COMPUMEDICS™ Neuroscan

news

Issue 2, 2010

CURRY gains momentum in the clinical realm.

*Prominent Australian hospitals and the Compumedics Neuroscan team have collaborated in ground breaking research and published the outcomes 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."

The abstract of the article titled "Dipole versus distributed EEG source localization for single versus averaged spiked in focal epilepsy." is reproduced below.

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

C.Plummer,*† M.Wagner,‡ M.Fuchs,‡ A.S.Harvey,§Δ and M.J.Cook*†

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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Breaking News: Seamless integration between Neuroscan Access SDK and BCI2000

Data acquisition using the ***Neuroscan Access SDK*** is now supported by ***BCI2000***. The Access SDK to BCI2000 interface has been tested and verified by both the Neuroscan and BCI2000 development groups. This seamless integration between the Access SDK and BCI2000 allows for improved uses of the ***SynAmps 2/RT*** and ***SynAmps Wireless*** system in the area of brain-computer interface (BCI) research. When using the Access SDK, the SCAN software is not needed; data are transferred directly from the amplifier to BCI2000 without additional overhead. Testing shows that data acquisition latencies are on the order of only a few milliseconds.

BCI2000 is a general-purpose system for brain-computer interface (BCI) research. It can also be used for data acquisition, stimulus presentation, and brain monitoring applications.

www.neuroscan.com.au

INSIDE

The CURRY Neuroimaging Suite provides a continuum of tools ...

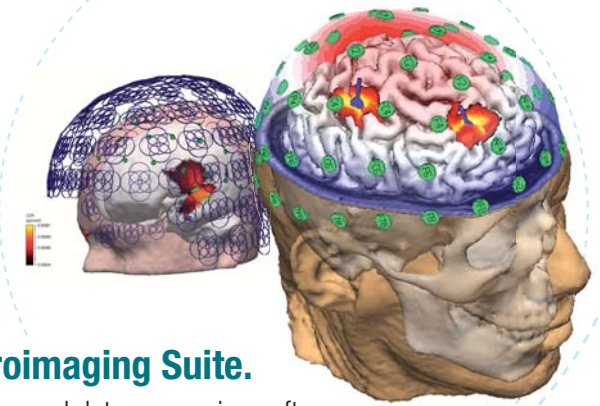
acquisition
signal processing
time domain analysis
automation
source reconstruction
statistical analysis
imaging analysis
co-registration
visualization
integration with third party software
report generator

that is unprecedented in the EEG world today.

over 2 DECADES of ADVANCED BRAIN RESEARCH

PRODUCT UPDATE

The new CURRY™ Neuroimaging Suite. ...Coming soon

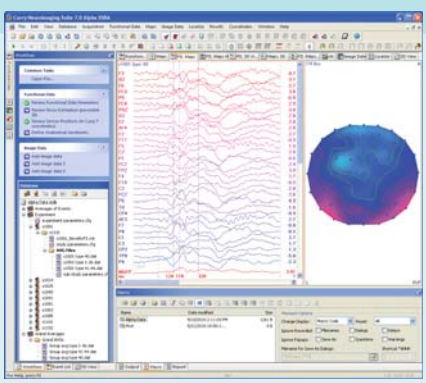


For more then 25 years Neuroscan has developed and provided world class tools for EEG data processing and signal analysis. The SCAN software has served as the primary tool for EEG applications in more then 3000 labs around the world. While SCAN has seen many updates throughout the years and still maintains a leading position in data processing software, the time has come for a significant change in the way we think about and handle data processing and analysis.

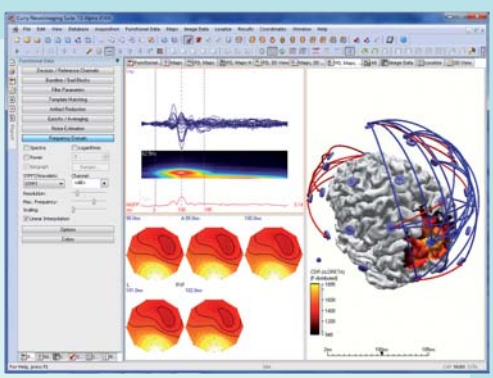
This change comes in the form of the new CURRY™ Neuroimaging Suite.

The CURRY™ Neuroimaging Suite will replace the SCAN software as our acquisition and data processing software. The history of the CURRY software is well known. Throughout the world CURRY has the well deserved reputation as the most advanced and comprehensive tool for Multimodal Neuroimaging. CURRY's strength has historically been combining functional data such as EEG and MEG with structural data from MRI and CT to optimize source reconstruction. Now we are combining CURRY's strength with the acquisition and signal processing features of the SCAN software for a comprehensive EEG acquisition, data analysis, source localization and source imaging package.

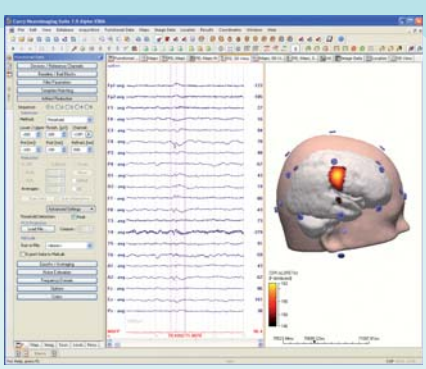
Here's a preview



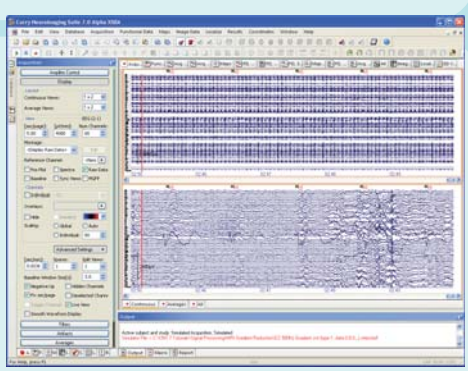
Workflow and database tool bars (shown on left) provide powerful organizational tools and walkthrough functions. The macro recorder on the bottom provides for comprehensive automation functions. The data shown illustrates topographic mapping of averaged N200 data on a standard head model.



This multi-view display allows you to see many aspects of your data at one time. The data shown (clockwise) are a butterfly plot of P100 data and the corresponding wavelet data; a realistic 3D brain with a sLORETA source reconstruction; the original MRI with the source solution show; coherence between recorded channels.



CURRY Neuroimaging Suite achieves greater signal processing power with a streamlined functional data menu and transforms are automatically and immediately applied to the data. The workflow feature can walk you through the processing steps or you can initiate them manually. The data shown depicts a current density reconstruction of spike data on a standardized realistic brain model.



Multi-view display showing data recorded in the MRI (Top) in its raw form and corrected with the latest tools for ERP and BKG artifact (Bottom). These advanced artifact reduction tools are a standard part of the Signal Processing features.

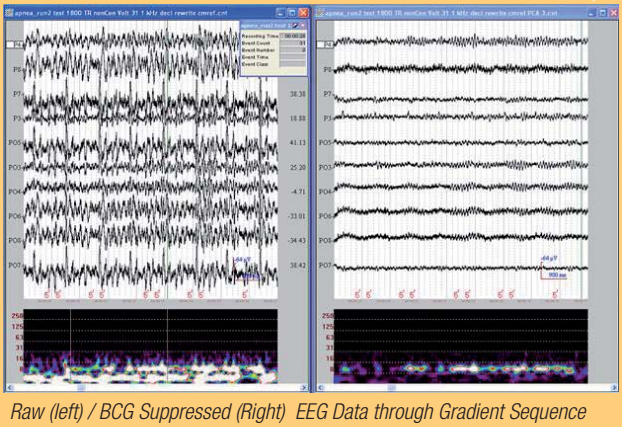
For more information, please contact us at sales@neuroscan.com

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, ***Szaflarksi and colleagues*** have used the Maglink to investigate the origins 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.



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

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 possibly. 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.

For more information on Maglink RT please contact the Compumedics Neuroscan team or sales@neuroscan.com

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EVENTS UPDATE

DEC - 10		
AES - American Epilepsy Society Annual Meeting	Dec 3rd - 7th	Texas, USA
AARC- 56th American Association for Respiratory Care International Respiratory Congress	Dec 6th - 9th	Nevada, USA
APRIL - 11		
AAN- 63rd Annual Meeting of American Academy of Neurology	April 9th -16th	Honolulu, Hawaii
MAY - 11		
8th Intl. Symp. on Noninvasive Functional Source Imaging of the Brain & Heart and the 8th Intl. Conference on Bioelectromagnetism (NFSI & ICBEM 2011)	May 13th -16th	Banff, Alberta Canada

Events subject to change, to keep up to date with all our latest tradeshows & events go to:
www.neuroscan.com/events.cfm

EEG/LTM in High Definition

neuvo™

The Ultimate Long-term EEG Monitoring System

Solutions for your every EEG need in High Definition

When the Epilepsy Monitoring Unit demands performance, Neuvo LTM delivers. Built on the Compumedics Neuroscan technology platform, the leading ampliflier technology in the brain research world, Neuvo LTM is capable of high density, high speed recording for high-definition and superior quality data. Combined with outstanding ergonomics, connectivity innovations and ProFusion neXus networking, Neuvo LTM is the Ultimate LTM EEG Monitoring system.

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.

Bedside control from touchscreen LCD Display

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

Passive Headbox

- Lightweight 64 Channel Jackbox for patient comfort

Design derived from Neuroscan's leading brain researh SynAmps Amplifier

- Ultimate amplifier technology platform for brain research
- High Definition 24-bit resolution
- Unprecedented high speed amplifier sampling rates up to10,000Hz all channels
- High channel counts up to 256 channels for depth and grid recording
- 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 SynAmps 'Research' Amplifier (available for evaluation of high frequency and high sampling rates data up to 20,000Hz). Use with Neuvo software for ERP.

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over 2 DECADES of ADVANCED BRAIN RESEARCH

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