

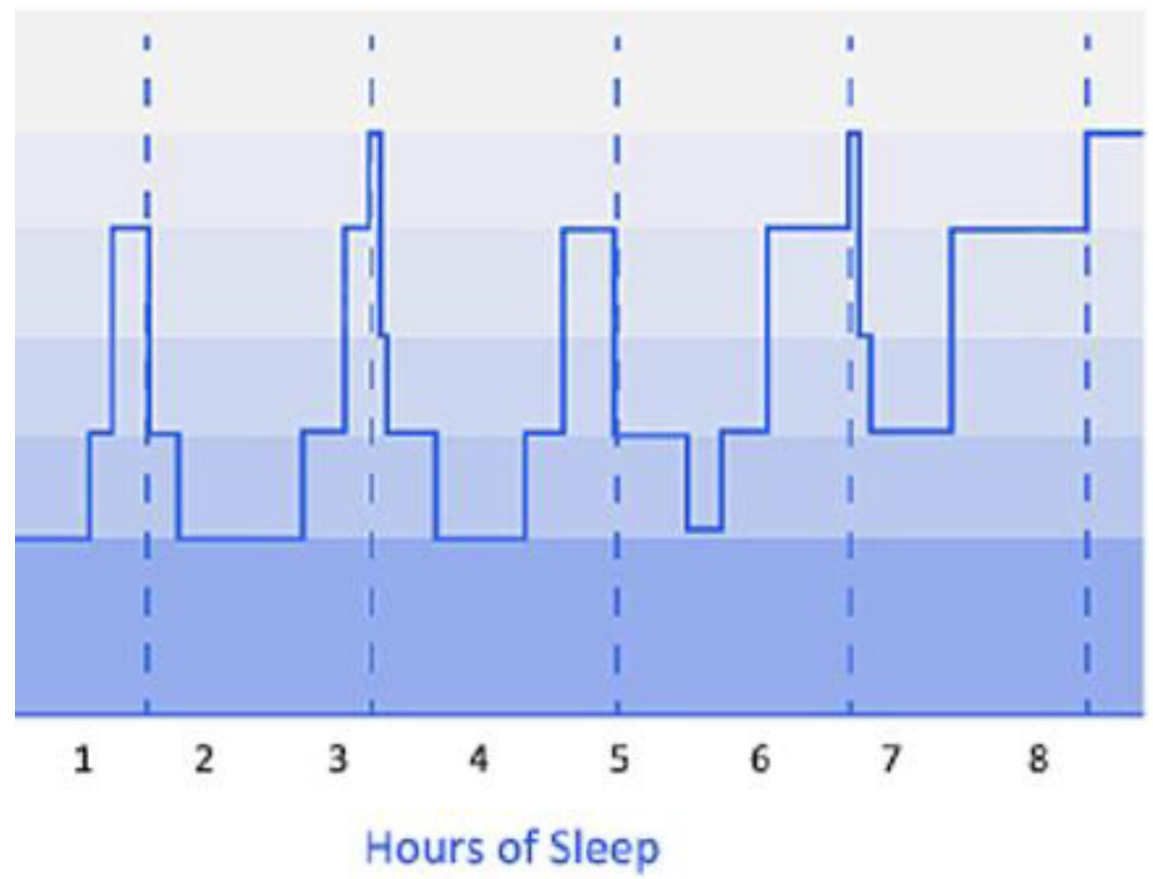
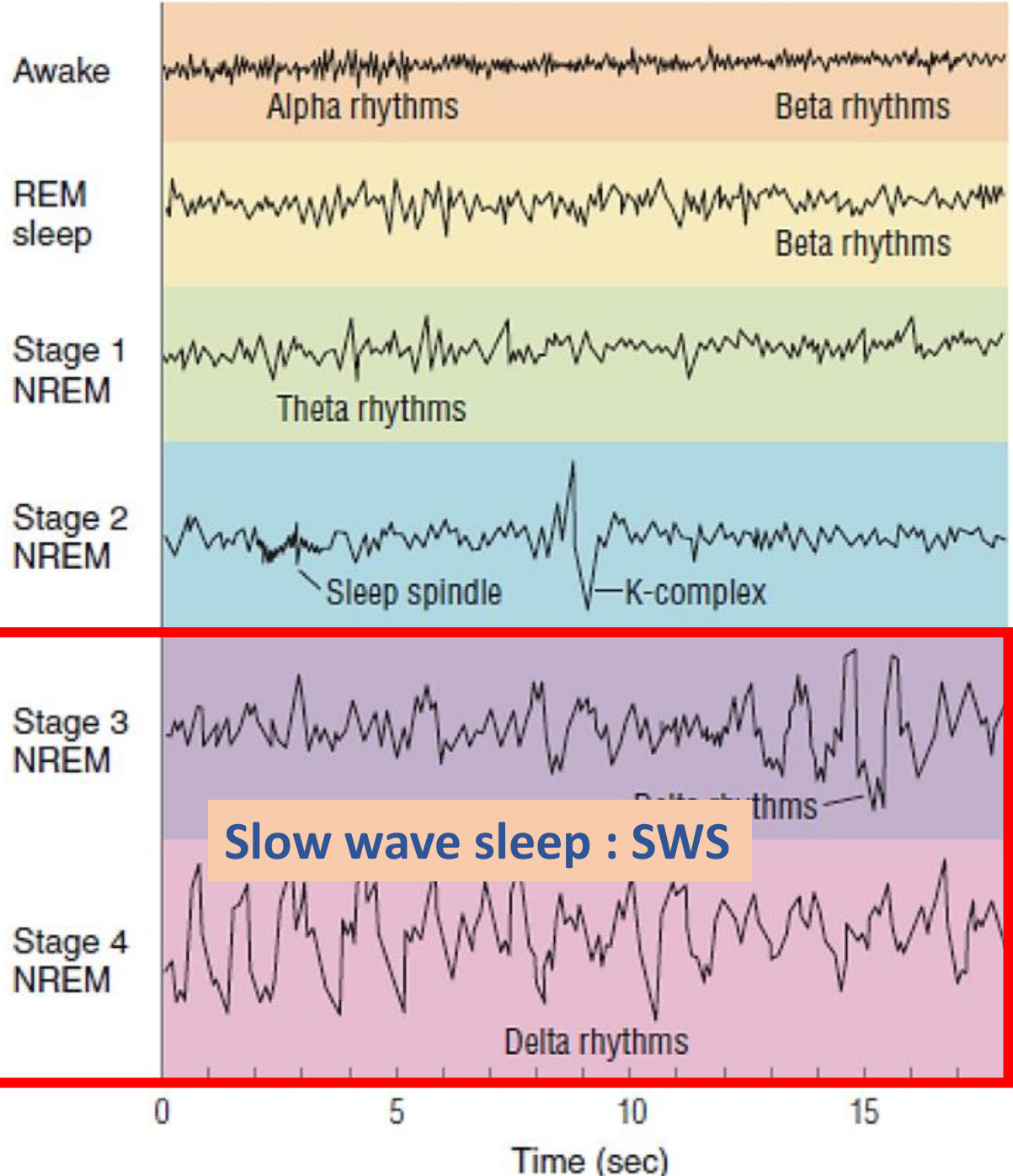
NORMAL SLEEP EEG

Thapanee Somboon, MD.

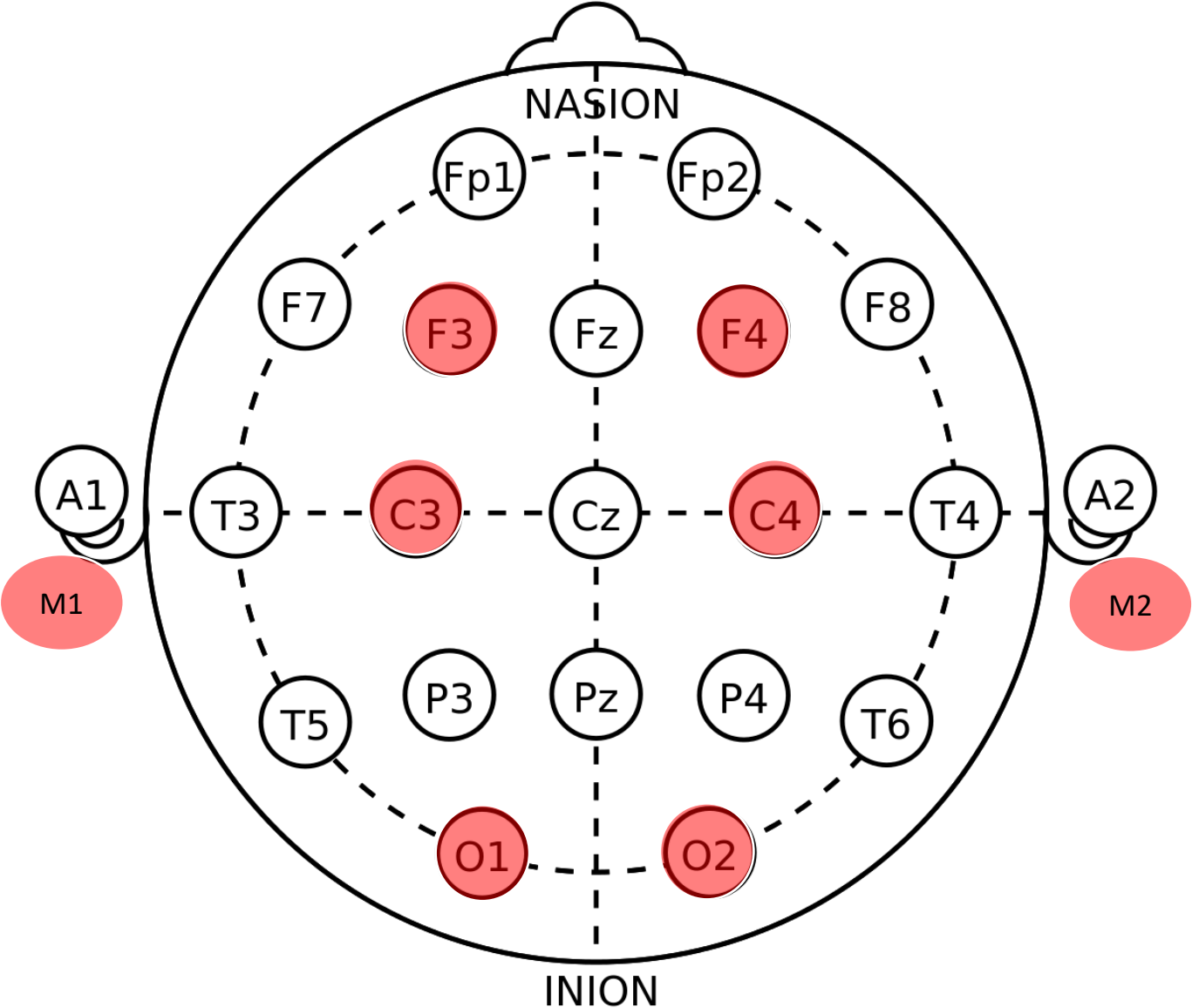
Adult neurologist, Epileptologist

International Sleep Disorder Specialist, WSS

Epilepsy Monitoring Unit, Neurological Institute of Thailand



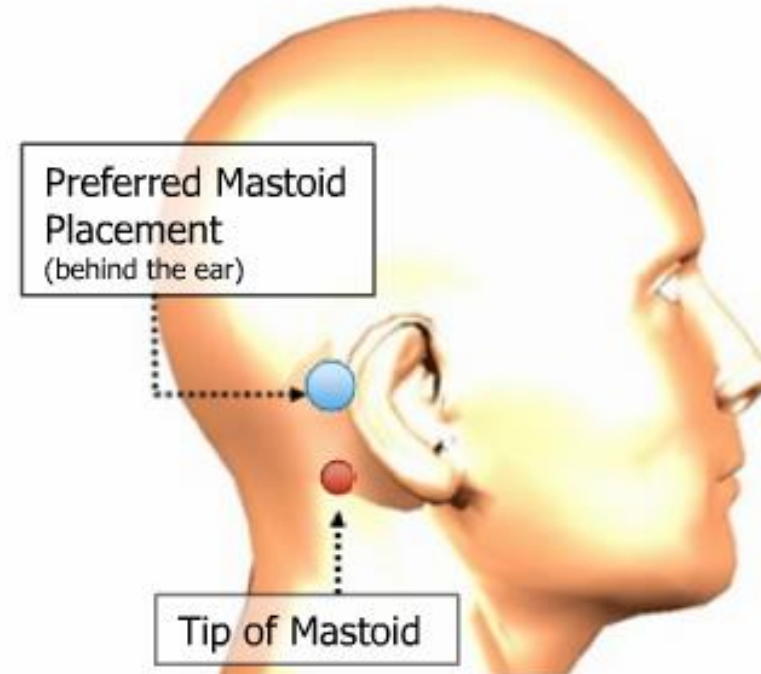
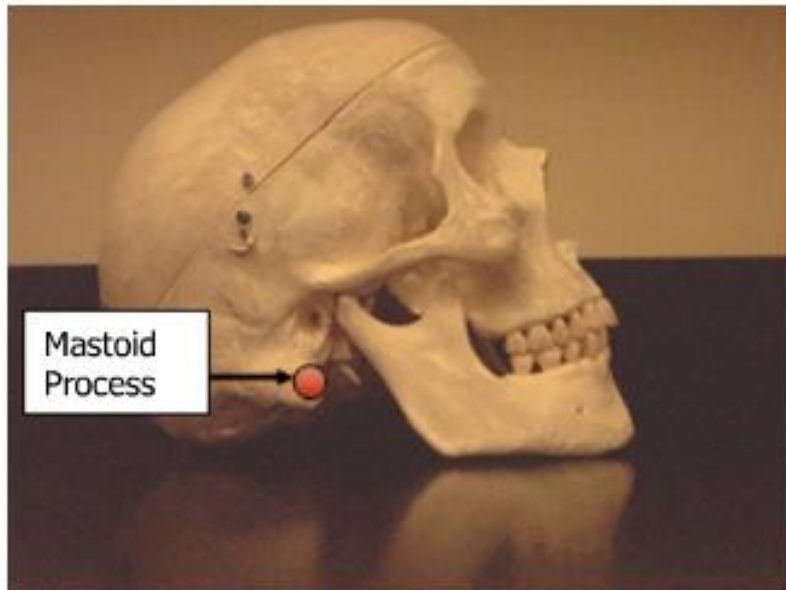
INTRODUCTION TO AASM SCORING GUIDELINES





Placement of Reference Electrodes

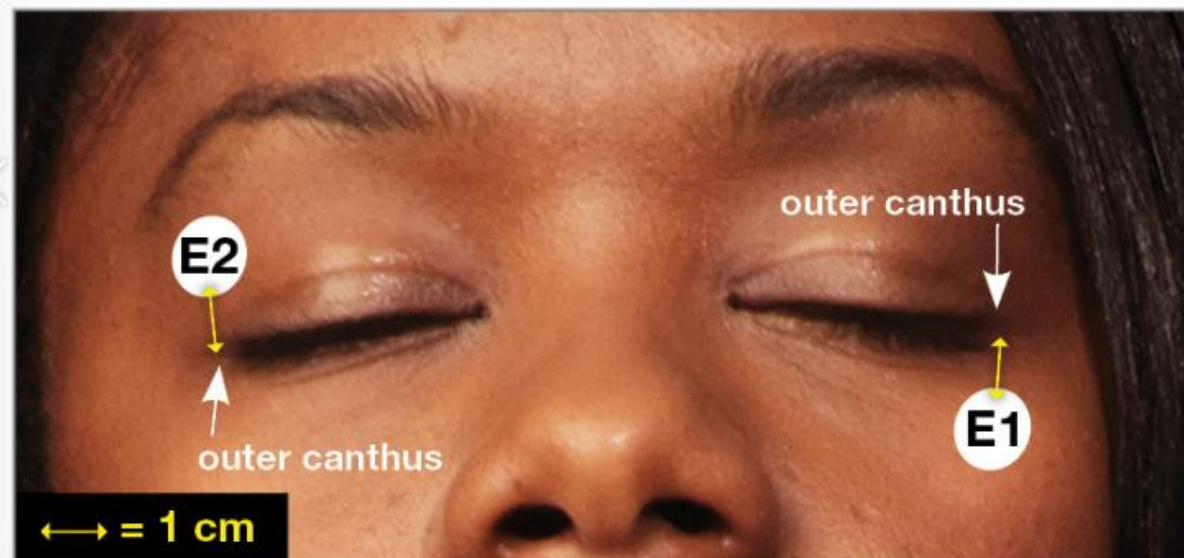
- The reference electrodes are placed over the body of the Mastoid Process, located just behind the ear.
 - Place the electrode on the bony area at the top of the process
 - Avoid the tip which is frequently covered with fatty tissue that interferes with the signal.



A. RECOMMENDED

RIGHT

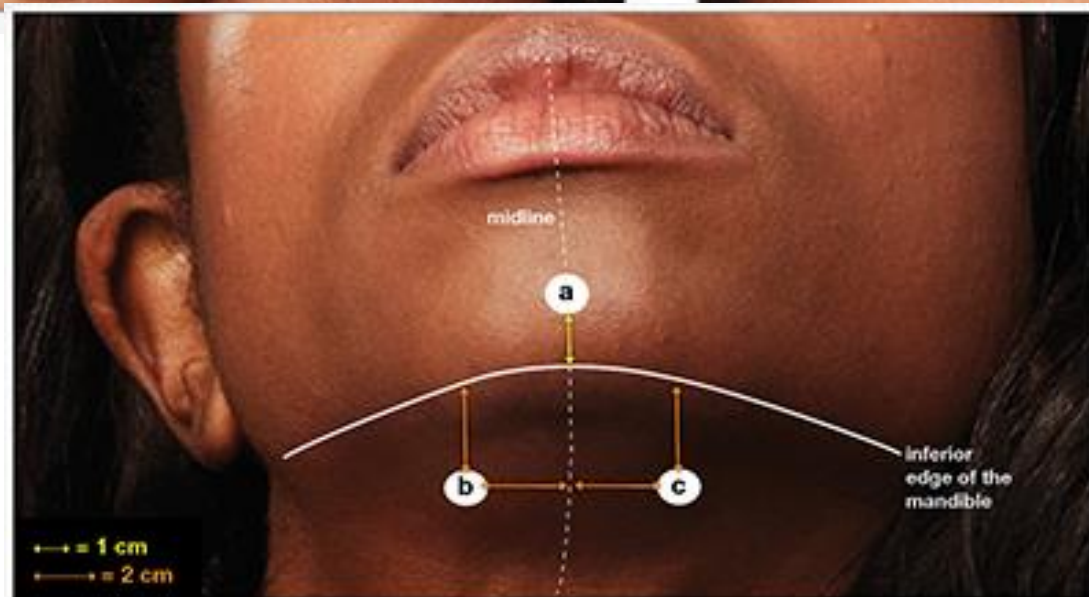
LEFT



B. ACCEPTABLE

RIGHT

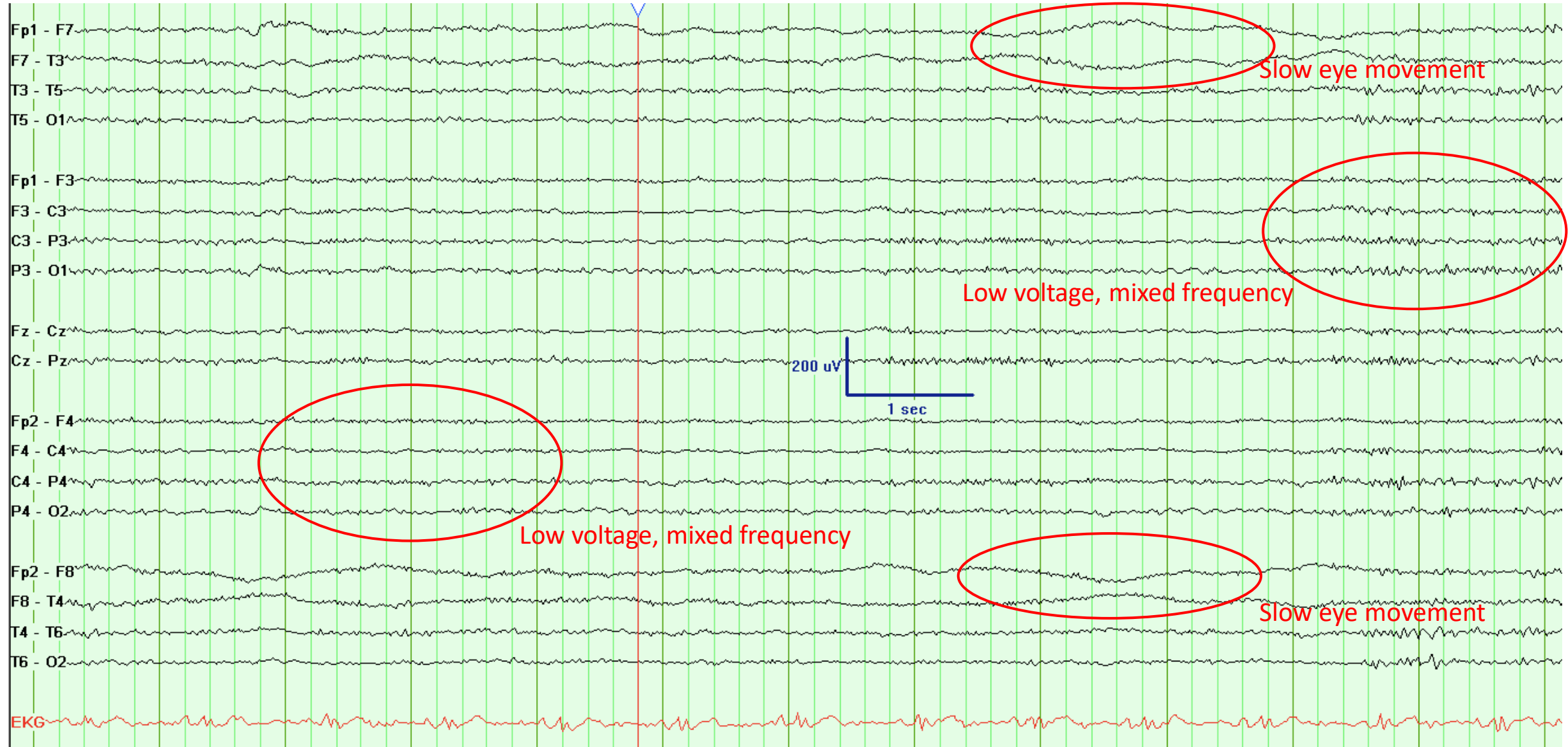
LEFT



SLEEP STAGE

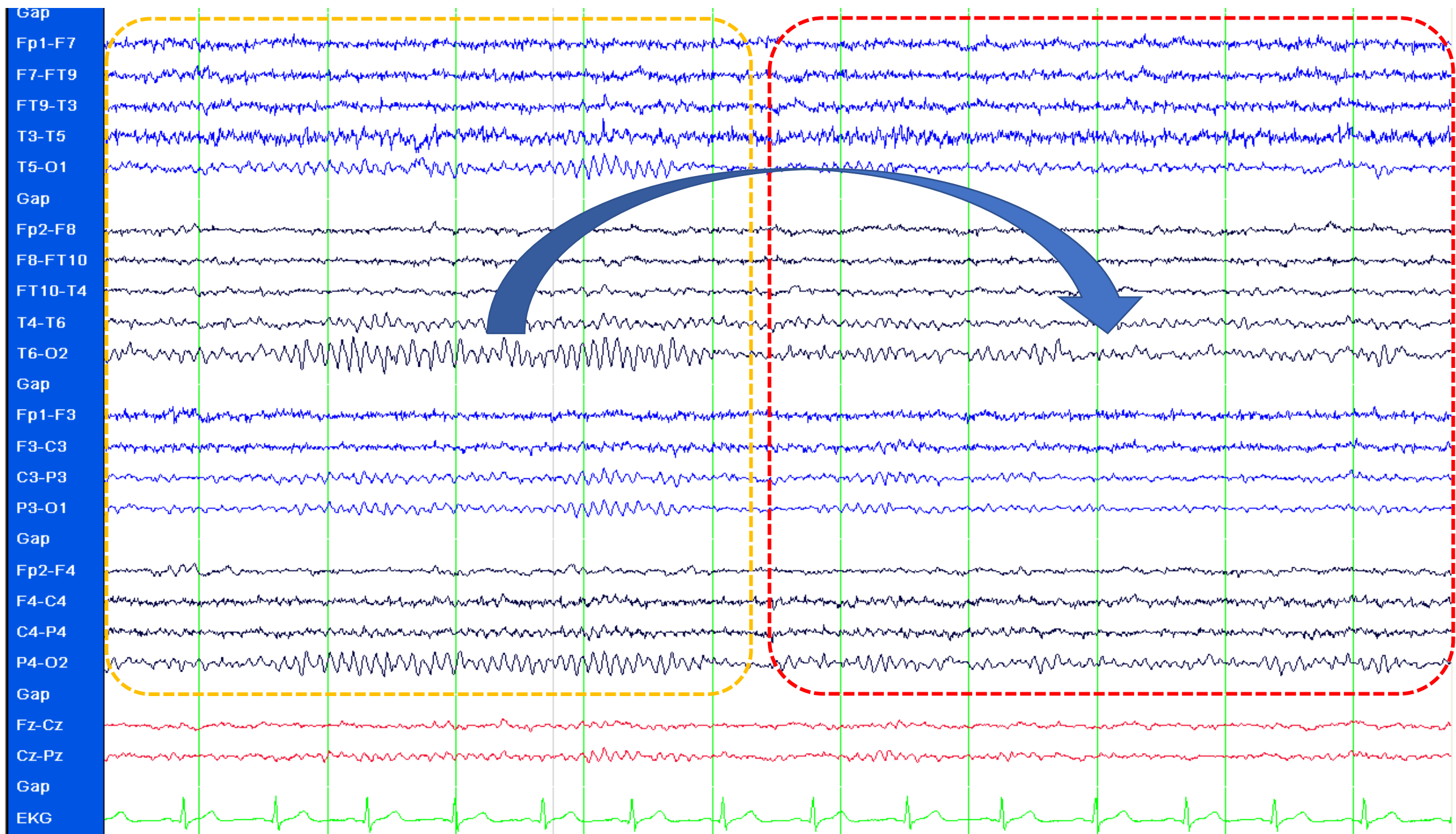
- Stage I (N1) : 5-10%
- Stage II (N2): 45-55%
- Stage III-IV (slow wave sleep: N3) : 20-40%
- REM (rapid eyes movement) : 15-25%

SLEEP STAGE N1

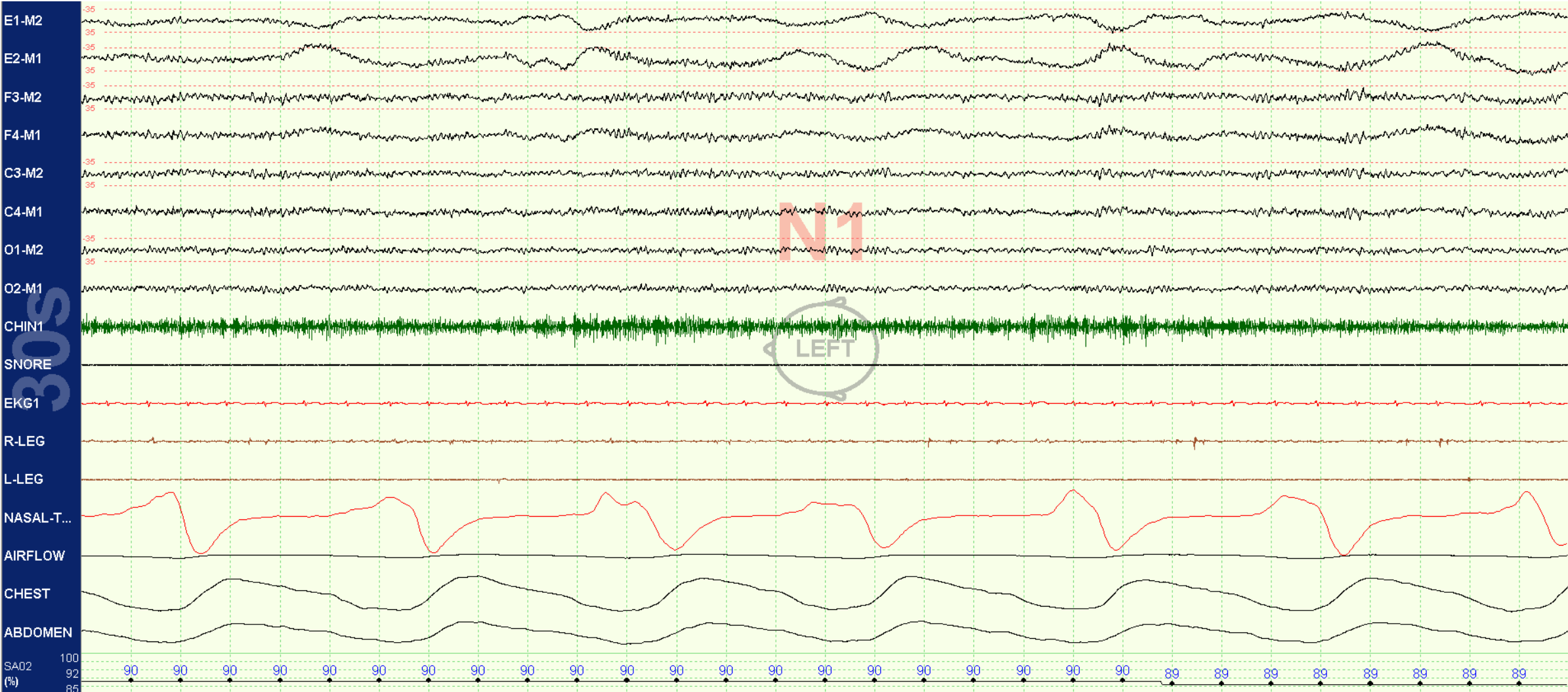


SLEEP STAGE N1

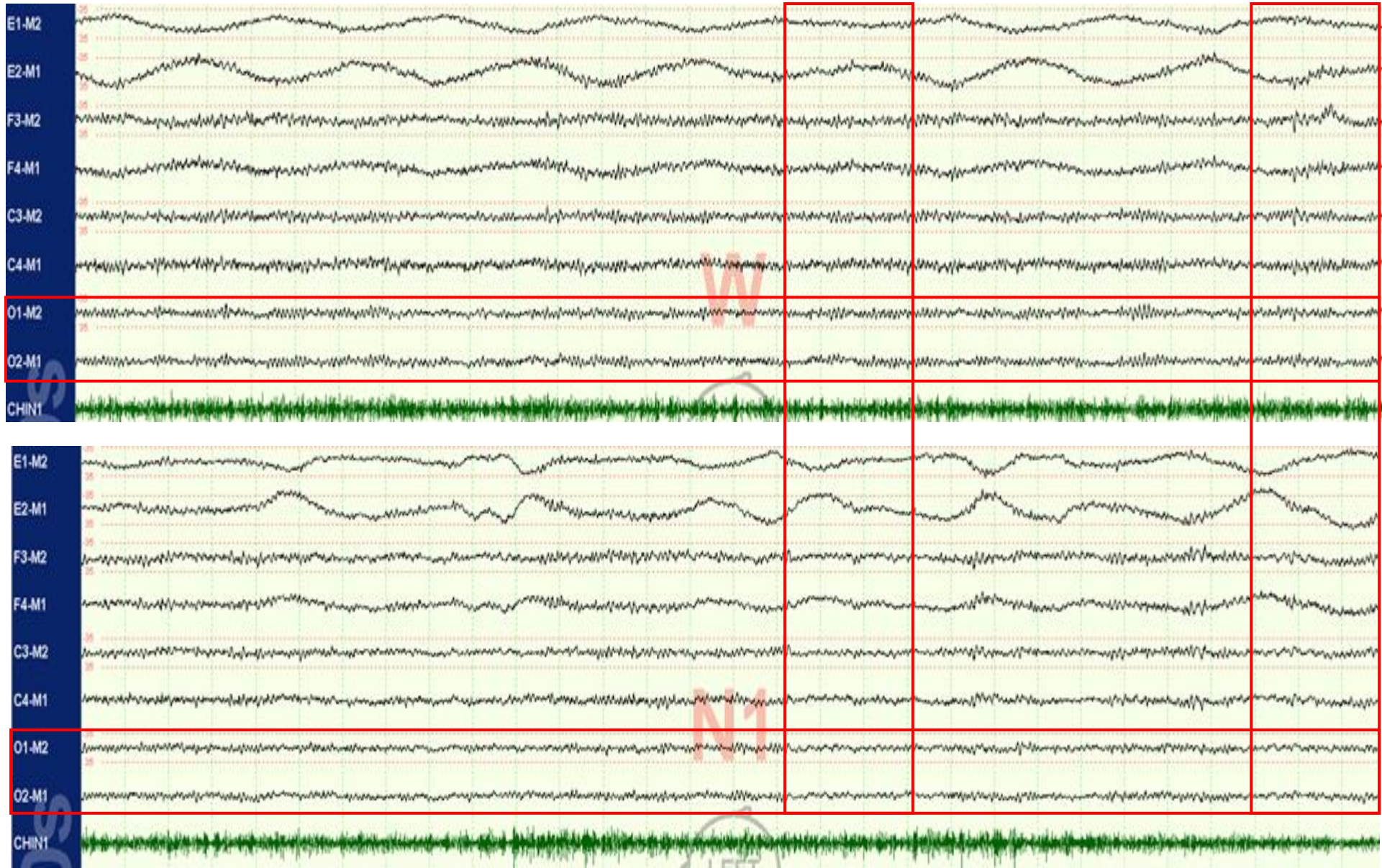
- Slow eye movement (SEM)
- Low-amplitude, mixed frequency EEG activity (LAMF)
- Vertex sharp transient : sharply contoured waves with duration < 0.5 sec, maximal over the central region and distinguishable from the background activity. They are most often seen during transition stage N1 sleep but can occur in either stage N1 or N2 sleep. These waveforms typically first appear at 4-6 months post term.



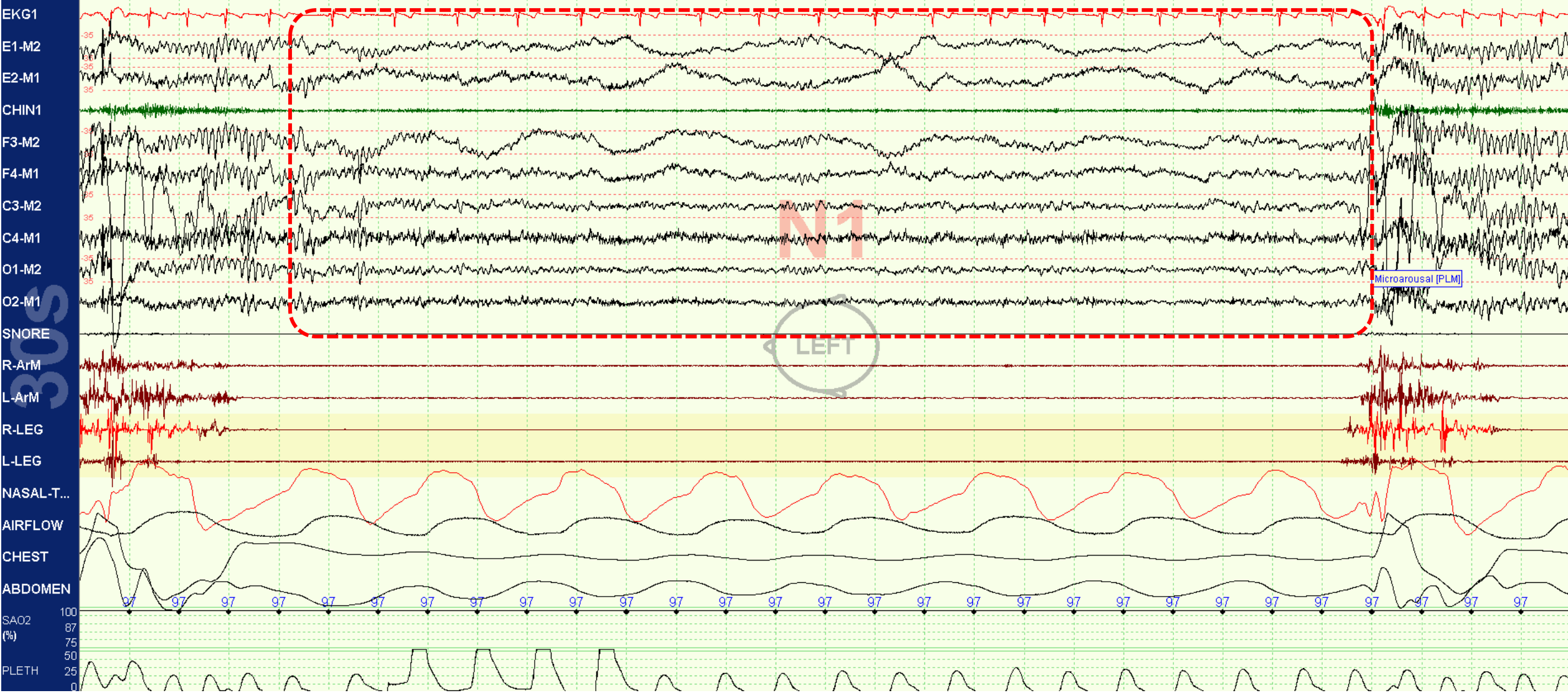
SLEEP STAGE N1



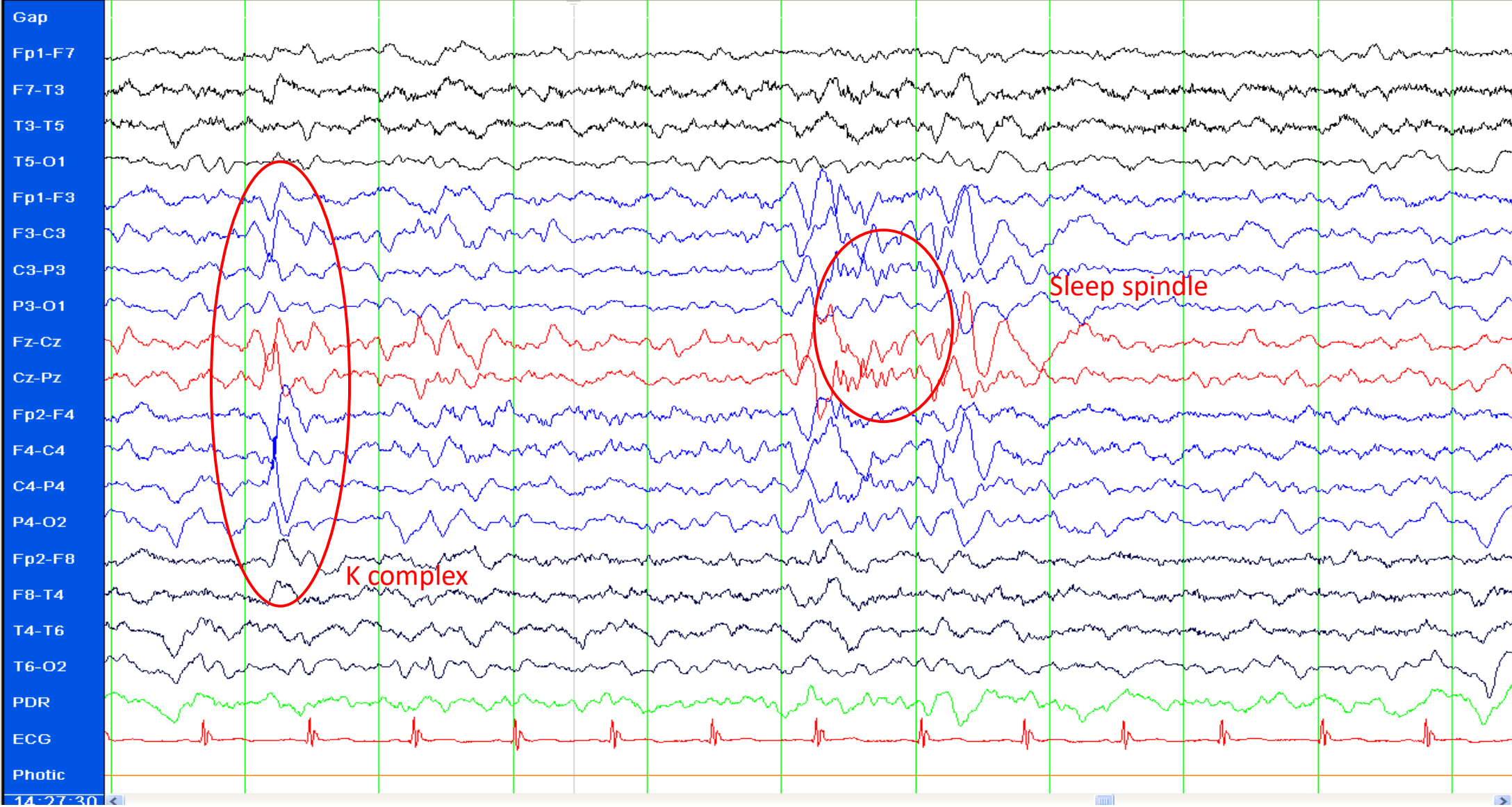
SLEEP STAGE N1



SLEEP STAGE N1



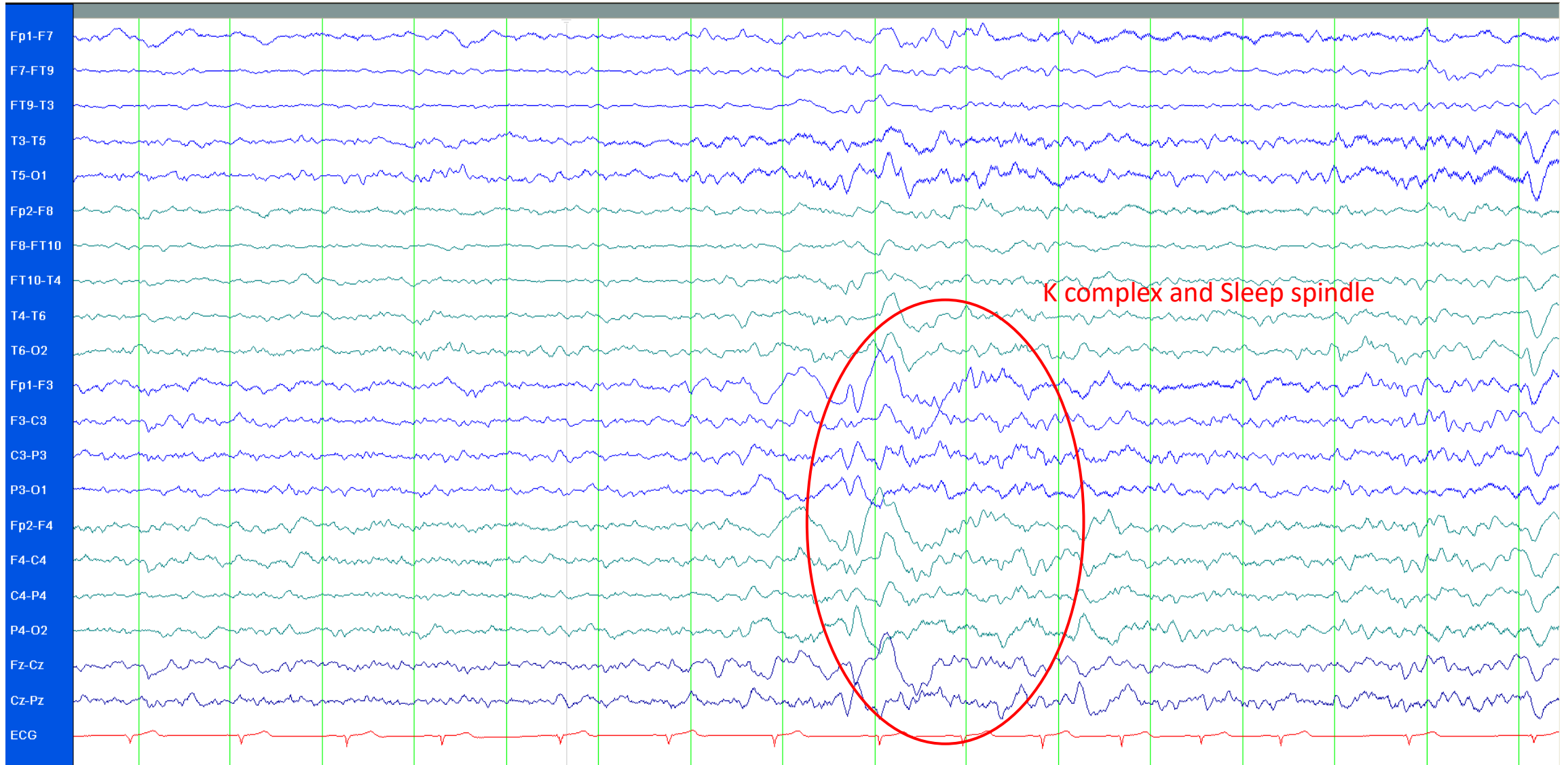
SLEEP STAGE N2



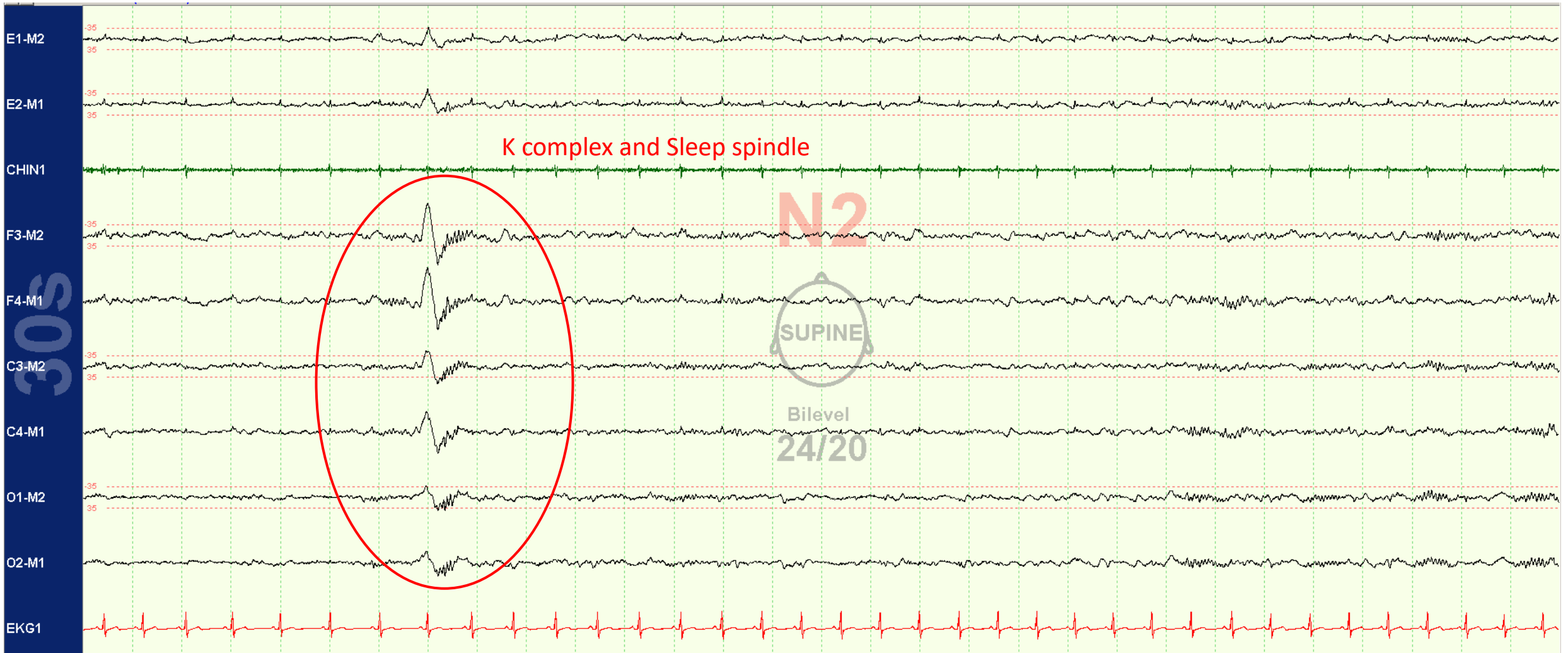
SLEEP STAGE N2

- K complex : a well-delineated, negative, sharp wave immediately followed by a positive component standing out from the background EEG, with total duration ≥ 0.5 sec, usually maximal in amplitude when recorded using frontal derivations.
- Sleep spindle: a train of distinct sinusoidal waves with frequency 11-16Hz (most commonly 12-14Hz) with a duration ≥ 0.5 sec, usually maximal in amplitude in the central derivations.

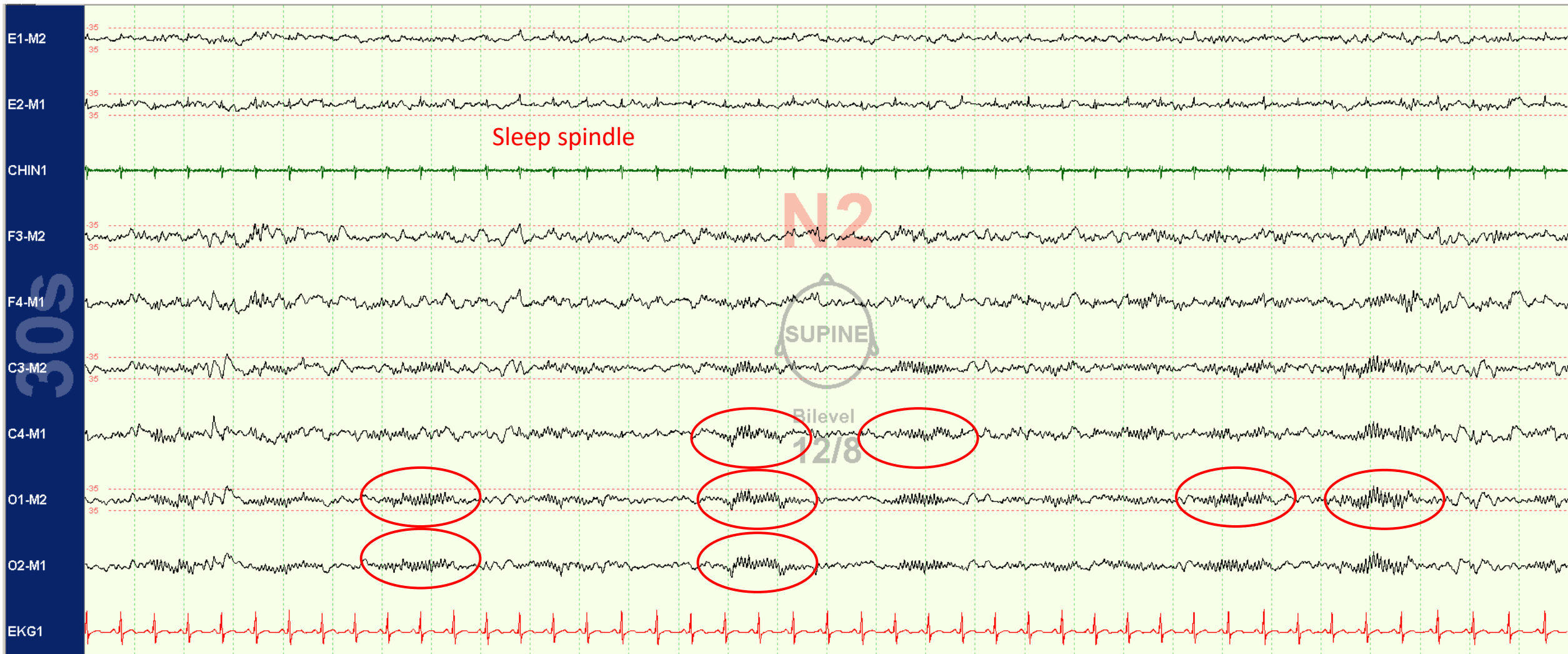
SLEEP STAGE N2



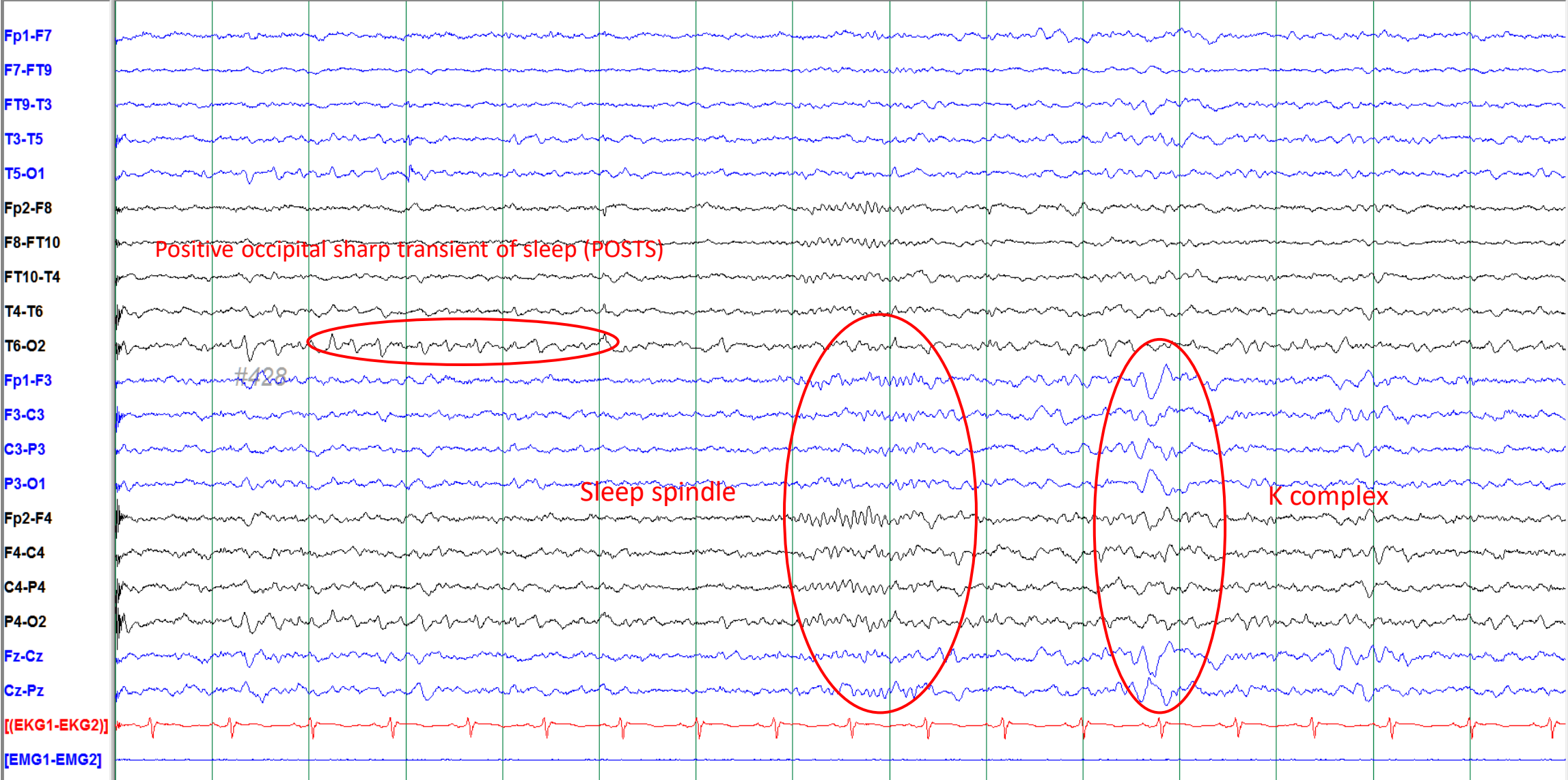
SLEEP STAGE N2



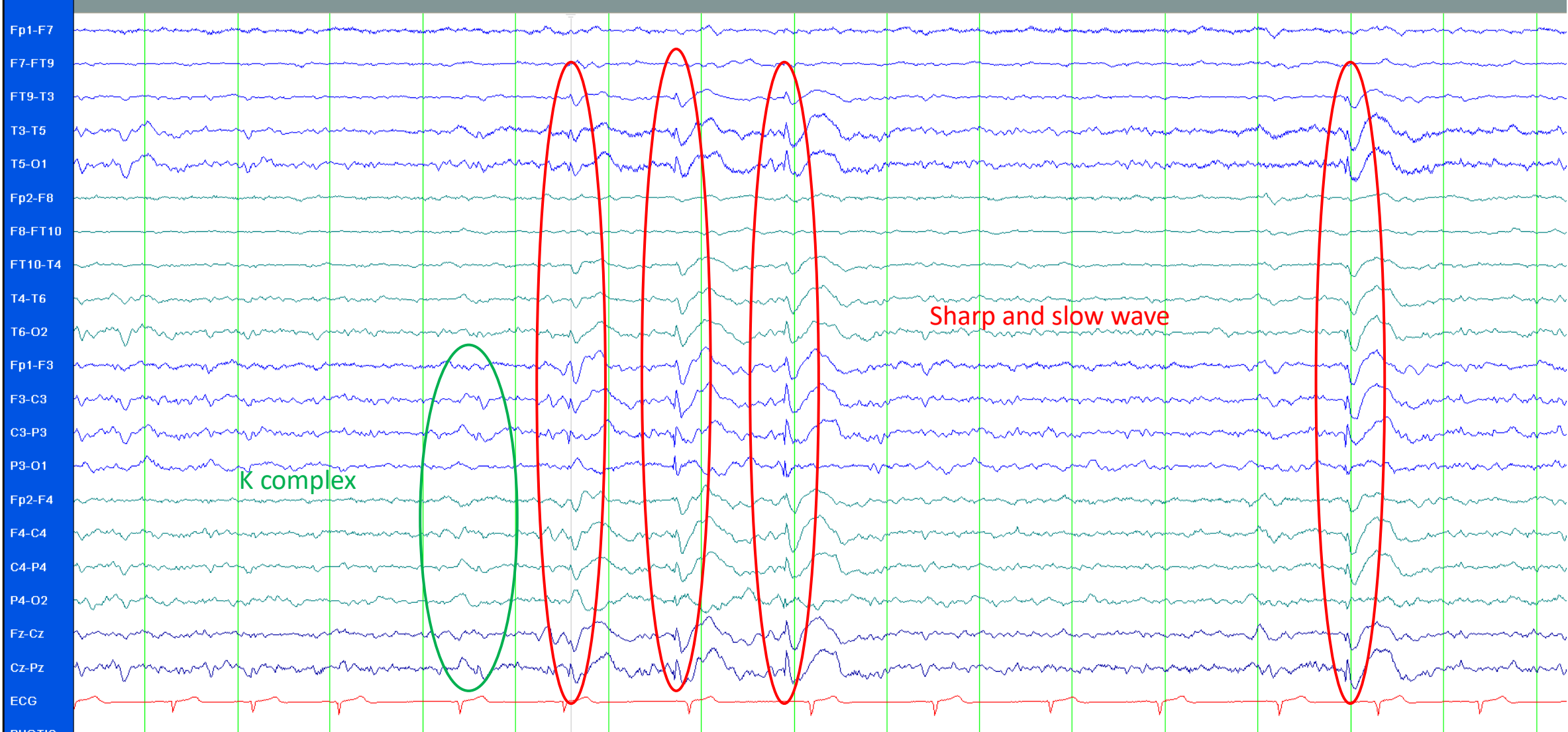
SLEEP STAGE N2



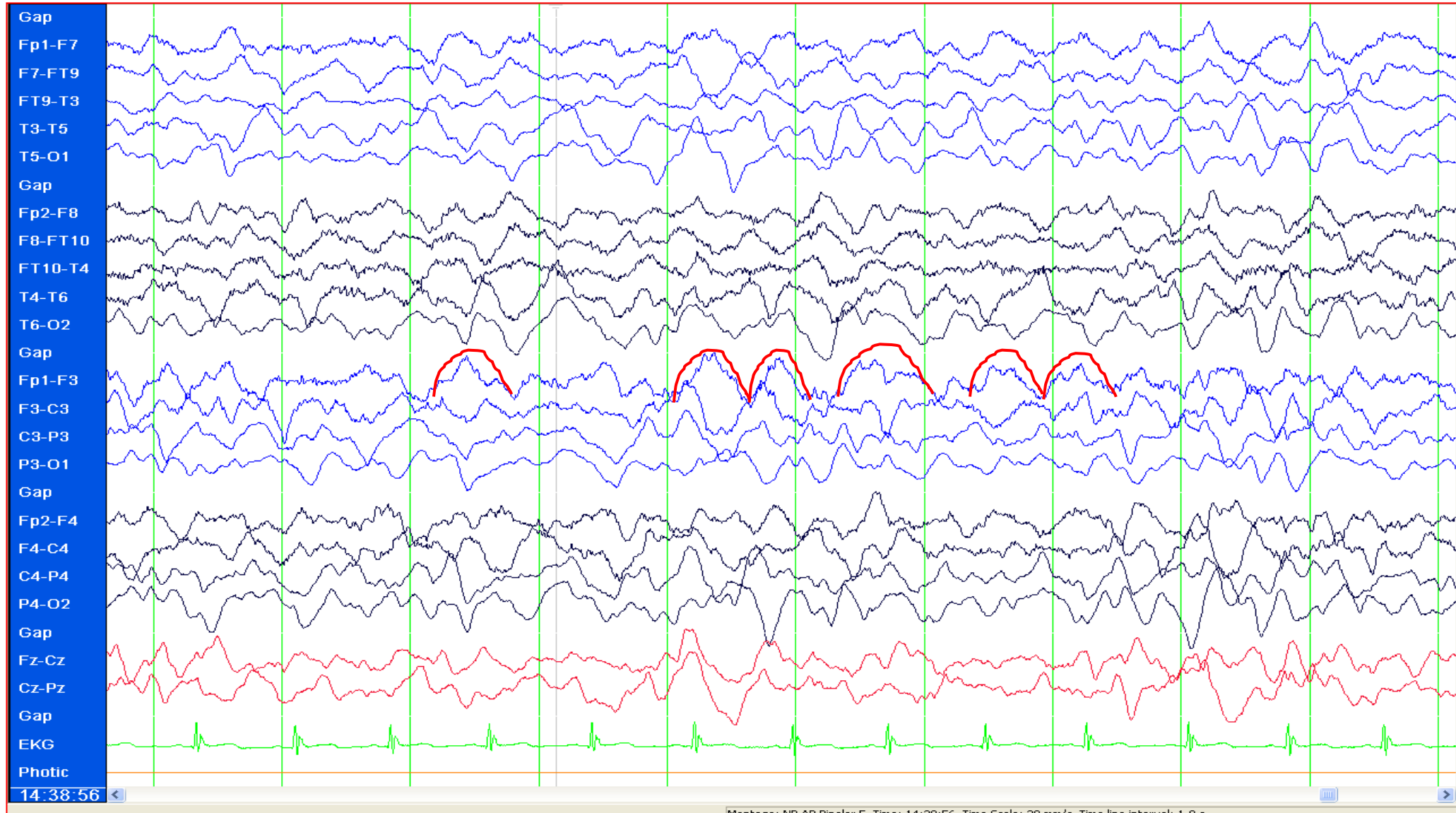
SLEEP STAGE N2



SLEEP STAGE N2



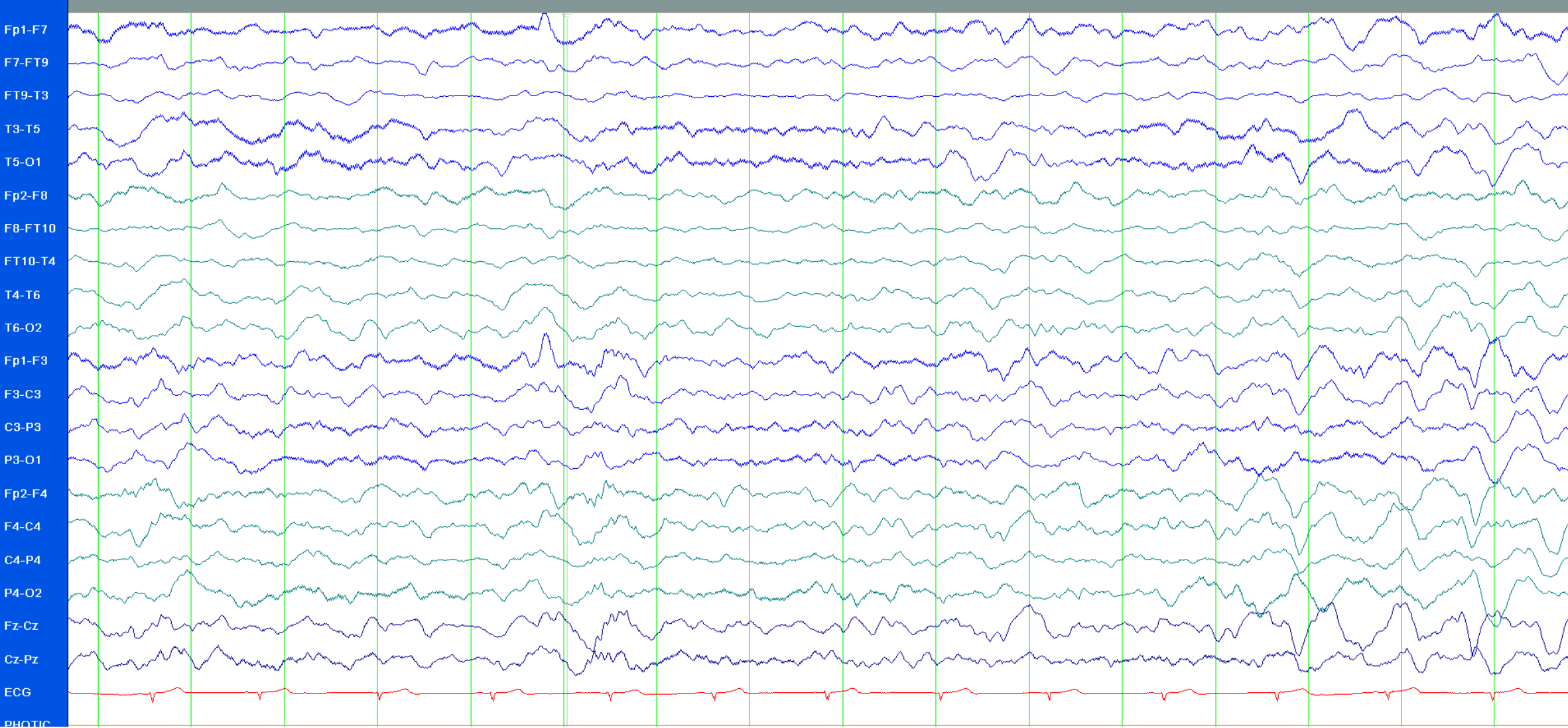
SLEEP STAGE N3



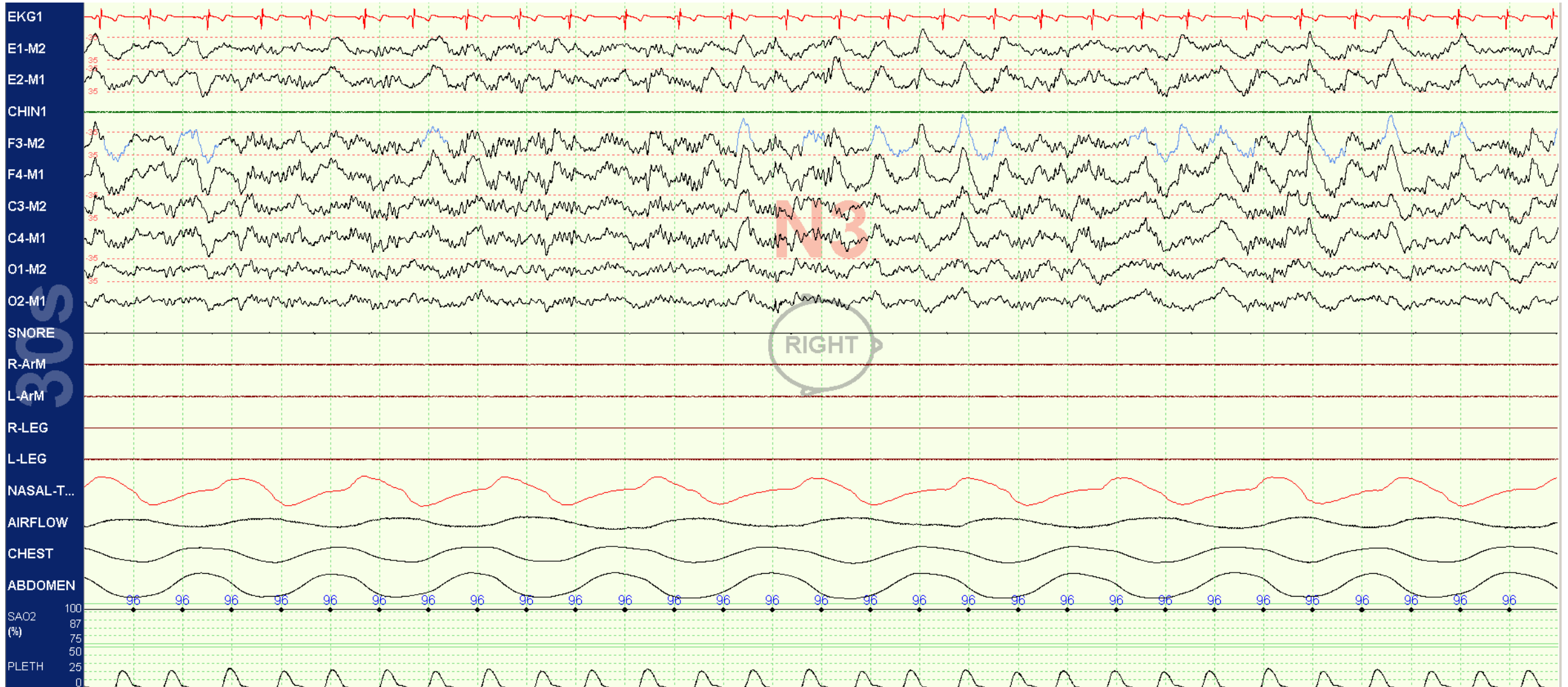
SLEEP STAGE N3

- Slow wave activity : waves of frequency 0.5-2Hz and peak to peak amplitude $> 75\mu\text{V}$, $\geq 20\%$ of tracing

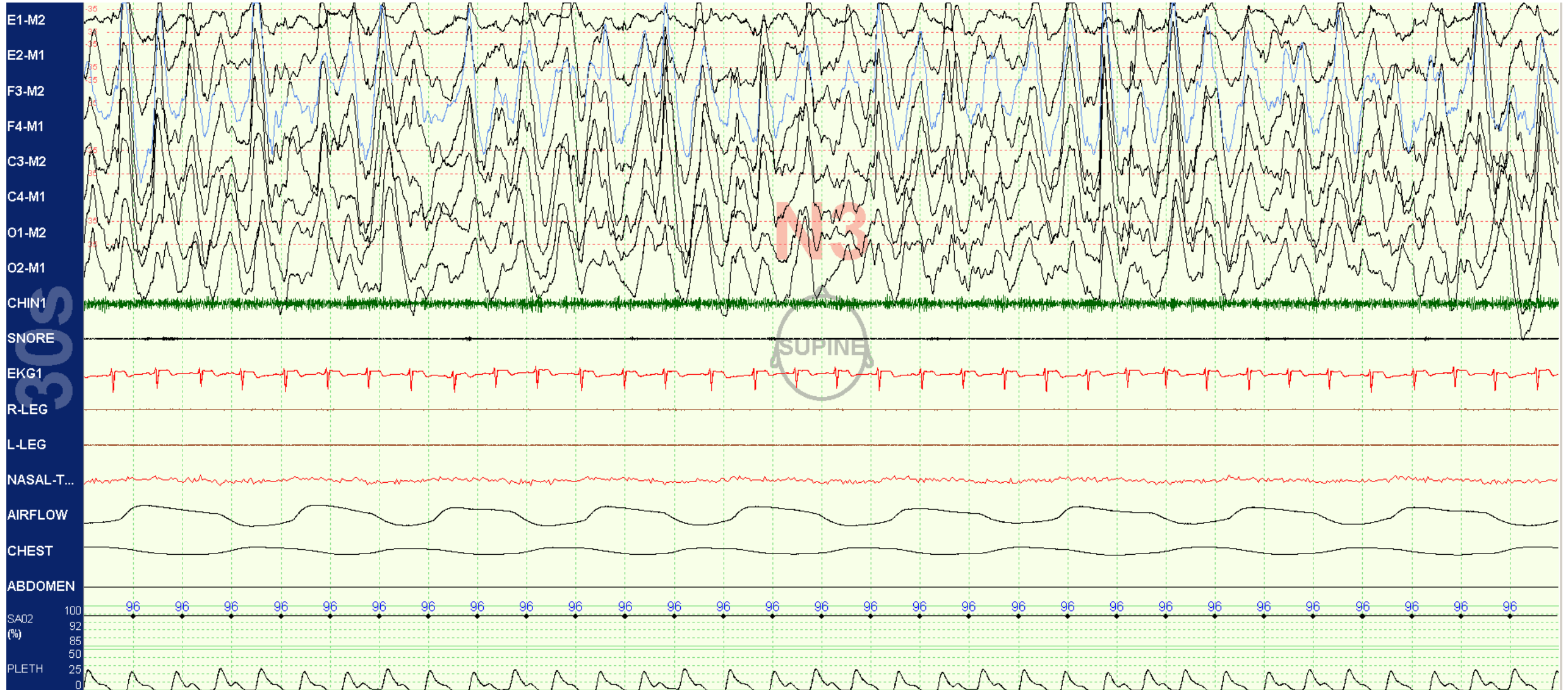
SLEEP STAGE N3



SLEEP STAGE N3



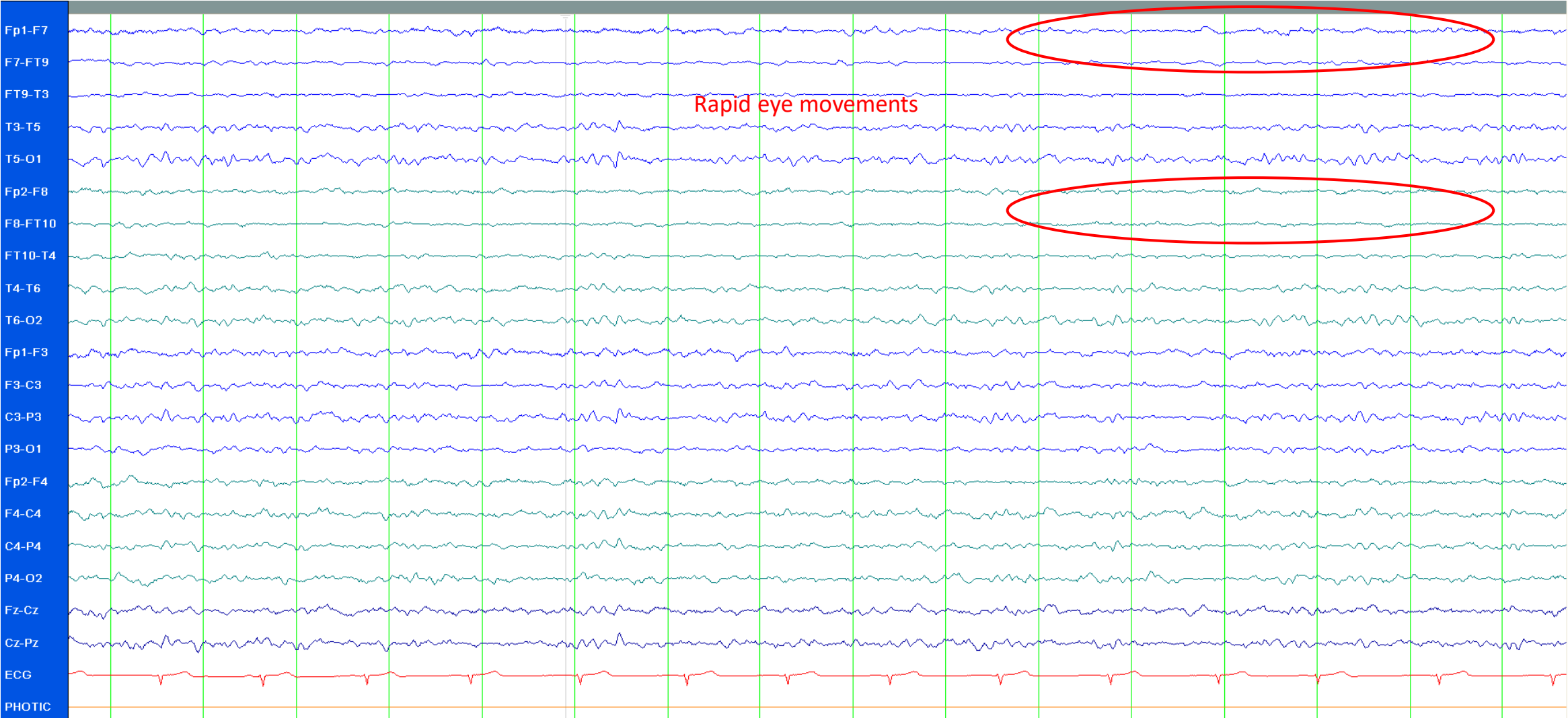
SLEEP STAGE N3



SLEEP STAGE REM



SLEEP STAGE REM



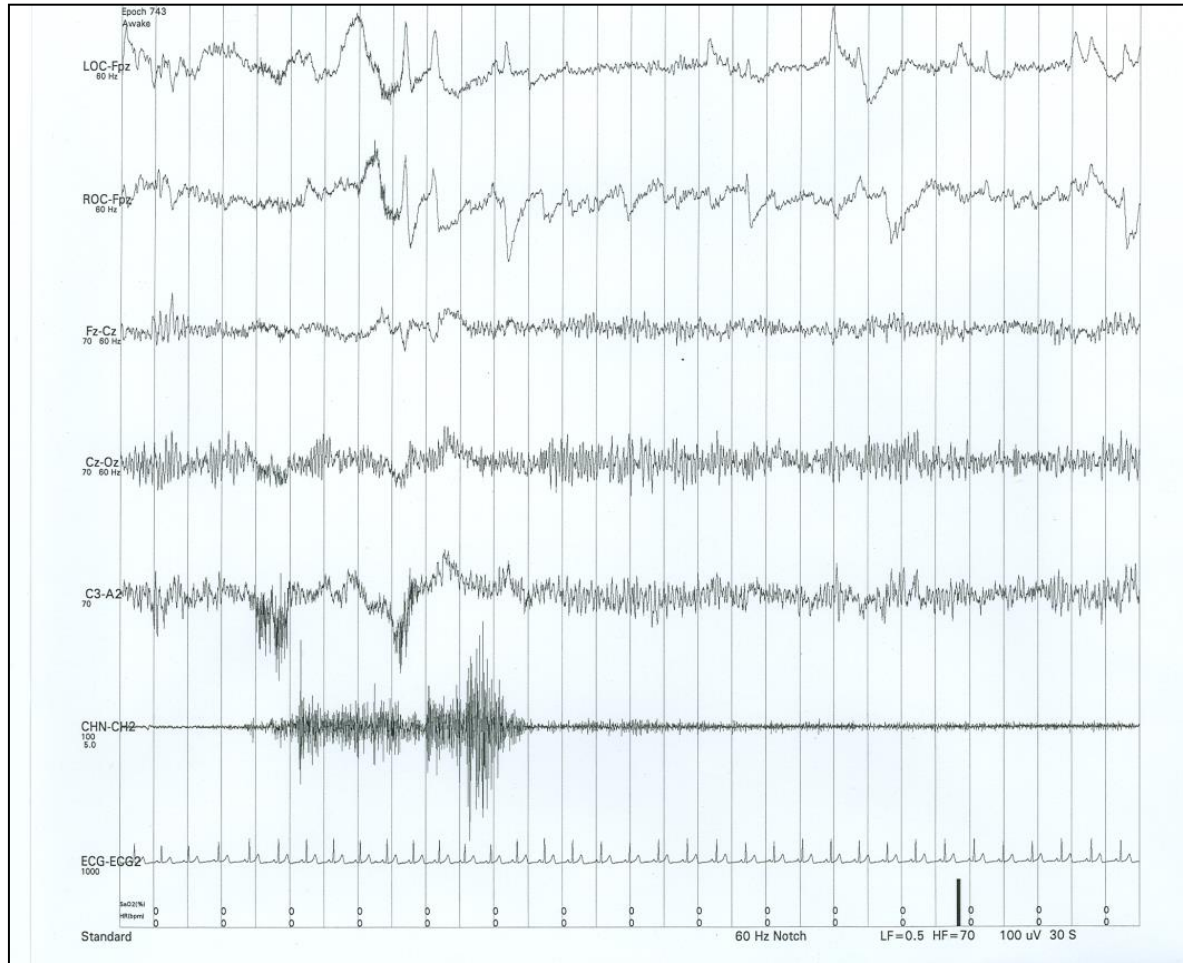
SLEEP STAGE REM

- Rapid eye movement (REMs): conjugate, irregular, sharply peaked eye movements with an initial deflection usually lasting <500 msec.
- Sawtooth waves: An EEG pattern consisting of trains of sharply contoured or triangular, often serrated, 2-6Hz waves maximal in amplitude over the central head regions and often, but not always, preceding a burst of REM
- LAMF EEG activity

AWAKE VERSUS STAGE R (REM)

AWAKE

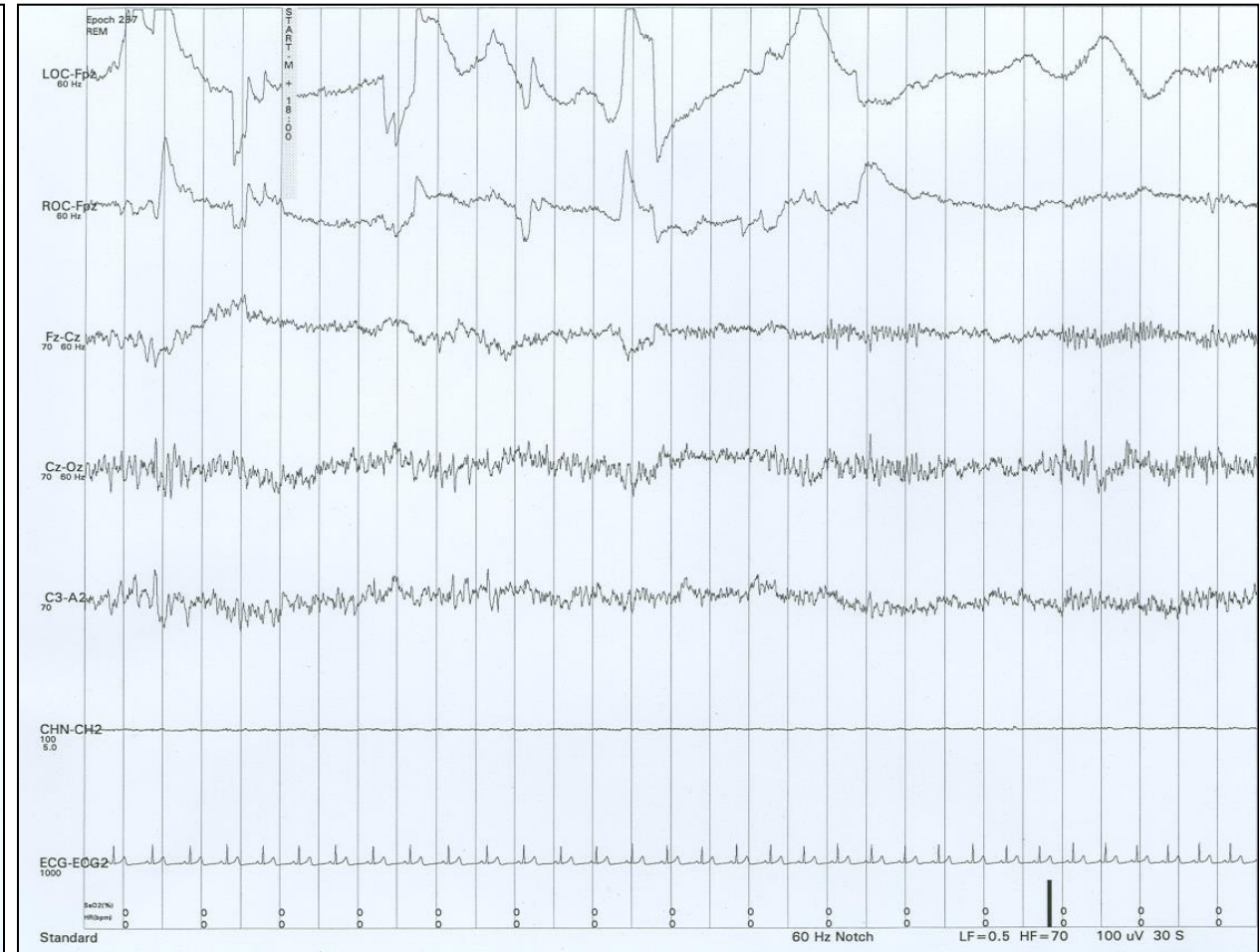
REM



EOG: REMs

EEG: Alpha frequency

Chin EMG: Increased



EOG: REMs

EEG: Low amplitude, mixed frequency

Chin EMG: Suppressed

Thank
you

The image features the words "Thank you" written in a dark blue, elegant cursive font. The text is arranged in two lines: "Thank" on the top line and "you" on the bottom line. The letters are thick and have a slight shadow effect, giving them a three-dimensional appearance. The word "Thank" starts with a large, sweeping flourish that curves upwards and to the left. The word "you" ends with a similar flourish that curves downwards and to the right. Scattered around the text are several red, five-pointed stars of varying sizes. There are 14 stars in total, some positioned above the letters and others below. The background is plain white.