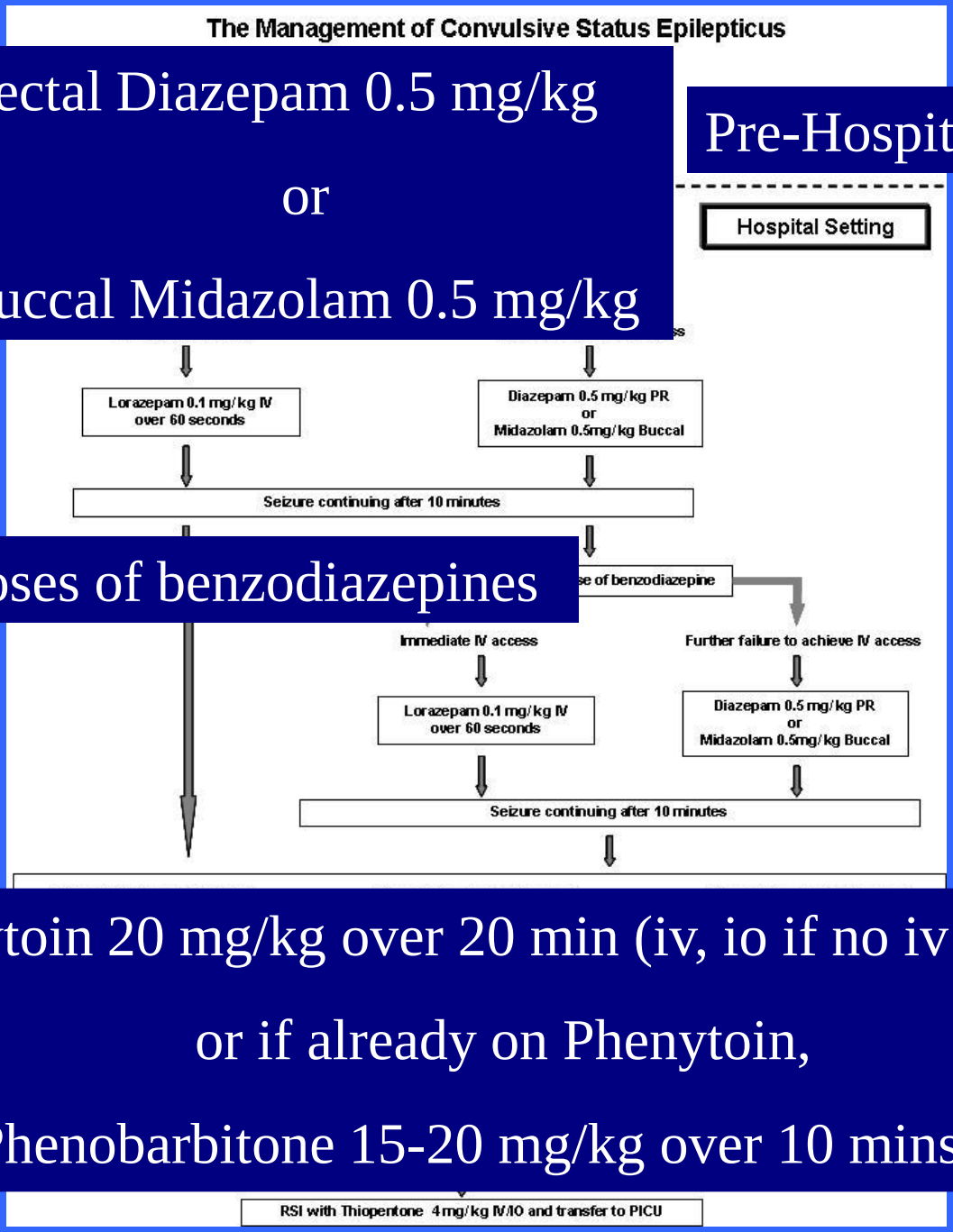
- Rectal diazepam (<20% appropriate treatment)
- Buccal midazolam
- Buccal lorazepam
- Nasal midazolam

Rectal Diazepam 0.5 mg/kg

or

Buccal Midazolam 0.5 mg/kg

Pre-Hospital Setting




2 previous doses of benzodiazepines

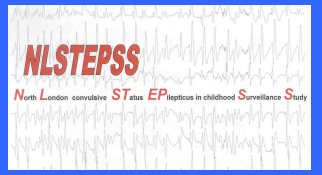
Phenytoin 20 mg/kg over 20 min (iv, io if no iv access)

or if already on Phenytoin,

give Phenobarbitone 15-20 mg/kg over 10 mins

# Summary

- 17-23/100,000/yr (?Genetic, socioeconomic influences)
- PFC most common cause
- CNS infection in ~ 20% of incidence CSE with fever
- IV lorazepam may be better 1st line than PR diazepam
- IV PHT may be better 2nd line than PR paraldehyde
- Intermittent CSE-common.
- Prehospital treatment important
- Limit number of doses of BZ to 2
- One year recurrence is 17%
- In hospital mortality = 3%



# Childhood Epilepsy

- 1 in 200 children with epilepsy
- 25% continuing seizures (75,000)
  - 30-50% learning and behavioural problems (25,000)
  - 10% serious developmental arrest psychiatric illness (7,500)
  - Mortality
- Similar numbers surviving to adult life

# The impairments of childhood epilepsy

- Seizures
- Cognitive arrest/regression
- Psychiatric illness
  - Mood disorders
  - ADHD
  - autism
  - Obsessive Compulsive Disorder
- Motor disorders
  - apraxia
  - dystonia
  - ataxia

# Lambeth Study of Children with Epilepsy

- 75/127 parents responded
- Quality of life was at least mildly impaired in 69%
- Quality of life was more greatly impaired in 36%
- 47-67% were disturbed on Rutter behavioural scales
- Quality of life impairment associated with learning and behaviour problems but impaired in some without learning problems

(Besag, Ross et al)

# Impairment in Childhood Epilepsy

- Primary disease, eg CP
- Secondary to epilepsy (epileptic encephalopathy
- A combination of the above

# Epileptic encephalopathy EE

- Persistent alteration in brain function caused by ‘epilepsy’ – clinical and subclinical
- High rate of subclinical discharges
- No change in MRI
- Recoverable or permanent
- Any functional domain
- A phenomenon not the whole syndrome

# Purpose of defining EE

- Full phenotypic description of a developmental epilepsy syndrome
- Wide range and severity of impairments
- Research into pathogenesis

  prevention

  treatment

  service provision

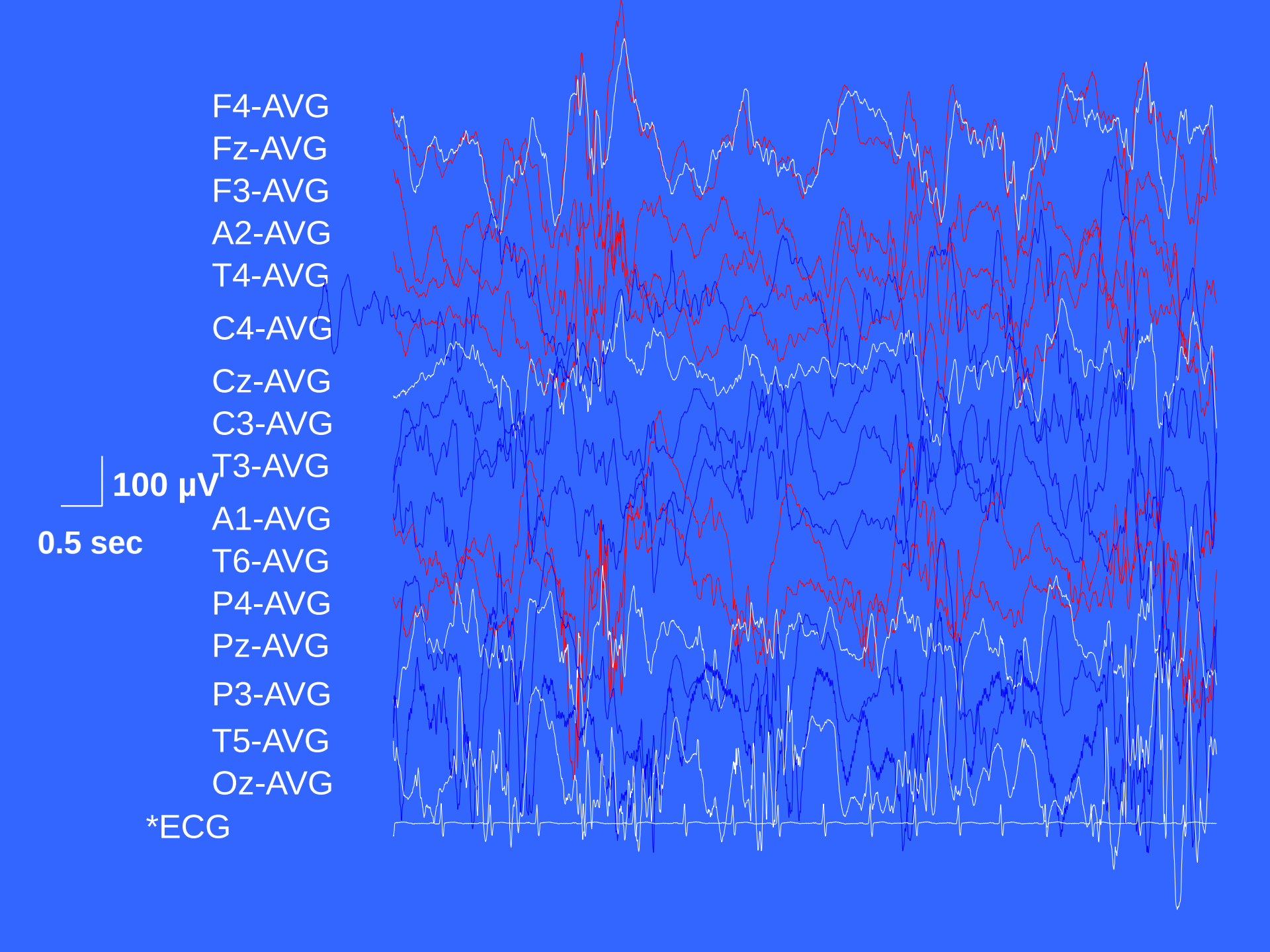
# Syndromes

- Infantile spasms
- Dravet
- Landau – Kleffner
- Benign Rolandic
- Early onset dysembryoplastic
- Lennox-Gastaut

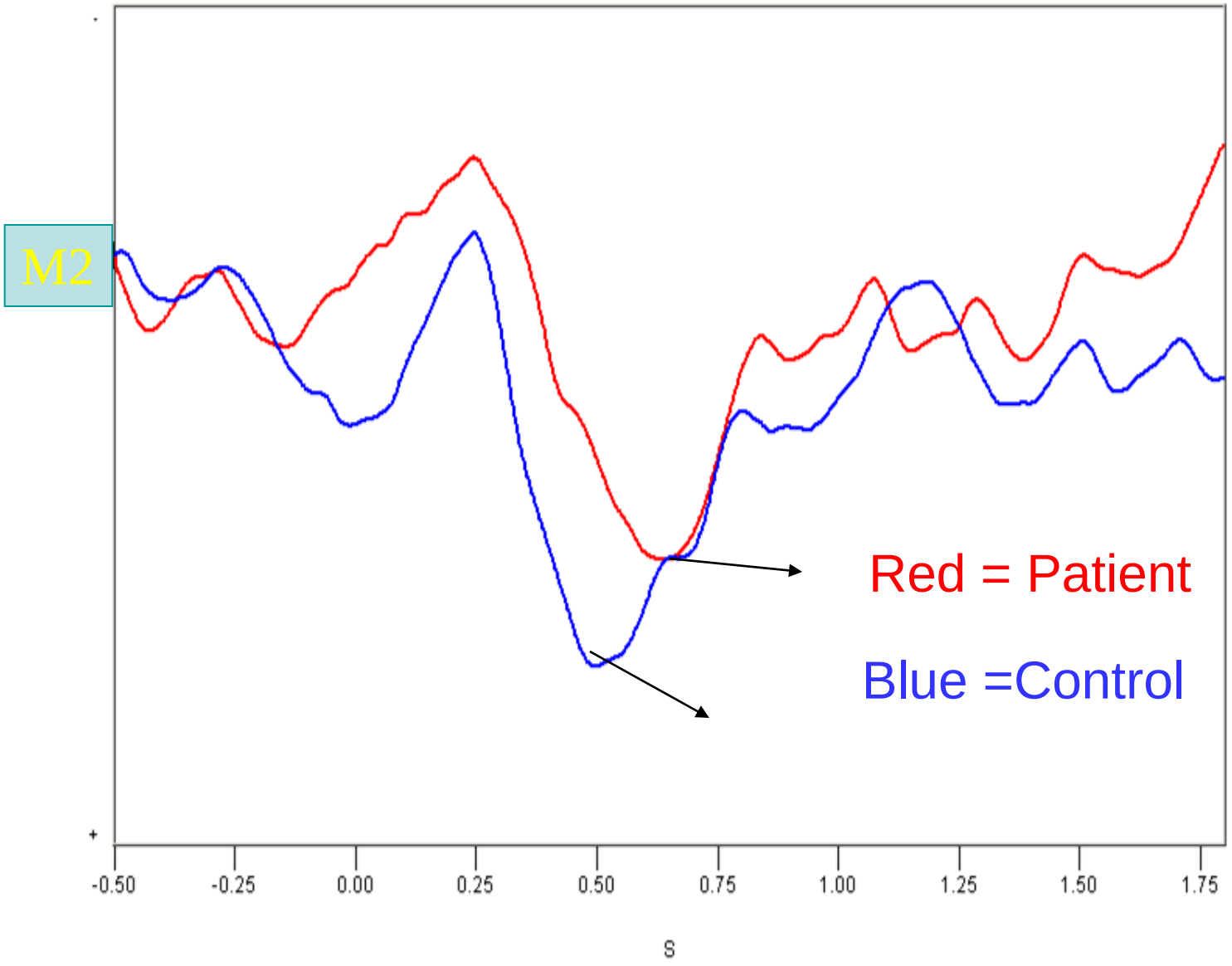
(high rate of sub clinical discharges)

# West Syndrome/Infantile Spasms

- Clusters of spasms
- Onset 3-7 months
- Developmental arrest/regression/deviance
- Hypsarrhythmia interictally
- 75-80%
  - mental retardation
  - continuing epilepsy
  - Autism spectrum disorder


F4-AVG
Fz-AVG
F3-AVG
A2-AVG
T4-AVG
C4-AVG
Cz-AVG
C3-AVG
T3-AVG
100 µV
A1-AVG
0.5 sec
T6-AVG
P4-AVG
Pz-AVG
P3-AVG
T5-AVG
Oz-AVG
*ECG

# Novelty P 500 component in sleep

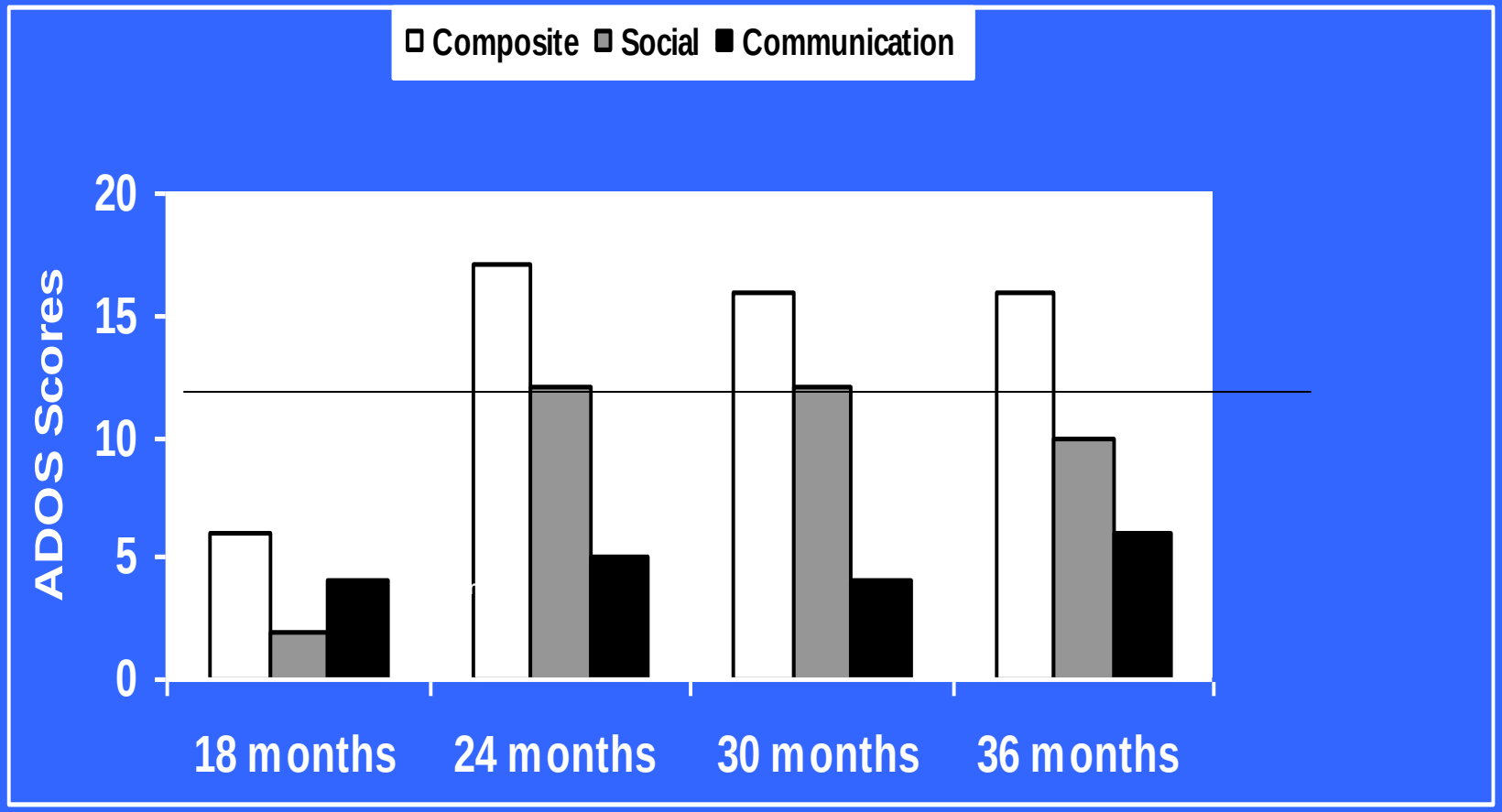


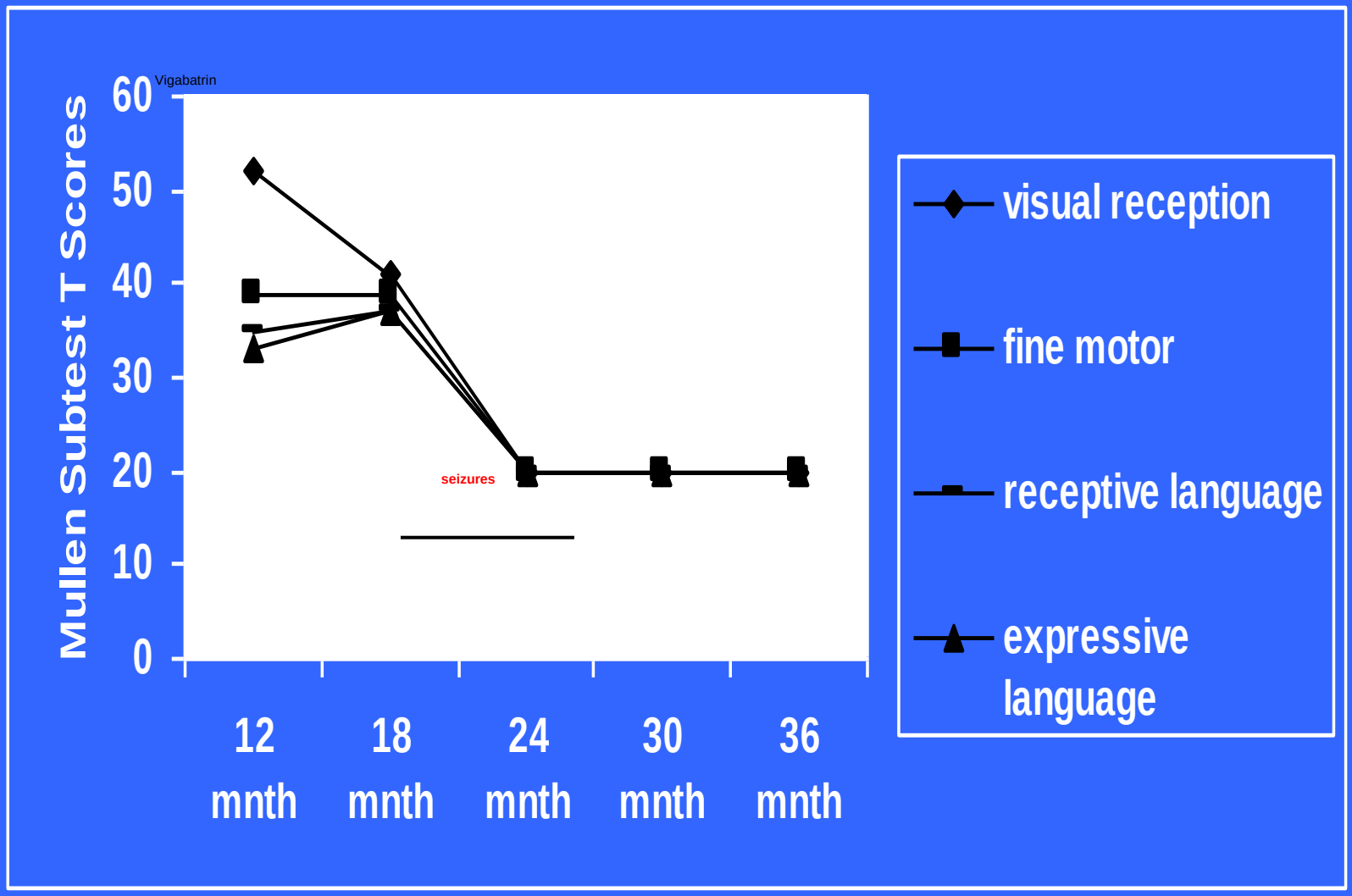
# TSC2

- 0.6 R.jerks/hypsarhythmia/vig.
- 0.7 EEG – N
  - 1.1 vig stopped
  - 1.9 partial sz./1.S.
    - Bilat S-W front-temp
    - AEDs. ineffective
  - 2.0 Regressed
    - Sz. Stopped with vig and pred.
  - 2.4 N.EEG
    - Remained regressed/autism

(Humphrey et al 2006)

# Figure 2. Autism Observation Schedule Scores and Mullen T Scores by Age and by Seizure History




Vigabatrin
Mullen Subtest T Scores
60
50
40
30
20
10
0
seizures
12 mnth
18 mnth
24 mnth
30 mnth
36 mnth
visual reception
fine motor
receptive language
expressive language

# Education

- Epilepsy is seen as a medical problem
- Autism

# Primary autism

Excess of epilepsy

Increases throughout childhood

32% (Herder 1993) 47% (Carod et al 1995)

40% (Billstedt) 8% mortality (epilepsy)

Girls 24% boys 11% (Tuchman et al 1991)

Normal IQ 8%  low IQ 21%

# Study:

- Standard management
- 3 tiered investigation:
  - 1. School
  - 2. psychology
  - 3. In patient assessment

(New SEN Procedure)

# Proposed assessments

Initial and final screening:

1. 4 questions (parents and teachers)
2. Strengths and difficulties questionnaire (SDQ)- a 25 +5 item screen for psychiatric disorder, behavioural and emotional problems including a broad screen for ADHD.
3. Global assessment of functioning (GAF) scale (15) – a DSM-IV 0-100 scale assessing overall child functioning at home, in school and with peers.
4. Quality of life in childhood epilepsy questionnaire (QUOLCE) (16) – a validated parent questionnaire for assessing the child's quality of life.

The whole battery of tests will take 45-60 minutes.

# Detailed assessment

5. Weschler abbreviated scale of intelligence (WASI) (17) - the best validated brief test of intelligence available.

6. Autism spectrum screening questionnaire (ASSQ) (Parents and Teachers) (18) – a 27-item well validated screening questionnaire for ASD.

7. ADHD Rating Scale-IV (ADHD RD-IV) (Parents and Teachers) (19) – a DSM-IV based 18 item scale now considered standard for a preliminary diagnosis of ADHD.

8. Developmental Coordination Disorder Questionnaire (DCD-Q) (20) – A 17-item validated parent questionnaire for the identification of motor difficulties in their child.

9. Children's Depression Inventory (CDI) (20) – the best validated instrument for making preliminary diagnosis of depression in children.

10. The Parent version of the Spence Children's Anxiety Scale (SCAS-P) (21) – the only validated screening instrument for anxiety disorder in children (7 years and over).

# What is required in school

1. Seizure description and action required
2. Cognitive abilities/management e.g. processing speed memory.
3. Behavioural diagnosis/management.
4. Interaction of 1. on 2. and 3.
5. Support - psychology
   - mentoring

# Perceptions

- paediatricians are variably trained in behavioural disorders
- child psychiatrist are largely not trained in paediatrics or neurodisability (including epilepsy)
- child psychiatry is usually too slow, too selective and separated from the rest of services
- child psychiatry is often found to be “intrusive” and not relevant

# Causes of Problems

- Separation of training and business management
- lack of recognition of comorbidities
  - –occurrence
  - –assessment
  - –treatment
- lack of brain/behaviour research
  - –non-biological ICD
  - –primary
  - –community management
- cult of non-diagnosis

# Psychiatrists and Paediatricians Working Together Justification (2003)

- Early onset brain disease: very commonly has a behavioural component
- behavioural components are the commonest continuing concerns in parent support groups
- often highly treatable
- never on a stable platform
  - i.e. you ‘sort out’ the epilepsy, then we will see what we can offer
- multiple impairments managed by paediatricians
- parents, children, nurseries, schools, social services expect an integrated service

# Paediatric Epilepsy Service

- The proposal
  - Primary configuration of model of care
    - Managed clinical network - brings together professionals across different sectors
    - A well defined clinical pathway
    - Appropriate guide-lines for each step in the pathway

# Families want

- Availability
- Expertise
- Someone they know and trust
- A system that links all aspects of their lives.
    - education
    - health
    - home support
    - finance