

Normal EEG variants

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Overview

- (1) Normal variants in different frequency ranges
- (2) Sleep patterns

The alpha variants

- Fast alpha variant
 - At a frequency twice that of normal alpha
 - Same distribution
 - Attenuation with eye opening
- Slow alpha variant
 - At a frequency half of normal alpha
 - “notch” appearance

Mu rhythm

- Arch-shaped waves at 7-11 Hz
- In trains of up to a few seconds
- Central or centroparietal region
- Younger adults
- Blocked by voluntary, reflex or passive movement, by the intention to move or tactile stimuli

Lambda waves, λ

- Sharp transients in the occipital regions
- Brought about by visual scanning e.g. looking at a picture with interesting subjects
- Probably represents visual evoked potentials
- The equivalent during sleep : POST

Breach rhythm

- Interhemispheric asymmetry
- Focal enhancement of amplitudes and over-expression of fast frequency activities
- Usually in the context of skull defect e.g. post-craniectomy

Wicket spikes

- Temporal minor sharp transients of old age
- Trains of spikes in mid-temporal area
- Best seen in light sleep
- Can be bilateral
- Monophasic, electro-negative, 6-11 Hz at 60-200 μ V
- To be distinguished from mu rhythm (location), 14&6 (positive), RMTD (flat-top), temp spikes

Rhythmic mid-temporal theta discharges (RMTD)

- Rhythmic sharply contoured theta waves 5-6 Hz
- Mid- temporal region
- In bursts of brief duration discharges
- Unilateral or independent in both mid-temporal region
- More pronounced during sleep

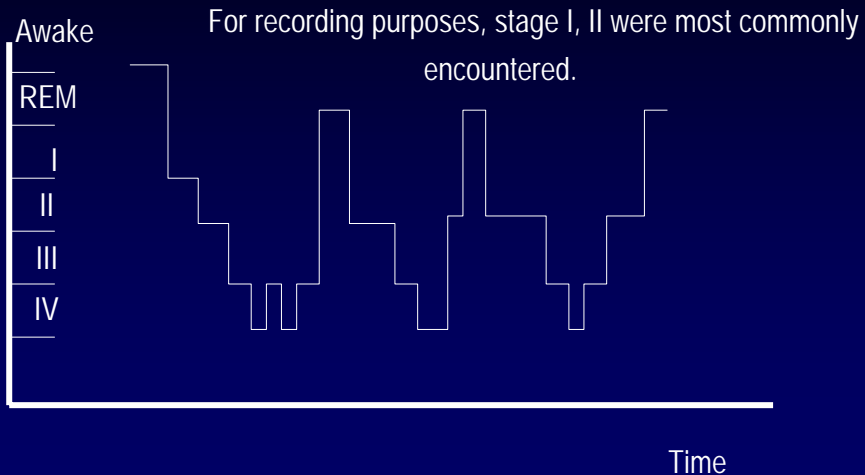
Subclinical rhythmic electroencephalographic discharge of adults (SREDA)

- Can be similar to RMTD
- Theta range and in temporal derivations
- Mostly occurs in wakefulness
- Mainly in elderly
- Has an onset, continuation and termination
- Resembles a subclinical temporal seizure except patterns not epileptiform
- Patient may cooperate with testing
- Rare

14/6 positive spikes

- Maximal in posterior quadrants
- Unilateral or bilateral
- Positive polarity
- Appears during drowsiness
- Best recorded with crossed ear references

Stages of sleep



Stage I sleep

- Slowing, fragmentation, disappearance of alpha and PDR
- Lower voltage
- Diffuse beta may appear
- In older patients theta and occasionally delta can be seen.
- Vertex sharps, POSTS

Stage II sleep

- Appearance of well-defined sleep spindles
- More prominent vertex sharps, sleep spindles, K-complexes, POSTS

Slow wave sleep (II and III)

- Increasing amount of delta activity
- ~50% of record taken up
- Progressive decline in sleep spindles

Hyperventilation

- Standard response ~ moderate to high voltage delta activities with bifrontal preponderance (although this is not always seen)

Photic stimulation

- Stimulation frequency programmable (e.g up to ~24 Hz)
- Photic driving – visual evoked potentials may appear to have the same frequency as stimulation frequency
- Photomyoclonic response – brief muscle contractions triggered in the eyelids.

Summary of normal variants

Alpha range	Beta	Theta	Delta	Sharps/spikes-like
Slow alpha variants	Breach rhythm	RMTD	glossokinetic	Lambda waves
Fast alpha variants		SREDA	FIRDA	Wicket spikes
Mu rhythm			Hyper-ventilation response	14/6 positive spikes
			Posterior slow waves of youth	Phantom spike waves

Summary of normal variants (2)

Better during sleep	Better during wakefulness	Young	Elderly
wicket	SREDA	Mu	wicket
14/6 positive spikes	Lambda (visual scanning)	Posterior slow waves of youth	SREDA
RMTD	Mu		

Summary (3)

Frontal	Temporal	Central	Occipital
hyperventilation	Wicket	Mu (motor strip)	POSTS
FIRDA	RMTD		lambda
glossokinetic	SREDA		Photic driving
photomyoclonic	14/6		Posterior slow waves of youth

References

- EEG atlas: e-medicine
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