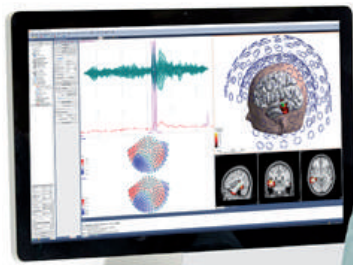


ORION LIFESPAN™
MEG


A NEW DAY IN MEG

The Mission to Transform Brain Health


**RANKED AS ONE OF THE BEST CENTERS
 FOR NEUROLOGY & NEUROSURGERY 2016-17**

Our Collaborators - The Barrow Neurological Institute

Through the vision of a neurosurgeon, BNI was founded in 1961 with the dream of establishing a first-class neurological institute. Via various grants from a local philanthropist, BNI grew and hired its

third chair of neurosurgery, **Dr. Robert Spetzler**. Becoming the Director of BNI in 1986, Dr. Spetzler oversaw BNI's continued growth and the introduction of many highly innovative treatment and surgical procedures. Highly regarded both within the USA and around the world, and before his retirement, Dr. Spetzler was one of the key decision makers in choosing the Compumedics NeuroScan Orion Lifespan™ MEG system.

Compumedics NeuroScan spoke with several of the key users at BNI recently. Our first question was simple – **why purchase a MEG?** **Dr. Michael Stein**, BNI neurology and specializing in epilepsy, answered that for him it was important to be within the CURRY software environment that would allow him to co-register the MEG-EEG-SEEG results with other diagnostic data for the same patient, such as SISCOM, PET, and fMRI. Then he could collate all the data via CURRY and "... then be directly imported in the neuro-navigation system and utilized intraoperatively during epilepsy surgery."

Working closely with Dr. Stein, **Dr. Kris Smith**, an epilepsy neurosurgeon, added an additional point from his view: **"MEG may prove to be superior to fMRI** and awake mapping for guiding the surgeon in a non-invasive way with respect to safe surgical resection of tumors. I personally believe this advantage of direct mapping localization with MEG has been severely underutilized to date and needs to be prospectively evaluated and compared to alternative techniques which are now in use."

On June 17, 2017 Compumedics NeuroScan signed its first order for their newly developed Orion LifeSpan™ magnetoencephalography (MEG) system to be placed at the prestigious Barrow Neurological Institute (BNI) in Phoenix, Arizona. For over 25 years Compumedics NeuroScan has pioneered neuroscience analytical software, the CURRY™ Neuroimaging Suite. This software has become the "gold standard" inside the world-wide MEG and EEG community when working up epilepsy patients. And for years the company, led by Executive Chairman **Dr. David Burton**, has had a dream to complement their world-class software with an equally innovative hardware platform.

That new platform has been developed in conjunction with the **Korean Research Institute for Standards and Science (KRISS)**, based in Daejeon, South Korea. Led by **Dr. Yong-Ho Lee** and his team, Compumedics NeuroScan and KRISS started with a clean page to design the 22nd century MEG system. The result was the **Orion LifeSpan™** which include robust and low-noise sensors for incomparable data quality, 24/7 helium recycling, eliminating weekly costly refills, and a dewar with dual helmets, one for the traditional adult size and an additional one especially designed for 3 year and younger pediatric patients.

And the "brain" of the system is piloted by CURRY. When asked about this milestone, Dr. Burton has said, *"We are very pleased and honored to announce this strategic BNI MEG milestone, representing the largest system contract in Compumedics' history."*

"In 2016, Compumedics NeuroScan and KRISS united their achievements and ongoing efforts, as part of a comprehensive 20-year exclusive Technology Transfer and License Agreement, to produce the new Orion LifeSpan™ MEG. After almost a year of extraordinary scrutiny by some of the world's most distinguished neuro-surgeons, neuroscientists and clinical experts at BNI, Compumedics NeuroScan, KRISS and BNI are inspired and intensely focused more than ever on our shared mission to transform brain-health."

TRANSFORMING BRAIN HEALTH

More Reasons for **ORION LIFESPAN™ MEG**



"This contract (with BNI) ultimately sees Compumedics, with the Orion LifeSpan™ MEG, now positioned to transform brain-health and improve people's lives, worldwide."

Dr. David Burton
Executive Chairman, CEO Compumedics

Data Uncompromised

Dr. Michael Stein, MD is a long-user of MEG. He first wanted to see how Compumedics Neuroscan's data compared to what he has been used to receiving.

"We are very excited to be the first US site for the new Compumedics MEG hardware system as well (as CURRY). I was able to visit the KRISS site and observe the manufacturing process involved in this system, and also to visit a local medical center utilizing the KRISS MEG system and review several cases with them. I was very impressed with the expertise and quality of workmanship I observed while at KRISS by the team led by Dr. Lee, as well as with the quality of data reviewed."



Dr. Michael Stein, MD
Neurologist

Michael Stein, MD, is a neurologist with the Epilepsy Program at Barrow Neurological Institute. He is

board certified in neurology by the American Board of Psychiatry and Neurology, with a subspecialty board certification in epilepsy.

Dr. Stein's expertise includes epilepsy and clinical neurophysiology. He is a member of the American Academy of Neurology, the American Epilepsy Society, the American Clinical Neurophysiology Society, and the American Clinical Magnetoencephalography Society.

LifeSpan Analysis Uncompromised

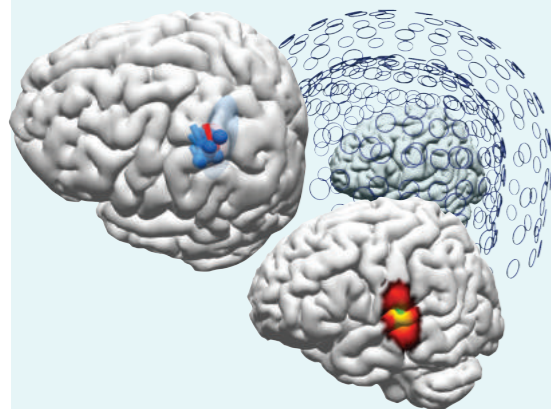
The Compumedics Neuroscan Orion LifeSpan™ MEG system is a powerful addition to the clinical and research community because it is capable of studying the brain functions across the patient's entire lifespan. The dual dewar system – one adult helmet and another helmet designed especially for 3 year children and younger – only with the Compumedics Neuroscan's Orion LifeSpan™ allows that.

The unique system enables longitudinal studies, useful and crucial for following the development of brain disorders, for predicting the onset of certain disorders such as autism, and for providing the prognosis of patients under various treatments.

Pediatrics Uncompromised

Continuing on about the pediatric helmet, Dr. Stein added, *"Given the many technical challenges in acquiring quality MEG data, including the limitations in distance from cortical generators to sensors due to the small signal strength being measured, having dual adult and pediatric helmets should also significantly improve the data quality for pediatric cases compared with the current standard of using an adult system to acquire pediatric data."*

Analysis Uncompromised



Dr. Stein, who has used the CURRY software for years, was, *"In my ten years of experience reading clinical MEG and EEG source localization studies, I have found CURRY software to offer the most comprehensive set of tools for the task. Specifically, this software suite allows me to get a **full clinical neurophysiologic picture** by simultaneously calculating EEG and MEG dipole solutions on realistic head models based on the patient's MRI. Recently, SEEG modeling has been added which advances the functionality of these tools even further. Within this same software environment we often co-register the MEG-EEG-SEEG results with other diagnostic data for the same patient, such as SISCOM, PET, and fMRI."*

Patient Care Uncompromised

As called many times to assist the neurosurgery group, **Dr. Stein** put it this way, *"Having a turnkey system which allows us to acquire and analyze simultaneous EEG and MEG data, co-register it with other diagnostic results, and export directly to the operating room will **raise the bar of pre-surgical analysis** for medically intractable epilepsy cases, and improve our efficiency tremendously compared with the previous workflow which involved utilizing different software and hardware platforms which were not easily compatible."*

Dr. Smith had this to say about the newly-to-be-installed Orion LifeSpan™ system, *"MEG offers a non-invasive way to determine the location of the seizure focus and also to directly determine the location of various neurological functions relative to the seizure focus. I have personally had experience with numerous patients where high resolution MRIs are normal, but MEG studies pointed us to the location of seizure onset and allowed **patients to become seizure free after MEG guided SEEG implants and ultimate resection of their seizure focus.**"*



Dr. Kris Smith, MD
Neurosurgeon

"I believe MEG fundamentally changes our approach for lesional and non-lesional epilepsy patients alike."

"The goal of epilepsy surgery is to localize the region of the brain which is responsible for medically intractable epilepsy and to remove this tissue in order to cure the patient or dramatically reduce the number of debilitating seizures. Equally important is the need to assess if removing the epileptogenic tissue will cause any deficits in cognitive or neurological function that would outweigh the benefit of seizure reduction."

Research Uncompromised



Dr. Stephen Foldes, PhD, is a recent neuroscience research professor at the BNI at the Phoenix Children's Hospital. His first reaction was, *"I am excited for us to have such a unique, powerful research tool at BNI and about the pediatric consideration with the Compumedics Neuroscan MEG system."*

*"I am specifically interested in using the MEG to study **neuroplasticity** across ages in cases of maladaptive networks, such as epilepsy, and during recovery from acquired brain injury, such as **severe traumatic brain injury.**"*

*"In my previous work at the University of Pittsburgh I used MEG extensively in my brain-computer interfacing research. Specifically, I developed a **real-time MEG** system as a potential rehabilitation tool after paralysis and used MEG for pre-surgical mapping to **guide the implantation of brain-computer interfacing electrodes.** My research now focuses on characterizing neuroplasticity in cases of maladaptive networks, such as epilepsy,*

and during recovery from acquired brain injury, such as severe traumatic brain injury. MEG will be a tremendous tool for quantifying these clinical brain changes.

*"We have also received a great deal of interest from other institutions across the Phoenix area and have begun planning research projects that exploit the high spatial resolution of MEG for applications in **speech and language processing and autism.**"*

*"Having an MEG system that is dedicated to developing user friendly recording and analysis environments will attract more researchers to the center and **spark innovative cross-disciplinary projects.** I'm personally excited for the state-of-the-art sensor technology to get unique insights into cortical oscillations for both research and clinical applications. I can't wait for the breakthroughs in neuroscience that are bound to happen when we combine this advanced MEG technology with BNI's existing strengths in neural engineering, neuroimaging, and neuroscience."*



Orion LifeSpan™ advantages

50%+

Better spatial resolution & sensitivity than traditional market leader

4-5 ORDERS OF MAGNITUDE FASTER

MEG provides vastly greater temporal resolution than traditional functional MRI PET or other structural brain imaging systems

320+ MEG CHANNELS

UP TO **256** FULLY SYNCHRONIZED EEG CHANNELS

320 AXIAL GRADIOMETER ON DEMAND

183 Adult standard
135 Pediatric standard
(9 reference coils each)

Our unique sensing system advantage

- The Compumedics Neuroscan Orion LifeSpan™ MEG system uses new generation high-sensitivity, axial gradiometers with increased SNR for superficial and deep sources
- Patented SQUID sensor type: double relaxation oscillation SQUID (DROS)
- Average sensitivity : better than $3 \text{ fT}_{\text{rms}}/\sqrt{\text{Hz}}$ (@ 100 Hz)
- Sampling rate : 10 kHz max option, resolution: 24 bits
- 32-256 channels of integrated simultaneous EEG, plus 4-16 bipolar/auxiliary analog channels

Our hardware advantage

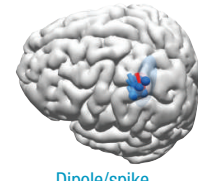
- The unique Orion LifeSpan™ is comprised of a patented rotating dual-helmet dewar for adult and pediatric patients (adult/adult, pediatric/pediatric options available)
- Up to 320 axial gradiometers option, 183/135 adult/pediatric standard (each with 9 additional reference channels for noise reduction)
- Specially designed adjustable bed system for adult and pediatric patients optimized for comfort
- Continuous helium-recycling minimizes operating costs & maintenance requirements
- Medium-weight, active magnetically shielded room (MSR)
- Designed for a standard 4x3 meter MSR to accommodate retrofit of existing MEG systems
- Smaller electronics footprint for reduced lab space & power use

CURRY™ acquisition and analytics software platform advantage

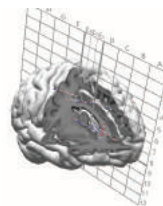
- Simplified user interface
- Co-registration of EEG & MEG, with MRI, fMRI, CT, SPECT, PET, DTI
- CURRY integrated with STIM2, including eloquent cortex evaluation
- Integrated synchronized video
- Individualized head models for MEG, EEG and combined analysis including both individualized BEM and FEM
- Complete dipole, CDR, statistics modules
- User-friendly pre-surgical planning module
- Maximum memory access for rapid processing of large data files (64 bit native application)
- Suitable for all applications (research, clinical)
- Enhanced connectivity with other hardware and software (e.g. Free Surfer, Matlab™)
- sEEG analysis module



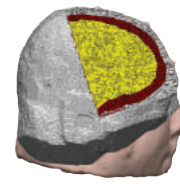
High tesla image intensity correction



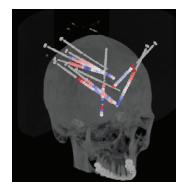
Dipole/spike clustering/averaging



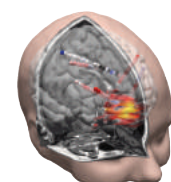
Talarach grid surgical planning



Individualized finite element model



Rotatable maximum intensity proj.



CDR for sEEG



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