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APPENDIX - I

DEFINITION OF WAVES

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 Chezria 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.

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X. SWEEVE

A transient complex wave form consisting of slow waves sometimes associated with sharp components and often followed by a sequence of waves of about 16 Hz. The amplitude is very variable but usually about 100 µv (Roth, Shaw and Green, 1996).
**Spike**

A transient wave, clearly distinguished from background activity, with pointed peak at conventional paper speeds and a duration of from 20-60 milli seconds.

**Sharp Wave**

A transient clearly distinguished from background activity with pointed peak at conventional paper speeds and duration of 20-300 milli seconds.

**Spike and Wave Rhythm**

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 there are several spikes in each complex which is then called a polyepilept and wave complex. The amplitude may attain 1000 microvolts (Chatrian, Guérin and Tessier, 1962).

**Sleep spindle**

An episodic rhythm at about 14 Hz maximal over the mesencephal regions occurring during certain stages of sleep. The amplitude varies up to about 30 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 (Constant, 1983).
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 rhythmic feature - this might be the alpha rhythm.
2. Other rhythmic 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 ELECTRODE 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 balled 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 $P_{ps}$ and $O_{y}$. 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 $C_{n}$.

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

3. Reapply the tape along the midline through $C_{n}$ and mark points at 10, 20, 30, 40 and 50% of the total nasion—inion distance. These are positions of $P_{ps}$, $P_{s}$, $C_{n}$ $P_{u}$ and $C_{u}$.

4. Reapply the tape transversely through $C_{n}$ and mark points at 10, 20, 30, 40, 50 and 60% of the total distance between the pre-auricular points. These are the positions of $T_{3}$, $C_{3}$, $C_{2}$, $C_{1}$ and $T_{4}$. Note that the odd numbered positions are always on the left.

5. Measure the distance between $P_{ps}$ and $C_{n}$ by applying the tape along the great circle passing through $T_{3}$ and mark points at 10, 20, 30, 40, 50 and 60% of this length. These are the positions of $P_{pl}$, $P_{7}$, $T_{5}$, $T_{6}$ and $C_{1}$. 
6. Repeat this procedure on the right side and mark the positions of P4, P3, P2, P1 and C2.

7. Measure the distance between P1 and C1 by applying the tape along the great circle passing through C3 and marks points at 25% intervals. These give the positions of P3, C3 and P2.

8. Repeat this procedure on the right side and mark the positions of P4, C4 and P4.

9. Check that P7, P3, P2, P4 and P6 are equidistant by applying the tape transversely along the great circle passing through P7, P3 and P6.

10. Check that P3, P6, P5, P4 and P6 are equidistant in a similar manner.
WORKING FORMULA

CLINICAL AND ELECTROENCEPHALOGRAPHIC STUDY OF EPILEPSY
IN BUNDALKHAND

Case No.

OPD/NRD No. EEC 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. Predisposing and etiological factors: 
   Not known 
   Febrile convulsions 
   Birth injury with anoxia 
   Inflammatory brain disease 
   Vascular lesions 
   Head injury 
   Intracranial 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)
   - Myoclonic Absence
   - Myoclonic

B. **Partial (Focal)**
   a. Simple partial — (without impairment of consciousness)
   b. Complex partial — (with impairment of consciousness)

C. **Partial Seizure Secundarily generalized**

D. **Unclassifiable**

II. **Tonic–clonic Seizures** (Details of events)

a. **Preconvulsive symptoms**
   - Irritability/drowsiness/Abnormal feeling
   - Related to head/giddiness/sudden myoclonic
   - Triches/others

b. **The Auras — Sensory**
   - Psycho-sensory
   - Emotional
   - Asthenic

c. **The convulsions**
   - Epileptic Cry
   - Consciousness
   - Tonic stage
   - 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 - VITAL (Reactive/Nonreactive)
    - 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
    Abnormal - Spikes
    - Sharpwaves
    - Slow waves
    - Spikes and waves
    - Polysharp waves
    - Polyspike
    - Phase reversals
    - Constant/paroxysmal

CAT Scan:

Drug Treatment: