

GIUSTIZIA

Spagna, archiviato il processo per la strage dell'Erasmus dopo la morte dell'unico imputato

L'autista del bus era mancato per un malore lo scorso 5 aprile. Il rammarico dei familiari delle vittime, fra cui la genovese Francesca Bonello

TOMMASO FREGATTI



Francesca Bonello, vittima genovese nella strage delle studentesse Erasmus in Spagna

Strage del bus di studenti in A4, l'autista soffriva della malattia del sonno

Un particolare che potrebbe essere determinante nella causa per i risarcimenti ai parenti delle vittime (16). Sembra infatti che la ditta per cui l'uomo lavorava fosse a conoscenza della sua sindrome da apnea da sonno.

A cura di Biagio Chiariello

LA TRAGEDIA DI HELENIA

Publicato il 17 novembre 2021

Il perito del giudice conferma "Fu un colpo di sonno patologico"

Sentito in aula il dottor Ciabatti. I familiari della ragazza, chiedono verità e incaricano consulente esterno al processo



Il perito nominato dal giudice Giulia Soldini conferma: Marco Caneschi che nel 2019 provocò l'incidente in cui morì la giovane Helenium Rapini a Ristradelle è affetto dall'Osas, la sindrome delle apnee ostruttive del sonno con un grado di severità da "moderato a grave" e, con "alta probabilità" l'imputato era già affetto dalla patologia che provocò il 'colpo di sonno' in occasione dell'incidente. Ricoverato dopo lo scontro gli fu rilevata un'ipertensione - uno dei campanelli di allarme dell'Osas - e la patologia diagnosticata tre mesi dopo ma migliorò con l'utilizzo della Cpap (una sorta di 'casco' per respirare, ndr). Il dottor Pier Guido Ciabatti, direttore dell'Unità operativa di otorinolaringoiatria aggiunge in aula che, seppur a conoscenza dell'ipertensione per l'imputato sarebbe stato difficilissimo prevedere la sindrome delle apnee ostruttive perché "purtroppo sono pochi i medici che, di fronte a un paziente iperteso, tra gli esami indagano anche il campo Osa".

Una ricostruzione sanitaria che potrebbe far ritenere l'imputato incolpevole. La decisione del gup (il processo è in corso con il rito abbreviato) arriverà a gennaio. Ma intanto contro la perizia si scagliano i familiari di Helenium (che non sono parte nel processo ma intendono portare avanti una battaglia per la verità attraverso una contro consulenza di parte.

POTREBBE INTERESSARTI ANCHE



Bollettino Covid Italia oggi: male i contagi in Veneto e Alto Adige. Dati ricoveri e morti



Vetralla, bambino ucciso in casa: arrestato il padre



Zona gialla, regole e restrizioni: cosa si può fare. Differenze dalla bianca

POTREBBE INTERESSARTI ANCHE



Green pass, verso riduzione della durata a 9 mesi? E si guarda anche al modello 2G



Covid in Italia, spettro restrizioni. Regioni: "Misure solo per non vaccinati"



Le conseguenze del colpo di sonno possono prefigurare il reato di omicidio stradale e le relative sanzioni, tra cui è prevista una pena fino a 18 anni di reclusione. Come del resto ha confermato la **sentenza 27410/2018 della Corte di Cassazione**, secondo cui è legittimo ipotizzare il reato di omicidio stradale “qualora siano presenti elementi idonei a far ritenere che la perdita di controllo del veicolo sia stata determinata non da un malore, ma da un altro fattore non imprevedibile, che avrebbe dovuto indurre il conducente a desistere dalla guida”.

Improving road safety is a priority of the French Government.

Among the various causes of road accidents, one of them is especially common on motorways: lack of alertness, which leads to inattention and drowsiness. Lack of alertness is responsible for one in three collisions resulting in deaths on the motorway network, although it is a symptom of all road networks. The government is not fully grasped by the public. Therefore, it is essential to gain knowledge and raise the public awareness as regards sleepiness at the wheel. It means generalising drowsiness at the wheel courses, understood both socially and culturally, putting which is a major issue for road safety and public health. This white book, put together by the French Motorway Company (ASF) and the National Institute of Sleep and Vigilance (INSV), presents the most recent knowledge on the subject as well as the French and European data and provides a number of recommendations. By contributing to a better understanding of sleepiness at the wheel, this work will help promote the implementation of new prevention strategies, to further reduce the number of victims on the road. Our objective is to cut down to less than 2000 the number of deaths per year on French roads by 2020.

Manuel VALLS
 French Minister of Interior

Sleepiness at the wheel is one of the recently uncovered reasons behind a large proportion of fatal car crashes around Europe. Although it is often difficult to determine precisely how much responsibility can be attributed to sleepiness in certain traffic accident situations, it is estimated to underlie about 20% of car crashes in Europe. In this regard, national statistics have been put forward by a few European countries. In France, a preliminary report published in 2011 stated that from a total of 3970 fatal accidents that took place on French roads, 732 cases occurred on straight roads, 85% of which were related to sleepy driving.

In the United Kingdom, the national database indicates a low incidence of drowsy driving (around 4%) but this estimate is most certainly largely underestimated, probably due to the mode of reporting. In Germany, drowsiness is reportedly implicated in 25% of all fatal road accidents. In Italy, although recent data are missing, sleepiness is estimated to be involved in about 22% of road accidents. In Scandinavian countries, a recent Swedish pilot study found that drivers admitted experiencing sleepiness in 15% of road crashes. In Finland, an analysis of the national database on road accidents from 1991 to 2001 found that 15.3% of accidents were related to fatigue/sleepiness.



TABLE 1.2

Change in rank order of DALYs for the 10 leading causes of the global burden of disease

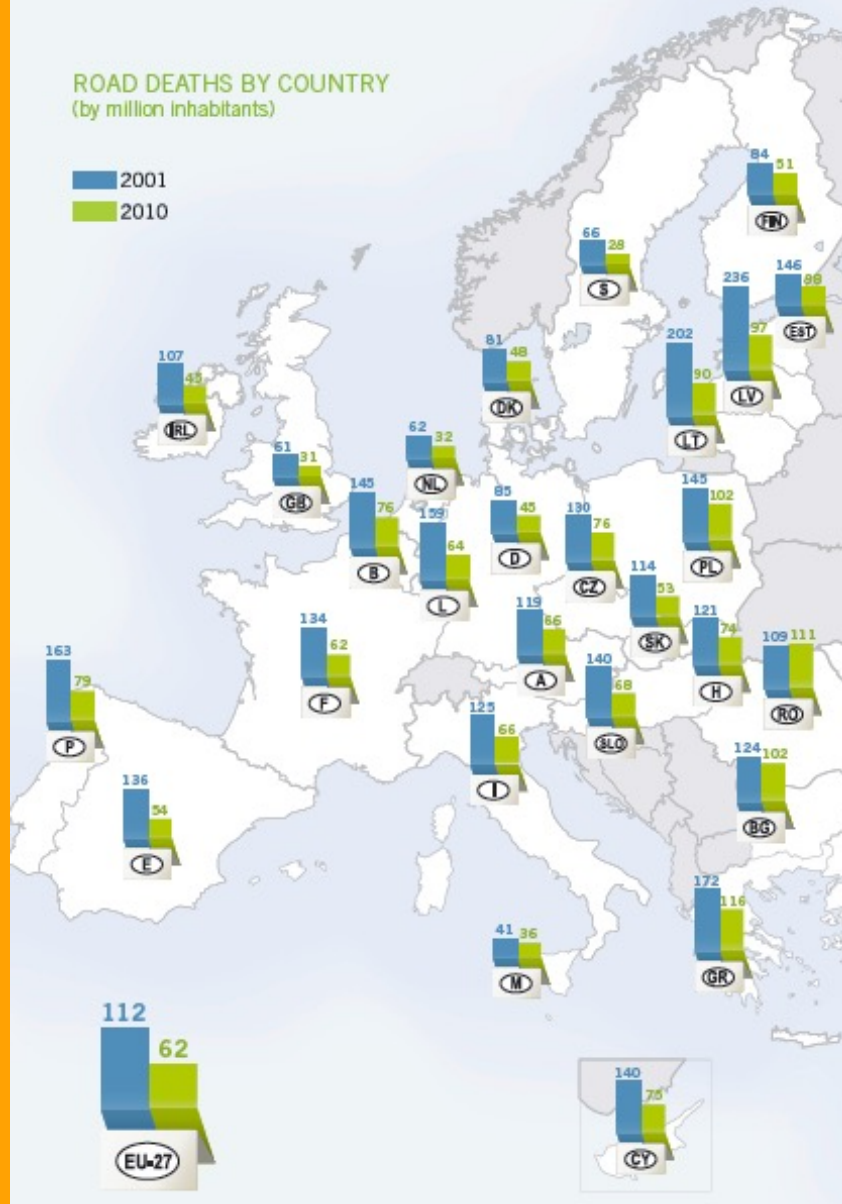
1990		2020	
Rank	Disease or injury	Rank	Disease or injury
1	Lower respiratory infections	1	Ischaemic heart disease
2	Diarrhoeal diseases	2	Unipolar major depression
3	Perinatal conditions	3	Road traffic injuries
4	Unipolar major depression	4	Cerebrovascular disease
5	Ischaemic heart disease	5	Chronic obstructive pulmonary disease
6	Cerebrovascular disease	6	Lower respiratory infections
7	Tuberculosis	7	Tuberculosis
8	Measles	8	War
9	Road traffic injuries	9	Diarrhoeal diseases
10	Congenital abnormalities	10	HIV

DALY: Disability-adjusted life year. A health-gap measure that combines information on the number of years lost from premature death with the loss of health from disability.

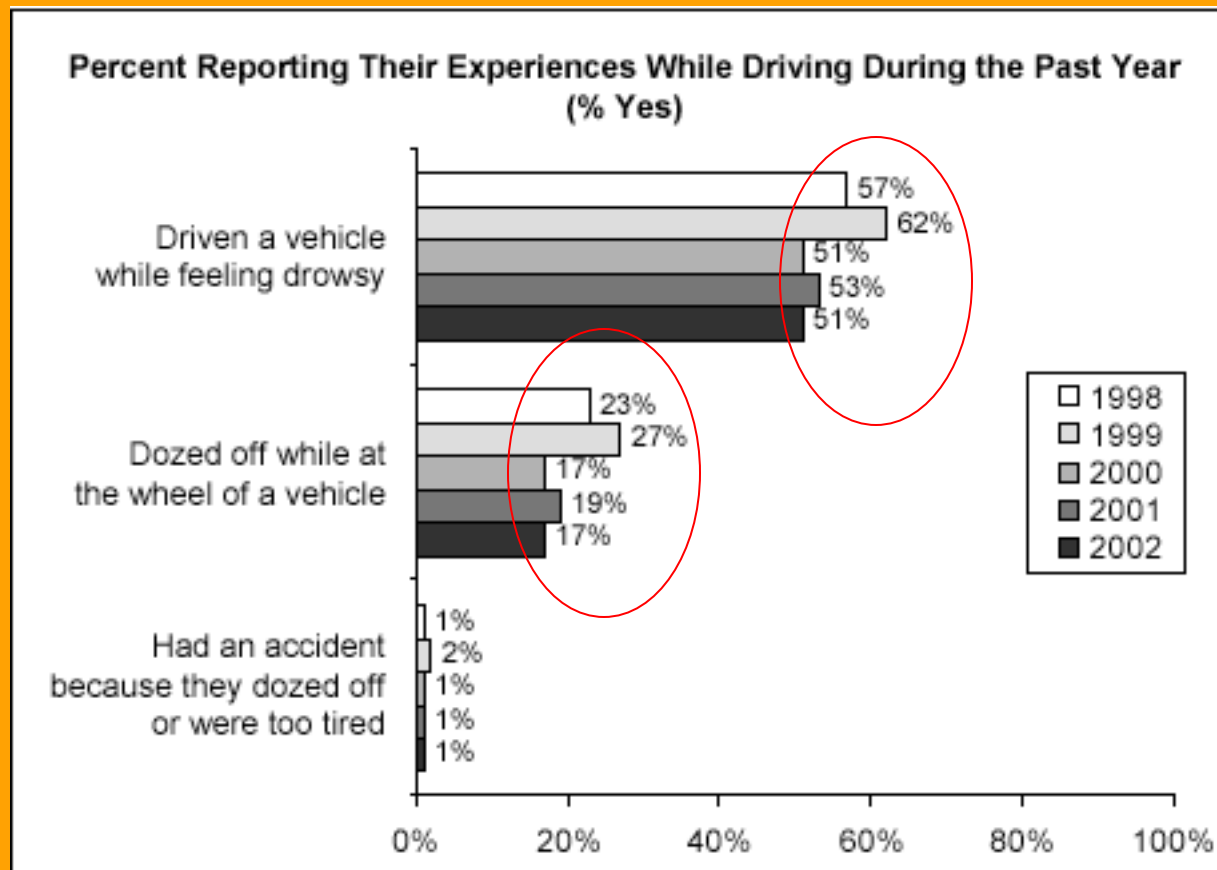
Source: reference 2.

ROAD DEATHS BY COUNTRY (by million inhabitants)

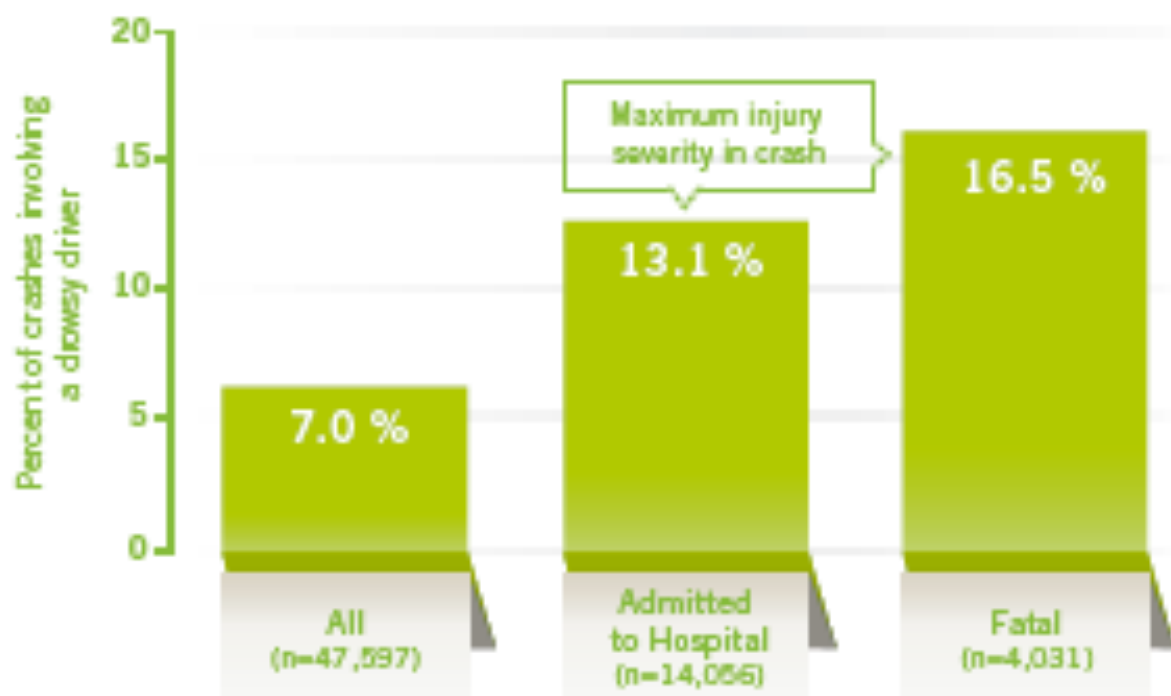
2001
2010



Sonnolenza alla guida



Percentage of crashes involving drowsy driving in the USA



Estimated proportion of crashes involving a drowsy driver, by maximum injury severity in crash. Study population: crashes that involved a passenger vehicle that was towed from the scene, United States, 1999-2008.

Adapted from *SO Toffi* Prevalence of motor vehicle crashes involving drowsy drivers, United States, 1999-2008
Accident Analysis & Prevention, 2012, vol 46, 180-6 with permission.

Stima ponderata dell'incidentistica stradale italiana in rapporto alla propensione sonno (*sleepiness*)

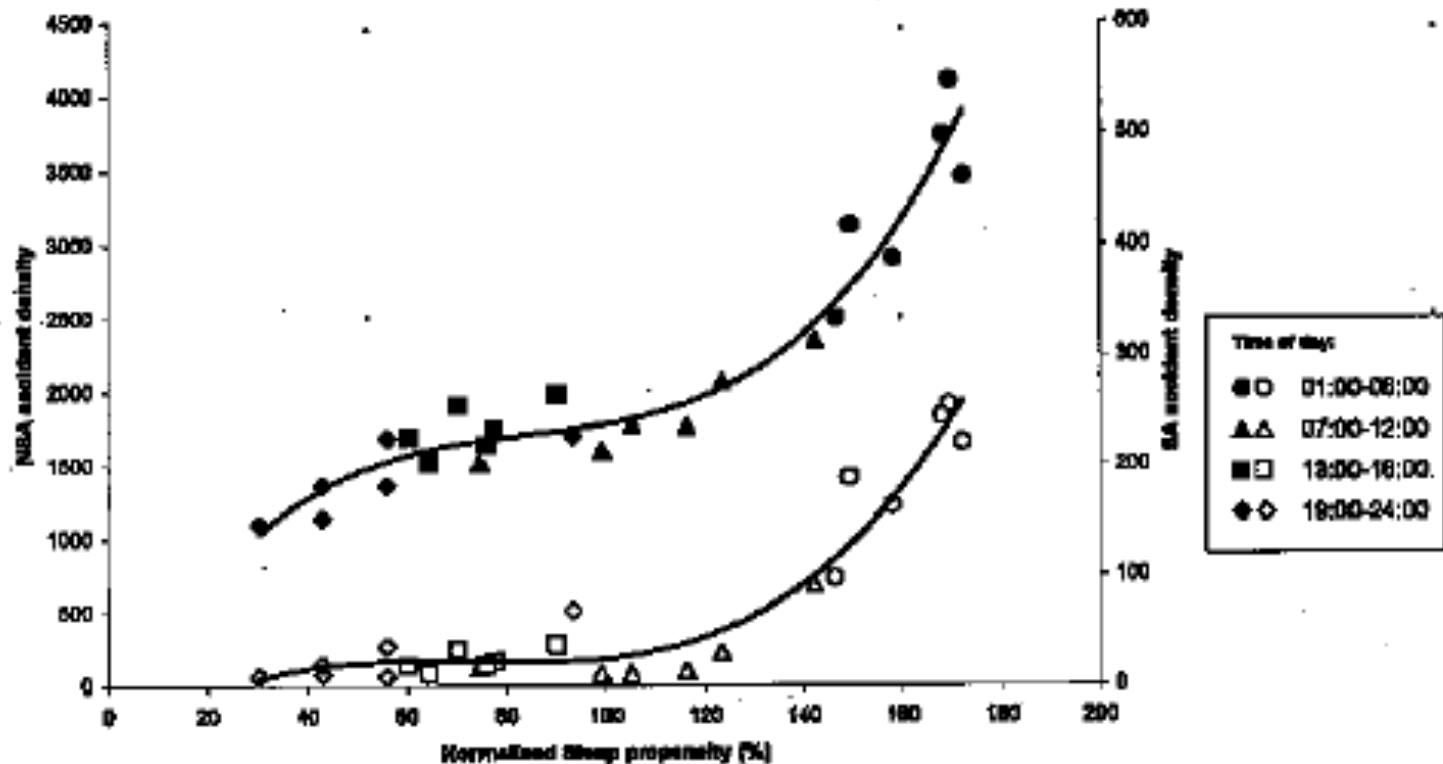
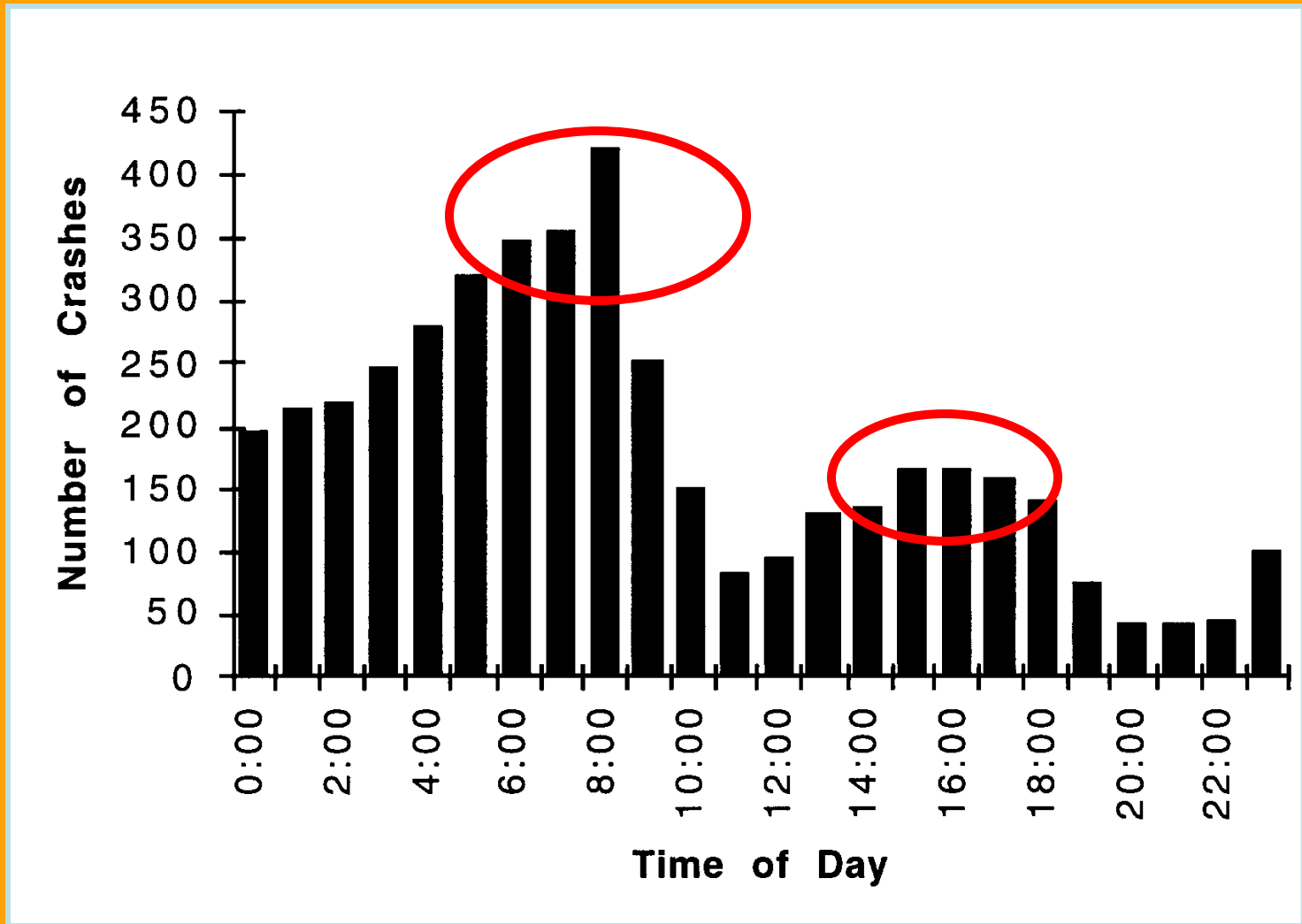


Figure 2—The density of accidents occurred on Italian highways (1993-97) is plotted versus the sleep propensity curve for both the sleep-ascribed accidents (SA, empty symbols) and non sleep- ascribed ones (NSA, full symbols). The number of accidents has been divided by the traffic density and then normalized so that the data point sum to the total number of accidents in the five years considered. The sleep propensity has been estimated from a bed rest protocol by evaluating, for every hour, the time spent in sleep as percent of its mean value during the 24 hours.

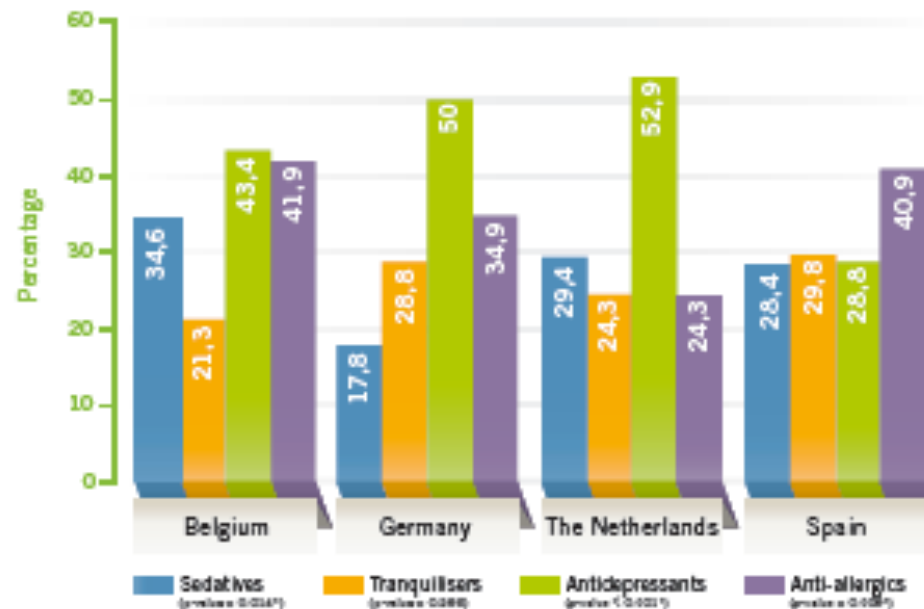
Distribuzione degli incidenti stradali in funzione delle 24 ore



Considerare anche farmaci direttamente o indirettamente associati al sonno

As part of the DRUID (DRiving Under the Influence of Drugs, alcohol and medicines) project, a survey was conducted in 4 European countries to assess knowledge and behaviour when driving under the influence of medicines. Pharmacists handed out questionnaires to drivers aged 18-75 years and using any psychotropic drug. Hereunder are the impressive percentages of use of psychotropic drugs.

Use of medicines by respondents per country



Belgium n= 136 Germany n= 146 The Netherlands n= 136 Spain n= 215

Global results of this survey are exposed in Chapter 3 European Initiatives.

Adapted from Monteiro et al, *BMC Public Health*, 2012, 12:59 with permission

MINISTERO DELLE INFRASTRUTTURE E DEI TRASPORTI

DECRETO 22 dicembre 2015

Recepimento della direttiva della Commissione 2014/85/UE recante modifica della direttiva 2006/126/CE del Parlamento europeo e del Consiglio concernente la patente di guida. (16A00299)

(GU n.9 del 13-1-2016)

IL MINISTRO DELLE INFRASTRUTTURE E DEI TRASPORTI

Visto il decreto legislativo 30 aprile 1992, n. 285, e successive modificazioni, recante «Nuovo codice della strada», ed in particolare l'articolo 119, concernente i requisiti fisici e psichici per il conseguimento e la conferma di validità della patente di guida, nonché l'articolo 121 concernente l'esame di idoneità per il conseguimento della patente di guida;

Vista la direttiva 2006/126/CE del Parlamento europeo e del Consiglio del 20 dicembre 2006, concernente la patente di guida, ed in particolare l'allegato II «Requisiti minimi per l'esame di idoneità alla guida» e l'allegato III «Norme minime concernenti

Modifiche all'allegato III
del decreto legislativo 18 aprile 2011, n. 59

1. All'allegato III del decreto legislativo 18 aprile 2011, n. 59, sono apportate le seguenti modifiche:

a) al secondo capoverso, dopo le parole «- turbe psichiche,» e' inserito il seguente alinea «- malattie neurologiche,»;

b) il terzo capoverso e' sostituito dal seguente: «Conseguentemente, all'appendice II - Art. 320 del decreto del Presidente della Repubblica 16 dicembre 1992, n. 495, le voci relative alle seguenti patologie: affezioni cardiovascolari, diabete, epilessia, malattie del sistema nervoso, malattie psichiche, sostanze psicoattive, sono soppresse».

c) dopo il paragrafo G, e' inserito il seguente:

«H. MALATTIE NEUROLOGICHE E SINDROME DELLE APNEE OSTRUTTIVE NEL SONNO

H.1. Malattie neurologiche

La patente di guida non deve essere ne' rilasciata ne' rinnovata a candidati o conducenti colpiti da gravi affezioni neurologiche di grado tale da risultare incompatibili con la sicurezza della guida.

La commissione medica locale, anche avvalendosi dell'esito di visita specialistica presso strutture pubbliche, puo' autorizzare la guida in relazione allo stato evolutivo ed alle capacita' funzionali

possedute, previa valutazione della compatibilita' della sintomatologia sensitiva, sensoriale, motoria e del trofismo muscolare, dovuta a malattie neurologiche od a postumi invalidanti di interventi chirurgici o traumatici del sistema nervoso centrale o periferico, con la sussistenza di condizioni che possano far escludere pregiudizi per la sicurezza della circolazione. In tali casi, gli interessati devono dimostrare di essere in grado di azionare, in condizioni di sicurezza, i comandi del veicolo della categoria per la quale si richiede il rilascio o il rinnovo di validita' della patente. La validita' della patente, in questi casi, non puo' essere superiore a due anni.

H2. DISTURBI DEL SONNO DA APNEE OSTRUTTIVE NOTTURNE

La patente di guida non deve essere ne' rilasciata ne' rinnovata a candidati o conducenti affetti da disturbi del sonno causati da apnee ostruttive notturne che determinano una grave ed incoercibile sonnolenza diurna, con accentuata riduzione delle capacita' dell'attenzione non adeguatamente controllate con le cure prescritte.

Il medico, di cui all'articolo 119, comma 2, del codice della strada, sottopone a particolare valutazione i soggetti per i quali sussistono sintomi riconducibili alla sindrome da apnea ostruttiva notturna. Nei casi in cui si possa concludere per l'assenza o lieve entita' di sonnolenza diurna, il medico di cui all'articolo 119, comma 2, del codice della strada, certifica l'idoneita' alla guida del conducente. Nel caso sussistano dubbi circa l'idoneita' e la sicurezza di guida, l'accertamento dei requisiti di idoneita' psichici e fisici e' demandato alla commissione medica locale.

La commissione medica locale puo' autorizzare alla guida i soggetti affetti da sindrome da apnee ostruttive notturne moderate o gravi che dimostrino un adeguato controllo della sintomatologia presentata con relativo miglioramento della sonnolenza diurna, se del caso confermato da parere specialistico di strutture pubbliche.

La validita' della patente rilasciata o rinnovata, eventualmente anche con prescrizioni da parte della Commissione Medica Locale, non puo' superare i tre anni per i conducenti del gruppo 1 ed un anno per i conducenti del gruppo 2.».

Il presente decreto sara' inviato agli organi di controllo e pubblicato nella Gazzetta Ufficiale della Repubblica italiana.

Roma, 22 dicembre 2015

Il Ministro: Delrio

Registrato alla Corte dei conti il 7 gennaio 2016
Ufficio controllo atti Ministero delle infrastrutture e dei trasporti
e del Ministero dell'ambiente e della tutela del territorio e del
mare foglio n. 1, registro n. 21

Valutazioni soggettive

Allegato II

Questionario "Sonnolenza diurna"

sig.....

capita di appisolarsi frequentemente nelle seguenti situazioni?

1 – davanti alla televisione

Si No

2 – in treno o in autobus o in macchina se non guida

Si No

3 – leggendo il giornale

Si No

4 - al cinema o ad una conferenza

Si No

5 – conversando con qualcuno o durante i pasti

Si No

6 – alla guida, nelle brevi soste del traffico?

Si No

Interpretazione dei risultati:

Risposte tutte negative = sonnolenza assente

Positive da n. 1 a n. 3 = presenza di lieve sonnolenza diurna

Risposta positiva da 4 a 6 = presenza di eccessiva sonnolenza diurna

Che probabilità ha di appisolarsi o di addormentarsi nelle seguenti situazioni, indipendentemente dalla sensazione di stanchezza?

La domanda si riferisce alle usuali abitudini di vita nell'ultimo periodo.

Qualora non si sia trovato di recente in alcune delle situazioni elencate sotto, provi ad immaginare come si sentirebbe.

Usi la seguente scala per scegliere il punteggio più adatto ad ogni situazione:

0 = non mi addormento mai

1 = ho qualche probabilità di addormentarmi

2 = ho una discreta probabilità di addormentarmi

3 = ho un'alta probabilità di addormentarmi

Situazioni

1 Seduto mentre leggo

2 Guardando la TV

3 Seduto, inattivo in un luogo pubblico (a teatro, ad una conferenza)

4 Passeggero in automobile, per un'ora senza sosta

5 Sdraiato per riposare nel pomeriggio, quando ne ho l'occasione

6 Seduto mentre parlo con qualcuno

7 Seduto tranquillamente dopo pranzo, senza avere bevuto alcoolici

8 In automobile, fermo per pochi minuti nel traffico

Soma

AASM Guidelines for the Multiple Sleep Latency Test (MSLT)

- Standardized protocol
 - Five naps at 2 hour intervals; 4 nap test only if 2 SOREMPs are recorded
 - Always performed after a nocturnal polysomnogram ideally with a minimum of 6 hours of sleep
 - Rooms should be dark, quiet and at a comfortable temperature
 - After appropriate withdrawal of any psychotropic drugs
 - Stimulants withdrawn 2 weeks prior to test
 - No smoking 30 minutes prior to each nap
 - No vigorous physical activity on the day of the test
 - No caffeine or exposure to bright sunlight

From Littner et al 2005

© 2008 AMERICAN ACADEMY OF SLEEP MEDICINE

SLEEP MEDICINE PROFESSIONAL EDUCATION

Your Multiple Sleep Latency Test (MSLT)
What to expect

- 1 - Lights on
- 2 - Patient awake
- 3 - Electrodes reapplied
- 4 - 20 minute nap
- 5 - Patient awake
- 6 - 20 minute nap
- 7 - Patient eats lunch
- 8 - 20 minute nap
- 9 - Patient leaves

Mean sleep latency (min)

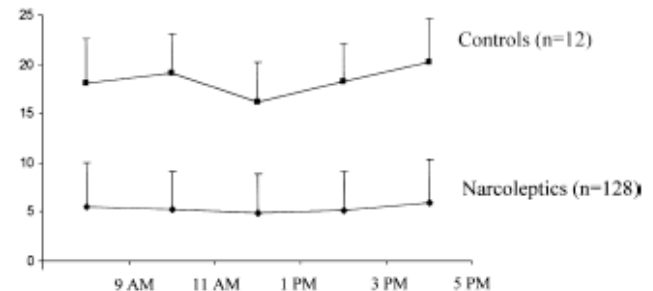
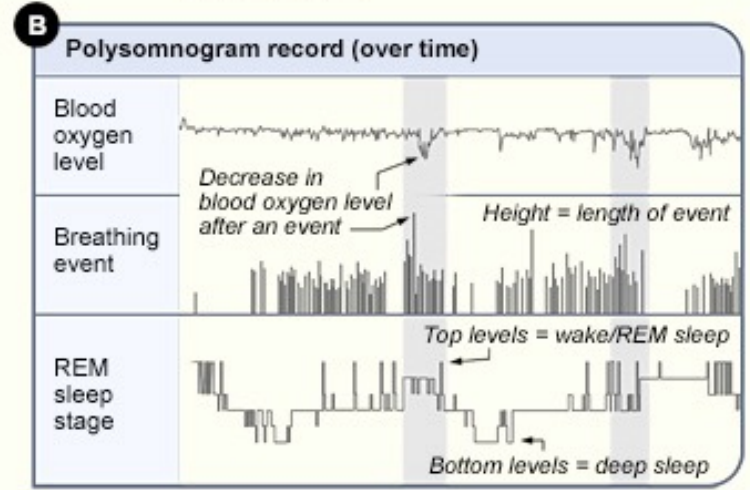
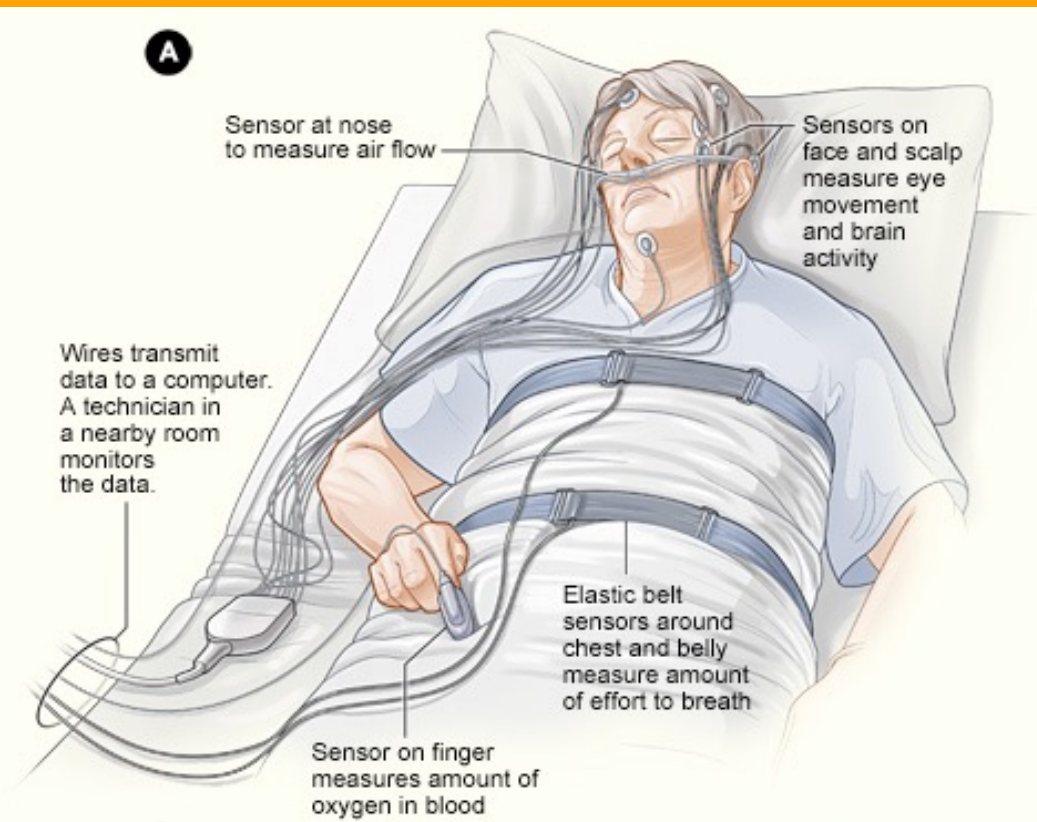


Fig. 2. Multiple sleep latency test in narcoleptic patients and controls.



Diagnosis of OSA

- **Apnea**
 - Complete cessation of breathing ≥ 10 sec
- **Hypopnea**
 - Partial reduction of airflow by $\geq 30\%$
- **Oxygen desaturation**
 - Oxygen desaturation $\geq 4\%$ from sleep baseline

Diagnosis

- **Apnea-Hypopnea Index (AHI)**
 - Total number of apneas and hypopneas divided by number of hours slept
 - Mild OSA: AHI = 5 – 14 events per hour
 - Moderate OSA: AHI = 15 – 29 events per hour
 - Severe OSA: AHI = 30+ events per hour
- **Also considered in diagnosis are:**
 - Number and severity of oxygen desaturation episodes
 - Number of awakenings
 - Severity of daytime symptoms

La tragedia dell'Erasmus: così la tecnologia può evitare gli incidenti



Dalle auto che frenano da sole a quelle che avvertono del pericolo colpo di sonno, da quelle che evitano tamponamenti a quelle che aiutano nel cambio di corsia

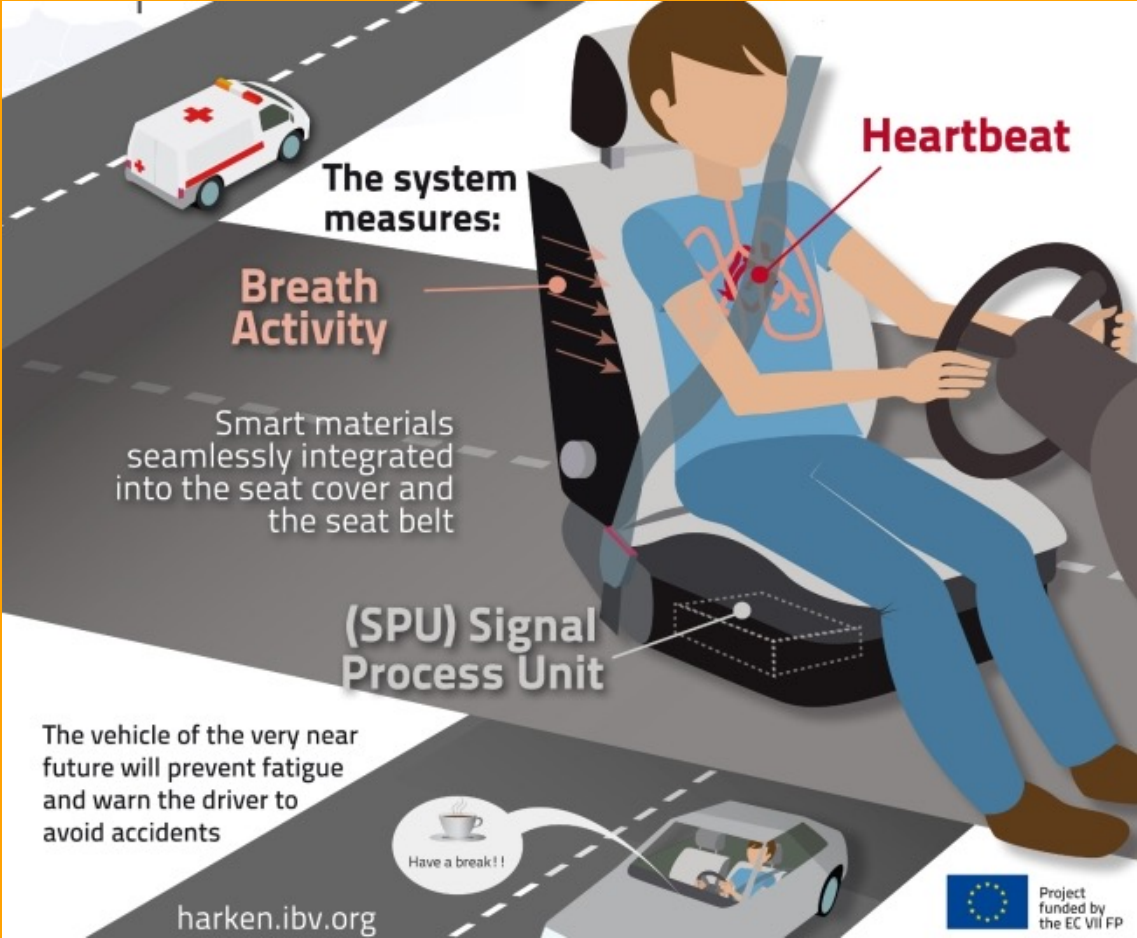
StopSleep®

Alerts the driver with an audible tone and vibration for 2-5 minutes before sleep.

The principle of the StopSleep device is based on the continuous analysis and measurement of skin conductivity using eight built in electrodermal sensors.



Sensor-enabled seatbelts, seat covers jolt up drivers when they're sleepy



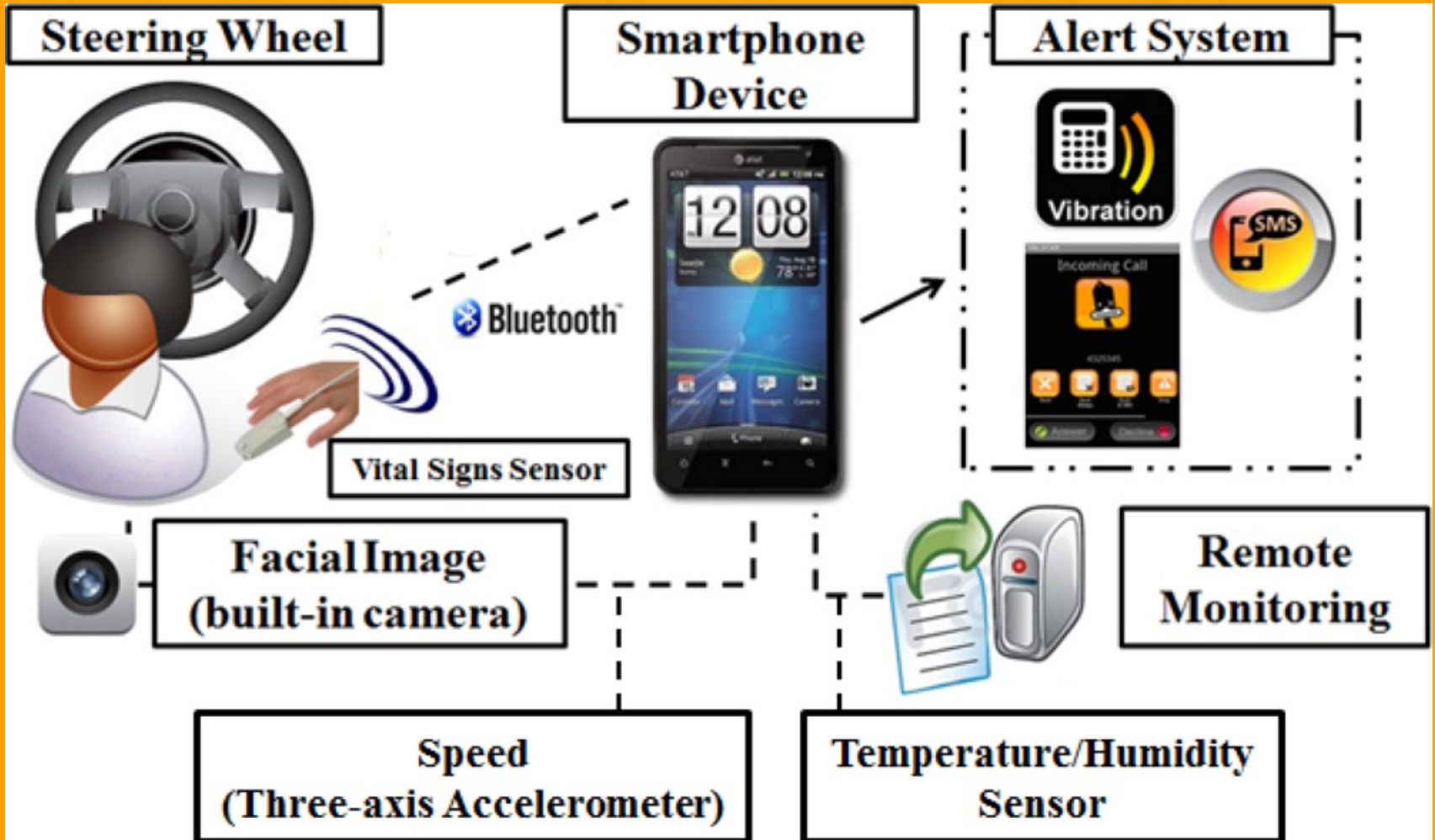
Brainwave hat

Brainwave hat | Product concept

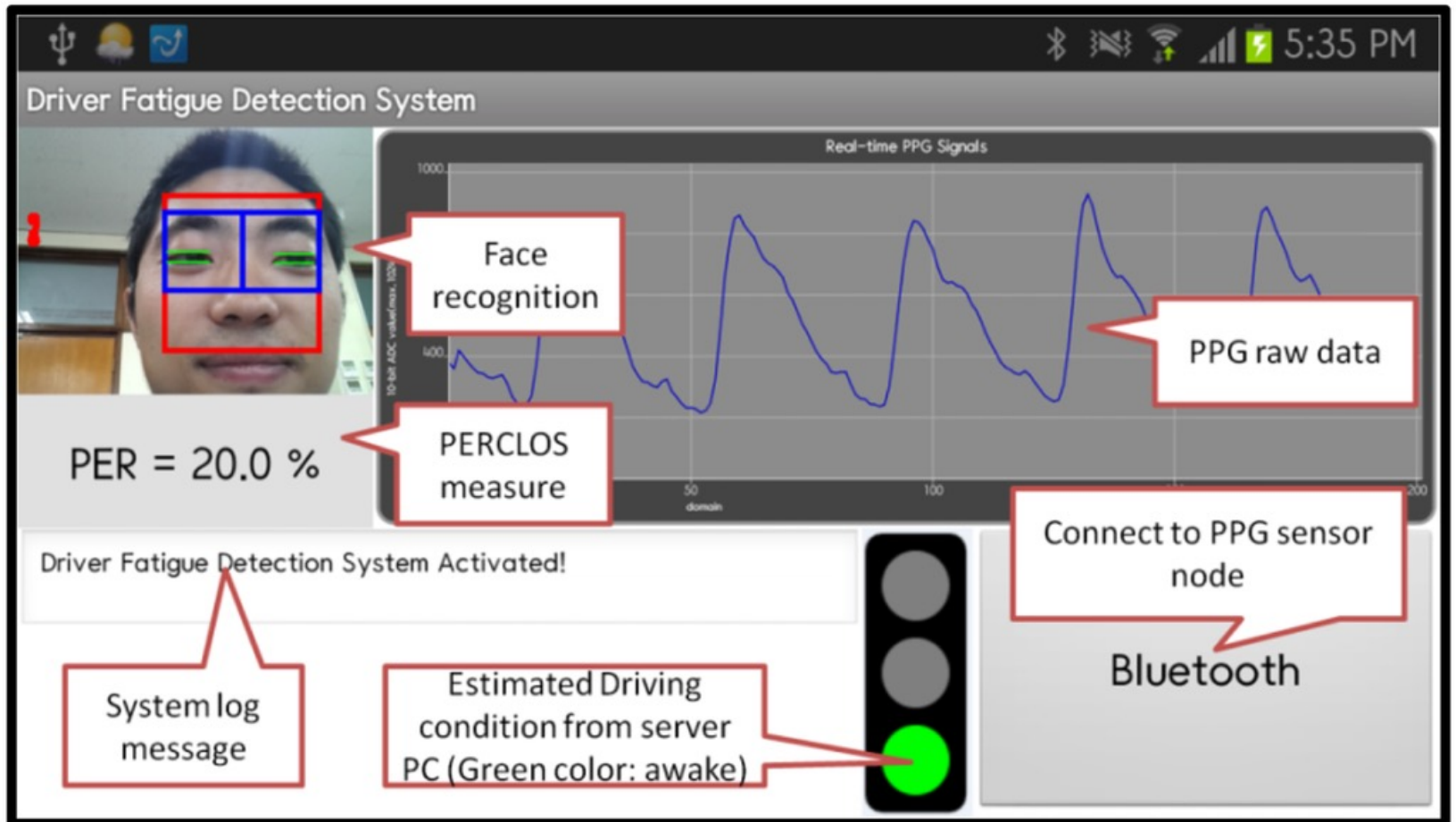


The product is mainly comprised of a hat and a dock for handheld device

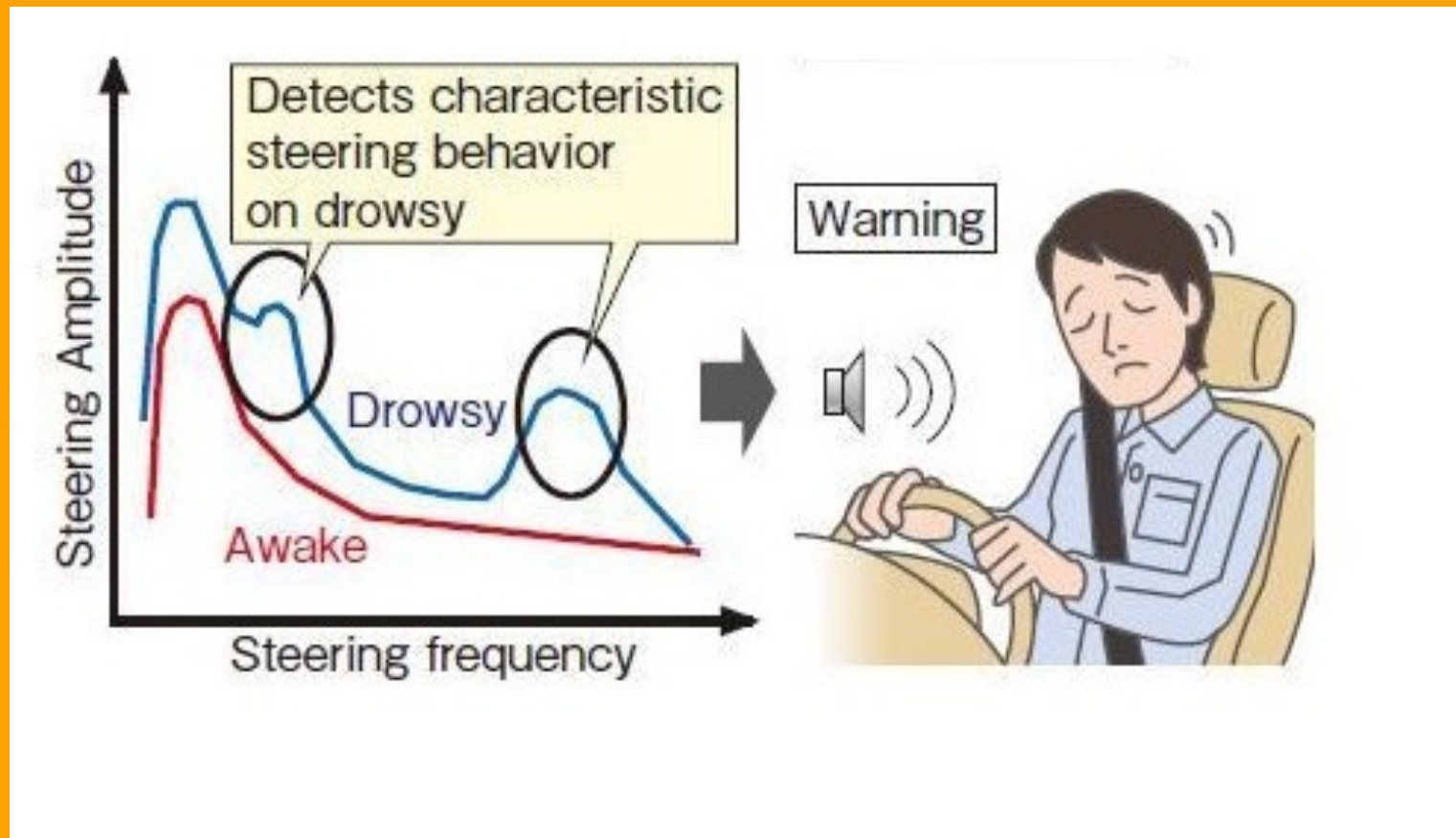
A Smartphone-Based Driver Safety Monitoring System Using Data Fusion



PERCLOS



Steering Movement Based Detection



Colpi di sonno in auto, ci pensa Ford SafeCap a svegliarti

Ford, in occasione del 60° anniversario dell'avvio della produzione dei propri camion in Brasile, ha svelato un cappello in grado di rilevare eventuali colpi di sonno al volante. Si chiama SafeCap, ed il funzionamento è basato su giroscopi e vari sensori.

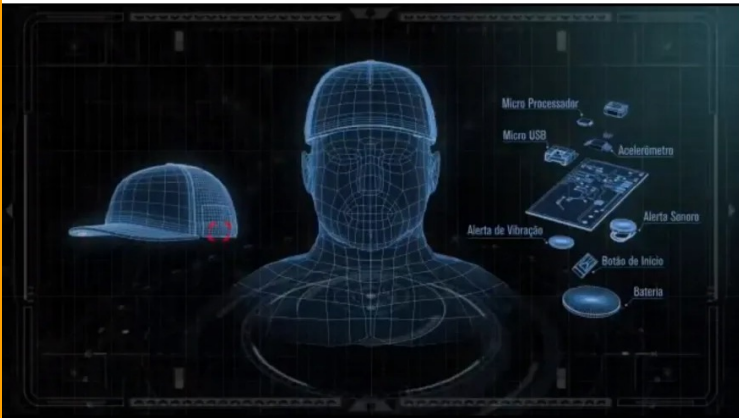
di [Saverio Alloggio @Save1990](#) · 15 Novembre 2017, 17:30 · (Fonte [International Business Times](#))





(da 1.25)

The SafeCap tracks head movements to warn when they're dozing off at the wheel.



Ford invented a trucker cap that fights drowsy driving

The only problem is that you have to wear a trucker cap.

Andrew Krok
Nov. 13, 2017 10:44 a.m. PT 2 min read



Ford's New Vibrating Baseball Cap Will Stop Drivers Driving Tired

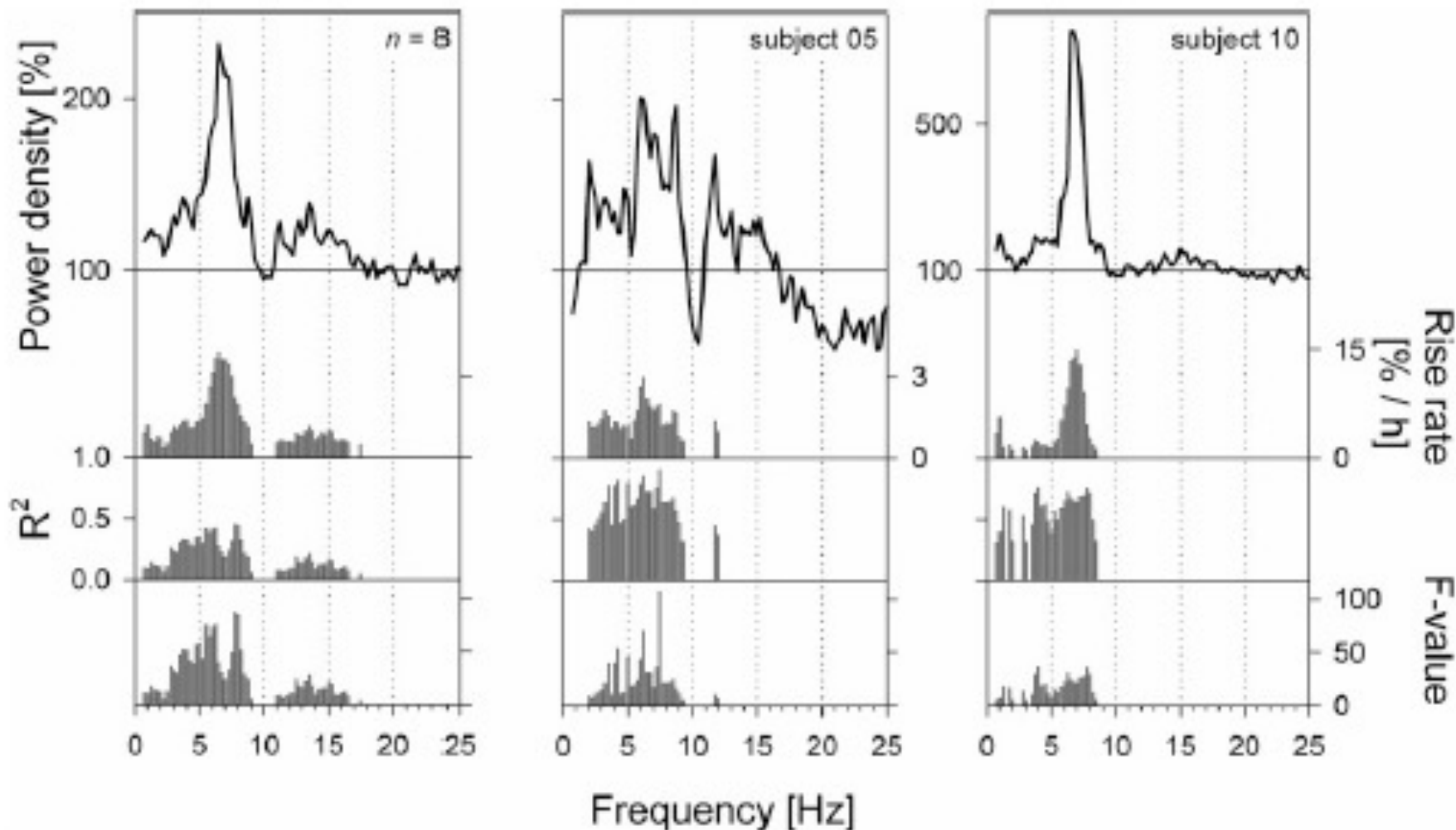
Following a Brazilian government investigation showing truckers were battling tiredness too much, Ford Brazil's Heavy Truck division has attempted a neat solution...

REMEMBER ME LATER
SHARE TWITTER EMAIL

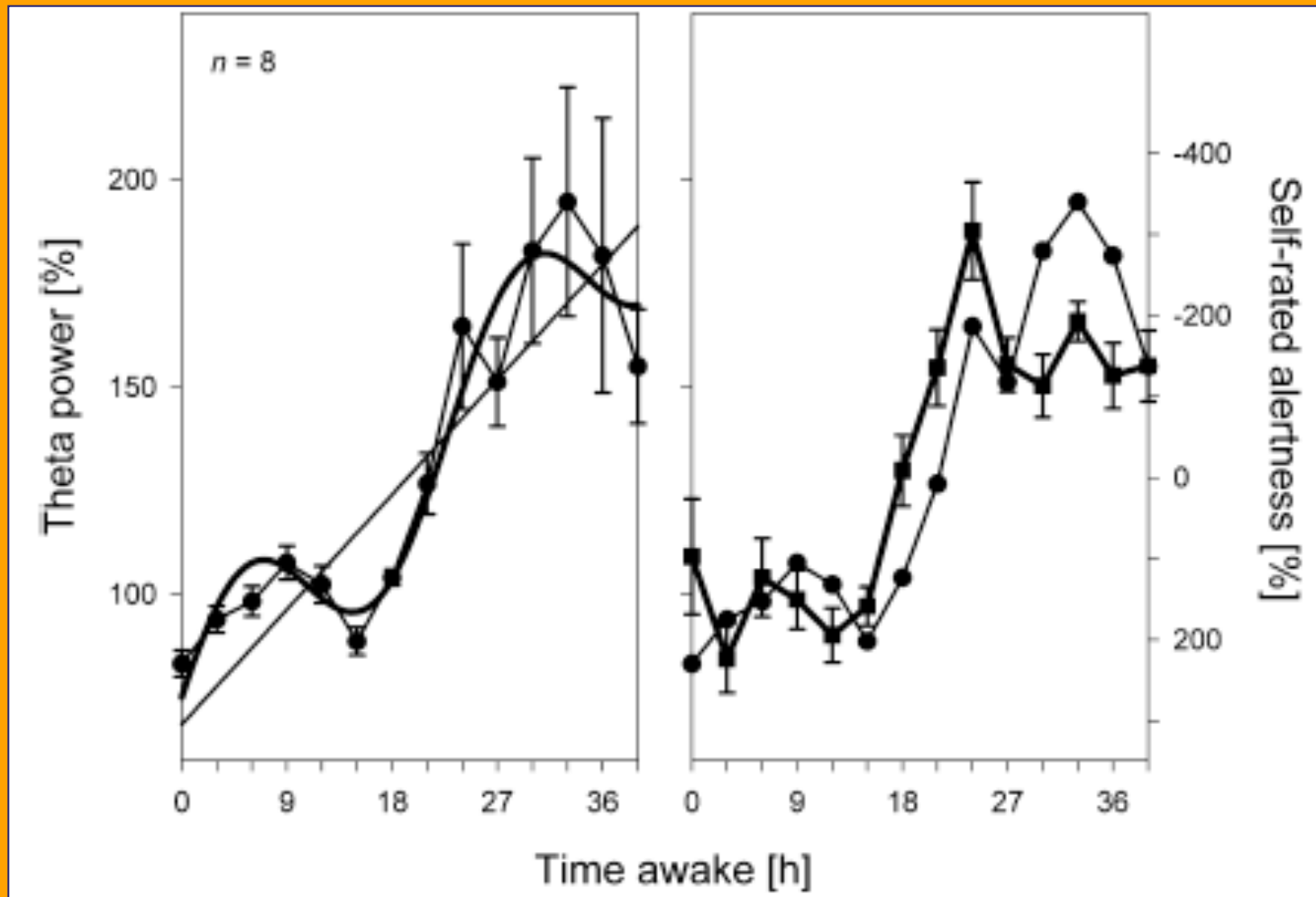


EEG

Effetti di 36 ore di deprivazione totale di sonno sull'EEG di veglia

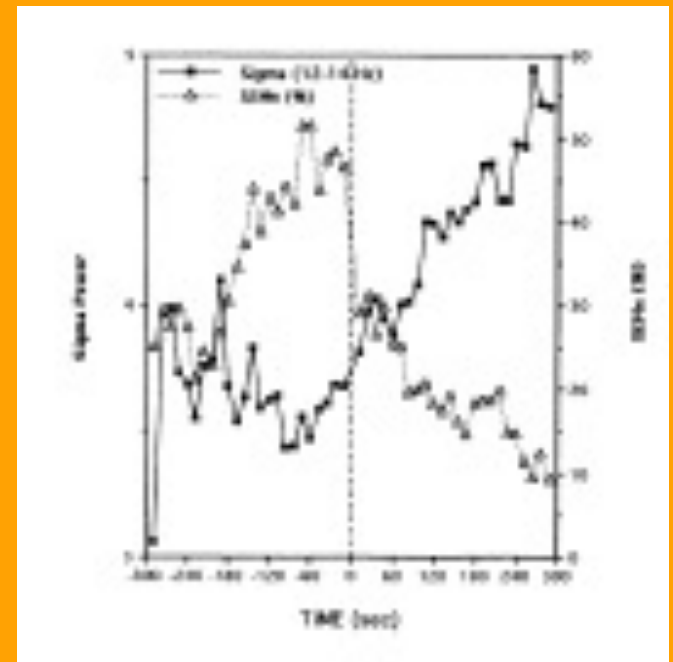
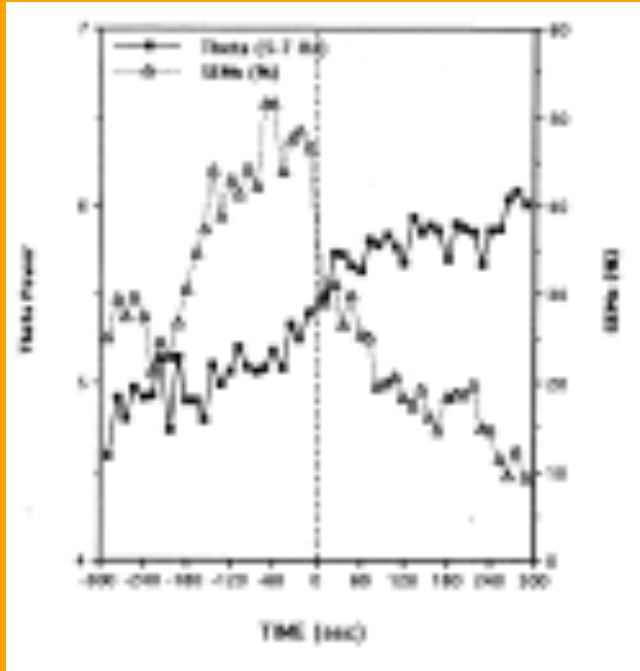
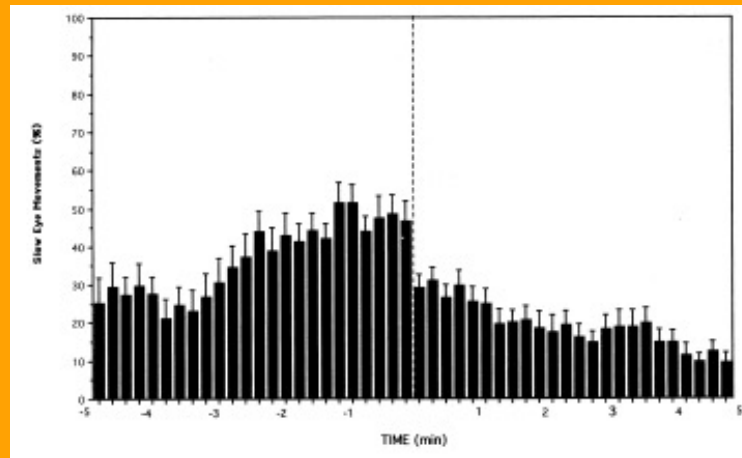


Associazione tra variazione EEG e *self-report*

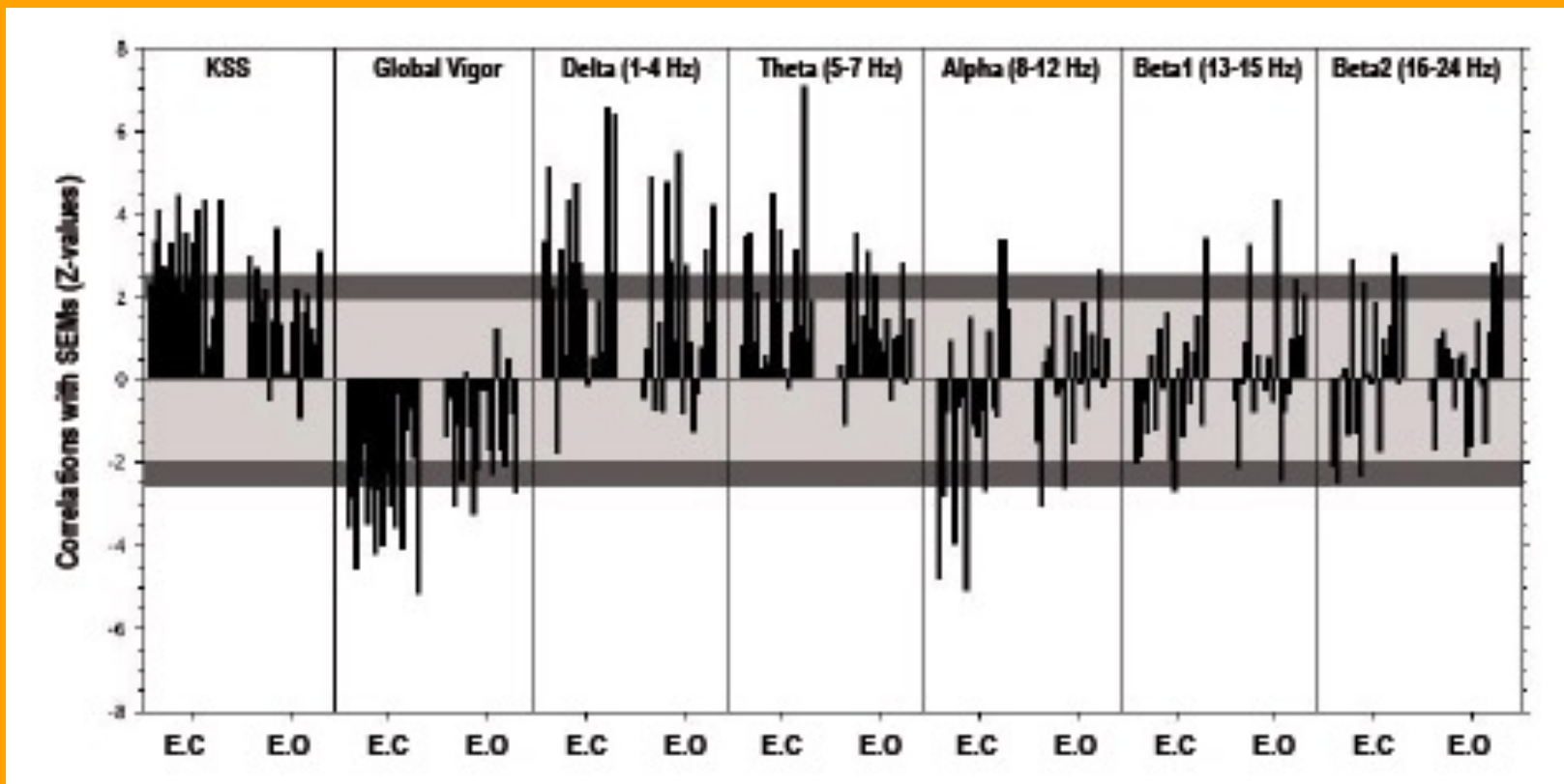


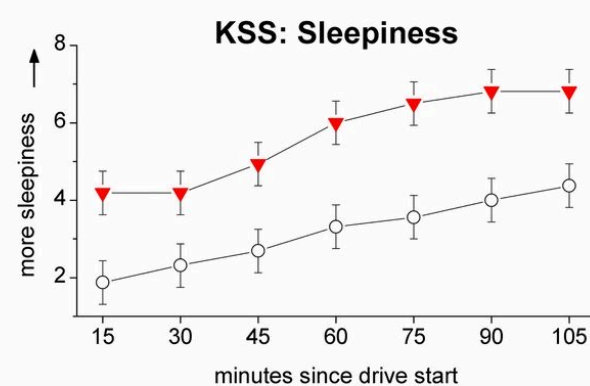
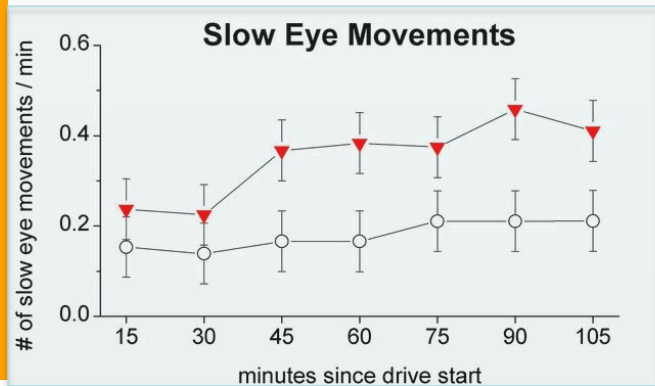
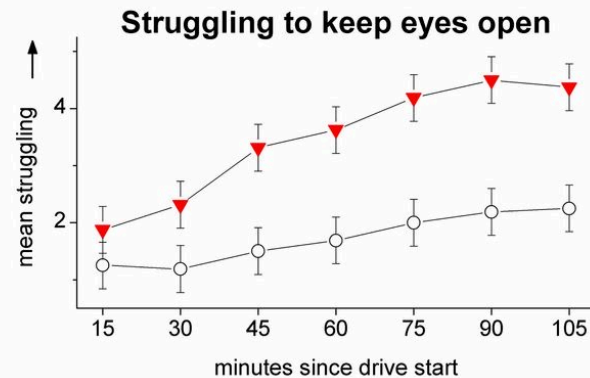
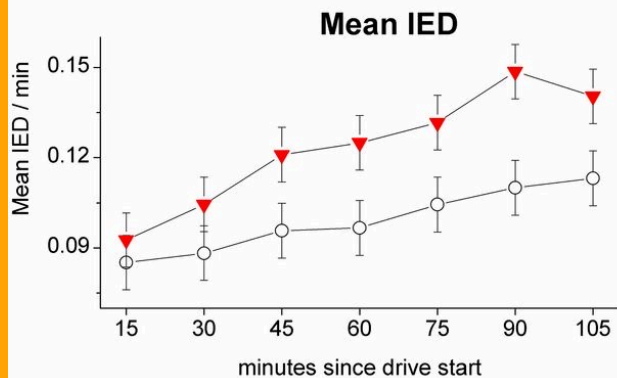
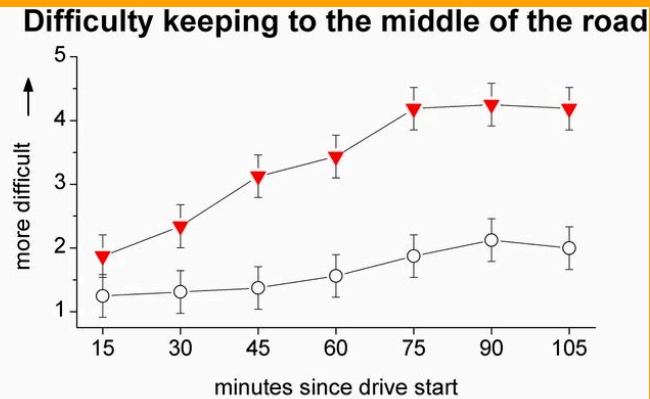
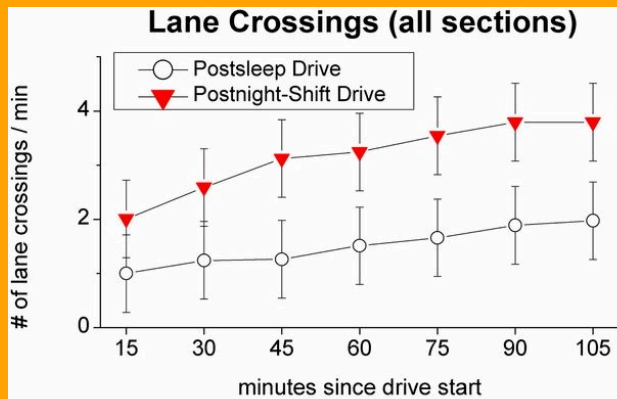
ATTIVITA OCULOMOTORIA

Slow Eye Movements



Elevata correlazione intra-individuale tra EOG e misure diverse di ESD



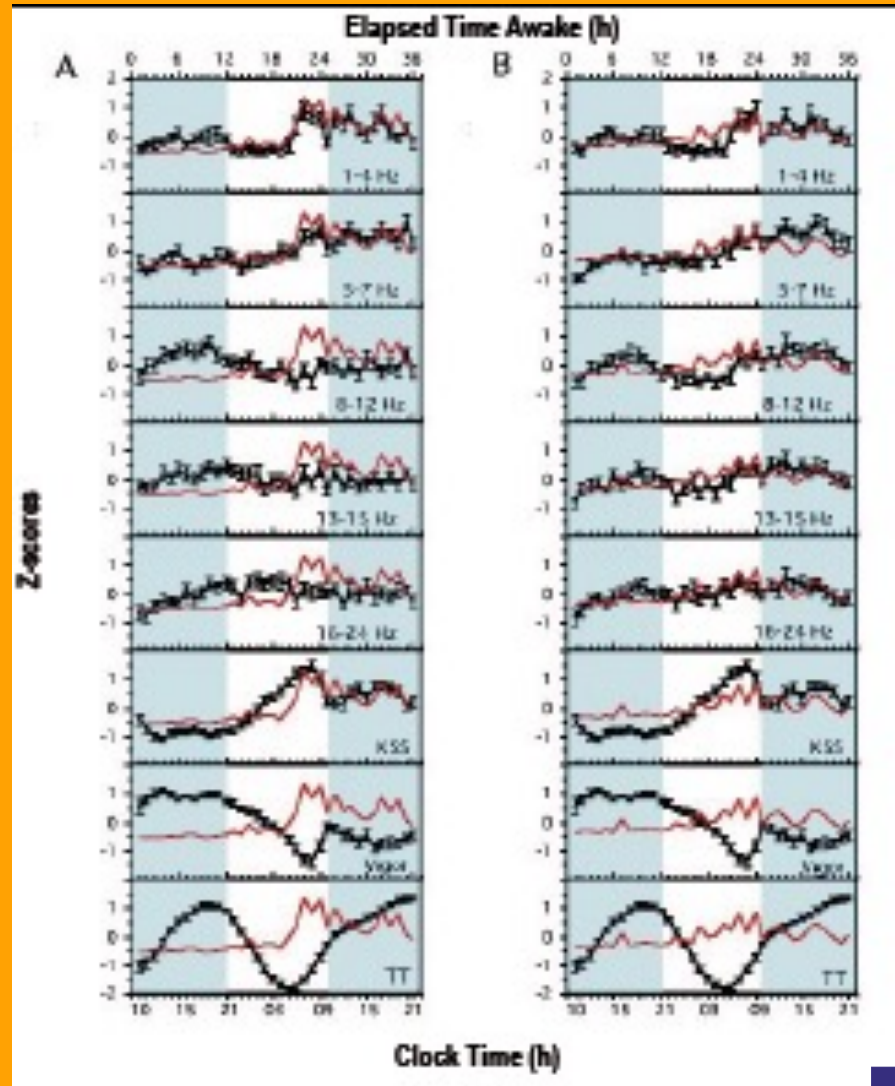


Michael L. Lee et al. PNAS 2016;113:176-181

Drowsiness progressively increased across driving sessions



Slow Eye Movements



Occhi chiusi

Occhi aperti

Slow Eye Movements and Subjective Estimates of Sleepiness Predict EEG Power Changes During Sleep Deprivation

Cristina Marzano¹, Fabiana Fratello, PhD¹, Fabio Moroni¹, Maria Concetta Pellicani, PhD², Giuseppe Curio, PhD¹, Michele Ferrara, PhD¹, Fabio Ferazzo, PhD¹, Luigi De Gennaro, PhD^{1,3}
¹Department of Psychology, University of Rome "La Sapienza", Rome, Italy; ²IRCCS Centro S. Giovanni di Dio, Hosp. Fatebenefratelli, Brescia, Italy; ³Department of Internal Medicine and Public Health, University of L'Aquila, Italy; ⁴Università Europea di Roma, Rome, Italy

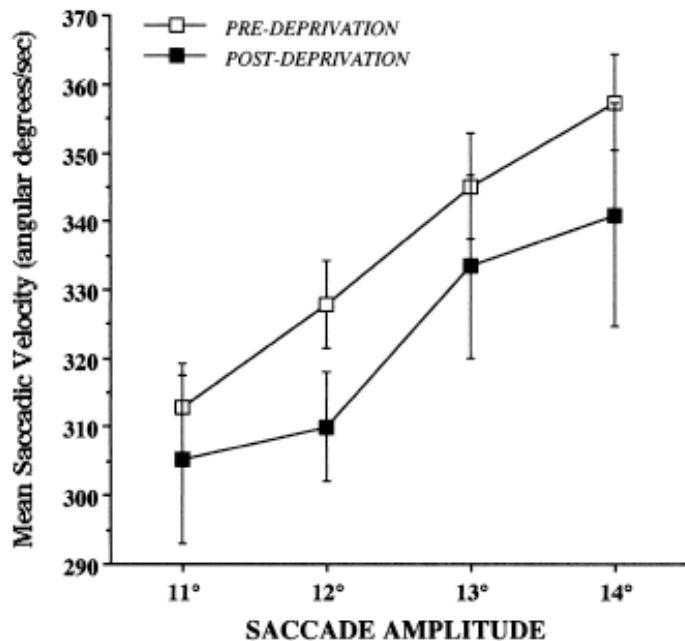


Fig. 2. Mean peak velocity (and SEMs) of saccadic eye movements for each considered amplitude during the 7 pre- and post-deprivation sessions.

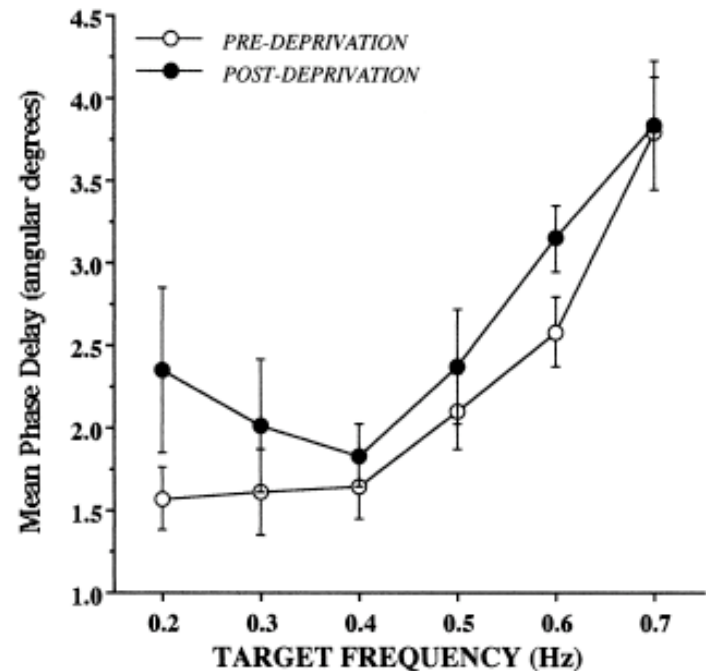


Fig. 4. Mean phase delay in angular degrees (and SEMs) of smooth pursuit eye movements at each target frequency during the 7 pre- and post-deprivation sessions.

Sensibilità di indicatori oculomotori (velocità saccadica e accuratezza dello *smooth pursuit*) nell'indicare aumentati livelli di sonnolenza



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Clinical Neurophysiology 111 (2000) 1771–1778



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Oculomotor impairment after 1 night of total sleep deprivation: a dissociation between measures of speed and accuracy

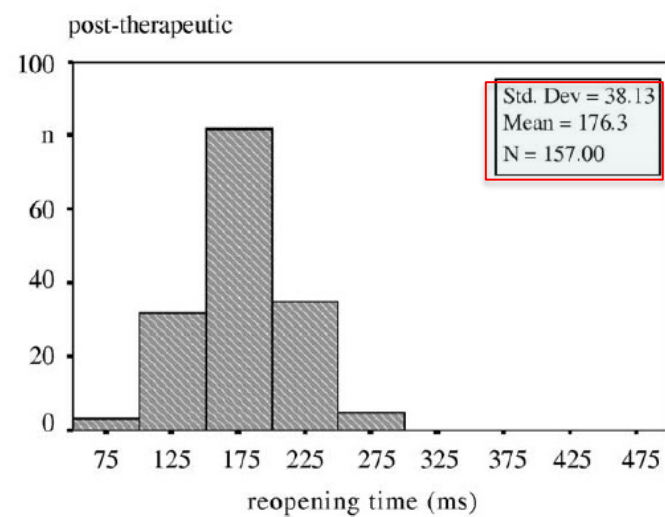
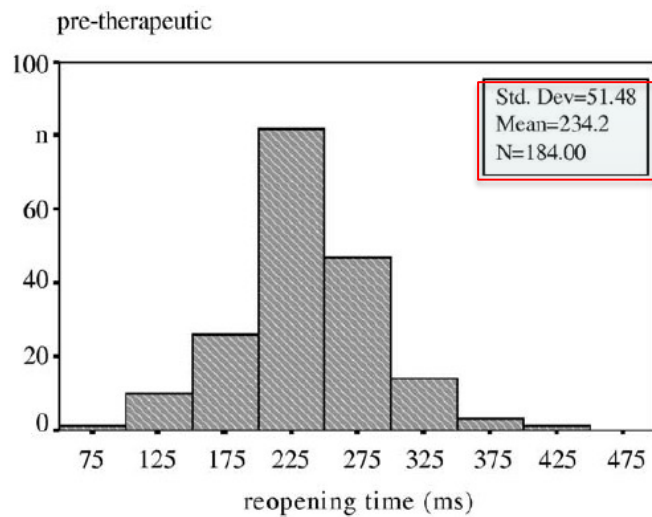
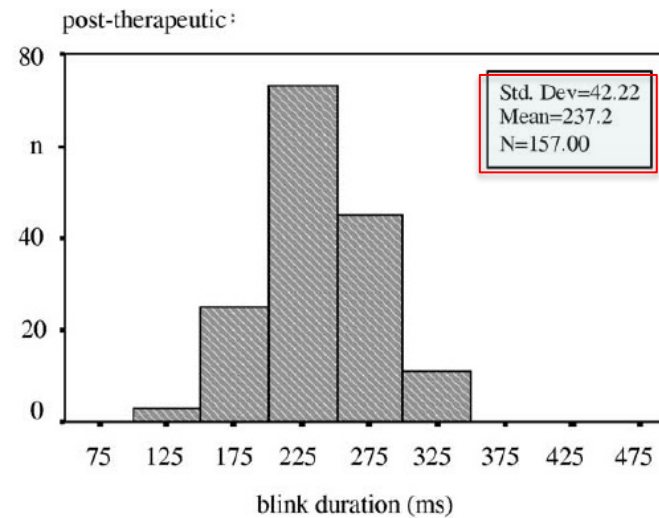
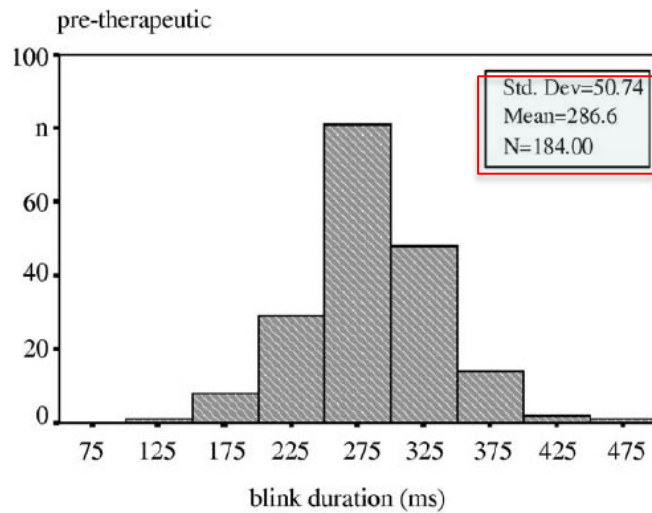
Luigi De Gennaro^{a,*}, Michele Ferrara^a, Luca Urbani^b, Mario Bertini^a

^aDepartment of Psychology, University of Rome "La Sapienza", Via dei Marsi, 78; 00185 Roma, Italy

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Accepted 28 June 2000

Blinking



Pazienti OSA prima e dopo CPAP



Sleep Medicine 6 (2005) 155–162

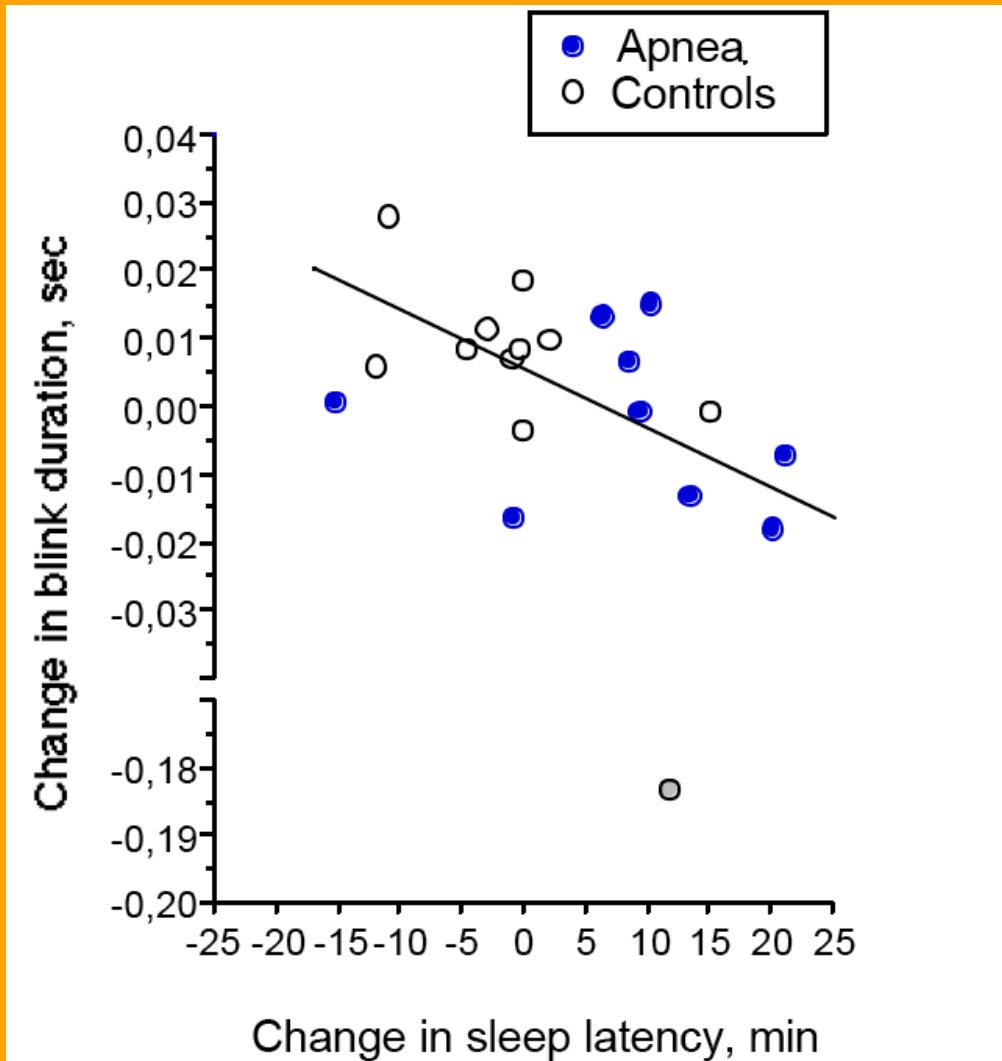
Original article

The spontaneous eye-blink as sleepiness indicator in patients with obstructive sleep apnoea syndrome—a pilot study

Philipp P. Cuffler^a, Udo Erdmann^b, Peter Ultsch^{a,*}

SLEEP
MEDICINE

Blinking



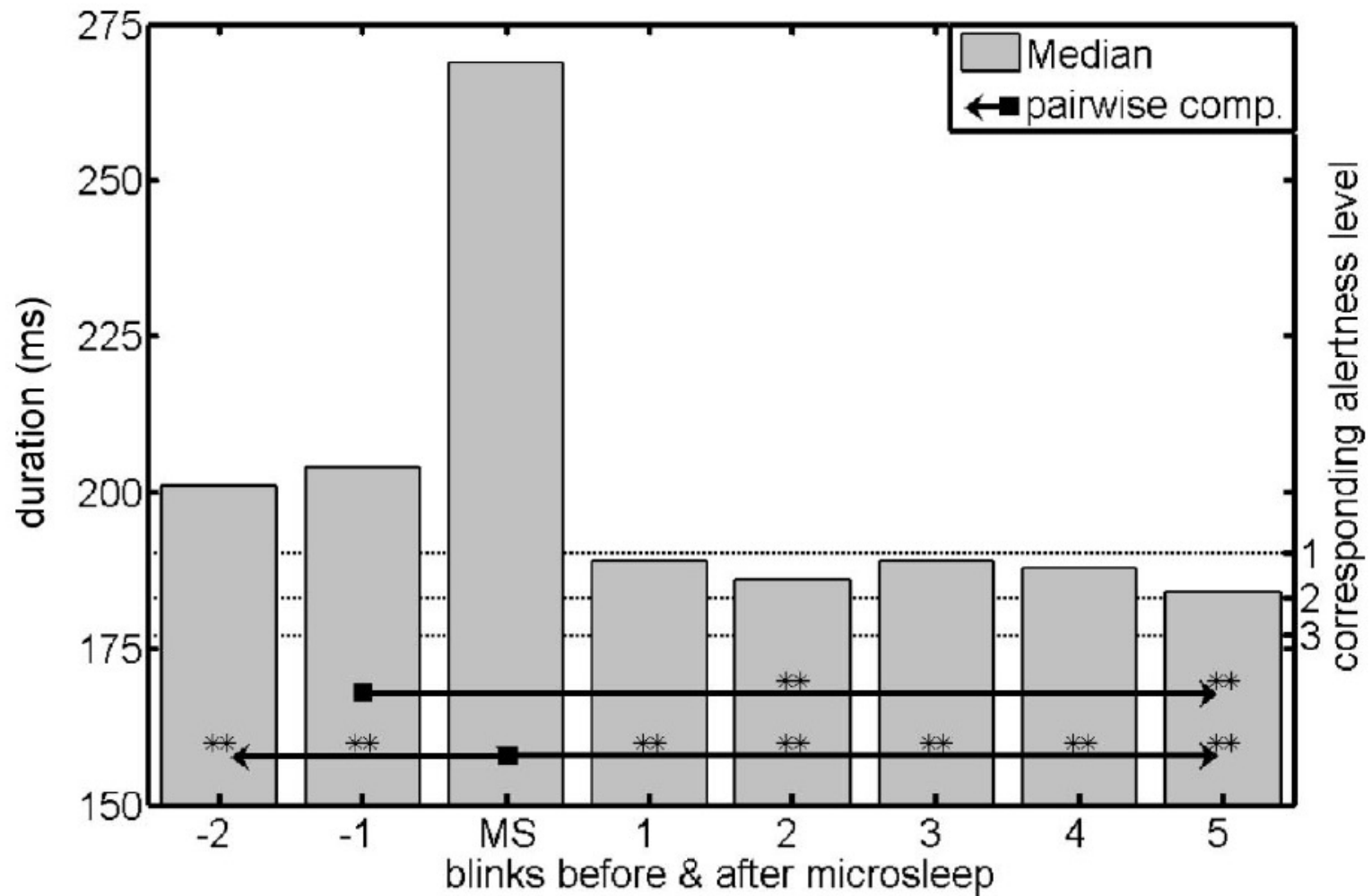
BLINK DURATION AS AN INDICATOR OF DRIVER SLEEPINESS IN PROFESSIONAL BUS DRIVERS

BLINK Duration as an Indicator of Driver Sleepiness in Professional Bus Drivers

Helina Häkkinen, LicPsych,¹ Heikki Summala, PhD,¹ Markku Partinen, MD,^{2,3} Mikko Tihonen, MD,^{3,4} Jouni Silvo, MD⁵

¹Traffic Research Unit, Department of Psychology, University of Helsinki; ²Huuga Neurological Research Centre, Helsinki; ³Department of Clinical Neurosciences, Helsinki University Central Hospital, Helsinki; ⁴Department of Forensic Medicine, University of Helsinki; ⁵Helsinki City Transport, Finland

Blinking

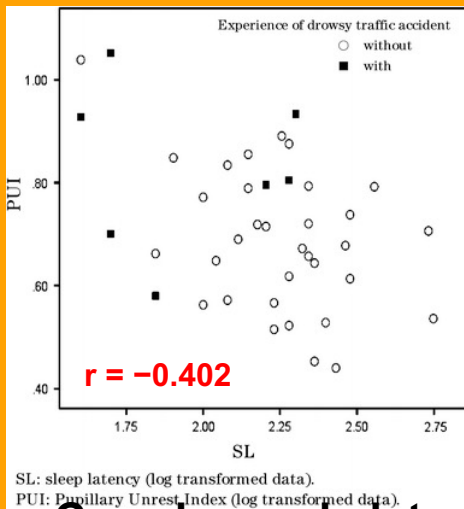
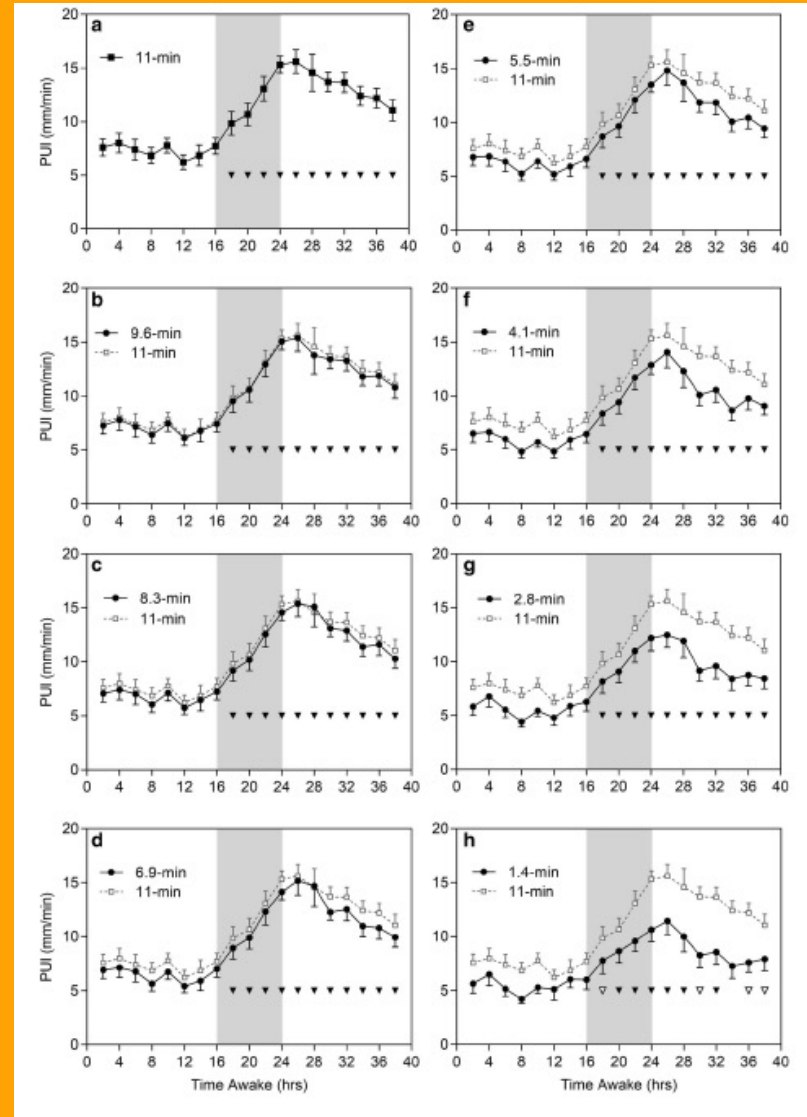
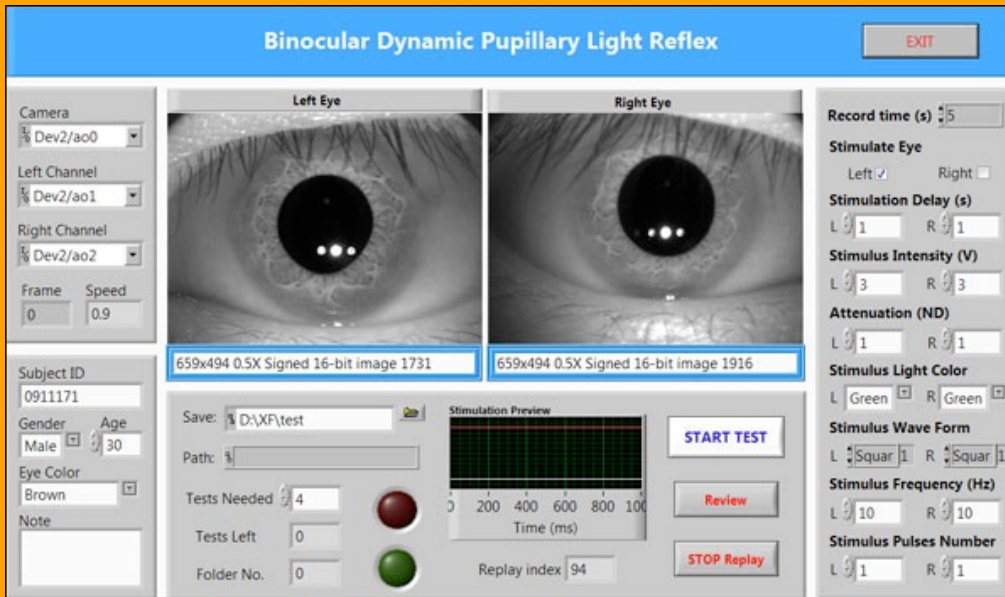


Blinks and saccades as indicators of fatigue in sleepiness
warnings: looking tired?

R. Schleicher^{1*}, N. Galley², S. Briesch³ and L. Galley⁴

¹Deutsche Telekom Laboratories, Berlin University of Technology, Ernst-Reuter-Platz 7, 10587 Berlin, Germany; ²Department of Anatomy, University of Cologne, Joseph-Stelmann-Strasse 9, 50931 Cologne, Germany; ³German Aerospace Center, Institute of Transportation Systems, Lilienthalplatz 7, 38108 Braunschweig, Germany; ⁴DaimlerChrysler AG, Customer Research Center, Leibnizstr. 2, 71022 Böblingen, Germany

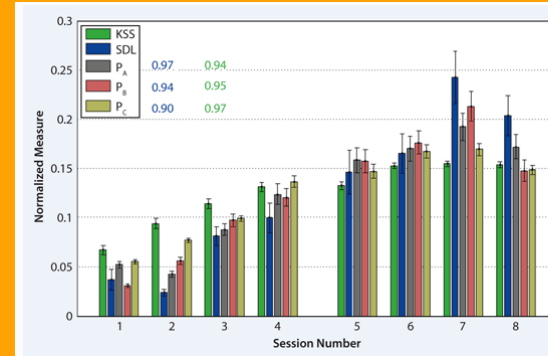
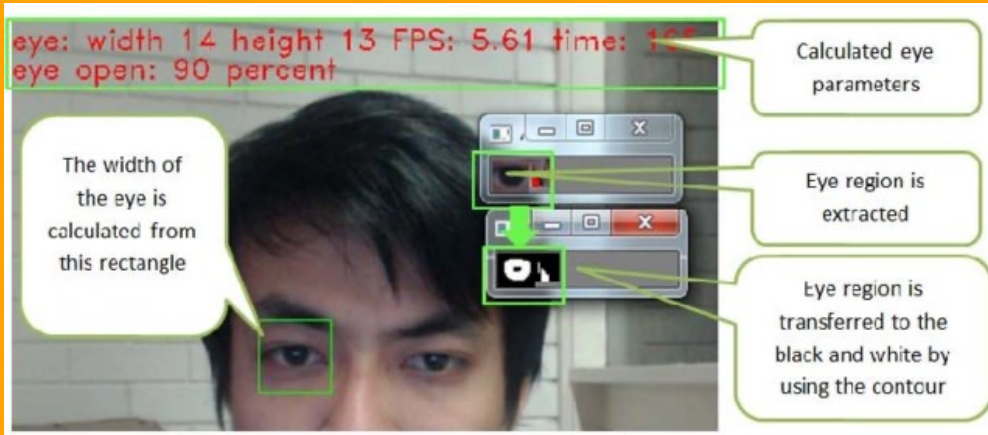
Pupillografia



SL: sleep latency (log transformed data).
 PUI: Pupillary Unrest Index (log transformed data).
Correla con la latenza del sonno

Discrimina livelli variabili di sonnolenza

Chiusura oculare



Mean and standard deviations of five measured variables, i.e., standard deviation of lateral position in lane (SDL), self-ratings on the Karolinska sleepiness scale (KSS), percentage of eye closures (PERCLOS) of FMT devices A, B, C. The latter are abbreviated as P_A, P_B, P_C. All variables were average session values for all subjects. Pearson's correlation coefficients ($n=208$) between SDL and P_A, P_B, P_C as well as between KSS and P_A, P_B, and P_C are listed (*inset*)

Correla con KSS e performance di guida

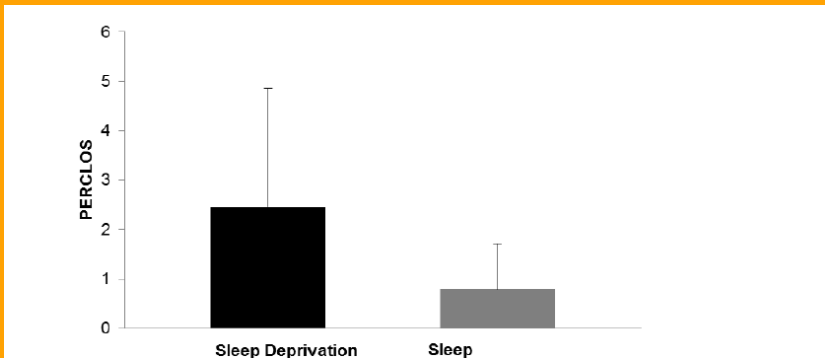
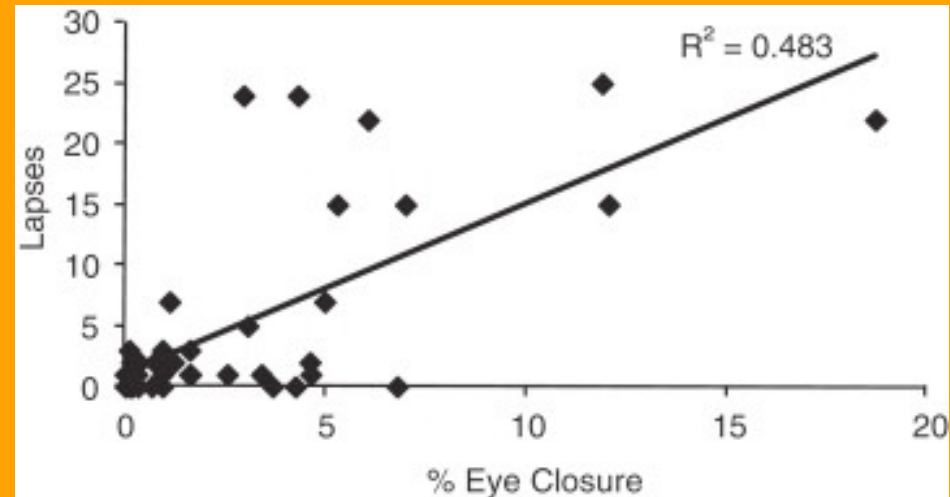


Fig. 1. Average PERCLOS recorded during the simulated driving task in the Sleep Deprivation and Sleep sessions. Errors bars represent standard deviations.



Discrimina livelli diversi di sonnolenza

Correla con lapses in compiti di guida

Diversi metodi a confronto

Accident Analysis and Prevention 153 (2021) 104658

Contents lists available at ScienceDirect

Accident Analysis and Prevention

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Journal homepage: www.elsevier.com/locate/sap

Effects of partially automated driving on the development of driver sleepiness

Christer Ahletröm^{a,b,c}, Raimondas Zembyls^b, Herman Jansson^c, Christian Forsberg^d, Johan Karlsson^e, Anna Anund^{a,b,f}

^a Swedish Institute of Transport Research, Institute PV0, Linköping, Sweden
^b Department of Biomedical Engineering, Linköping University, Linköping, Sweden
^c Swedish AB, Gothenburg, Sweden
^d Health Research, Swedish Transport Agency, Västerås, Sweden
^e Department of Psychology, Swedish Research Institute, Stockholm University, Stockholm, Sweden
^f Rehabilitation Medicine, Linköping University, Linköping, Sweden

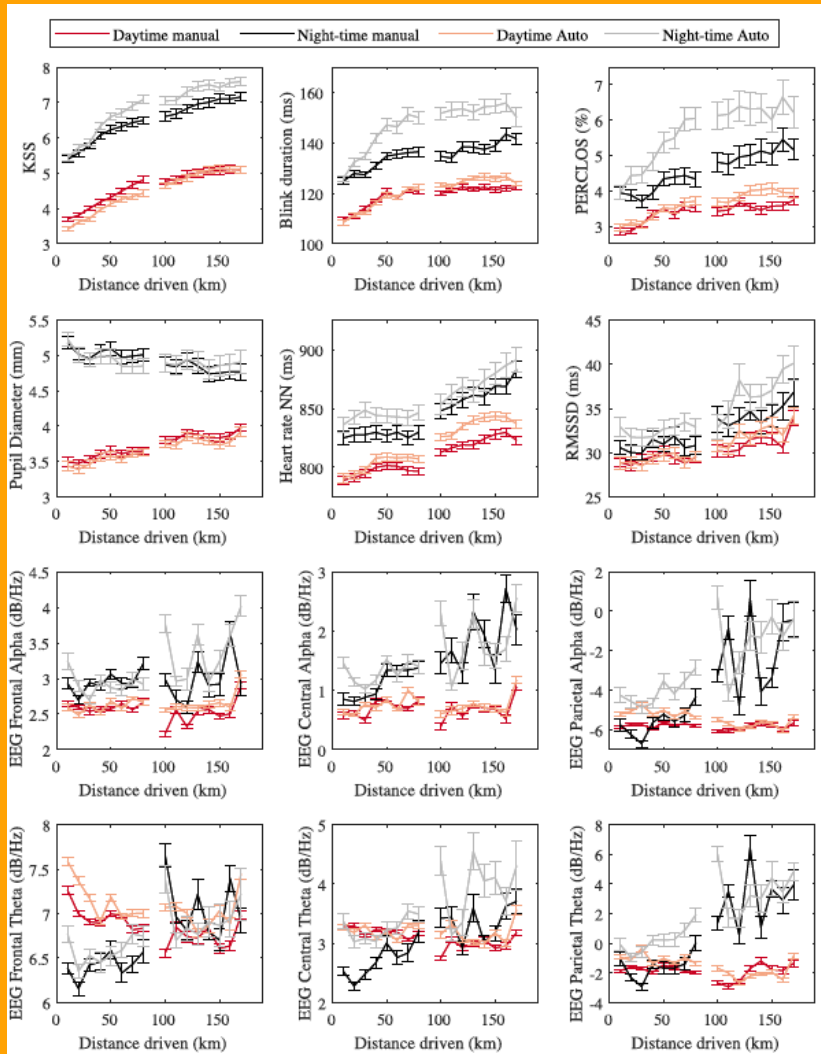


Table 1 Coefficient of determination (R^2), model fit (-2LL) and ANOVA results (F -values) for the linear regression models. Degrees of freedom are $df1 = 1$ in all cases, $df2$ according to the table. Significant differences at the 0.01 level (0.0005 after Bonferroni correction) are marked in green (**), at the 0.05 level (0.0025 after correction) in green/yellow (*) and higher levels in shades from yellow/orange to red. The factor Vehicle was excluded in the EEG analyses since EEG data were only available in one of the vehicles.

	R^2	Model fit (-2LL)	df2	Intercept	Condition (daytime vs night-time)	Automation mode (manual vs partially automated)	Time on Task (10k → 180 km)	Vehicle (XC90 vs V60)	Gender (Female vs male)	Cond*Auto	Cond*ToT	Auto*ToT
KSS	85.9%	9908	4405	10.3*	231.7**	83.7**	29.1**	0.2	10.1*	71.0**	90.0**	24.1**
Blink duration [ms]	86.0%	31160	4113	121.5**	52.9**	41.7**	0.6	2.2	7.5	60.5**	90.1**	61.4**
PERCLOS (%)	90.4%	22752	4113	3.5	11.0*	3.9	1.1	0.2	0.9	10.6*	51.1**	14.4**
Pupil Diameter (mm)	86.7%	6094	4113	17.1**	272.5**	9.3*	175.2**	0.0	0.1	15.9**	255.1**	0.1
Interbeat interval NN (ms)	92.7%	37087	4084	180.1**	28.6**	24.0**	42.5**	0.4	1.0	15.2**	0.5	0.0
RMSSD (ms)	85.2%	26061	4084	1.7	2.5	1.4	2.5	5.6	0.2	3.5	4.9	0.1
EEG Frontal Alpha (dB/Hz)	60.7%	10011	2115	6.2	0.4	1.0	0.0		2.8	3.0	0.7	3.8
EEG Central Alpha (dB/Hz)	74.4%	8830	2115	2.7	1.1	39.4**	0.6		0.1	39.1**	0.2	5.8
EEG Parietal Alpha (dB/Hz)	53.4%	11595	2115	0.0	0.3	7.0	5.1		2.9	21.9**	13.1**	0.8
EEG Frontal Theta (dB/Hz)	82.7%	7720	2115	46.2**	3.4	19.7**	5.7		11.1*	34.2**	4.8	1.3
EEG Central Theta (dB/Hz)	68.8%	8862	2115	14.7**	2.7	18.8**	2.5		1.2	26.5**	5.6	0.1
EEG Parietal Theta (dB/Hz)	54.8%	11416	2115	0.0	0.0	0.4	4.5		0.4	6.0	15.2**	2.3

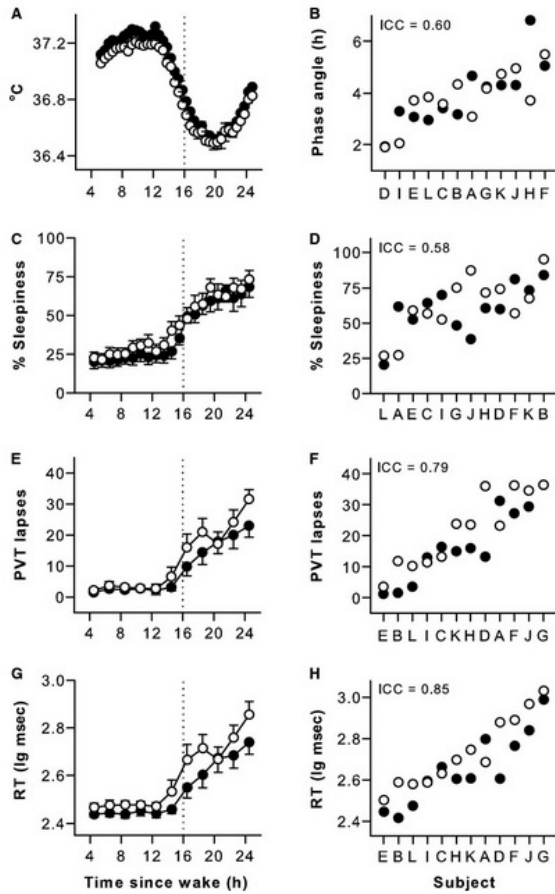
Table 2 Mean change in a sleepiness indicator per factor in the linear regression models. Significant differences at the 0.01 level (0.0005 after Bonferroni correction) are marked in green (**), at the 0.05 level (0.0025 after correction) in yellow (*) and higher levels in shades from orange to red. The factor Vehicle was excluded in the EEG analyses since EEG data were only available in one of the vehicles.

	Condition (daytime → night-time)	Automation (manual → automated)	Time on Task (10km → 180 km)	Vehicle (XC90 → V60)	Gender (Female → Male)
KSS	2.13**	0.07**	1.84**	-0.05	0.30*
Blink duration (ms)	17.67**	4.48**	16.55	0.74	1.35
PERCLOS (%)	0.87*	0.28	1.05	0.28	-0.19
Pupil Diameter (mm)	1.13**	-0.10*	0.14**	-0.02	-0.13
Interbeat interval NN (ms)	37.12**	9.22**	51.40**	6.15	5.72
RMSSD (ms)	2.16	0.79	4.80	0.30	0.67
EEG Frontal Alpha (dB/Hz)	0.54	-0.09	0.30		0.17
EEG Central Alpha (dB/Hz)	0.54	0.16**	0.44		0.22
EEG Parietal Alpha (dB/Hz)	0.46	0.61	0.33		1.33
EEG Frontal Theta (dB/Hz)	-0.22	0.04**	0.07		0.16*
EEG Central Theta (dB/Hz)	-0.11	0.36**	0.22		0.60
EEG Parietal Theta (dB/Hz)	2.33	0.64	2.05		0.74

Ripetibilità individuale delle valutazioni di sonnolenza

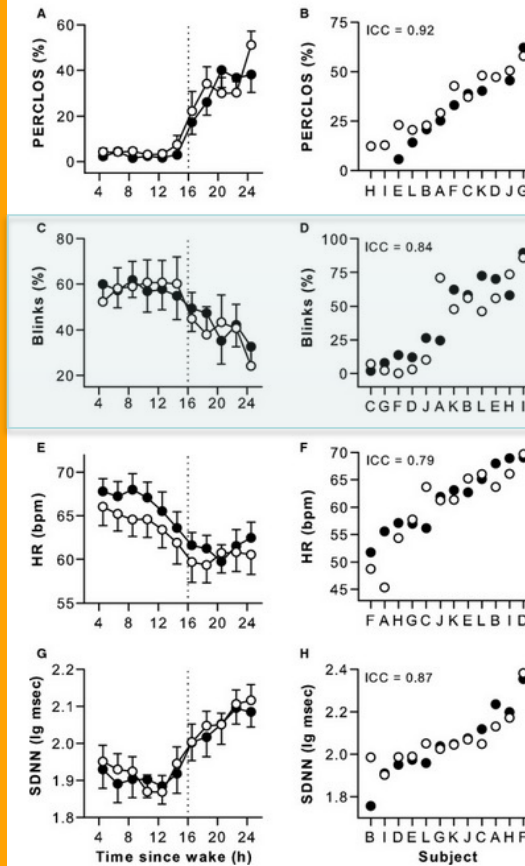
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Figure 2.



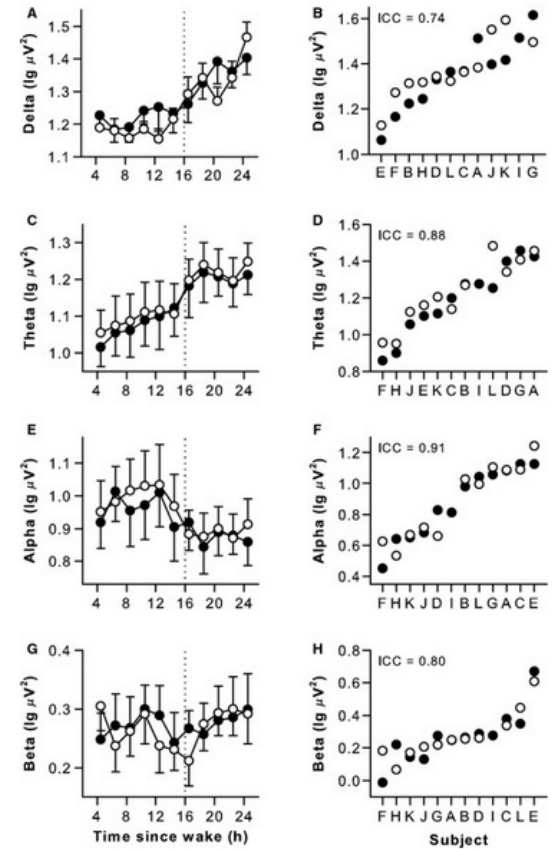
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Figure 3.



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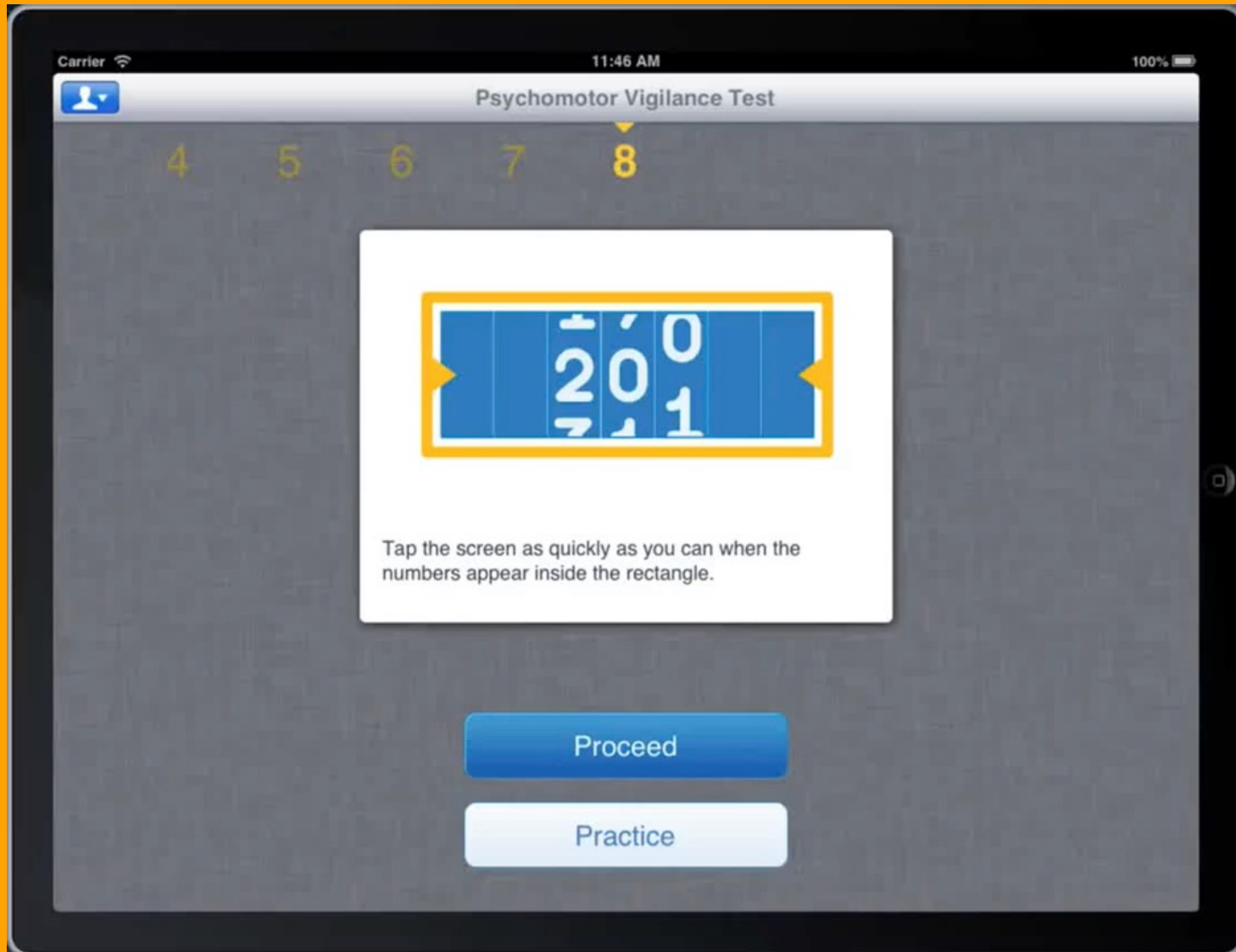
Figure 4.



Psychomotor Vigilance Test



Psychomotor Vigilance Test



Impaired sustained attention and lapses are present in patients with mild obstructive sleep apnea

Gabriela Pontes Luz¹, Thais Moura Guimarães², Terri E. Weaver³, Luke E. Ney¹, Luciana Oliveira e Silva², Luciana Batko¹, Glaury Coelho², Alline Miliani-Carvalho², Sergio Tufik², Lis Bittencourt²

Obstructive sleep apnea and psychomotor vigilance task performance

Table 7 Evaluation of lapses

Time	Control (n=25)	Mild OSA (n=39)
1	3.0±5.5	3.8±4.2
2	2.0±5.8	4.2±4.4
3	1.8±6.3	4.2±4.7
4	2.5±5.8	3.8±4.4
5	2.6±5.9	3.2±4.5
Total average	2.4±5.5	3.9±4.1

Table 4 Psychomotor vigilance task performance by Epworth sleepiness score categories

PVT variables	ESS categories		P-value
	≤9 n=25	>9 n=36	
RT (ms)*	260 (27)	283.4 (48)	0.04
Fastest 10% RT (ms)*	198 (20)	204 (25)	0.27
Slowest 10% RT (ms)*	396 (100)	485 (181)	0.03
1/slowest 10% RT (ms)*	2.8 (0.42)	2.4 (0.57)	0.01
l/RT (ms)*	4.03 (0.41)	3.8 (0.55)	0.11
Lapses (RT >500 ms)**	0.6 (0.73)	1.2 (1.0)	0.03
False start (RT <100 ms)**	0.86 (1.1)	1 (1.1)	0.62

Notes: *Log transformed; **square root transformed; PVT variables represent back transformation after log/square root transformation; Bold P-values represent statistical significance. All PVT variable data is presented as mean (SD).

Abbreviations: ESS, Epworth sleepiness scale; l/RT, reciprocal response time; 1/slowest, reciprocal of slowest response time; ms, milliseconds; PVT, psychomotor vigilance task; RT, reaction time; SD, standard deviation.

PVT discrimina pz. OSAS
lievi

PVT discrimina pz. OSAS con diversa
sonnolenza sogg.

Psychomotor Vigilance Task Demonstrates Impaired Vigilance
in Disorders with Excessive Daytime SleepinessJanina Thomann, M.Sc.¹, Christian R. Eumans, M.D.¹, Hans-Peter Landolt, Ph.D.^{2,3}, Esther Werth, Ph.D.¹¹Department of Neurology, University Hospital Zurich, Zurich, Switzerland; ²Institute of Pharmacology and Toxicology, University of Zurich, Zurich, Switzerland; ³Zurich Centre of Integrative Human Physiology, University of Zurich, Zurich, Switzerland

Table 3—Psychomotor vigilance task (PVT) variables and different sleep-wake disorders.

PVT measure	Narc (n = 20)	ISS (n = 67)	HS (n = 56)	ANOVA	χ^2 test
1/RT	3.41 ± 0.53 (70.0%)	3.70 ± 0.86 ^{ab} (41.8%)	3.38 ± 0.74 (66.1%)	F = 5.53; p = 0.005	0.009
1/RT500	3.61 ± 0.36 (60.0%)	3.85 ± 0.61 ^b (40.3%)	3.54 ± 0.55 (66.1%)	F = 5.83; p = 0.004	0.014
1/RT variability	2.12 ± 0.63 (30.0%)	1.73 ± 0.40 ^a (11.9%)	1.81 ± 0.45 (19.6%)	F = 4.39; p = 0.014	ns
Fastest 10%	4.69 ± 0.45 (45.0%)	4.79 ± 0.82 ^b (28.4%)	4.51 ± 0.68 (42.9%)	p = 0.017 [#]	ns
Slowest 10%	1.75 ± 0.75 (70.0%)	2.32 ± 0.91 ^{ab} (31.3%)	1.99 ± 0.79 (58.9%)	p = 0.002 [#]	0.001
False RT	3.08 ± 4.09 (0%)	2.46 ± 3.92 (1.5%)	1.81 ± 2.76 (0%)	p = 0.046 [#]	ns
Lapses	4.88 ± 2.97 (65.0%)	3.68 ± 3.94 ^a (29.2%)	4.72 ± 3.95 (50.0%)	p = 0.008 [#]	0.007
Average Lapses Time *	476 ± 606 (42.1%) n = 19	324 ± 599 (29.2%) n = 48	368 ± 868 (34.7%) n = 49	F = 1.71; p = 0.185	ns
Total Lapses Time *	8.46 ± 17.70 (65.0%) n = 19	7.82 ± 19.46 (31.3%) n = 48	7.39 ± 24.24 (53.6%) n = 49	F = 1.58; p = 0.210	ns

Data are expressed as mean ± SD. n, number of subjects; Narc, narcolepsy; ISS, insufficient sleep syndrome; HS, hypersomnia. 1/RT refers to mean reciprocal reaction time (RT) in 1/seconds. 1/RT500, mean reciprocal reaction time without RT of lapses in 1/seconds. 1/RT variability, range between the 10th and the 90th percentile in 1/seconds. Fastest 10%, mean of the reciprocal of the fastest 10% RTs in 1/seconds. Slowest 10%, mean of the reciprocal of the slowest 10% RTs in 1/seconds. Lapses, number of responses > 500 milliseconds (transformed by $(\text{SQRT}(x)+\text{SQRT}(x+1))$). False RT, number of false responses divided by the number of valid stimuli in percentage. Average Lapses Time, mean of lapses time (RT of lapses minus 500 ms). Total Lapses Time, accumulated lapses times in seconds. Statistic: for comparison of three independent groups: one way ANOVA or when all transformation failed Kruskal-Wallis H-test[#]; post hoc Bonferroni test. p < 0.05: ^asignificant difference between Narc and ISS, ^bsignificant difference between ISS and HS; χ^2 -test for binominal data. Percents in parenthesis are percentage of patients outside range of controls (range of controls refers to mean ± 2 SD when normal distribution was met otherwise 2.5th percentile and 97.5th percentile, respectively). * Only patients with lapses were included in the mean value. ns, not significant.

PVT discrimina controlla da insonni e narcolettici

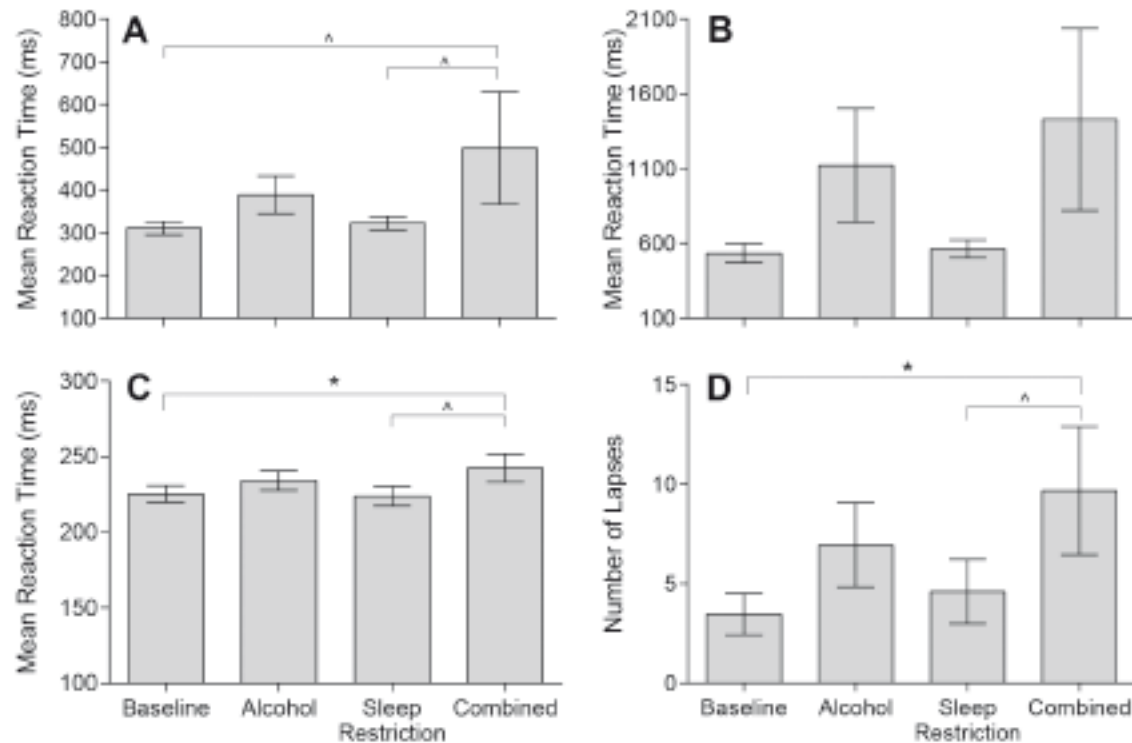


Figure 3—Mean and standard error of the means for Psychomotor Vigilance Test performance under Baseline (BL), Alcohol (AL), Sleep Restriction (SR), and Combined (C) conditions. These include (A) Mean Reaction Time (BL: 311.0 ± 15.2ms; AL: 388.7 ± 44.1 ms; SR: 322.5 ± 15.8 ms; C: 498.3 ± 131.4 ms); (B) Slowest 10% of reaction times (BL: 533.5 ± 36.3 ms; AL: 1122.1 ± 380.2ms; SR: 562.8 ± 60.4 ms; C: 1429.3 ± 610.1 ms); (C) Fastest 10% of reaction times (BL: 225.2 ± 5.5 ms; AL: 232.2 ± 6.4ms; SR: 223.9 ± 6.4 ms; C: 242.4 ± 9.3ms); and (D) Number of Lapses (BL: 3.5 ± 1.0; AL: 6.9 ± 2.1ms; SR: 4.6 ± 1.6 ms; C: 9.7 ± 3.2 ms). [^] $P_{sig} < 0.10$; ⁺ $P_{sig} < 0.05$. Untransformed data are plotted.

PVT discrimina condizione di aumentata
pressione verso il sonno

SLEEP DURATION/SLEEP QUALITY

A 30-Minute, but Not a 10-Minute Nighttime Nap is Associated with Sleep Inertia

Cassie J. Hilditch, BSc (Hons), Stephanie A. Centofanti, BPsych (Hons), Jillian Dorian, PhD, Siobhan Banks, PhD
 Centre for Sleep Research, University of South Australia, Adelaide, South Australia, Australia

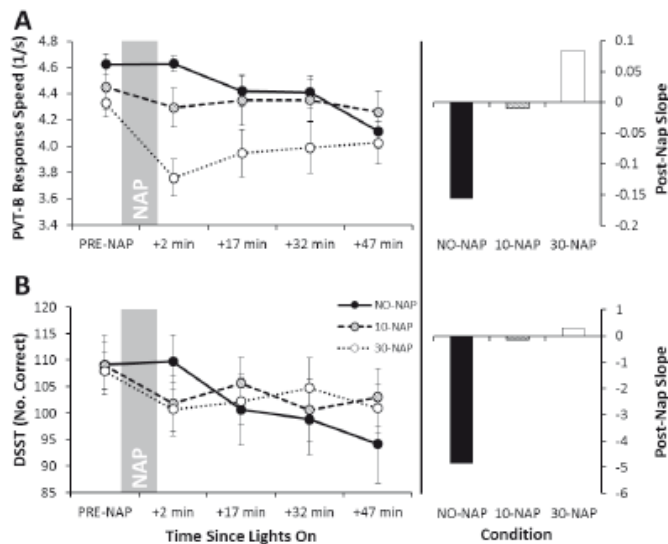


Figure 2—Mean (\pm standard error of the mean) for cognitive performance tasks. (A) Psychomotor Vigilance Task-B Response Speed; (B) Digit-Symbol Substitution Task Number of Correct Responses. Higher values represent better performance. Left-side panels display data per condition across pre- and post-nap testing points. Marker shading in the left-side panels matches column shading in the right-side panels for each condition. To assist the reader in clearly identifying the post-nap slopes for each group, the bars on the right simply represent the slope of the mean points as displayed in the left panel.

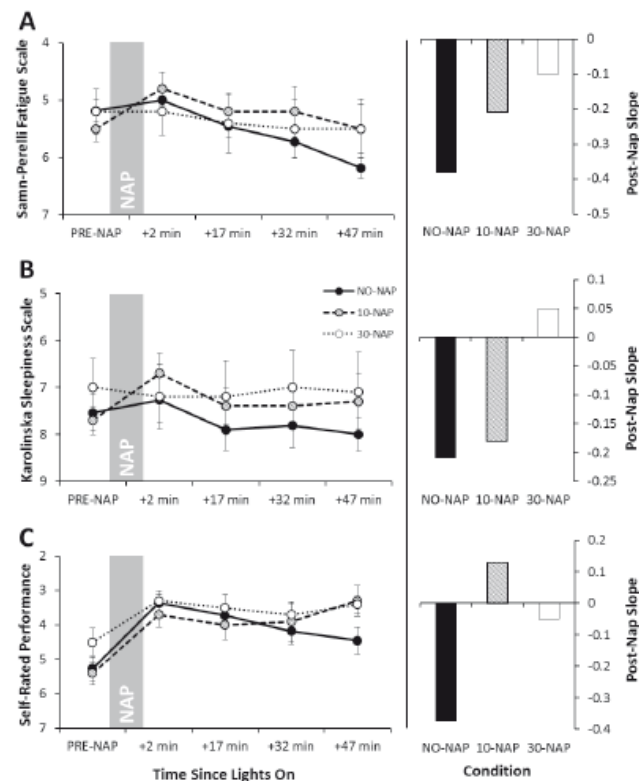


Figure 3—Mean (\pm standard error of the mean) for subjective scales. (A) Samn-Perelli Fatigue Scale; (B) Karolinska Sleepiness Scale; (C) Self-Rated Performance Scale. Scales are reversed for presentation, with better ratings higher on the y-axis. Left-side panels display data per condition across pre- and post-nap testing points. Marker shading in the left-side panels matches column shading in the right-side panels for each condition. To assist the reader in clearly identifying the post-nap slopes for each group, the bars on the right simply represent the slope of the mean points as displayed in the left panel.

Elevata sensibilità nella valutazione dell'inerzia del sonno

Nurses and Night Shifts: Poor Sleep Quality Exacerbates Psychomotor Performance

Marco Di Muzio¹, Giulia Diella¹, Emanuele Di Simone¹, Luana Novelli², Valentina Alfonsi¹, Serena Scarpelli¹, Ludovica Annamaria¹, Federico Satti¹, Mariella Pazzaglia^{1*}, Anna Maria Giannini² and Luigi De Gennaro^{1*}

Article

Not only a Problem of Fatigue and Sleepiness: Changes in Psychomotor Performance in Italian Nurses across 8-h Rapidly Rotating Shifts

Marco Di Muzio¹, Flaminia Reda², Giulia Diella¹, Emanuele Di Simone¹, Luana Novelli², Aurora D'Atri², Annamaria Giannini² and Luigi De Gennaro^{1,4*}

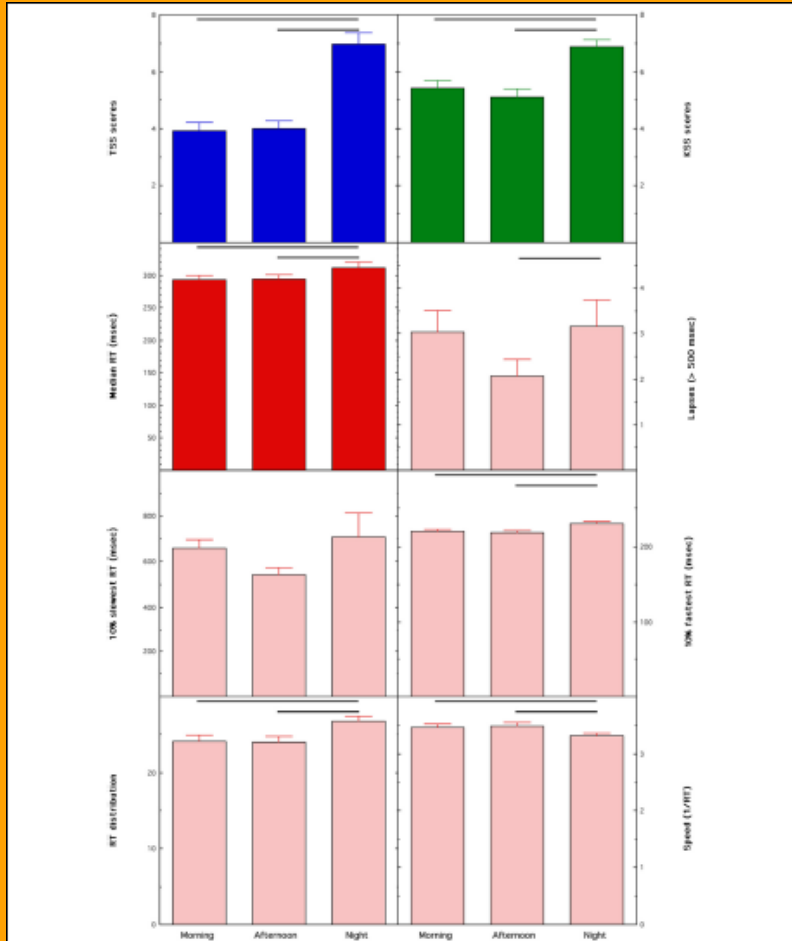
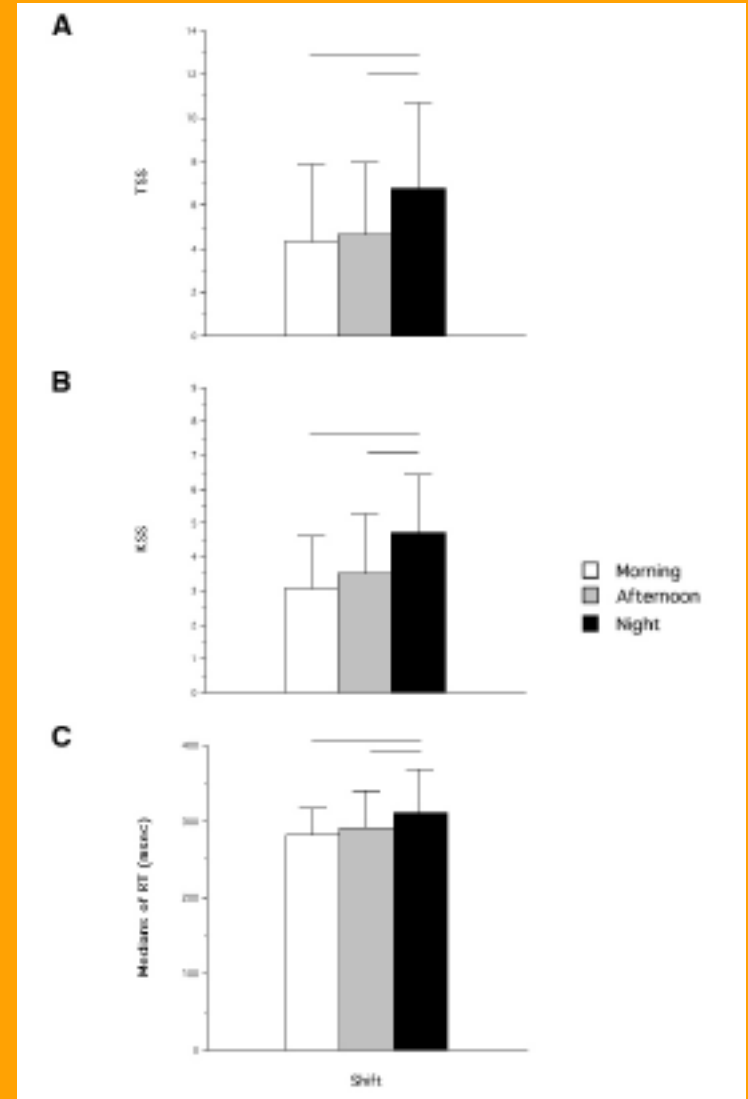


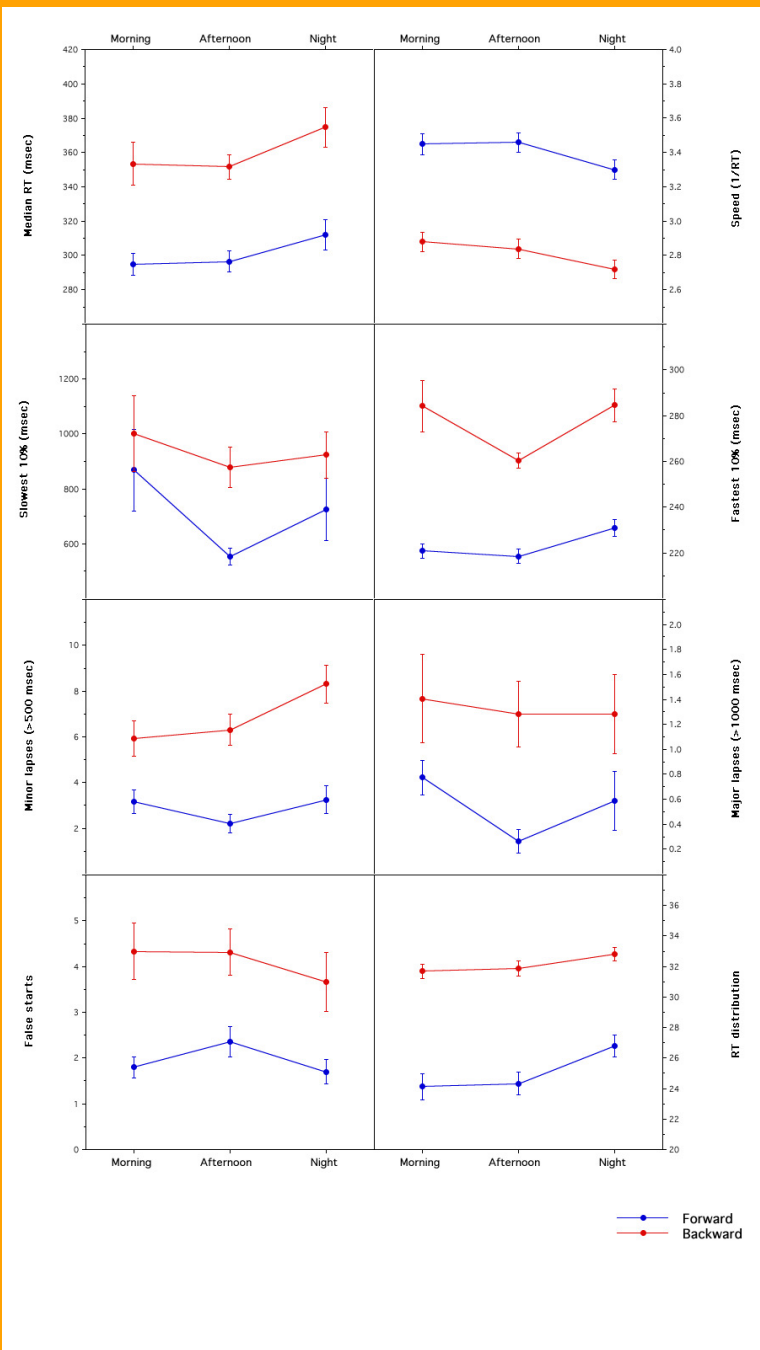
FIGURE 1 | Means and standard errors of the dependent measures collected in female and male nurses across different rapidly rotating shifts (morning, afternoon, and night), Tiredness Symptoms Scale (TSS), Karolinska Sleepiness Scale (KSS), medians of Reaction Times (RT) on the Psychomotor Vigilance Task (PVT) (Median RT), Horizontal lines highlight significant comparisons between conditions.



In due studi, PVT discrimina il notturno da quelli diurni



PVT discrimina regimi diversi di turni (orario e antiorario)



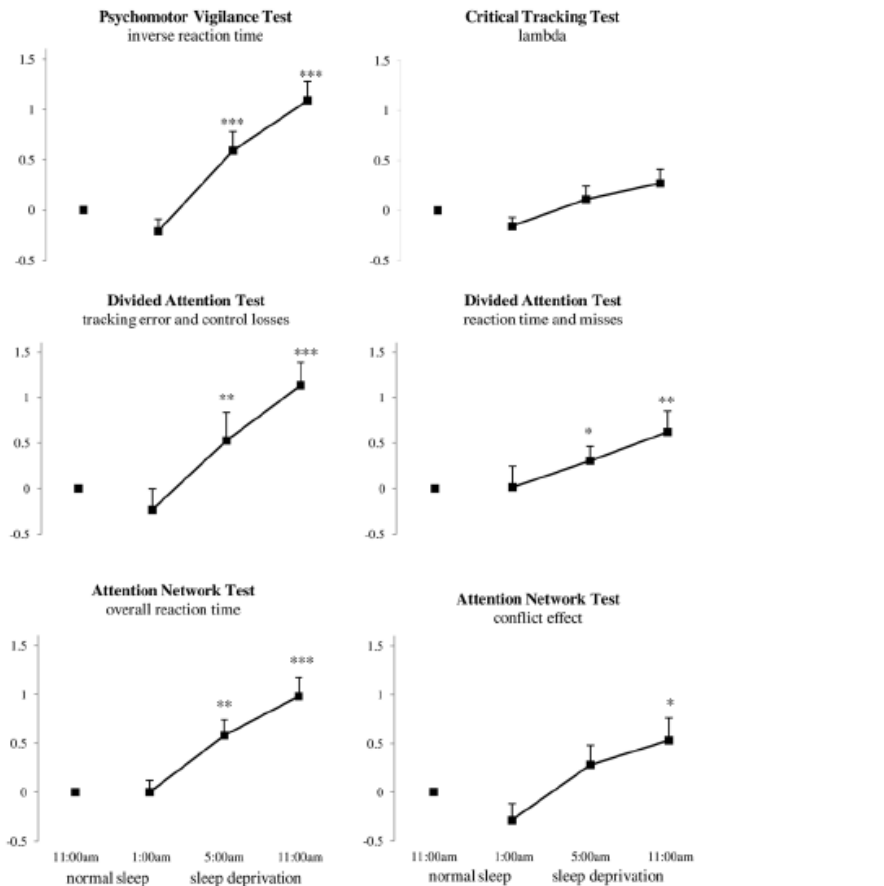


Fig 2. Mean baseline normalized performance at 1:00am (16 hours awake), 5:00am (20 hours awake) and 11:00am (26 hours awake) compared with performance after a normal night of sleep (at 11:00 am) across dependent variables of the Psychomotor Vigilance Test, Critical Tracking Test, Divided Attention Test, and Attention Network Test. *p < 0.05, **p < 0.01, ***p < 0.001. Error bars indicate the standard error of the mean.

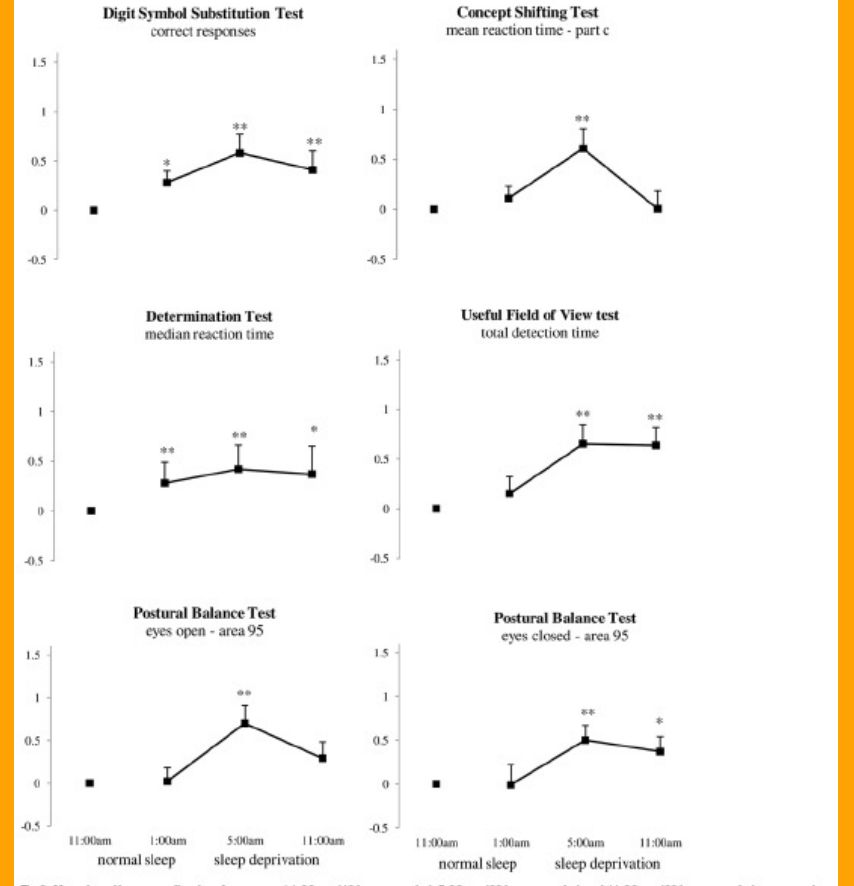


Fig 3. Mean baseline normalized performance at 1:00 am (16 hours awake), 5:00 am (20 hours awake) and 11:00 am (26 hours awake) compared with performance after a normal night of sleep (at 11:00 am) across dependent variables of the Digit Symbol Substitution Test, Concept Shifting Test, Determination Test, Useful Field of View Test, and Postural Balance Test. *p < 0.05, **p < 0.01, ***p < 0.001. Error bars indicate the standard error of the mean.

PVT ha la più elevata sensibilità discriminativa della sonnolenza alla guida

RESEARCH ARTICLE
Sensitivity and Validity of Psychometric Tests for Assessing Driving Impairment: Effects of Sleep Deprivation

Stefan Jonen^{1*}, Joy Perier^{1,2}, Eric F. Vuurman¹, Johannes G. Ramackers¹, Anouk Vermeulen¹

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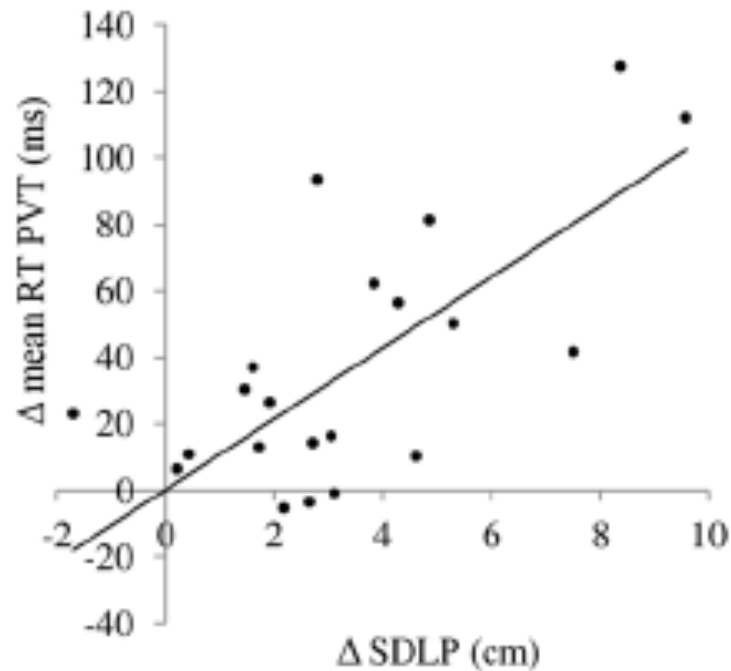
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Fig 4. Correlations between changes (performance at 5:00 am—performance after normal night of sleep) in mean reaction time in the Psychomotor Vigilance Test and changes in SDLP.

[doi:10.1371/journal.pone.0117045.g004](https://doi.org/10.1371/journal.pone.0117045.g004)

PVT correla con performance alla guida al simulatore

QUALE MISURA PER LA RILEVAZIONE DELL'ECCESSIVA SONNOLENZA ALLA GUIDA?

- Validità: misura livelli diversi di sonnolenza
- Attendibilità: fornisce misure stabili in diverse occasioni
- Ergonomia: è applicabile in contesti applicativi con scarsa invasività
- Predittività: è capace di anticipare i livelli patologici di sonnolenza

5 aprile 2016

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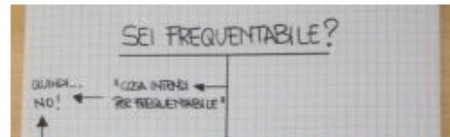
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5 lezioni di vita del Piccolo Principe confermate dalla scienza

1. What is BMI?
2. Calculate your BMI.

A scuola le chiedono di scrivere l'indice di massa corporea. La sua risposta è da "ottimo"



Questo diagramma di flusso stabilirà se sei frequentabile



BLOG

I commenti originali e le analisi in tempo reale a cura delle firme dell'HuffPost



Luigi De Gennaro

Diventa fan



Psicofisiologo, esperto di disturbi del sonno

La sonnolenza alla guida uccide, ecco la rivoluzione per le patenti

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SPORT EDITION.

LEGAL ASPECTS

- Work on European legislation concerning drivers who suffer from diagnosed and acknowledged sleep disorders but are still not following an adapted treatment, to cancel or at least lower their insurance protection in case of sleepiness-related accidents.
- Forbid driving under psycho-active substance use.
- Generalization of rest areas on European road networks
- Detection and management of sleepiness among professional drivers, especially lorry-drivers.

NEW DIRECTIONS

- Improved detection of sleepiness.
- Better knowledge of determinants of dangerous behavior.
- Improvement of countermeasures, especially vehicle alert systems that notify drivers when they are becoming sleepy and suggest a break in driving.

Road traffic collisions before and after rest areas in the UK



Means (s.d. error bars) of all road traffic collisions (RTCs) and road traffic collisions subdivided into non-sleep-related collisions (non-SRCs) and sleep-related collisions (SRCs) in 16 km sections before and after the 14 motorway service areas.

Adapted from Reyner L A et al, *Accident Analysis and Prevention*, 2010; 48, 1416-28 with permission.