

Quantitative vigilance index evaluation during Multiple Sleep Latency Test

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M.S.L.T. is the classical method for excessive daytime sleepiness evaluation (1). Criterias are based on standardization of polygraphic conditions, visual analysis and sleep scoring. We report in this study a comparative evaluation of quantitative analysis of EEG and visual scoring with reference to interscorer reliability.

METHODS : Study was performed in 2 groups : 4 reference subjects (age from 23 to 25 years); 8 subjects with an hypersomnia complaint (Epworth Sleepiness Scale > 16, age from 25 to 61 years) diagnosed as primary hypersomnia (Gélineau syndrom, Narcolepsia without cataplexia, Idiopathic hypersomnia). For each subject 5 naps were recorded : totally 60 naps analyzed. Visual scoring was performed according to Rechtschaffen & Kales (2) criterias by 5 well-trained physicians. EEG were digitalized on an Apple-Macintosh micro-computer, with a 102,4Hz sampling rate, and spectral analysis done by 20s epochs. A "vigilance index" was computed as the ratio of the alpha density square and delta*theta density ($\alpha^2/\delta*\theta$). Epochs by epochs in each record an interscorer reliability index was calculated. This index was related to sleep stages by an analysis of variance (ANOVA). Then a threshold of the vigilance index ($\alpha^2/\delta*\theta$) was computed with discriminate wake and sleep stages. Vigilance index and visual scoring stages concordance were tested by Cohen's Kappa index.

FINDINGS : Interscorer agreements are different according to vigilance level ($p < 0.001$) and differently in each group ($p < 0.001$).

On manual scoring the best reliability is observed for recognition of wake state. There are significant difference of the vigilance index between sleep stages ($p < 0.001$). There is a good reliability between visual scoring and vigilance index of EEG (Kappa = 0.52, $p < 0,05$).

DISCUSSION : The agreement index between physicians shows a low reliability for the sleep stage 1 typing even though there is no ambiguous typing for sleep stage 2.

CONCLUSIONS : Problems of reliability sleep scoring in MSLT are well known. It may be helpful to have objective criteria such as EEG index in the clinical routines.

(1) Carskadon M., Dement W C., Mitler M., Roth T., Westbrook P. R., Keenan S. (1986) Guidelines for the Multiple Sleep Latency Test (MSLT) : A Standard Measure of Sleepiness : *Sleep* 9 (4) : 519 - 524

(2) Rechtschaffen A., Kales A. (1968) A manual of standardized terminology, techniques and scoring system for sleep stages of human subjects : *US National Institute of Neurological Diseases and Blindness, Bethesda, Maryland/20014 (1968)*

Keywords:

EEG Quantification, inter-scorer reliability, spectral analysis