

news **NEUROVIRTUAL**



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In an interview, **Dr. Daniel Perez Chada** tells us about his research on fatigue and somnolence in professional drivers in **Argentina**

Neurovirtual News: Doctor, could you tell us a little bit about your background?

Daniel Perez Chada: I am a pulmonologist, and I work at the Hospital Universitario Austral, where I am the head of the pulmonology and Sleep Clinic service. Also, since October 2016, I am the chairman of the Argentinean Sleep Foundation.

For many years, I worked in intensive treatment, with a special focus in respiratory failure and mechanical ventilation. I completed my training in Great Britain, where I worked on basic investigation on mechanical ventilation and pulmonary injury. Throughout the years, I started focusing on noninvasive ventilation, and during the last 15 years I have devoted 80% of my time to the study of respiratory disorders during sleep.

NN: Doctor, could you tell us about the studies and services offered by the Sleep Clinic at Hospital Universitario Austral?

DC: In the Hospital Universitario Austral our staff studies patients with sleep disorders; we are especially focused on respiratory disorders during sleep. We have a Sleep Clinic with five beds to study patients through nocturnal polysomnography, and equipments for ambulatory polygraphy studies.

This is a very committed team, whose members interact with each other actively, besides constituting a strong exchange source with other hospital services, and we have managed to solve most of the sleep apnea problems of our patients.

NN: Doctor, could you tell us something about the investigation you conducted on fatigue and somnolence in professional drivers?

DC: This has been an investigation topic we have been interested in for years given its huge impact on society. We have done a lot of cross-disciplinary work with basic researchers, mostly with investigators from CONICET, the main organization of investigation in Argentina.

We trained a team, led by Dr. Daniel Cardinali, a renowned physiologist, with whom we studied the relationship between sleep deficit in professional drivers and the decline in their level of alertness.

We started by studying load transport truck drivers in Mercado Central in Buenos Aires. These drivers are freelancers who transport goods from and to Buenos Aires City, from different locations in the country. We discovered there is a high prevalence of snoring, and, as expected, a connection of this symptom to obesity.

These drivers suffered from high blood pressure and a severe restriction in the amount of hours they slept since they could not sleep for more than four hours per night on weekdays, and tried to make up for this sleep debt on weekends. This was a group of young men, who chronically slept one hour less than their colleagues, with high prevalence of cardiovascular risk indicators like smoking and obesity.

These are people who, due the characteristics of their job, are not likely to have healthy diet habits, and who are also sedentary. We also found out that those drivers who were regular snorers had more chances of having an accident or were as likely to have an accident during their workday than those who did not snore.

On the other hand, daytime sleepiness was frequent: More than 40% of the drivers felt sleepy while driving. When these people felt sleepy in route, most tried to stop to take a rest; however, there were around 30% of them who adopted absolutely ineffective behaviors to fight sleepiness, like smoking, listening to loud music in the truck cab, cooling the cab, drinking carbonated beverages, etc. Regrettably, the sleep debt is only paid through sleep so these measures are not quite efficient against sleepiness at the wheel.

This was a very interesting investigation that involved more than 800 drivers, in their work place, with a structured questionnaire. This has been the first large-scale work on the topic in Argentina; the results were published by SLEEP magazine.

Sleep medicine should be a bright spot! Why do you keep using old technology?

"We looked at customer service, price, and just the overall ease-of-use of the software... Sleepvirtual met and exceeded all of our needs in those various categories, especially the customer service category; that was really what sold it for us."

Melanie Anderson, RPSGT - Goodyear, AZ

"In the last twelve months that we have been using Neurovirtual, our experience has been incredible. The customer service is topnotch, our questions are always answered and help is readily available. Transition was seamless and kept us running topnotch sleep studies..."

Tina Helphrey, RRT, RPSGT - Sleep Lab Coordinator at Bellin Health, WI

"[Neurovirtual is] very user-friendly not only for our technicians, but also for our physicians. They are able to remotely access the reader station, to do reporting. So they can do this from their office, or a laptop from their home... If we happen to have any issues, we call tech support and they are there for us 24/7..."

Lauren McCune, RN, BSN - Supervisor of Electrodiagnostics Services at Butler Memorial Hospital, PA

"[Neurovirtual is] a very intuitive, well thought out, comprehensive sleep package."

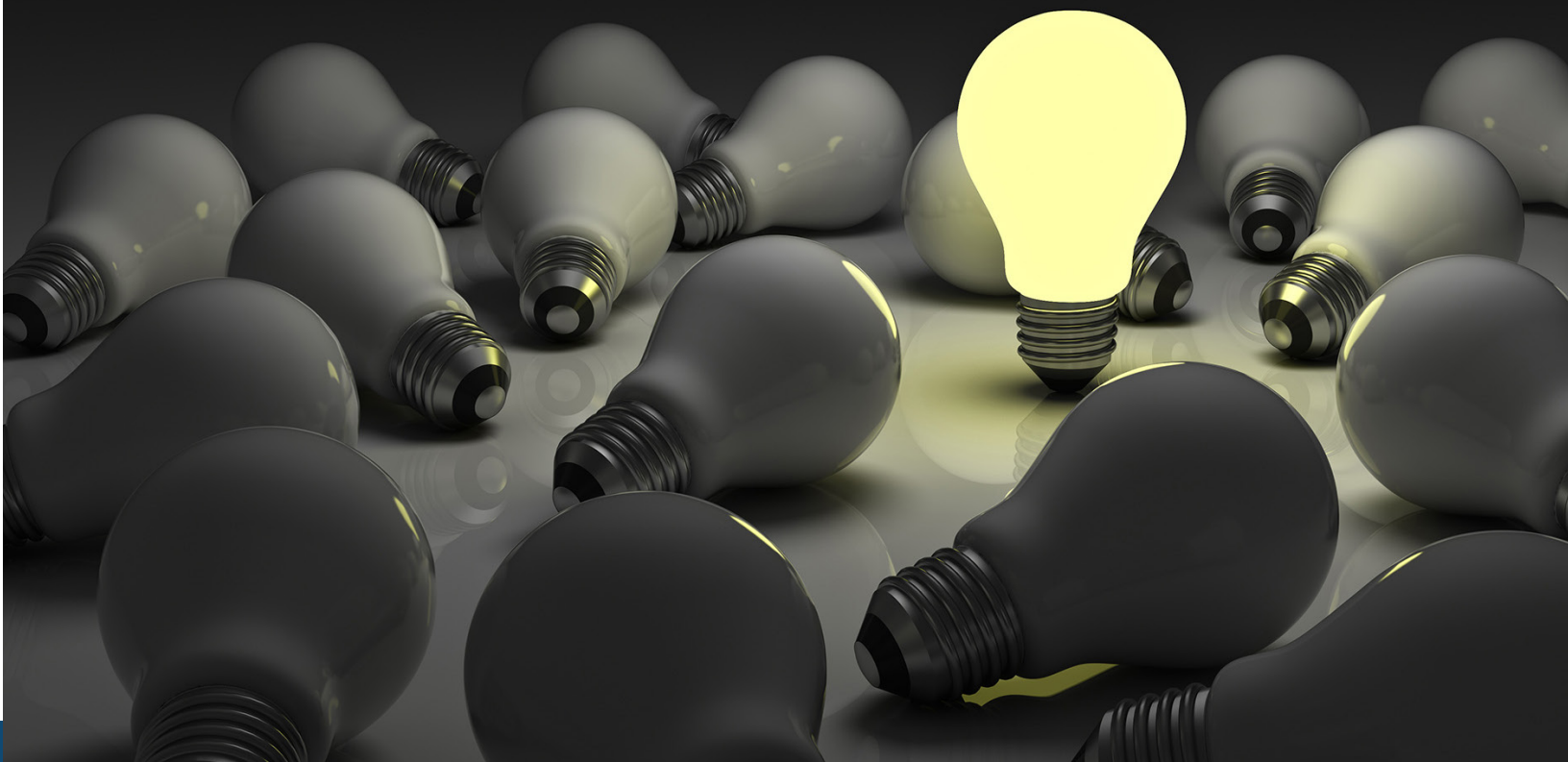
Michael Nielson, RPSGT- Willows, CA

"I am impressed with Neurovirtual's service personnel and commitment to customer satisfaction."

Ron Price EEG T. - Duncanville, TX

"My Neurovirtual experience was pleasant and exceeded my expectations."

John Axley MD - Pensacola, FL





Some years later, we worked with Unión de Tranviarios Automotor, which is the labor union gathering all public passenger transport drivers; we surveyed around 2,000 public passenger transport drivers in this group working in Buenos Aires and in the city's metro area. Our finding, once again, was that the amount of hours these drivers slept was reduced; they were obese and experienced cardiovascular comorbidities.

Drivers working in the morning shift slept one hour less than those working in the afternoon shift, and it was precisely those drivers working in the morning shift, and chronically sleeping one hour less than their colleagues, the ones whose level of alertness declined as measured by a very simple and reliable alertness test; these drivers had an earlier decline of alertness than the drivers working in the afternoon shift.

Sleep apnea risk prevalence was present in 55% of the study sample participants.

These objective measurements we performed in a small group of drivers included actigraphy for five nights, cortisol levels at the beginning and at the end of the workday, and a heart rate variability study.

Finally, we conducted a third study; this time, we studied a request from the Work Risks Superintendent's Office, a sample of long distance professional drivers that is, those drivers transporting passengers to the different regions of the Argentine Republic.

Once again, we performed objective measurements and we confirmed exactly what we had confirmed with the short-distance drivers: Sleep hours were scarce, long workdays, and an early decline in alertness in the drivers, particularly on the way back.

NN: Just one question: how did you measure the level of alertness?

DC: Yes, the level of alertness is assessed through a test similar to the psychomotor surveillance test.

When drivers are not at the wheel, but as co-drivers, they are placed in front of a laptop at various stages during the workday; the screen shows a sequence of numbers, and whenever a number stops on the screen the subject has to strike any key on the keyboard. The time between the sequence of numbers stopping and the subject striking the key is the reaction time.

What we saw is that the longer the workday the longer the reaction time, which means that the ability to respond to unexpected stimuli, like an animal crossing the road, or an unexpected reaction from another driver, or a pedestrian crossing the road unexpectedly, the reaction time to avoid an accident in these situations is also deteriorated.

NN: Doctor, do you think this type of professionals should have a closer follow-up in terms of their sleep disorders?

DC: In fact, the whole of society should know that the number of hours we sleep is below the number of hours we should sleep; during the last fifty years, we have lost 25% of our sleep hours. And that is worldwide data, both in the North Hemisphere and in the South Hemisphere, according to surveys conducted by several organizations: It has been demonstrated that there is a two-hour sleep debt approximately.

Workdays are even longer and there is irrefutable evidence to confirm the fact that if a person is awake for more than 15 hours, that person has the same chances of making a mistake in a driving simulator as a person who has had the maximum amount of alcohol permitted by law, which means that being awake for 16 hours is equal to having, for example, an 0.05 grams/liter blood alcohol content. This BAC, obviously, for a professional driver should be equal to 0, but what I mean is that the restriction in sleep hours produces the same cognitive deterioration as having a blood alcohol content above what is permitted by law.

Obviously, sleep must be ranked in society, particularly for those at a higher risk of exposure such as the professional drivers both goods drivers, and passenger drivers and obviously, campaigns have to be launched so that sleep hours start to be respected, both by workers, and by the companies hiring these workers as well as by the regulatory entities controlling working shifts.

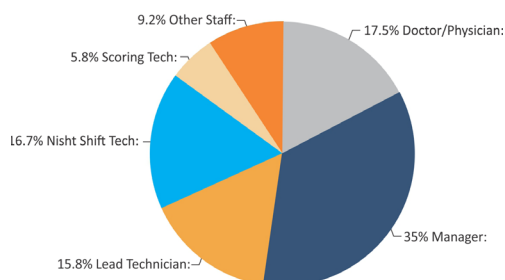
We also need to bear in mind that there are very prevalent diseases, particularly in males, and particularly in those leading a sedentary lifestyle, such as those who are drivers, which is the sleep apnea syndrome which deteriorates the quality of sleep. Sleep apnea syndrome is a pathology well-known for increasing traffic accidents and which, when duly diagnosed and treated, allows people to lead an active and professional lifestyle without this representing a risk to them or to the people sharing the road with them.

Sleep Market Survey 2016

On June 2016, Neurovirtual commissioned a survey distributed by Sleep Review Magazine in order to gauge the current opinions of sleep professionals in relation to sleep diagnostic products and services. As a people-first company, our goal is to better understand what is most important to the individuals working with our equipment and administering patient care.

The demographics were made up primarily of sleep lab managers, most of which held the RPSGT and RRT credentials, followed by MD's.

What is your job title?



The most important product features for respondents was an easy-to-use software suite, quality technical support, and an affordable price, including favorable warranty terms. The complete results support the idea that professionals want a high quality, user-friendly product at a reasonable cost.

What are the 4 most important factors in choosing a company to perform a demo

Warranty Coverage	46.6%
Product Reputation	60.2%
Affordable Price	68.6%
Sales Rep Relationship	22.0%
Customer Service	58.5%
Prior experience	22.9%
Tech Support	68.6%
Company Website	0.8%
Software Upgrade Policy	31.4%
Other	3.4%

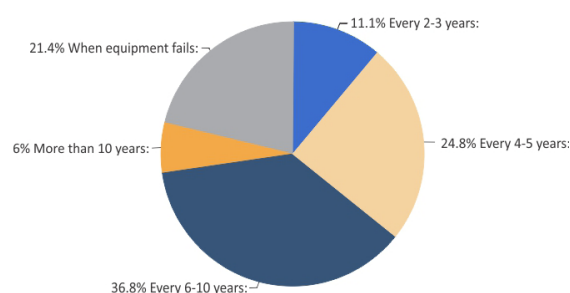
What are your favorite features on your current device?

Value	Percent	Count
The Software is easy to use	76.3%	90
The product labels are easy to understand	17.8%	21
The customer service experience	33.1%	39
The cost of ownership is low	21.2%	25
The product is very reliable	51.7%	61
Other	10.2%	12

Neurovirtual strives to produce a product that is reliable and sturdy in design. We model our software based on what feels most instinctive to the user, allowing for customizable features and a natural process that does not require a lot of time to learn. All updates and upgrades to the software are included for the life of your product, easing concerns of operating system upgrades and other variables that are out of your control. Our live technical support is highly rated among our customers and we ensure it is available 24 hours a day, 7 days a week. More details on our customer service statistics are available in our product catalogs. We also offer the most cost-effective warranty extension terms available, costing several thousand less in aggregate years for the peace of mind than an extended warranty can provide.

Please review the results of the survey below for more insight on what your peers are saying matters most to them. Do you agree?

How often do you upgrade your equipment?



Neurovirtual opens new sales office **Argentina**

Neurovirtual has been developing high quality diagnostic products at affordable prices since 1969. The company is known for pioneering solutions that are effective, affordable, and comfortable for patients and medical professionals to use.

Neurovirtual prides itself on providing a universally accessible family of neurology diagnostic products intended to help increase the quality of life of patients and the professionals who care for them. The company has been driven by a desire to humanize every aspect of

the experience by ensuring that all the product offerings are simple to use and backed by a team of knowledgeable professionals that are ready to assist anytime, day or night, across any time zone in three languages. Thus, globalizing the availability of Neurovirtual products is a priority objective, as evidenced by the establishment of Neurovirtual offices in the United States, Germany, Mexico, Brazil and Colombia.

Neurovirtual has been operating in Latin America since 1998, and strives to assist medical professions and consumers in LATAM to achieve better results through the use of better products. In the spirit of improving the quality of life on a global level, the company is pleased to announce the opening of an office in Buenos Aires, Argentina.

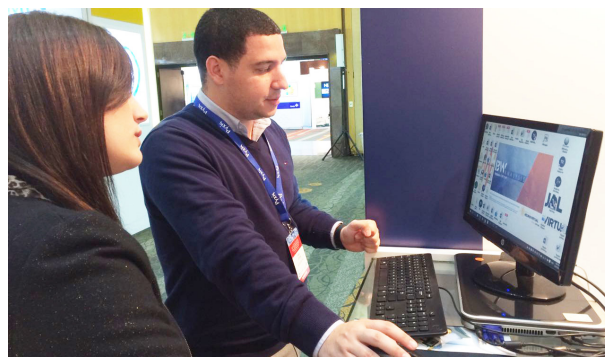
Neurology has become an extremely important part of Argentine medical treatment. Dr. Roberto Caraballo, a neurologist at Garrahan Hospital,

reported that there are 60,000 thousand refractory epilepsy patients in Argentina on average, and according to the Argentine League Against Epilepsy, the treatment of epileptic patients is still a challenge with the current state of available technology in the country. By providing high quality diagnostic

devices, Neurovirtual aims to contribute to the improved treatment of these epileptic patients.

Dr. Daniel Perez Chada, professor at Austral University in Buenos Aires, emphasized the quality of the equipment and peace-of-mind provided by the available 24/7 technical support

online and over the phone in English, Spanish, and Portuguese. The company attends several conferences and seminars through the world with the purpose of introducing a better option for diagnosing patients. Neurovirtual also hosts educations training programs in several countries, benefiting both the medical community and the general population it serves. Neurovirtual hopes to bring these benefits to the people and professionals of Argentina through this new venture.

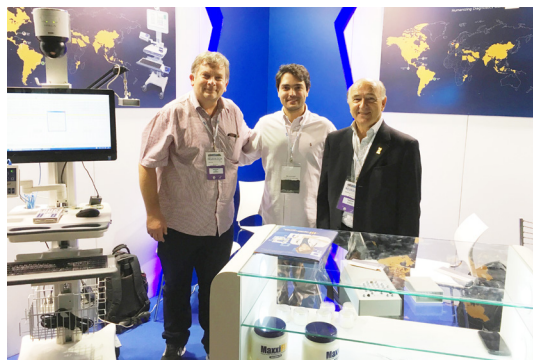


27th Brazilian Congress of Neurology

The 27th annual Brazilian Congress of Neurology was held in Belo Horizonte between the 27th and 31st of August. Organized by the Brazilian Academy of Neurology, the event was considered very successful. Neurovirtual had the opportunity to participate as an exhibitor, and to introduce equipment considered relevant to the field of neurology.

On average, the event was attended by 3,950 physicians from 19 Brazilian states, 299 speakers and 12 foreign physicians, including specialists from Argentina, Canada, Germany, Israel, Italy, the United States and the United Kingdom.

It was possible for all guests and speakers to learn about Neurovirtual's equipment and services by visiting our booth in the exhibitor's lounge. Products



featured like the BWIII PSG Plus and BWIII EEG Plus ICU/ LTM were a demonstration of Neurovirtual's commitment to offering high quality, efficiently designed equipment.

Two hundred and eight presentations took place, consisting of 16 pre-congress courses, 36 panel discussions, 18 plenary sessions and a session to discuss clinical cases.

Furthermore, 1001 posters and 72 free topics were presented.

"Does the Control of Epileptic Activity Imply a Better Cognitive Evolution?" by Dr. Elza Marcia Yacubian and "Not All Restlessness in the Legs is Equal to Restless Leg Syndrome" by Dr. Lucila Prado were two of the most remarkable presentations. A plenary session with British neurologists Hugh Willison and Andrew Less concluded the event.

Neurovirtual at the 14th Pan American Congress of Neurology

This year, Mexico hosted the 14th Pan American Congress of Neurology 2016 in beautiful Cancún Quintana Roo. The organization of this great event was led by the Academia Mexicana de Neurología and its board of directors, currently managed by its chairperson, Dr. Minerva López Ruiz and by the organizing committee, represented by the current Federación Panamericana de Neurología chair-person, Dr. Marco Tulio Medina.

Once again, Neurovirtual participated in this commercial exhibition with its high-end cutting-edge devices to support physicians specializing in neurology, as well as to support other neuroscience specialties to obtain the best tools for a better diagnostic. With more than 1,000 attendees, both from Mexico and overseas, participants could take part in more than 80 workshops and sessions in which several presentations stood out, including the neurooncology presentation given by Dr. Erin Dunbar from the United States. Another highly important topic which had a

significant audience was the presentation given by German doctor Volker Limmroth, who talked about multiple sclerosis (real-life experience with treatment).

The presentation of posters and e-posters with topics such as "Cerebrovascular Diseases," "Neurodegenerative Diseases," "Epilepsy," and "Neuroinfections", among others, made the visit of the event's attendees to the stands more appealing

since those in charge of these presentations committed themselves day by day to conduct a more thorough investigation and provide all visitors with further information.

At the event's closing and gala, Neurovirtual gave away a BWIII EEG electroencephalography device through a raffle.

The lucky winner was Dr. Lorenzo Hernández from the city of Toluca, Mexico state. We would like to once again thank the organizers for having welcomed us one more time to this extraordinary event.



On average, Neurovirtual participates in 20 to 30 congresses and conferences in different countries around the globe. Taking our goal to humanize the diagnostic, we pride ourselves to be part of this community and be able to give our contribution to clinicians and patients.

Below you will find the list of events for 2017, where Neurovirtual will be presenting its solutions to make neurology and sleep diagnostic more human! We hope to see you there!

USA

AAN 2017 Annual Meeting

📍 Boston Convention & Exhibition Center

22 to 28 April 2017

SLEEP 2017

📍 Hynes Convention Center 900 Boylston St. Boston, MA 02115

3 to 7 June 2017

CANADA

8th Conference of the Canadian Sleep Society

📍 Hyatt Regency in Calgary, Alberta

28 to 30 April 2017

BRASIL

XI Congresso Paulista de Neurologia

📍 Hotel Sofitel Jequitimar Av. Marjori da Silva Prado- Praia de Pernambuco- Guarujá

24 to 27 May 2017

XXVI Congresso da Sociedade Brasileira de Neurofisiologia Clínica

📍 Centro Convenções Goiânia- Goiás

26 to 28 October 2017

COLOMBIA

III Entrenamiento técnico en Polisomnografía

📍 Neurovirtual Colombia- Bogotá

5 and 6 April 2017

Diplomatura Latinoamericana en Medicina de Sueño

📍 Pereira Colombia

5 and 6 April 2017

ARGENTINA

Lace 2017 - Congreso Liga Argentina Contra la Epilepsia

📍 SALGUERO PLAZA Jerónimo Salguero 2686 - Ciudad de Buenos Aires

5 and 6 October 2017

MEXICO

XXVI Reunión Anual de la Sociedad Mexicana de Neurología Pediátrica A.C.

📍 Puerto Vallarta

16 to 20 May 2017

XXIV Congreso Nacional Mexicano de Cirugía Neurológica

📍 Centro de Convenciones Cancún Quintana Roo,

6 to 11 August 2017

ESPAÑA

XXV Reunión Anual de la Sociedad Española del Sueño (SES)

📍 Santander, España

20 to 22 April 2017

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