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DEFINITION OF EEG

EEG frequency bands - the rhythmicity of EEG signals gives a means of quantitatively describing EEG records, because the frequency of a rhythm can be measured. EEG frequencies are conveniently classified into the following ranges or bands:

- Delta - less than 4 Hz
- Theta - 4 to less than 8 Hz
- Alpha - 8 to 13 Hz
- Beta - more than 13 Hz

Alpha frequency and alpha rhythm - Although frequencies in the range of 8-13 Hz are referred to as alpha, the true alpha rhythm as defined by Chatrjan et al (1974) has the additional properties of being, 'Most prominent in the posterior areas, present most markedly when the eyes are closed and disappears on eye opening.'

SPECIFIC WAVE FORMS

K Complex

A transient complex wave form consisting of slow waves sometimes associated with sharp components and often followed by a sequence of waves of about 14 Hz. The amplitude is very variable but usually about 200 Hz (Roth, Show and Green, 1956).
**Spike**

A transient wave, clearly distinguished from background activity, with pointed peak at conventional paperseeds and a duration of from 20-30 milli seconds.

**Sharp Wave**

A transient clearly distinguished from background activity with pointed peak at conventional paperseeds and duration of 80-200 milli seconds.

**Spike and Wave Rhythms**

A sequence of surface - negative slow waves usually with a frequency of 2.5 to 3.5 Hz having a spike associated with each wave. Sometimes these are several spikes in each complex which is then called a polyspike and wave complex. The amplitude may attain 1000 microvolts (Chatrian, Somasundaram and Tassinari, 1968).

**Sleep Spindle**

An episodic rhythm at about 14 Hz maximal over the frontomcentral regions occurring during certain stages of sleep. The amplitude varies up to about 50 Hz.

**Vertex Waves**

A sharp potential maximal at the vertex negative in relation to other areas, occurring apparently spontaneously during sleep or in response to a sensory stimulus during sleep or wakefulness. The amplitude is very variable, but may attain 300 microvolts in children during sleep (Gastaut, 1953).
DESCRIBING THE EEG RECORD

Before beginning to describe an EEG record it should first be looked through quickly and a mental note made of the major features. The record is then described in chronological sequence in terms of the following features:

1. The most persistent rhythmical feature - this might be the alpha rhythm.

2. Other rhythmical features, such as - delta, theta or beta rhythms.

3. Describe features of relatively long duration such as - an episode of spike and wave activity.

4. Discrete features of relatively short duration, such as isolated spikes or sharp waves.

5. The activity remaining when all the previous features have been described - sometimes called the background activity.
Appendix II

EEG Electrodes and Electode Placement

Electrodes
Electrodes are used to make connection between the conducting fluid of the tissue in which the electrical activity is generated and the input circuit of the amplifier. Types of electrodes are scalp electrodes, sphenoidal electrodes, nasopharyngeal electrodes, electrocorticographic electrodes and intracerebral electrodes.

Scalp electrodes are of following types - the pad electrode is made of silver rod belted out at the end and padded with sponge. Metal disc or cups are commonly used. They are attached to the scalp with an adhesive. Needle electrodes of platinum alloy or stainless steel are sometimes used (but have inferior recording characteristic).

ElectrodE Placement
The majority of laboratories use the electrode placement recommended by the International Federation of Societies for Electroencephalography and Clinical Neurophysiology known as the 10-20 system. The initial description was given by Jasper (1958). It is stated that "Anatomical studies should be carried out to determine the cortical areas most likely to be found beneath each of the standard electrode positions in the average subject. The 10-20 system is based upon measurements from and standard points on the head, the nasion, the inion and the left and
right pre-auricular points. Two other points are also present $F_p$, and $C_s$. The position of all the electrodes are marked by a skin marking pencil prior to their application. The measurements are made with a tape measure or pliable rule as follows:

1. Measure the distance from Nasion to inion along the midline through the vertex and make a preliminary mark at the mid point $C_m$.

2. This is also the midpoint between the line drawn between the presuricular points (i.e. just anterior to the tragus).

3. Reapply the tape along the midline through $C_s$ and mark points at 10, 20, 20, 20 and 10% of the total nasion-inion distance. These are positions of $F_p, F_s, C_s, F_a$ and $C_m$.

4. Reapply the tape transversely through $C_s$ and mark points at 10, 20, 20, 20, 20 and 10% of the total distance between the pre-sauricular points. These are the positions of $T_1, C_3, C_2, C_4$ and $T_4$. Note that the odd numbered positions are always on the left.

5. Measure the distance between $F_p$ and $C_s$ by applying the tape along the great circle passing through $T_3$ and mark points at 10, 20, 20, 20, 20 and 10% of this length. These are the positions of $F_p, F_7, T_3, T_5$ and $C_1$. 
6. Repeat this procedure on the right side and mark the positions of Fp2, P8, T4, T6 and S2.

7. Measure the distance between Fp1 and C1 by applying the tape along the great circle passing through C3 and marks points at 25% intervals. These give the positions of F3, C3 and F3.

8. Repeat this procedure on the right side and mark the positions of F4, C4 and F4.

9. Check that F7, F3, F2, F4 and F8 are equidistant by applying the tape transversely along the great circle passing through F7, F3 and F8.

10. Check that T3, P3, F5, F6, F4 and T6 are equidistant in a similar manner.
CLINICAL AND ELECTROENCEPHALOGIC STUDY OF EPILEPSY
IN HUNDELEND

Case No.

1. Name:
2. Age/sex:
3. Occupation:
4. Marital status:
5. Address:
6. Date of contact:

7. Age when seizure started (in years):
   0 = 5
   6 = 10
   11 = 20
   21 = 30
   31 = 40
   41 = 50
   50+

8. Frequency of seizures:
   Yearly:
   Monthly:
   Weekly:
   Daily:
   More than once a day:

9. Pre-disposing and Antiological Factors:
   Not known
   Febrile convulsions
   Birth injury with Anoxia
   Inflammatory brain disease
   Vascular lesions
   Head injury
   Intra-cranial space occupying lesions

10. Family History of Epilepsy:
    Negative:
    Positive (Specify):

11. Precipitating factors:
    Sleep
    Sleep Deprivation
    Fatigue
    Light
    Menstruation/pregnancy
    Exposure to heat or cold
    Alcohol
    Emotional upset
    Any other
13. **Clinical Features**

I. Type of seizure:
   a. Generalized: Tonic-clonic
      - Tonic
      - Atonic
      - Absence (Petit mal)
      - Atypical Absence
      - Myoclonic
   b. Partial (Focal)
      a. Simple partial - (without impairment of consciousness)
      b. Complex partial - (with impairment of consciousness)
   c. Partial seizure secondarily generalized.
   d. Unclassifiable:

II. Tonic-clonic Seizures (Details of events)
   a. Preconvulsive symptoms:
      - Irritability/Depression/Abnormal feeling
      - Related to head/giddiness/sudden myoclonic
      - Sickness/others
   b. The Aura - Sensory
      - Psychosensory
      - Emotional
      - Autonomic
   c. The convulsions:
      - Epileptic Cry
      - Consciousness
      - Tonic spasm
      - Clonic phase
   d. Post convulsive phase:
      - Consciousness
      - Headache
      - Mental symptoms
      - Neurological deficit
III. Detailed Description of Seizures other than tonic-clonic seizures.

Drug History:

14. **Physical Examination**
   
   A. Neurological Examination
      
      a. Higher Psychological Functions.
      
      b. Cranial Nerves:
      
      c. Motor System:
      
      d. Sensory System:

15. **Investigations**
   
   Blood - V.B.L. (Reactive/Non-reactive)
      
      - Blood sugar:
      
      - Serum Calcium:
   
   X-ray: skull
   
   X-ray: Chest PA View:
   
   Fundus Examination:
   
   C.S.F. Examination: Normal/Abnormal
   
   E.E.G.: Normal
      
      Abnormal - Spikes
      
      - Sharpwaves
      
      - Slow waves
      
      - Spikes and waves
      
      - Polyspikes and waves
      
      - Polyspikes
      
      - Phase reversals
      
      - Constant/paroxysmal

CAT Scan:

Drug Treatment: