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NEUROVIRTUAL



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World Congress of Neurology in Chile

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apnea during sleep in infants

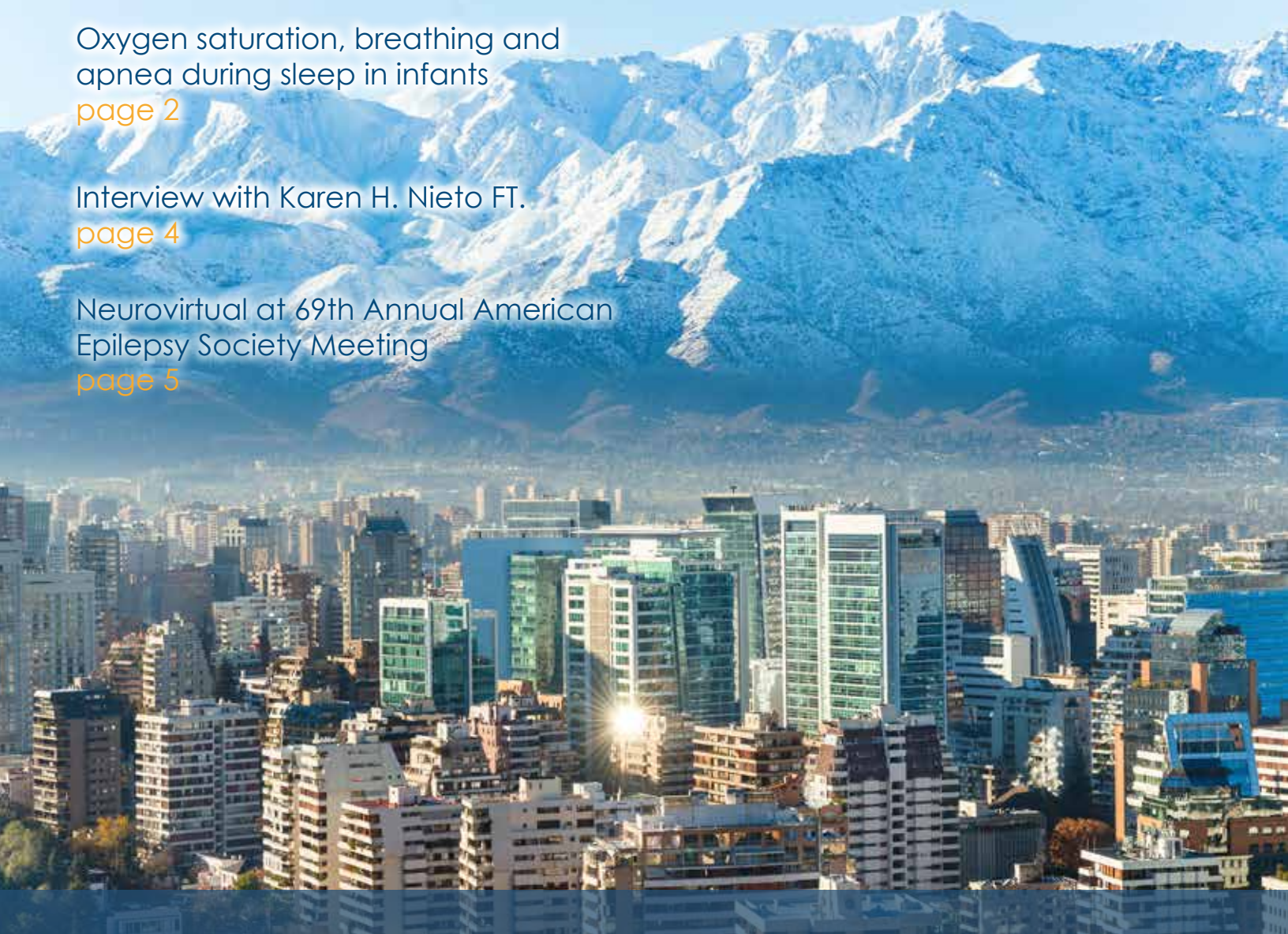
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Oxygen saturation, breathing and apnea during sleep in infants

Dr. Karen Parejo, President of the Colombian Association of Sleep Medicine, Dr. Santiago Ucrós, Dr. Claudia Granados, M. Sc., Dr. Fernando Guillén, Dr. Fausto Ortega, Dr. Sonia Restrepo, Fabián Gil, M. Sc. and fellow Miriam Guillén, presented important research titled: “Oxygen saturation, periodic breathing and apnea during sleep in infants 1 to 4 month old living at 2,560 meters above sea level.” Research recently published in the Arch Argent Pediatr 2015;113(4): 341-344.

ABSTRACT

There are few data in the literature related to polysomnography in infants in altitudes from 2,200 m to 2,800 m. The main objective of this investigation was to describe oxygen saturation (SpO₂) levels during sleep in infants aged between 1 and 4 months living at an altitude of 2,560 m. The secondary objectives were the description of periodic breathing (PB) and apnea indexes. Polysomnography was performed in 35 healthy infants aged 1-4 months in Cuenca (Ecuador) at 2,560 m. The median for SpO₂ was 92% and 4.9% for PB. The median for the central apnea index was 23.7/hour and 15.4/hour when related to PB. No correlation was found between PB and SpO₂. Conclusion: SpO₂ was lower than the values at sea level and PB and central apnea indices were higher. When apneas associated with PB were not considered, the central apnea index

was similar to that found at sea level.

The research team used the **Neurovirtual BW2 PSG and Sleepvirtual sensors** to compile the data for this study. The Neurovirtual development team actively participated in aiding the research team when required. A listing of the research parties are listed below:

- a. Department of Pediatrics. Fundación Santa Fe de Bogotá.
- b. Departments of Pediatrics and Clinical Epidemiology and Biostatistics. Pontificia Universidad Javeriana.
- c. Department of Neurology and Sleep Lab. Fundación Clínica Shaio. Bogotá, Colombia.
- d. Department of Pediatrics. Hospital del Río. Universidad del Azuay. Cuenca, Ecuador.
- e. Department of Pediatrics. Hospital Luis Fernando Martínez. Cañar, Ecuador.
- f. Departments of Pediatrics. Hospital de La Misericordia, Fundación Santa Fe de Bogotá, Universidad de los Andes.
- g. Biostatistician. Department of Clinical Epidemiology and Biostatistics. Pontificia Universidad Javeriana. Bogotá, Colombia.
- h. Medical Student. Universidad del Azuay. Cuenca, Ecuador.

DISCUSSION

In this study we present the description of the SpO₂ and other respiratory polysomnography parameters in infants 1-4 months of age, at 2,560 meters above sea level. The SpO₂ we found was

clearly lower than values described at sea level by Schlüter et al., who for children aged 1-4 months, reported a median of 98.1% (p5, 95% – p95, 99.5%). PB, on the other hand, was significantly higher than data recorded at sea level by Kelly et al., which was lower than 1% in infants 2-4 months old, and by Schlüter et al., who found PB below 0.5% in children aged 1-4 months. The fact that PB increases with altitude has physiological bases and has been previously reported in infants. In our study, PB was significantly higher during REM sleep compared with NREM sleep; this finding is recognized since 1977.

The data on CAI that we have found is higher than that reported by Schlüter et al., who recorded a median at sea level of 5-10/hour for infants aged 1-4 months. However, in our data, when central apneas associated with PB were discounted, the CAI median was close to the value reported by these authors. These results indicate that the discrimination between isolated apneas and PB-associated apneas becomes important in high altitude conditions in this age group. If ignored, the CAI values will be largely a reflection of the PB percentage. An increase in central apneas associated with PB was reported by Parkins et al., with findings similar to ours. These authors analyzed the breathing pattern in 34 children with a mean age of 3.1 months exposed to oxygen at 15% (equivalent to a barometric pressure of 582 mm Hg), and found that apneas associated with PB increased 3.5 times with the simulated altitude, whereas the increment of isolated apneas was only of 0.15.

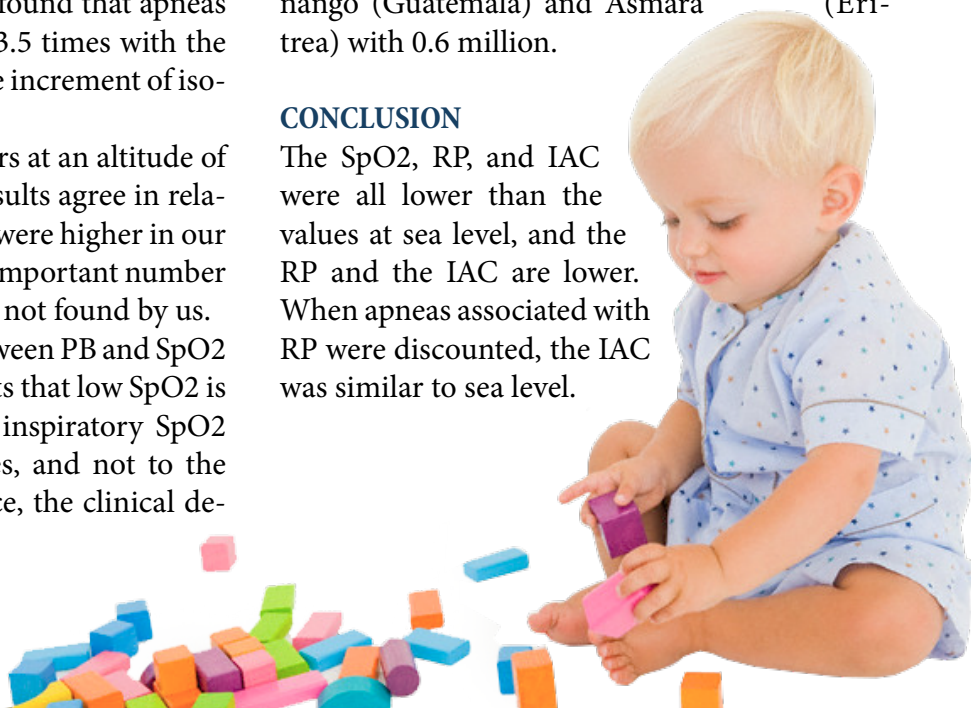
Recently, a study similar to ours at an altitude of 8,600 ft was published. The results agree in relation to SpO₂, but CAI and PB were higher in our results. The authors report an important number of obstructive apneas that was not found by us. The absence of correlation between PB and SpO₂ represented by the SSR suggests that low SpO₂ is attributable to the decreased inspiratory SpO₂ characteristic of high altitudes, and not to the increase in PB. In consequence, the clinical de-

cision to provide supplementary oxygen should be based on the SpO₂ data and not with the intention of changing the PB or CAI parameters. The obstructive sleep apnea index and the mixed apnea index were 0 in all the infants taking part in this study. Values approaching 0 for these parameters have been previously reported at sea level, by Schlüter in Germany and by Kato in Belgium. The SpO₂ difference between the 5th to 25th percentiles were the same as that observed between the 25th and 95th percentiles, showing a relevant difference in the physiological behavior of this parameter during sleep in about 25% of the babies. The reason why this happens, and whether there are any consequences, should be evaluated in further investigations. It could be hypothesized that some babies have a higher level of pulmonary vascular reactivity in response to the hypobaric hypoxia.

Considering the haemoglobin dissociation curve, the data obtained for SpO₂ in this study can be useful as an approximation to what happens in a range of ± 1000 ft around 8200 ft of altitude, where large populations live, including cities like México DF with 21 million inhabitants, Bogotá (Colombia) with 8 million, Addis Ababa (Ethiopia) with 2.7 million, Sana'a (Yemen) with 2.5 million, Quito (Ecuador) with 2.3 million, Arequipa (Peru) and Toluca (México) with 0.8 million, and Cochabamba (Bolivia), Quetzaltenango (Guatemala) and Asmara (Eritrea) with 0.6 million.

CONCLUSION

The SpO₂, RP, and IAC were all lower than the values at sea level, and the RP and the IAC are lower. When apneas associated with RP were discounted, the IAC was similar to sea level.





Karen Herrera Nieto FT.
Physiotherapist - Sleep Specialist at Ondina Sleep Lab

Neurovirtual News: Tell us about your training in sleep medicine.

Karen: I am a physiotherapist, I have nine years experience working in sleep medicine. I performed my training in Vitoria, Spain at the Txagorritxu Hospital with Dr. Joaquin Duran and Dr. Ramon Rubio and their entire team.

NN: When did the business relationship with Neurovirtual begin?

Karen: In 2010, we acquired Neurovirtual BW II PSG systems. Then, in 2012 we acquired BW 3's, and we are currently working with their new BWMini PSG/HST.

NN: When Neurovirtual presented the new BWMini PSG/HST, what was your first impression?

Karen: I found the product very interesting for use as a type 1 in our sleep laboratory and as a type 2/3 home sleep testing device from a patients home.

NN: During your first live home sleep testing study with the BWMini, what was the patients opinion related to the device?

Karen: The first patient that we performed a study with the BWMini, already had an in-lab sleep study done before in the sleep laboratory. With the BWMini, he reported feeling much more comfortable and at ease being at home, and enjoyed the flexibility of changing body positions freely. At the sleep laboratory he was not as comfortable and feared that changing body positions would disconnect a wire/sensor. Having all of the wires centrally placed on the unit placed at his chest lowered those concerns and in result,

the patient's level of anxiety during the recording was diminished.

With regards to handling the unit, it seems to me that the sensors/accessories are very easy to use since they are the same that we have been using with our other Neurovirtual products. Overall the system is very user friendly and the connections are very easy to locate.

NN: What was the most striking feature in the software of BWMini?

Karen: It is very important to us that the BWMini software share the same software platform with the other products since we are very familiar with it. Overall, the software is very user friendly, the time needed to start the study is adequate, scoring/review is easy for our physicians and allows them to edit any type of report quickly, those are a few positive things about the software.

NN: How would you rate your customer/vendor relationship with Neurovirtual?

Karen: Our relationship is really very close: They have always given us the support and advice we need from the business, clinical, and engineering side. I think it is quite positive at the time.

NN: Finally, what do you like about Neurovirtual in general, related to the following items?

Karen: Products are very intuitive and user friendly, reliable, and have a very good track record. The quality of the signals is adequate. The brand is increasingly becoming well-recognized in Colombia and around the world. In Colombia, the number of sleep labs using Neurovirtual equipment is on the rise. Accessories are standard for all Neurovirtual models products, easy to use, have an appropriate lifespan, and do not damage easily. Neurovirtual has a team members with experience in all areas of sleep medicine and neurology: We can count on their support 24 hours, seven days a week; they have highly trained support specialists.



BW MINI PSG/HST

Neurovirtual features EMU solutions at the 69th Annual American Epilepsy Society Meeting

The 2015 American Epilepsy Society meeting took place in historic Philadelphia, December 4th through the 8th, at the Pennsylvania Convention Center. This year's show was the largest to date with attendees from all 50 US states sharing new ideas, research abstracts, and treatment options.

“AES hosts its annual meeting with one goal in mind: to provide our broad community of epilepsy professionals with world-class education in order to take our understanding of epilepsy to the next level,” said AES Executive Director Eileen Murray. “Thanks to our board, planning committee, members, speakers, exhibitors, attendees, and staff, we accomplished our goal.”



Some of the most popular topics discussed at the meeting included (From the AES website):

- Pharmaceutical CBD (cannabidiol) for severe epilepsy Global interest is growing in using CBD for children with severe epilepsy, and three studies presented at the meeting looked at safety and efficacy in the largest trial of CBD to date.

- Personal monitoring devices – Three personal monitoring devices unveiled at the meeting offer biometric recording technology that could allow patients to monitor clinical and subclinical seizure activity in the everyday home environment and get advance warning before a seizure strikes.

- Better management options for status epilepticus in children
- A medical emergency with a high mortality rate, status epilepticus requires prompt treatment, but what constitutes the

appropriate care is an area of intense debate.

XXV Congress Brazilian Clinical Neurophysiology

From September 17th through the 19th, the city of Natal, Rio Grande do Norte, hosted the 25th Brazilian Congress of Clinical Neurophysiology which had 400 Neurology professional attendees. Among the speakers attending the conference was Dr. Elza Yacubian, one of the most important epilepsy experts in Latin America, and physicians from various countries like the USA, Portugal, Italy, Chile and Argentina.

Neurovirtual participated in the Congress, presenting diagnostic solutions in neurology and sleep medicine, displaying the diagnostic devices BWII EEG, BWII PSG, BWIII Plus, and the latest BWIII VEEG / ICU equipment, delivering the highest standard in quality and technology in epilepsy diagnostics.

Key topics addressed at the conference:

- Electro clinic aspects in idiopathic focal epilepsies;
- Special topics in the treatment of infant epilepsy;
- EEG's role in the diagnosis and management of epilepsy;
- EEG in the ICU and status epilepticus
- The neurophysiology evaluation of presurgical epilepsy
- Neurophysiological evaluation in the ICU

The XXV SBNC is one of the most important Neurology conferences in Brazil, and brings together the most distinguished professionals and physicians in the field.





Neurovirtual at the World Congress of Neurology

Neurovirtual attended the 22nd World Congress of Neurology, the largest Neurology-specific congress in the world. The event takes place every two years, and the location selected is often done so using parameters which include the geographical, economic, and influential weight of the host city. This year's event took place in Santiago de Chile, from October 31st through November 5th, 2015.

Why Chile?

The World Congress of Neurology chose Chile because like many countries in Latin America, it is on the verge of rapid development, with a growing need for new technology and new options for the expanding market. The congress focused on electroencephalography, polysomnography, developing techniques in genetics, neuro-radiology, rehabilitation, among other topics of importance to the global neurological community. Latin America is currently experiencing an explosion in the number of young neurologists, and an expansion in their geographic reach across the region.

In this context, the World Congress of Neurology felt that Chile was the perfect location to host its 22nd congress, and believe that It would produce a positive impact on the country and the entire Latin American region.

More than 3,500 specialists from around the world, 300 researchers, dozens of new studies, four years of preparation and six days of talks and presentations: These are some of the figures that characterize the XXII World Congress of Neurology which was hosted at the Casa Piedra Convention Center in Santiago, Chile.

The list of topics covered was extensive, from conditions such as stroke, epilepsy, Parkinson's, dementia and multiple sclerosis, to more common disorders such as headaches, sleep problems and pain management.

In fact, most of the topics covered corresponded to pathologies of high prevalence in Chile and Latin America.

“Neurodegenerative diseases are increasing explosively in the country, as the population ages. And do not forget that the first cause of death in Chile is cerebrovascular disease.”

The specialist

Dr. Raad Shakir, President of the WFN (World Federation of Neurology) said “If once we conclude this congress we will have benefited all of Latin America and Chile to advance and improve their treatment of neurological diseases and link them to the rest the world, then we will leave very satisfied.”

It is observed by a local publication, *the Diario Financiero*, that the senior population of Chile suffers from over 3,400 new cases of dementia every year, with alarming increases of seniors at-risk for developing other neurological disorders.

Chilean President Michelle Bachelet addressed the congress attendees during the opening ceremonies on Sunday, October 31st. She observed that the country's primary concern is that a very high percentage of Chileans are consumers of alcohol and tobacco products, and over 70% of the population is either overweight or suffers from obesity.



She went on to say that her administration is not only concerned with treating disorders, but to increase prevention efforts in their health system. She also referred to the increased efforts to complete the national plan for [prevention of] dementia, or “el Plan Nacional de Demencia” (Chilean President Michelle Bachelet).

Important Leaders at the WCN Conference

“Despite advances in communications, still the best way of learning and development is the personal contact and dialogue, especially among scientists. Virtually all big names in neurology are in the country,”

Dr. Renato Verdugo Chilean Neurologist and President of the WCN 2015 congress.

Among those names is Dr. Thomas Südhof, Nobel Prize winner in Medicine (2013), recognized for his contributions to the understanding of synapses (connections between neurons) and associated disorders. “His work has a tremendous importance in virtually all neurological disease and a huge projection, especially in neurodegenerative diseases such as Parkinson’s, Alzheimer’s and epilepsy,” Verdugo said.

Dr. Alejandro Marinis’ Conversation about Epilepsy

Dr. Alejandro Marinis, Medical Subdirector and Lab Manager of the “Laboratorio de la Clinica Alemana”, declared that there is a strong misconception among the public and, to some extent, the medical community at large, that epilepsy is the most prevalent form of neurological disorder in the global population. Many patients do not receive the care or education that they need, in large part because of the stigma related to the topic of epilepsy, which had not always been understood to be a neurological disorder. (Dr. Alejandro Marinis).

Dr. Marinis goes on to say that
“Epilepsy does not discriminate based on socio-economic status, gender, or any other such demographic, and it can appear at any stage of the life cycle. This is why it is so important for the community to take a conscientious approach for the need to help epileptic patients integrate into society.”

In Conclusion

The show provided an excellent stage from which the Latin American neurology community was able to share in globally accepted practices, discover new technologies, and continue the important conversation of improving the quality of life for the tens of millions of people suffering from various neurological disorders across the globe.

The congress also allowed for the technology sector to gather a better understanding of the needs of neurologists and their patients, and gain some insight on how to better develop the necessary tools to aid in the growing segment of the population that is subject to these disorders. Among the points made by Dr. Alejandro Marinis were the fact that as we live longer, the prevalence of Epilepsy and other neurological disorders is no longer a primarily pediatric concern, but is now reflecting itself in the latter half of the life cycle.

The consensus at this year’s congress acknowledges that better access to treatment is important: however, education remains paramount in understanding the causes and preventative measures we can take to step ahead of the ever-growing neurological problems facing the human population today.



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

Below you will find the list of events for 2016, where Neurovirtual will be presenting its solutions to make neurology and sleep diagnostics more human! We hope to see you there!

USA

American Clinical Neurophysiology Society Annual Meeting

📍 Hilton Orlando Lake Buena Vista, 1751 Hotel Plaza Blvd, Lake Buena Vista, FL 3283

10 to 14 February 2016

Philadelphia Sleep Conference

📍 Sheraton Valley Forge 480 North Gulph Road King of Prussia, PA 19406

18 March 2016

68th AAN American Academy of Neurology Annual Meeting

📍 Vancouver Convention Centre, 1055 Canada Pl, Vancouver, BC V6C 0C3

15 to 21 April 2016

APSS Associated Professional Sleep Societies- Sleep 2016

📍 Colorado Convention Center 700 14th St Denver, CO 80202

11 to 15 June 2016

ASET - The Neurodiagnostic Society

📍 Wyndham Grand Pittsburgh Downtown, 600 Commonwealth Pl, Pittsburgh, PA 15222

18 to 20 August 2016

The Southern Society of ElectroNeuroDiagnostic Technologists Annual Conference

📍 Clearwater, FL, USA

08 and 09 October 2016

BRASIL

XXI Congresso Paulista de Medicina do Sono

📍 Associação Paulista de Medicina- Avenida Brigadeiro Luis Antônio, 278- Bela Vista São Paulo - SP

13 and 14 May 2016

XXIII Feira Hospitalar

📍 Pavilhão Expo Center Norte- Rua José Bernardo Pinto, 333 Vila Guilherme São Paulo - SP

17 to 20 May 2016

36º congresso Brasileiro da Liga de Epilepsia

📍 Mercure Mar Hotel Conventions, Rua Barão de Souza Leão, 451, Boa Viagem Recife- PE

08 to 11 June 2016

XXVII Congresso Brasileiro de Neurologia

📍 Av. Amazonas, 6030 Gameleira, 30510-000, Belo Horizonte- MG

27 to 31 August 2016

COLOMBIA

XII Congreso Colombiano de Neurologia

📍 Fundación Valle del lili y centro de Eventos Valle del Pacífico. Cali

25 to 28 February 2016

VII Simposio Controversias Actuales en Diagnósticos y Tratamiento

📍 Centro de Convenciones Cafam Floresta, av Cra. 68 No 90-88, Bogotá D.C.

26 and 27 February 2016

MEXICO

XXIV Congreso Internacional de la Sociedad Mexicana de Neurofisiología Clínica

📍 Guadalajara jalisco mexico

4 to 7 May 2016

IX Congreso Latinoamericano en Epilepsia 2016

📍 Cancún Quintana Roo

20 to 23 August 2016

XL Reunión Anual Academia Mexicana de Neurología A.C.

📍 Cancún Quintana Roo

29 October to 3 November 2016

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