



# Compumedics Vista

COMPUMEDICS CLIENT UPDATE, ISSUE 27

Proudly Supporting the  
**8th Asian & Oceanian Epilepsy Congress,**  
Melbourne, Australia • 21 - 24 October, 2010

## Article Featuring **CURRY** in **J. Clinical Neurophysiology**

A new original article titled "**Dipole Versus Distributed EEG Source Localization for Single Versus Averaged Spikes in Focal Epilepsy**" was published in the *Journal of Clinical Neurophysiology* Volume 27 Number 3, June 2010.

Curtis Ponton PhD Chief Scientist, Vice President of Compumedics Neuroscan says  
"this is an outstanding collaboration, moving **CURRY** into the clinical realm."

### Dipole Versus Distributed EEG Source Localization for Single Versus Averaged Spikes in Focal Epilepsy

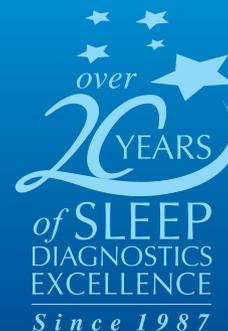
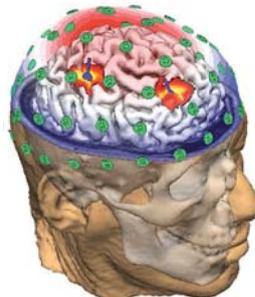
C.Plummer,<sup>†</sup> M.Wagner,<sup>‡</sup> M.Fuchs,<sup>‡</sup> A.S.Harvey,<sup>§</sup> and M.J.Cook<sup>\*†</sup>  
*Journal of Clinical Neurophysiology* • Volume 27, Number 3, June 2010

**Abstract:** The aim of this study is to characterize and compare dipole and distributed EEG source localization (ESL) of interictal epileptiform discharges (IEDs) in focal epilepsy. Single and averaged scalp IEDs from eight patients - four with benign focal epilepsy of childhood with centrotemporal spikes (BFEC) and four with mesial temporal lobe epilepsy (MTLE)- under-went independent component analysis (ICA) from IED onset to peak. The boundary element method forward model was applied to one of four inverse models: two dipolar - moving regularized, rotating nonregularized and two distributed- standardized low-resolution electromagnetic tomography with rotating cortical sources or with fixed extended sources. Solutions were studied at IED onset, midupswing, peak; ESL strength maxima; ESL residual deviation minima (best fit). From 11,040 ESL parameter points and

960 ESL maps, best-fit dipole and distributed solutions fell at the IED midupswing in BFEC and MTLE when the dominant ICA component typically peaked, localizing to the lower Rolandic sulcus in BFEC and to basolateral or anterior temporal cortex in MTLE. Single-to-averaged ESL variability was high in MTLE. Dipole and distributed ESL are complementary; best-fit solutions for both occupy the IED midupswing and not the IED peak. ICA, a "blind" statistical operation, aids clinical interpretation of ESL fit quality. Single-to averaged IED localization discordance can be high, a problem warranting further scrutiny if ESL is to earn a place in routine epilepsy care.

**Keywords:** EEG source localization, Dipole, Distributed, Focal epilepsy.

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## INSIDE

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## Join the Compumedics Neuroscan Virtual SCAN School

**DATE:** November 6 & 7, 2010  
**INSTRUCTOR:** Simon Vogrin  
**TIME:** 10am - 4pm  
Australian Eastern Standard Time  
for each day of the 2 day course.

**REQUIREMENTS:**  
Using web-based technology, your computer, internet connection and VOIP (voice over internet protocol) or an independent phone line. **Join us from where ever in the world you are!**

The "Virtual Scan School" will cover all elements of the Compumedics Neuroscan Basic Scan Course which includes the following areas:

- Introduction to Amplifiers and Hardware
- SCAN Acquisition
- SCAN Analysis
- Batch Processing

For queries or to register your attendance at this special education and training event, email [marketing@compumedics.com.au](mailto:marketing@compumedics.com.au) and provide your

- Name
- Institution
- Country

We will forward you a registration form

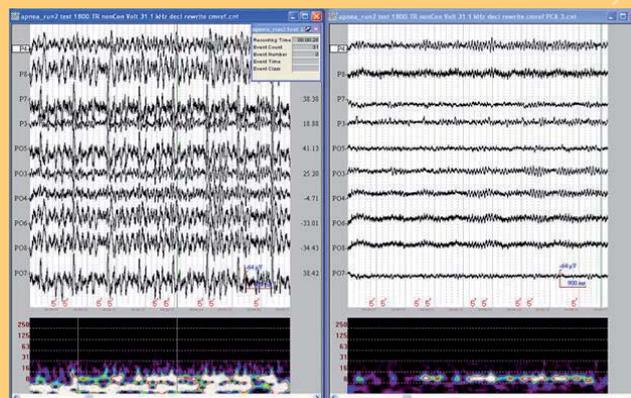


## MagLink RT™: *Enabling ground-breaking research*

***True Simultaneous EEG and fMRI in Real Time  
No Compromises – Infinite Possibilities***

The interest in simultaneously recording EEG and fMRI continues to grow in both the traditional physiology and imaging communities. In 2010 alone, a Google search of simultaneous EEG fMRI produces more than 1100 results, indicating a constant, if not growing interest in this field of scientific, and increasingly, clinical investigation. From its origins in the 1990's as an engineering "what if we could do it", to its present day status of "how far and for what applications might it be used", simultaneous recording of EEG and fMRI has essentially matured as a tool for investigating a wide range of research and clinical applications. With this evolution in the field of simultaneous EEG-fMRI, Compumedics Neuroscan has continued to evolve all aspects of the MagLink product. The evolution in both hardware to record the EEG signals, and software to process those signals has steadily improved the quality of the results, that it can be difficult to distinguish EEG signals recorded in the MRI from those recorded outside the MRI environment.

For Neuroscan customers, the application of the MagLink covers the complete domain of clinical application and research. For example, in an article published in the journal **Nature (vol 447, 2007) Vincent and colleagues** used the MagLink system to monitor EEG activity in monkeys while fMRI data were obtained to assess functional brain systems with and without anesthesia. Results of this study indicate that coherent changes in fMRI activations do not entirely reflect conscious cognitive processing since they are also present during deep anesthesia. In an article published in **Neuroscience Letters (vol 441, 2008) Picchioni and colleagues** used the MagLink system to study changes in brain hemodynamic responses measured by fMRI during sleep. Findings from this study indicated increased activity in the default-mode network in early stage 1 sleep, compared to bilateral increases in hippocampal activity during late stage 1 sleep. Results of this study demonstrated that by combining EEG and fMRI using MagLink, it is now possible to finely parse changes in brain activation during sub-stages of sleep. Moving into the realm of clinical neurology, **Szaflarski and colleagues** have used the MagLink to investigate the origins



*Raw (left) / BCG Suppressed (Right) EEG Data through Gradient Sequence Showing Alpha Bursts*

of absence seizures. The results of this study, published in **Epilepsy and Behavior (Vol 18, 2010)** demonstrated that using EEG recording simultaneously with fMRI, it was possible to identify timing differences between brain areas with respect to absence seizures. The results of this study demonstrated that while thalamic BOLD responses peaked about 6 seconds after the onset of absence seizures, BOLD activation of cortical regions including prefrontal and dorsolateral cortex peak about 4 seconds after the onset of absence seizures, thalamic activity peak 2 seconds later. Results of an advanced correlation modeling technique known as Granger Causality indicated that the path of connectivity was from frontal cortex back to the thalamus.

Overall, results of this small cross-section of studies demonstrates the quality and breadth of research currently underway with Compumedics Neuroscan's MagLink system. With ongoing implementation of existing functionality in the SynAmps 2 and SynAmps RT, lower sampling rates but with even more accurate representation of the EEG and the gradient artifact are allowing even better quality recordings than have previously been possible. Combined with the new easy 1-click functionality of the upcoming new CURRY release, we will undoubtedly see even more examples of ground-breaking research by these investigators and others in the future.



# Building your EEG lab is as easy as...

Let us show you how.

No matter what your needs are for an EEG or sleep lab, Compumedics has everything you require to build a great facility. Compumedics has the hardware and software solutions you can rely on to run your lab efficiently, effectively and reliably. In addition, Compumedics through our Neuroscan division can reliably meet all your EEG research needs.

## 1. Choose your hardware...

## 2. Choose your software...

## 3. Add some options...



**NEW GraeL HD PSG/EEG** (★)  
High-Definition EEG / PSG Amplifier for the clinical world



**Neuvo EEG**  
The Ultimate High-Density, High-frequency EEG Amplifier



**Siesta** (★)  
Revolutionary PSG & EEG Diagnostics for a Wireless World



**Safiro** (★)  
Diagnostic Excellence in Ambulatory PSG & EEG



**E-Series** (★)  
Comprehensive, Network-linked Amplifier System for PSG & EEG



**SynAmpsRT**  
The Gold Standard Amplifier for high-end research.



**Xegis EMG/EP**  
Leading the way in Neurophysiology.



**ProFusion EEG 4**  
World Class Acquisition, Review & Analysis Software for EEG. NOW fully supported in CURRY Source reconstruction analysis software.



**Digital video** (★)  
Superior capabilities with full 720 x 486 resolution at 30 frames per second. MPEG 4 compression.



**ProFusion neXus Lab Management System** (★)  
Complete laboratory management system for total patient data & laboratory control



**SCAN**  
A leading research EEG software analysis package. With advanced data processing tools for artifact removal and comprehensive spectral and temporal analysis tools.



**CURRY**  
World renowned, Gold Standard software in multi-modal neuroimaging and source reconstruction analysis.



**neXus Remote Access** (★)  
Get easy web or network access to patient studies from anywhere, with the confidence of full HIPPA compliant data access.



**neXus Scheduler** (★)  
Expand the power of neXus Intuitive tools to aid in scheduling appointment times and staff availability.



**ProFusion PSG** (★)  
World Class Acquisition, Review & Analysis Software for PSG.



**Persyst**  
online and offline spike and seizure detection - Persyst Spike and Seizure Suite is seamlessly integrated into ProFusion EEG.

### Recording EEG in the MRI



**Maglink RT**  
Proven, patented, data-acquisition in the MRI. The MagLink RT system combines the patented MR-compatible, safe transmission system of the Compumedics SynAmps RT amplifier, with an enhanced version of the Scan Data Acquisition Software suite.

★ - Supports PSG too

Research

EMG/EP

## OCT - 10

Australasian Sleep Association Conference	Oct 21 - 23	S	Christchurch, NZ
8th Asian & Oceanian Epilepsy Congress	Oct 21 - 24	NS	Melbourne, Australia
Wisconsin Neurological Society Annual Meeting	Oct 22 - 24	N	Wisconsin, USA
Epilepsy Symposium Baltimore	Oct 29	NS	Maryland, USA

## NOV - 10

Compumedics Virtual Scan School	Nov 6 - 7	N	Web based / online
NJ Sleep Society Annual Education Symposium	Nov 12 - 13	S	New Jersey, USA
ISET - Illinois Society of Electroneurodiagnostics Technologists	Nov 14	N	Illinois, USA
Medica 2010	Nov 17 - 20	G	Dusseldorf, Germany
Neuroscan MagLink School: EEG in MR	Nov 18 - 19	N	Ontario, Canada
Maglink Symposium: Technology Considerations & Challenges	Nov 21 - 22	N	Ontario, Canada

Information on  
Compumedics' events  
is available at:

[www.compumedics.com](http://www.compumedics.com)

> Home > News > Upcoming Events

(Check back regularly for updates)

## NEW EEG/LTM Innovations only from Compumedics at the 2010 8th Asian and Oceanian Epilepsy Congress.

# NEUVO™

The Ultimate Long-term EEG Monitoring System

### EEG/LTM in High Definition

- High Definition 24-bit resolution
- High channel counts for depth and grid recordings
- True DC coupled inputs (DC to 3500Hz)
- Research grade for your clinical and LTM environments
- Convenient Bedside impedance checking
- Lightweight 64 Channel Jackbox for patient comfort
- Unprecedented sampling rates up to 10,000 Hz

### Fully integrated digital monitoring system Control Box

Centralised system display and control unit allows connections for Strobe, Event Button, Camera, Microphone and other external devices.



Wall Configuration

### Bedside control from touchscreen LCD Display

- Unique Integrated LCD Display and Control Panel
- Bedside patient information for centralised operation at your fingertips
- Convenient calibrations and impedance checking in the room

### Passive Headbox

- 64-channel light-weight and compact patient worn passive jack box

### Design derived from the SynAmps2 Clinical Amplifier

- Ultimate amplifier technology platform for brain research
- High speed amplifier sampling up to 10,000Hz all channels
- High channel counts up to 256 channels
- True DC amplifier (bandwidth DC to 3500Hz)
- No stimulus artifact
- Superior quality EEG with our "Active Noise Cancellation" technology
- Grid and surface recordings
- 64 referential EEG inputs per amplifier
- 4 bi-polar inputs per amplifier
- Up to 4 amplifiers per system unit

Neuvo components also function perfectly with our SynAmps2 'Research' Amplifier (available for evaluation of high frequency and high sampling rates data up to 20,000Hz). Use with Neuvo software for ERP.

## THE COMPUMEDICS DIVISIONS Defining Life's Signals

Compumedics' operations consist of five divisions - each with its own product focus



Compumedics Sleep  
Clinical Diagnostic Systems  
for Sleep Disorders



Compumedics Neuroscan  
World-leading Research  
EEG/ERP systems



Compumedics Neuroscience  
for Neurophysiology  
Clinical Diagnostic Systems



Compumedics NeuroMedical Supplies  
Electrodes, sensors  
and Sleep Laboratories  
and supplies for Neurology



Compumedics DWL  
Ultrasound Doppler Systems

**COMPUMEDICS®**  
"Defining Life's Signals"

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