

# Continuous EEG Recording Iterative Sleepiness Tests



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## Introduction :

MSLT and MWT Tests are well-known for the evaluation of capacity of waking and sleeping. These tests which are mainly performed in sleep-labs by well-trained technicians are highly time and cost-consuming. Genton & al described in 1995 an alternative for the diagnosis of narcolepsy-cataplexy by continuous ambulatory EEG monitoring (Neurophysiol Clin. 1995;25(4):187-95). We report here the usage of this method in clinical routine.

## Material and Methods :

The performance of Continuous EEG Recording Iterative Sleepiness tests follows that of polysomnography. 4 EEG derivations (C3-Cz, C4-Cz, A1-Cz, A2-Cz), 2 EOG (Vertical and Horizontal), 2 EMG, (Chin, Leg.), 1 EKG (D1), light signal are continuously recorded on a MICROMED BrainSpy MS40 recorder with a 64Hz sampling frequency. A sleep practitioner using Rechtschaffen & kales rules (EEG from C4-A1 and C3-A2) visually scored the recordings on a microcomputer. Four sleepiness tests are performed during recording at 9:00 am, 11:30 am, 14:00 pm and 16:30 pm. In each test a nurse lets the patients attempt at napping for 20mn in a dark sleeping-room. At the end of the period the nurse wakes up the patient, opens the shutters, and she fills up a stanford sleepiness scale.

In each record sleep latency, the total duration of sleep and REM during and apart from test are calculated. Results are analysed under the ICD 10 Sleep Diagnoses, the sleepiness ESS scale , the asthenia ADA scale (Ann Med Psychol. 1984 Jun;142(6):862-5), and the depression Q2DA scale (J Affect Disord. 1991 May-Jun;22(1-2):55-64). A Component Principal Analysis is carried out on these variables. The diagnosis of Narcolepsy is finally confirmed by HLA phenotype DR15-DQ6.

## Results :

We analysed 205 patients records with Sleepiness score higher than 10 or Asthenia score higher than 15. All the records were visually scored. As reported in Genton article the presence of sleep latency lower than 10mn and the REM sleep are significantly ( $p < 0.002$ ) associated with Narcolepsy (Fig 1) regarding other sleep diseases and with the total duration of sleep (Fig 2). In this case the probability of narcolepsy is higher than 65% regardless clinical symptoms.

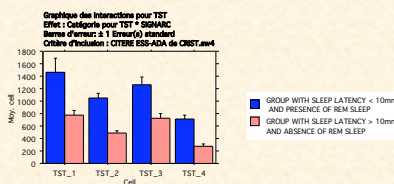


Tableau "résumé" pour SIGNARC, TYPE  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

Manquants	1
DOL	7
Chi 2	22,644
p (Chi 2)	,0020
G-carré	*
p (G-carré)	*
Coef. de contingence	,315
V de Cramer	,332

Fréquences observ. pour SIGNARC, TYPE  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

	DEXT	HSP	TRVS	SAOS	NARC	PARA	MPS	ADINT	Totaux
OUI	5	9	6	15	18	0	2	2	57
NON	7	24	7	53	17	1	31	8	148
Totaux	12	33	13	68	35	1	33	10	205

Chi 2 des cellules pour SIGNARC, TYPE  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

	DEXT	HSP	TRVS	SAOS	NARC	PARA	MPS	ADINT
OUI	,829	,003	1,574	,807	7,025	,278	5,612	,219
NON	,319	,001	,606	,311	2,706	,107	2,161	,084

Fig 1 : observed frequency, Chi2 of comparison between presence of sleep latency under 10 mn with presence of 1 rem sleep during tests and dyssomnia diagnoses (DEXT : Extrinsic dyssomnia, HSP : primary hyperponmia, TRVS. Circadian rhythms disorders, SAOS : Obstructive Sleep Apnoea syndrome, NARC : Narcolepsy, PARA : Parasomnia, MPS : Periodical Limb syndroma, ADINT : other intrinsic dyssomnia).

Tableau ANOVA pour TST  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

	ddl	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Lambda	Puissance
Catégorie pour TST	3	36326186,998	12108728,999	17,298	<,0001	51,893	1,000
SIGNARC	1	49551009,348	49551009,348	70,785	<,0001	70,785	1,000
Catégorie pour TST * SIGNARC	3	1241966,639	413988,880	,591	,6208	1,774	,170
Résidu	787	550914570,948	700018,515				

Fig 2 Total duration of sleep associated with presence of REM SLEEP and SLEEP Latency < 10mn

Component Principal Analysis (Fig 3) explain data variance by mean of 3 factors : 1/ Sleep Latency, total sleep time and REM sleep; 2/ ADA, Q2DA scores; 3/ ESS score, ADA, Q2DA, Sleep Latency

Analyse factorielle  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

Nombre de variables	6
Nombre de facteurs (est.)	3
Nombre de facteurs	3
Nombre de cas	735
Nombre de manquants	89
Degrés de liberté	20
Chi 2 de Bartlett	800,610
Valeur de p	<,0001
Méthode d'extraction factorielle	Composantes principales
Règle d'extraction	Méthode par défaut
Méthode de transformation	Orthotran/Varimax

Poids des scores factoriels  
Critère d'inclusion : CITERE ESS-ADA de CRIST.sw4

	Facteur1	Facteur2	Facteur3
LAT	-,385	,047	,126
TST	,463	,022	,037
ESS	-,039	,090	,945
ADA	,003	,656	,248
Q2DA	,008	,520	-,165
SP	,402	,059	,010

Fig 3 Component Principal Analysis results - Factorial Score Weight

## Conclusion :

Continuous EEG Recording Iterative Sleepiness Tests is useful for clinical practice and diagnosis of Narcolepsy. This method also provides more information on vigilance organisation during the recording period. This will be also useful for evaluation of chronobiological pathology.