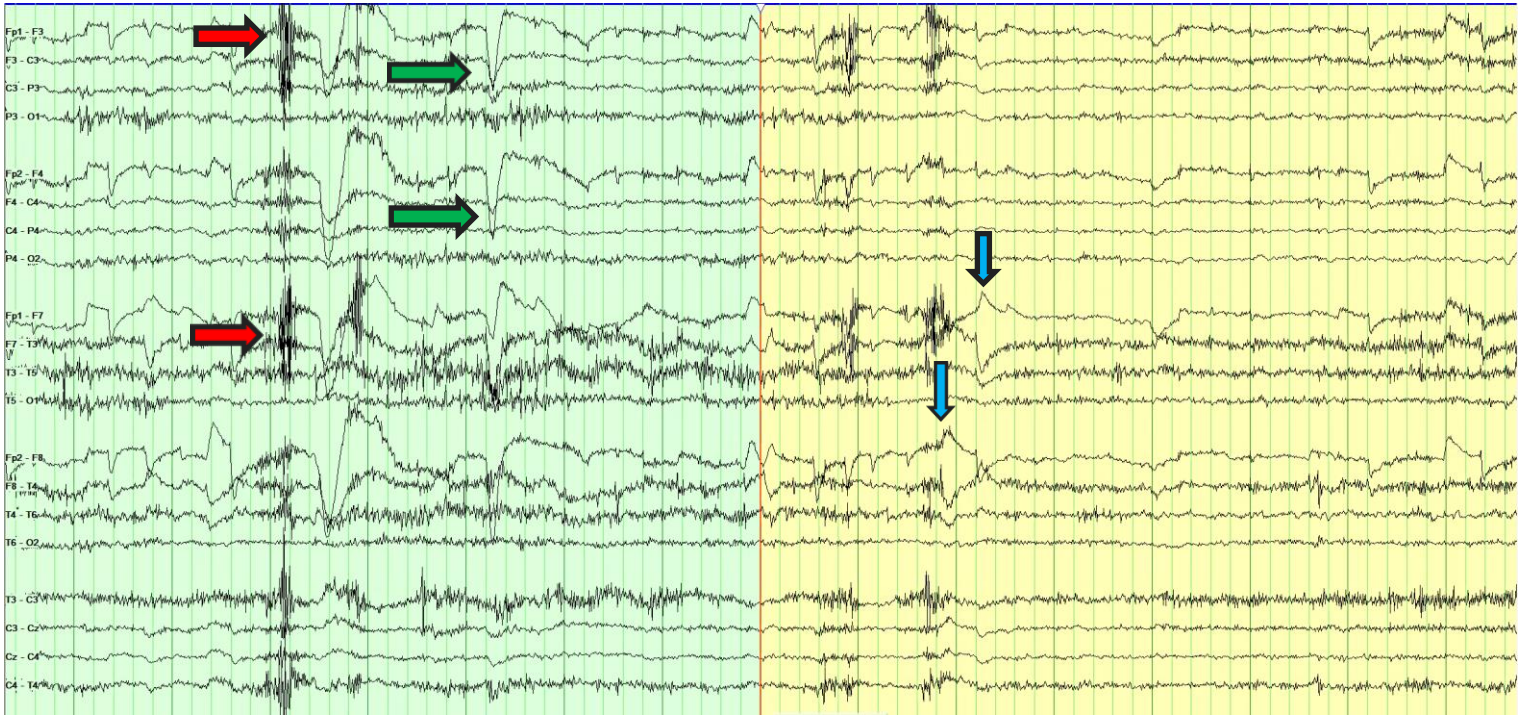
Test your EEG Knowledge

An EEG Practice Quiz for Rotating M4's

Created by Ehsaun Huff OMS IV

Q1. Is this an EEG strip of a person in an awake or sleep state?



Q1. Is this an EEG strip of a person in an awake or sleep state?

ANSWER: Awake state

-Note the uniformly distributed downward deflections in the frontal electrodes indicating eye blinking (see green arrows)

-You can also see the presence of lateral eye movements in the yellow section of the strip where there is opposite polarity in the opposite side of the scalp (note F7 and F8 electrodes) (see blue arrows)

-Additionally, the very high frequency (bolded) waves represent muscle activity (see red arrows)

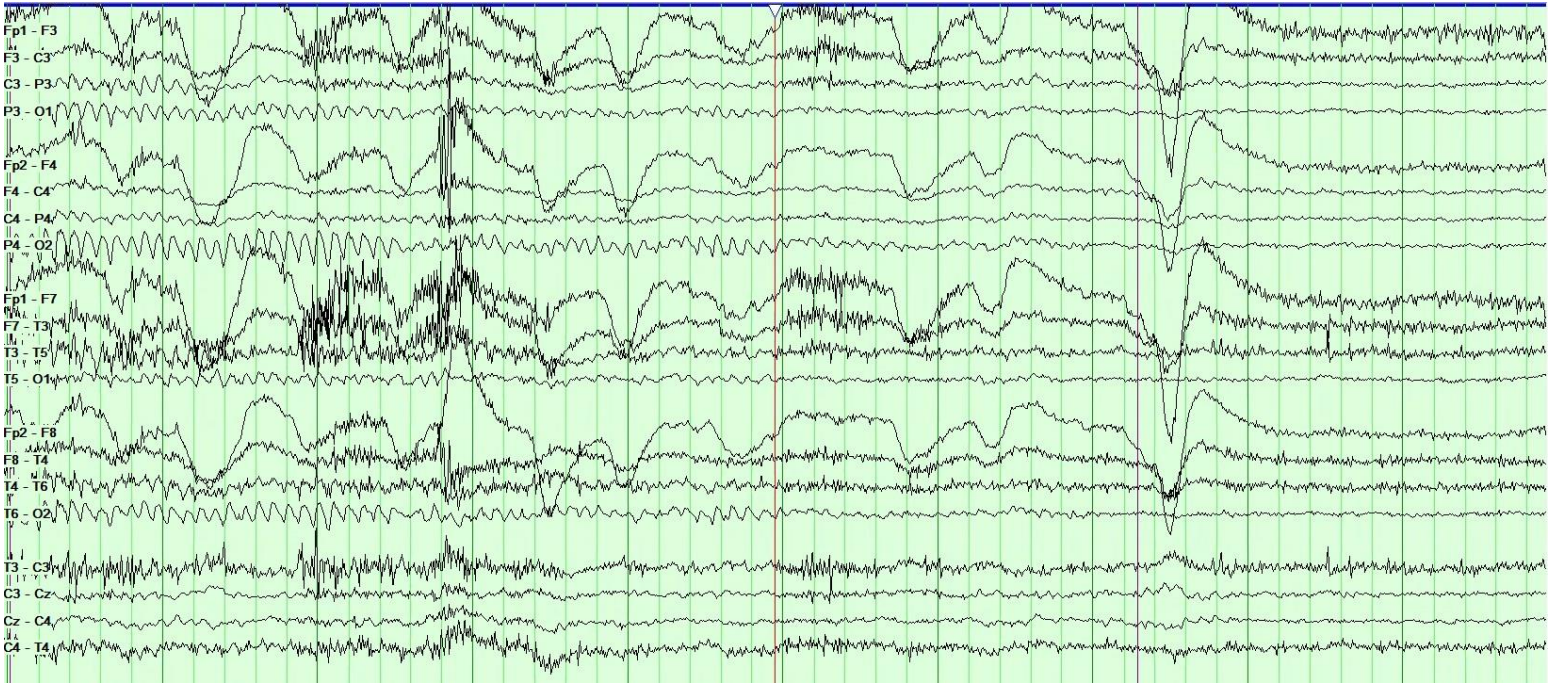
Q2. Identify what the orange arrows are pointing to.

Q2 Key

-ANSWER: Lateral Rectus spikes

-A lateral rectus spike is a short-duration spike overriding a slow wave during lateral eye movement, noted at the F7 and F8 electrodes.

Q3. What is the frequency of the Posterior Dominant Rhythm (PDR) in this strip?



Q3. What is the most likely frequency of the posterior dominant rhythm (PDR) in this strip?

a. 12 Hz
b. 10 Hz
c. 15 Hz
d. 6 Hz

Q3 Key

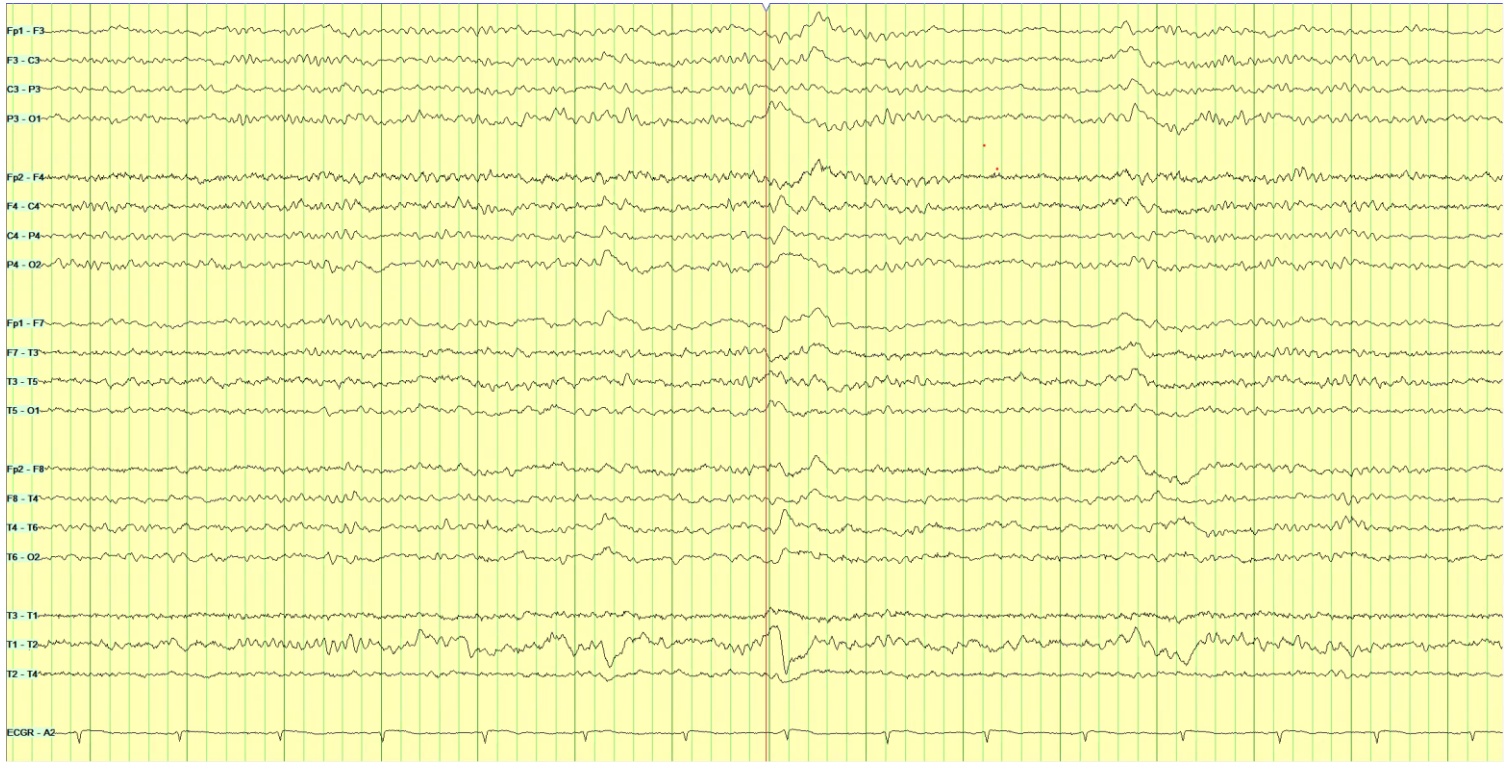
-The best answer here is **B**.

-A normal adult (age <= 65) PDR is characterized by a specific dominant frequency range of 8.5-13 Hz (alpha rhythm), in an awake state, predominantly posterior, and reactive to eye opening and eye closure. You can identify this frequency range by examining the amplitude and frequency of the waveform. Above age 65, a PDR of 8 Hz or more is considered normal.

-Identify the location of the posterior electrodes, best seen at O1 and O2

-Measuring the frequency in 02 in the interval specified by the red line, we can determine a frequency of roughly 10 Hz.

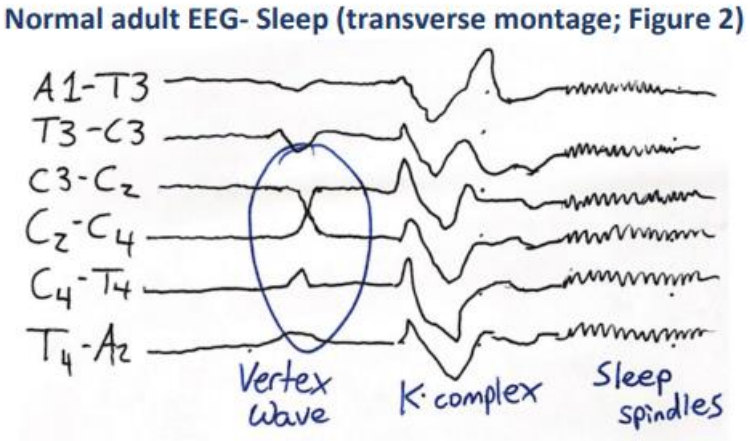
Q4. Is this an EEG strip of a person in an awake or sleep state?



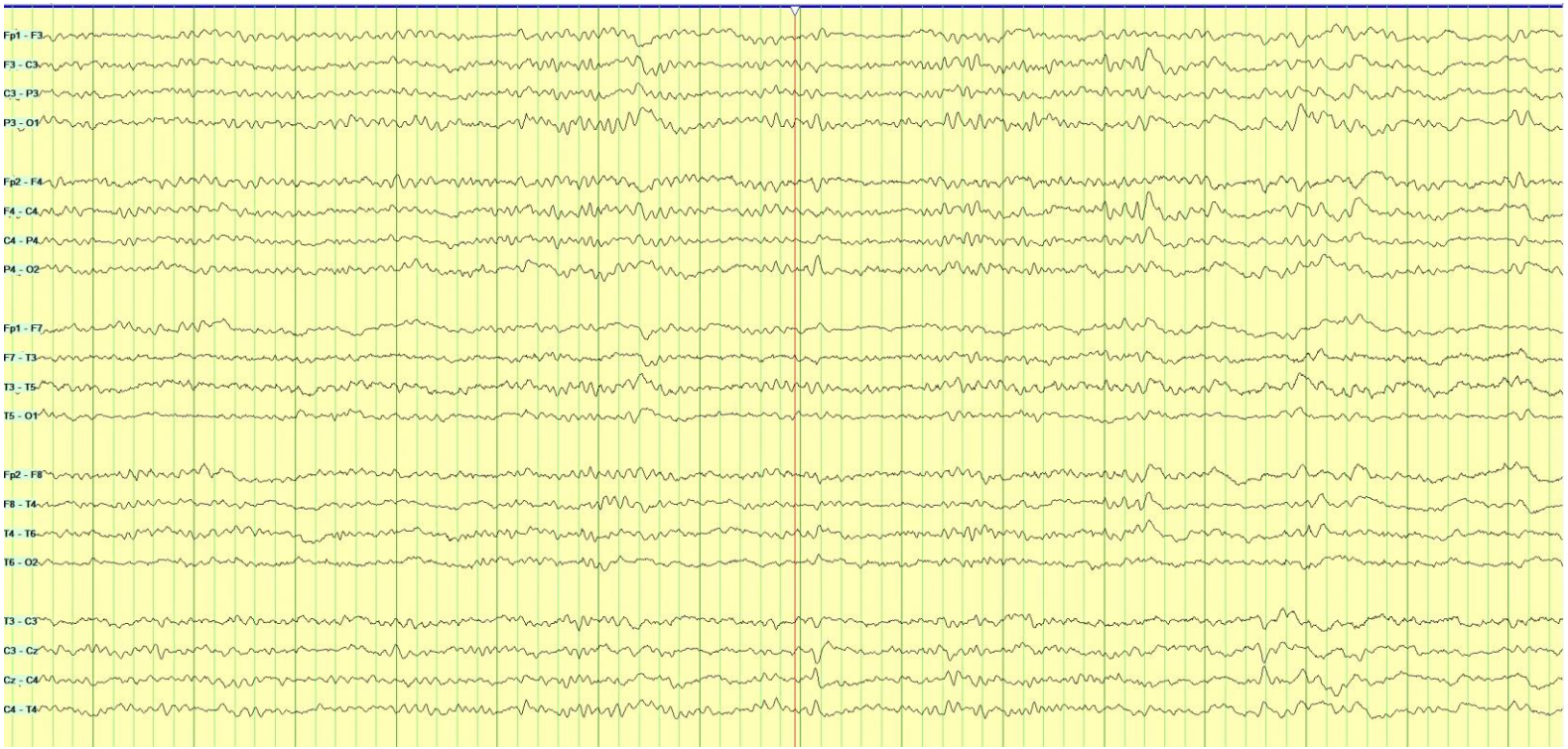
Q4. Is this an EEG strip of a person in an awake or sleep state?

ANSWER: Sleep state

-note the presence of sleep spindles and K complexes and the lack of any muscle activity



Q5. What is going on in the rhythm strips immediately after the red line marker?



Q5. What is going on in the rhythm strips in the interval signified by the red line marker?

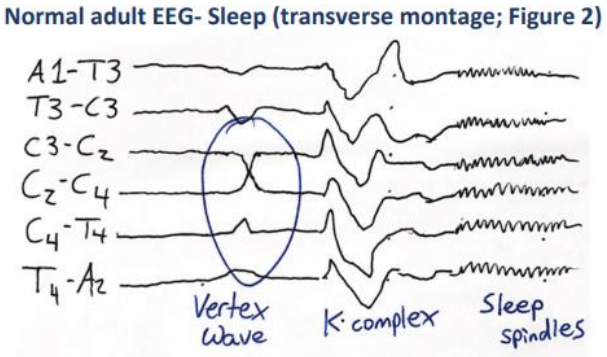
a. Epileptiform discharges
b. Myogenic artifact
c. Vertex waves
d. Lateral rectus spikes

Q5 Key

-The best answer here is **C**.

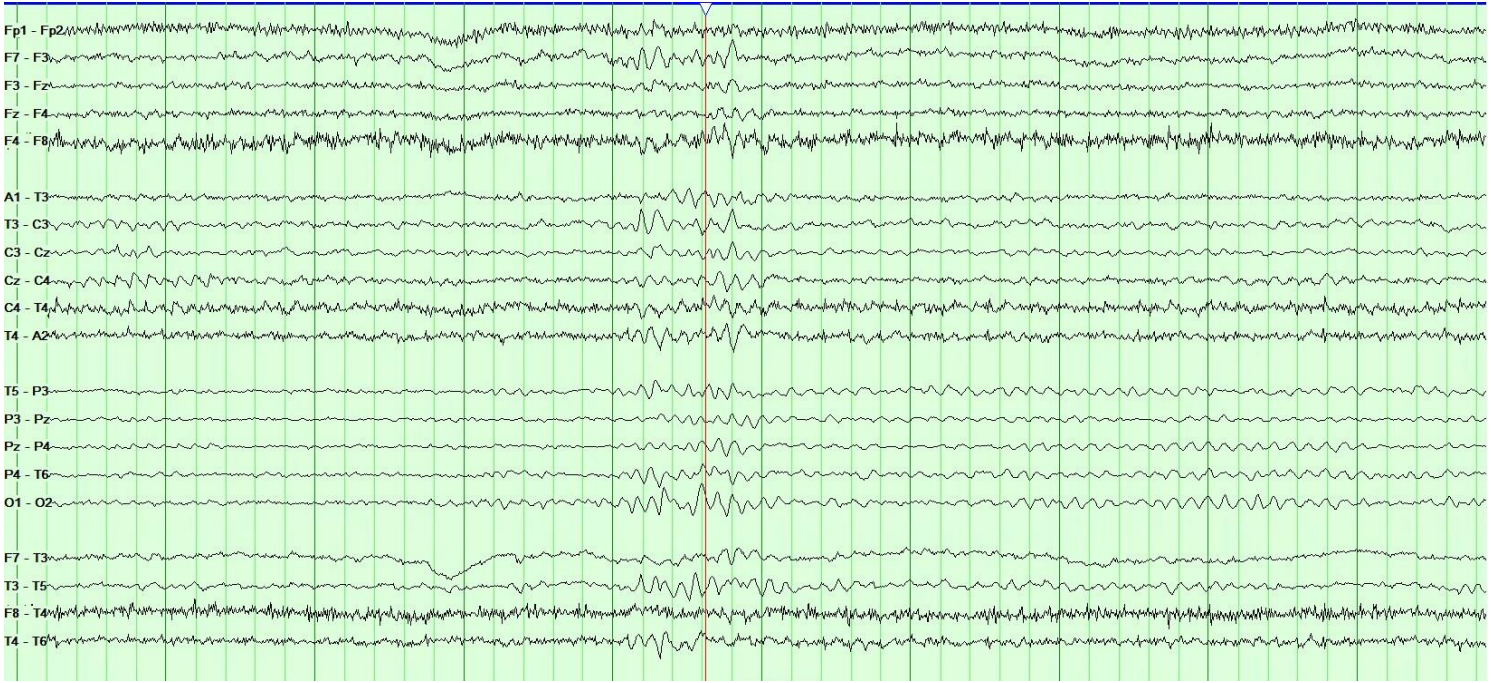
-Vertex waves are seen during sleep and are maximal in the central electrodes (e.g. Cz)

-We can determine that the EEG strip is during sleep due to the presence of the sleep spindles and the lack of a PDR or any eye movement. This coupled with the fact that we are seeing these waves in the central electrodes helps distinguish vertex waves from phase reversals.



-TIP: Transverse montage is ideal for evaluating sleep spindles, vertex waves, and K complexes

Q6. What is going on in the rhythm strips in the interval signified by the red line marker?



Q6. What is going on in the rhythm strips in the interval signified by the red line marker?

a. Epileptiform discharges
b. Myogenic artifact
c. Vertex waves
d. Sleep spindles

Q6 Key

-The best answer here is **D**.

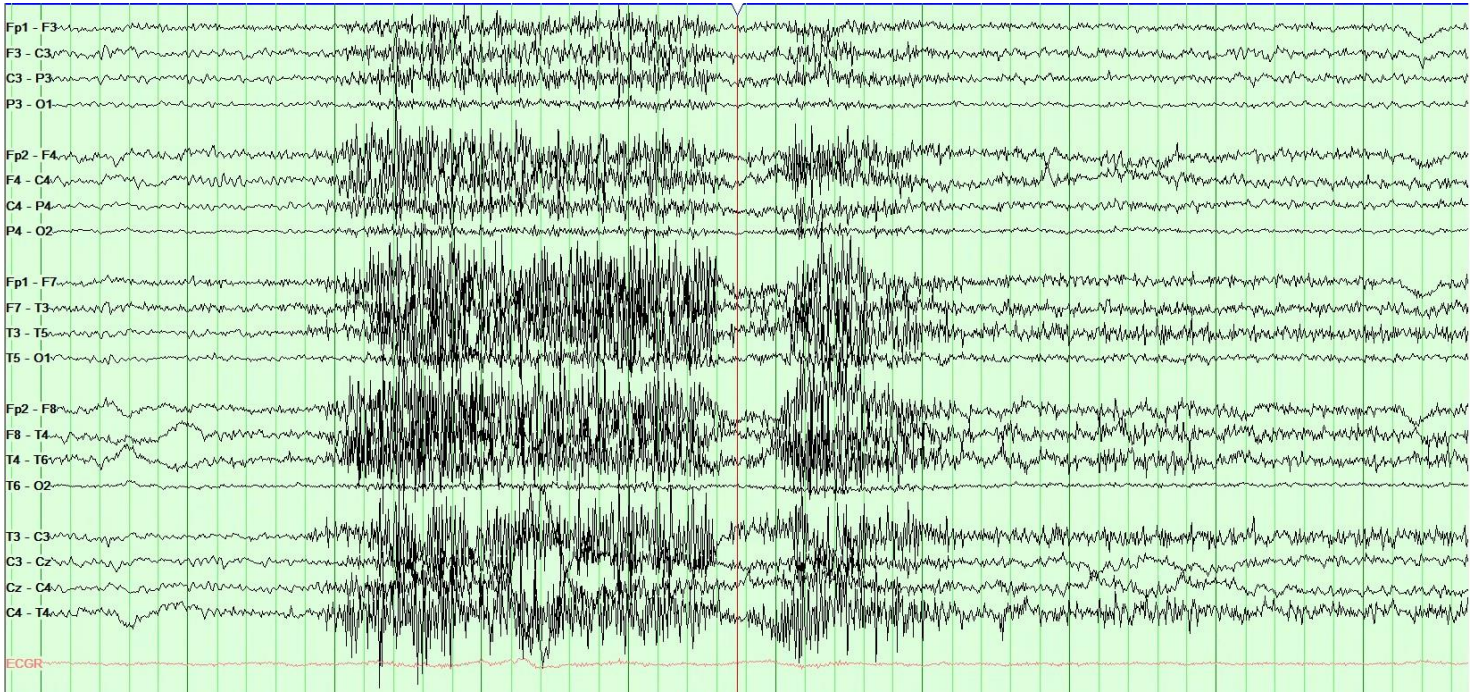
-Sleep spindles are characterized by a frequency of 11-15 Hz with a duration of 0.5 to 1.5s. They are of medium voltage and generally occur maximally in the central electrodes

-An abnormal appearance of spindles (**asymmetric**) occurs when the spindles are unilateral or predominantly occur on one side.

-Spindles that occur on both sides but not at the same time (**asynchronous**) are still considered normal.

-**TIP**: Transverse montage is ideal for evaluating sleep spindles, vertex waves, and K complexes

Q7. What is most likely going on in this EEG strip?



Q7. What is most likely going on in this EEG strip?

a. Epileptiform discharges
b. Myogenic artifact
c. Vertex waves
d. Sleep spindles

Q7 Key

-The best answer here is **B**.

-Muscle activity artifact typically appears on the EEG as high-frequency, low-amplitude waves or spikes. These artifacts are often irregular and may have a sawtooth-like appearance.

-The amplitude and frequency of the muscle activity artifact can vary depending on the intensity of muscle contractions.

Q8. What is going on in the rhythm strips in the interval signified by the red line marker?

Q8. What is going on in the rhythm strips in the interval signified by the red line marker?

a. Myogenic artifact
b. Sharp waves
c. Generalized spike-and-wave
d. Sleep spindles

Q8 Key

-The best answer here is **C**.

-These epileptiform complexes are generalized spike-and-wave discharges. They typically manifest as abrupt, sharp waves followed by slow wave activity with a frequency range of 2-4 Hz. They usually have a generalized distribution which was seen in the EEG strip. These are most seen in generalized epilepsy.

-Spike: The spike component of the discharge is characterized by a brief, sharp, and high-amplitude waveform. It appears as a pointed deflection that occurs rapidly and lasts for a very short duration, typically less than 70 milliseconds. The spike is often seen as a vertical or slanted line with a sharp peak.

-Wave: The slow wave appears as a broad, low-frequency waveform with a longer duration than the spike. It typically lasts for more than 200 milliseconds and often has a sawtooth-like appearance.

Q9. What is going on in this EEG strip?

Q9. What is the best answer?

a. Seizure activity Right hemisphere
b. Left hemisphere slowing
c. Right hemisphere slowing
d. Vertex waves
e. Sleep spindles

Q9 Key

-The best answer here is **C**.

-The background rhythm, which is the ongoing electrical activity seen in the EEG when the brain is at rest, appears slower (lower frequency) on the right side compared to the left. In this example, the slow wave activity is maximal in the right temporal > frontal regions.

-The normal background rhythm is typically in the alpha or beta (14-30 Hz) frequency range, but with slowing, it may show a shift towards slower frequencies such as theta (4-7 Hz) or even delta (0.5-3 Hz) waves.

-In this EEG, we can see that the right side of the brain is producing 2 Hz delta waves, whereas the left side of the brain is exhibiting a normal frequencies.

Q10. Identify the location of seizure activity if any

Q10. Identify the most likely location of seizure activity if any

a. Right hemispheric/lateralization
b. Left hemispheric/lateralization
c. Generalized seizure
d. No seizure activity

Q10 Key

-The best answer here is **A**.

-Note the presence of rhythmic small spikes and phase-reversals with evolution in the right hemispheric electrodes which are not equally seen in the left electrodes

Q11. Is there any signs of slowing in this EEG strip? If yes, what location.

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a. No signs of slowing
b. Left temporal slowing
c. Right temporal slowing
d. Diffuse slowing throughout
e. Left frontal slowing

Q11 Key

-The best answer here is C.

-Note the lower frequency (Delta) of the waves in the T4 – T6 and F8 – T4 electrodes compared to the frequency of waves in the T3 – T5 and F7 – T3 electrodes.

Q12. Is there any signs of slowing in this EEG strip? If yes, what location.

Q12. Is there any signs of slowing in this EEG strip? If yes, what location.

a. Generalized slowing
b. No slowing
c. Left hemisphere slowing
d. Right hemisphere slowing
e. Right temporal slowing

Q12 Key

-The best answer here is C.

-The left hemisphere slowing is maximal at F7, T3, T5. Note how the waves in these electrodes are much more broad compared to the corresponding electrodes on the right.

Q13. Is there any signs of slowing in this EEG strip? If yes, what location.

Q13. Is there any signs of slowing in this EEG strip? If yes, what location.

a. Generalized slowing
b. No slowing
c. Left temporal slowing
d. Left hemisphere slowing
e. Right hemisphere slowing

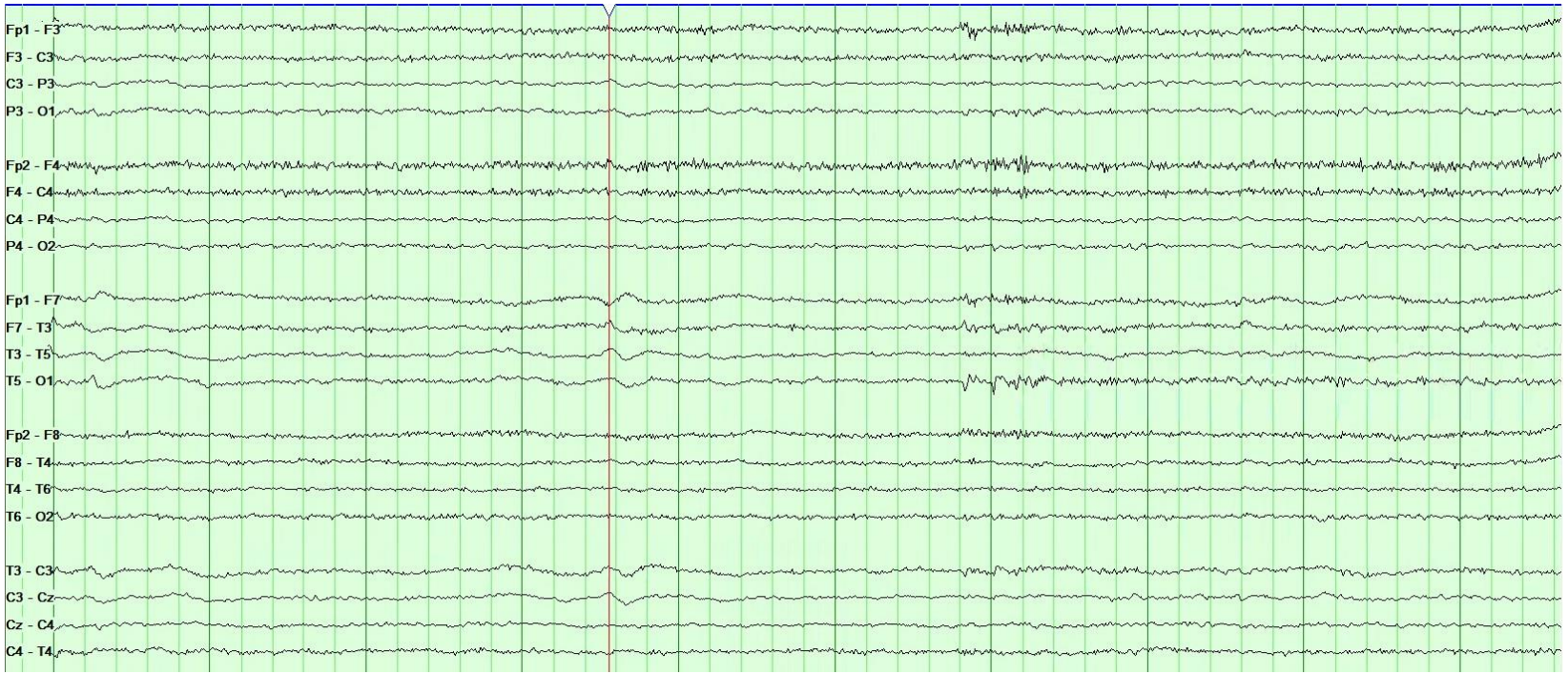
Q13 Key

-The best answer here is E.

-Note how the waves in the right electrodes are uniformly broad compared to the corresponding electrodes on the right.

-The slowing is maximal in the temporal region.

Q14. Identify the location of epileptiform activity if any



Q14. Identify the most likely location of epileptiform activity if any

a. Fp1
b. C3
c. Cz
d. F7 – T3
e. No seizure activity

Q14 Key

-The best answer here is **D**.

-Note the sharp contour phase reversal at F7 – T3

Q15. Identify any abnormalities in this EEG strip if any

Q15

a. Seizure activity Right fronto-centro-parietal region
b. Diffuse slowing besides the Right fronto-centro-parietal region
c. Generalized epileptiform activity
d. Right fronto-centro-parietal breach
e. Left fronto-centro-parietal breach

Q15 Key

-The best answer here is **D**.

-The breach rhythm is a benign EEG pattern often marked by an increase in the amplitude and frequency of alpha, beta, and mu rhythms in that region. It is usually caused by a skull defect (e.g. previous craniotomy). A key difference between a breach and a seizure is the lack of any evolution of the rhythm.