





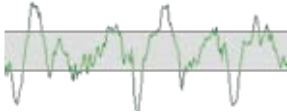





Morphological Criteria for Sleep EEG

Sleep Stage	EEG (F4-A1, C4-A1, O2-A1) or (F3-A2, C3-A2, O1-A2)	EOG	EMG	Portion of Sleep Time	
Stage W Wake	> 50% alpha 8-13 Hz (esp. O) or with eyes open: beta (> 13 Hz), eye blinks at 0,5 to 2 Hz.	 EEG alpha	Eye blinks / reading eye movements, irregular peaked eye movements	Variable tone high amplitude	< 5 %
Stage 1	> 50% low amplitude, mixed frequency (4 to 7 Hz) Background frequency 1Hz slower than W, Vertex sharp waves (< 0,5 sec., esp. C)	   SEM	Slow eye movements	Variable tone, still high amplitude	5 – 10 %
Stage 2	Begin: spindles (11 to 16 Hz, $\geq 0,5$ sec., esp. C) and/or K-complexes ($\geq 0,5$ sec., esp. F) End: change to W, N3 or R, arousal or body movement with SEM: N1 or body movement with no SEM: N2.	 EEG Spindel  EEG K-Komplex	No eye movements	Variable tone, decreasing amplitude	50 %
Stage 3	> 20% slow waves (0,5 to 2 Hz, >75micro V). (esp. F)	 EEG delta	No eye movements	Variable tone, low amplitude	20 %
REM Sleep	Begin: low amplitude, mixed frequency EEG (esp. C) Saw tooth waves ¹ End: transition to W or N3 Increase in chin EMG+alpha=N1 K-complex or spindles without REMs, arousals or movement: N2	 EOG   EEG REM EEG in REM	Rapid, conjugate, irregular eye movements ² . Continue REM even without REMs, if EEG and EMG unchanged.	Lowest amplitude ³	20 – 25 %

^{1,2,3} 2 out of 3 criteria must be met, EMG must be low, spindles and K-complexes may appear.