

Infinite possibilities,  
research unleashed



## Advances from Neuroscan

At no time in Neuroscan's long history of developing cutting edge tools for Neuroscience, has our productivity been greater. With the help of Compumedics wide range of expertise in product design and development, we are seeing better products brought to market more quickly than ever before. This newsletter announces the release of **CURRY 6** and **SCAN 4.4** software, as well as the new **SynAmps Wireless** and **SynAmps RT** amplifier. Additionally, across our range of software and hardware products, without exception advances are currently being worked on. We are also pleased to announce the development of the **Neuroscan EPS-Cap**, an improved version of the **Quik-Cap**, to better suit our research customers. Finally, we have hired and continue to look for new staff to better support our growing customer base and streamline our administrative group to serve you better.

NO COMPROMISES, INFINITE POSSIBILITIES has been our mantra for many years, but now those possibilities are often a reality: Today we offer: automated image reconstruction in CURRY 6, real time fMRI artifact removal with the MagLink RT, wireless data acquisition using the SynAmps Wireless and the use of Neuroscan amplifiers with your custom built software using the Access SDK.

In the near future, we plan to remove the need for independent computers and provide for a comprehensive closed loop system between the stimulus and data acquisition systems. Our development has never been stronger, or faster. The next generation of SCAN is being designed and developed by the CURRY software team, ensuring SCAN's continued position as the world's leading EEG processing software. Enhanced functionality within SCAN and seamless integration with CURRY, as well as its interaction with third party software is paramount in its design.

*The INFINITE POSSIBILITIES that Neuroscan has strived to provide is beginning to be fulfilled by our product range, allowing your RESEARCH to be UNLEASHED with more accurate and flexible tools.*

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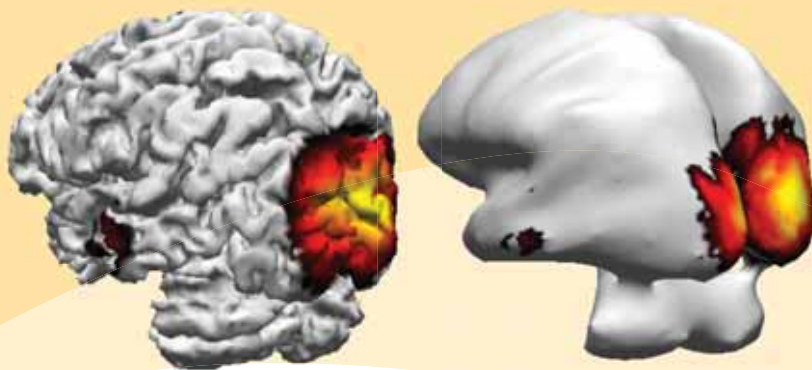
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# CURRY<sup>TM</sup> 6 is Released

*True Multi-Modal Neuroimaging*

This latest version of **CURRY** provides significant technical advances to the already much improved user interface of **CURRY 5**. Many of these new features are designed to make it simpler and much more powerful to conduct true multi-modality applications. Additional enhancements to the new interface provide toolbar buttons for the most often used features, allowing for better workflow and less searching within pull down menus. A new montage editor and data processing tools have also been added, such as template based event detection, enhanced averaging abilities. The much requested conversion to the Talairach co-ordinate system has also been included to allow a normalized comparison of data sets. A brief list of the new features follows; please visit our website for complete details.



## **NEW FEATURES:**

- Additional functional and anatomical formats supported*
- Montage editor*
- Template based event detection*
- PCA-projection for artifact suppression*
- Time-resolved spectra (short time FFT)*
- Vector beamformer scans*
- SWARM algorithm for current density reconstructions*
- Automated 3D-co-registration using mutual volume gray-level matching*
- Talairach co-ordinates (wizard for bounding box definition)*
- Anatomical and functional atlases*
- Orthogonal cuts through segmented surfaces with volume image data display*
- Cortical inflation (smoothing)*
- Full multi-core processor support (multi-threaded algorithms)*
- OpenGL-accelerated 3D-graphics*
- Highly interactive User-interface with toolbars*
- Export of results to EXCEL, MATLAB, SPM*
- Report generator (RTF-format)*

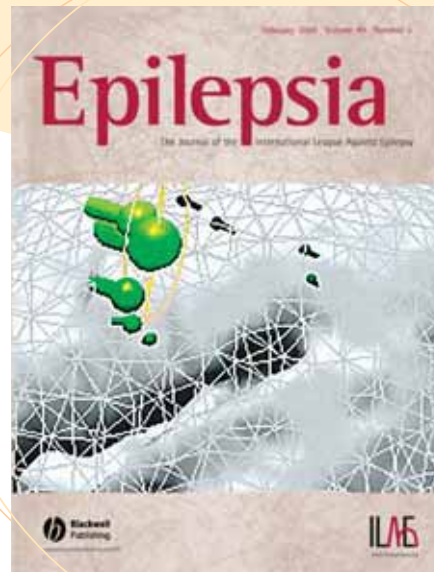
## Research Article Highlights: **CURRY on the cover of EPILEPSIA**

*Plummer C, Harvey AS, Cook M. (2008)*

### **EEG source localization in focal epilepsy: Where are we now?**

*Epilepsia. 49:201-18*

Clear demonstrations of the validity and utility has kept electroencephalographic source localization (ESL) of epilepsy away from standard clinical use. However, this review of state-of-the-art ESL techniques by Plummer, Harvey and Cook from St. Vincent's Hospital in Fitzroy, Victoria, Australia, illustrates how far such methods have come over the past decade. With a particular emphasis on CURRY, Plummer and colleagues strongly argue that ESL will soon become an accepted, standard tool in the repertoire of the clinical neurologist. CURRY's ability to easily and quickly generate realistically-shaped volume conductor models based on the individual's structural MRI combined with co-registered EEG from that individual brings a level of accuracy to ESL not previously available. Clearly, ESL will not replace current advanced imaging techniques such as (f)MRI. However, the capabilities provided by ESL as a method for localizing epilepsy provides an additional non-invasive source of convergent data to further assist in the neurologist in pre-surgical planning. With its FDA-clearance, CURRY is one ESL application fully prepared for this function.



## Examples of Recent EEG/fMRI Publications using NEUROSCAN Systems:

*Bernstein LE, Auer ET, Wagner M, Ponton CW. (2008)*

**Spatiotemporal dynamics of audiovisual speech processing.**  
*NeuroImage, in press.*  
*Neuroimage. 39:423-35.*

*Basilea LFH, Anghinah R, Ribeiro P, Ramosa RT, Piedaded R, Ballesterb G, Brunetti EP (2007)*

**Interindividual variability in EEG correlates of attention and limits of functional mapping.**  
*International Journal of Psychophysiology. 65:238-251.*

# Release of Scan 4.4

Compumedics/Neuroscan is pleased to announce the release of the latest version of the Scan software package for EEG acquisition and analysis. **Scan 4.4** was developed largely for users with MagLink RT systems, and it contains the latest methods for removing gradient sequencing and ballistocardiogram artifact.

Additional changes in **Scan 4.4** include several new transforms, as well as modifications to existing ones. Some of the new transforms have been created from parts of the existing EKG Noise Reduction transform. This gives greater control over how they may be used, and permit more general applications aside from ballistocardiogram removal. The **Scan 4.4** Release Notes, included with the 4.4 installation, describe all of the changes since 4.3.1.

**Correlate Peaks** (new; part of EKG Noise Reduction transform)

**DC Drift Correction** (modification)

**Export in EDF Format** (modification)

**Grid Layout** (new)

**Import Event File** (new)

**Insert Multiple Events** (new)

**QRS Detection** (new; part of EKG Noise Reduction transform)

**Subtract Average** (new; part of EKG Noise Reduction transform)

Included with the Scan 4.4 release is a complete set of updated user manuals. PDF versions are included with the installation; printed sets may be purchased. Also included are a set of example paradigms for recording a variety of cognitive and sensory EPs. Sample setup files and auditory/visual stimuli for use with **Stim2** are included.

Scan 4.4 is a "patch" that is installed on top of your existing Scan 4.3.1 or newer version (you must have at least 4.3.1). Your 4.3.1 license will run the regular version of Scan 4.4. The MagLink RT version of Scan 4.4 requires a Full ESI 4.3 license as well as a MagLink RT license.

New users will receive Scan 4.4 on a separate CD along with all of the other materials. Existing users may download Scan 4.4 from <ftp://ftp.neuroscan.com> (go to the Public, Released Software, Scan 4.4 folder and read the READ ME FIRST.doc file).

## SynAmps Wireless *Unleashed*

Compumedics Neuroscan is very pleased to offer the first wireless research grade EEG and ERP system. The 32 channel SynAmps Wireless is based on a well established clinical amplifier manufactured by Compumedics. We have extended its abilities to include true bipolar channels, DC recordings and the ability to synchronize trigger channels for ERPs.

Using 802.11 wireless technology, your subjects are free to move untethered from a computer. The self contained battery run amplifier fits into a belt worn pouch and can send data wirelessly to the host computer or record to its internal memory. With technical specifications to rival many of the standard research amplifiers from other manufacturers, the SynAmps Wireless offers a new level in portable and flexible hardware. Like the SynAmps, the SynAmps Wireless can be run from the SCAN software platform, or independently using the Access SDK and your custom acquisition software.



**SynAmps**™ wireless

# MagLink RT

## - Recording EEG in the fMRI in near Real Time

Recording EEG in the MRI has been a major focus of our Research and Development group for many years. The MagLink RT (Real Time) system is the culmination of that effort. While our previous system allows recordings in the MRI with some constraints, the MagLink RT allows the ultimate flexibility in recording right through the pulse sequence and provides the ability to correct both the EPI artifact and Ballistocardiogram (BKG) artifact in (near) REAL TIME.

A combination of advanced hardware and software, the MagLink RT system has been designed to eliminate any RF leakage into the MRI, by

installing a high quality custom designed RF filter. The system also includes an independent pulse oximeter to obtain accurate triggering of the BKG artifact. The MagLink RT software provides an on-line window to the data correction, allowing you to optimize the many different parameters that effect the quality of the artifact removal.

While the number of new installs of the MagLink RT is notable itself, more importantly is the ground breaking research being done with the MagLink systems. An example of which is discussed below.

## Research Article Highlights: **MAGLINK in NATURE**

*Vincent JL, Patel GH, Fox MD, Snyder AZ, Baker JT, Van Essen DC, Zempel JM, Snyder LH, Corbetta M, Raichle ME. (2007)*  
**Intrinsic functional architecture in the anaesthetized monkey brain.**  
Nature 447(7140):83-6.

Traditional methods of investigating functional networks in the brain have relied on paradigms in which a specific sensory system is stimulated and the resulting activated network is mapped. However, investigations ongoing at Washington University in St. Louis suggest that coherent patterns of fluctuation in blood-oxygen-level dependent (BOLD) underlying these functional networks may persist in the absence of stimulation. To compare so-called resting networks with driven networks fMRI data were collected with and without sensory stimulation in a group of anesthetized monkeys. In half of the monkeys tested, fMRI data were acquired simultaneously with EEG data using the MagLink system. Results of this study demonstrated that even in anesthetized monkeys, as verified by the MagLink recorded data, coherent activity associated with specific sensory system cortical network persist at arousal levels associated with extreme loss of consciousness. The further challenge the concept of "resting-state" bold activity and strongly suggested that patterned network activation persists within sensory systems in absence of input.

### Examples of Recent EEG/fMRI Publications using NEUROSCAN Systems

*Espay AJ, Schmithorst VJ, Szaflarski JP. (2008)*

**Chronic isolated hemifacial spasm as a manifestation of epilepsia partialis continua.** Epilepsy & Behavior 12:332-6.

*Vincent JL, Larson-Prior LJ, Zempel JM, Snyder AZ. (2007)*

**Moving GLM ballistocardiogram artifact reduction for EEG acquired simultaneously with fMRI** Clinical Neurophysiology 118: 981-998.

*Sabri M, Liebenthal E, Waldron EJ, Medler DA, Binder JR. (2006)*

**Attentional modulation in the detection of irrelevant deviance: a simultaneous ERP/fMRI study.** Journal of Cognitive Neuroscience 18:689-700.

## SynAmps RT Released

The next generation of the world's best selling research amplifier for EEG and ERP is here. The **SynAmps RT** builds on the famous SynAmps and SynAmps 2 platform but adds an unmatched level of noise suppression, with an even more advanced system for active noise cancellation. The front-end of the SynAmps RT utilizes the latest advances in design to dramatically improve the system specifications. The channel count and form factor of the SynAmps 2 are maintained, allowing for 64 monopolar, 4 bipolar and 2 high level channels per headbox. The SynAmps RT is designed to grow with your lab from a simple 32 channel system to a cutting edge 512 channel system.

In addition to technical improvements, the SynAmps RT was designed to work seamlessly with the MagLink RT for recording EEG in the MRI and correcting the artifact in (near) real time. SynAmps RT also works with the Access SDK, which allows you to write your own software, bypassing SCAN, for applications such as brain computer interface, where custom software is needed.

*Existing SynAmps 2 systems can be upgraded to RT systems for a nominal fee.*

**Contact your Neuroscan representative for more information.**



**SynAmps<sup>TM</sup> RT**

# Neuroscan strengthens Germany Support

Read more on the Compumedics Germany Neuroscan R&D team on page 6



**Daniel Pittman**  
Compumedics Neuroscan European Support Engineer

Dan's career has included a variety of positions, both creative and technical, but for more than the last decade he has concentrated on fields related to cognitive psychology, functional neuro-imaging, and EEG. Dan received his MSc. from the University of Calgary, Canada where he was also engaged as a researcher. His role at the University research centre has included overseeing the collection and analysis of data involving a wide range of modalities, including fMRI, EEG, simultaneous EEG/fMRI, EMG, GSR, TCD, and accelerometry. His experience with the Compumedics Neuroscan products has involved research into neuropsychology, stroke and epilepsy, and he played a key role within the center's recent ground-breaking advancement into simultaneous fMRI and EEG using intercranial electrodes.

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**Edgar Lehn**  
Compumedics European Service Technician

Edgar joins the support, service and repair team for the Compumedics Clinical Sleep and Neurophysiology/EEG product range. Edgar worked as a medical device specialist for training and support for the blind and disabled (D-Allensbach) since 1999 and before that, as Supervisor in production at Baumer Electric (CH-Frauenfeld).

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## NEWS FROM TECHNICAL SUPPORT!

### These include:

1. The addition of a **FAQ** to our website, including answers to questions revolving around amplifier installation, subject preparation, and basic software issues.
2. Direct, remote connection to your Scan or Stim desktop/laptop computer, enabling a direct demonstration of software transformations.

We also provide opportunities for support personnel to visit your laboratory in order to provide direct assistance and training! If you are interested in hosting a visit from a Compumedics Neuroscan representative, please contact us at **+49 (0) 1622 891 924**. We may also be reached via email at [djittman@neuroscan.com](mailto:djittman@neuroscan.com). We are committed to assisting your exploration of the unlimited possibilities and potential of your Neuroscan system.

## Compumedics Neuroscan's USA new Administrative Office.

We're pleased to report that the transition and move of operations from El Paso to Charlotte last fall was a success. All US Administration, Customer Order Entry, Accounting, HR, Service, Shipping and Receiving and Marketing functions are now in Charlotte, NC. We are excited about the new facilities and surroundings. More importantly we are excited about this new opportunity to better support our customers.

Neuroscan still maintains a research facility in El Paso and has expanded the research operations in both Australia and Germany. Working together, these three sites have vastly improved our ability to develop and bring products to market. Each group now has the ability to focus on its specific area of expertise, while benefiting from the expertise of the other groups. The benefit of this approach is clear in the number of new products and the capabilities they offer. We look forward to utilizing this new structure to ensure the best development and support of our growing customer base ... **Infinite Possibilities, Research Unleashed**



# Compumedics Germany Headquarters, Singen.

Located in Singen, Germany, the Compumedics European Head Office supports our growing European market and is currently dedicated to software development service, technical and customer support.

Built in 2001 the building is four stories high & houses over 100 workers.

It is DIN EN ISO 13485:2003 compliant for design and development, production, distribution and service of ultrasound diagnosis, monitoring and therapeutic devices, patient monitoring and plethysmography devices.

Compumedics has occupied the Singen office since 2003.



## Hamburg Research & Development Hub.

The Hamburg Research and Development Hub is the home of the CURRY development team. The Hub is located about 5km from the city centre in Hamburg. It also has a training centre where the expert CURRY team hosts the Neuroscan schools for our clients.

### Dr. Michael Wagner

Michael Wagner studied Electrical Engineering in Munich, Germany. In 1992, his interest in medical applications led him to the Philips Research Labs in Hamburg, Germany. In collaboration with Hamburg's Technical University, he worked on the combination of functional (EEG, MEG) and image (MRI) modalities and received his Ph.D. in 1998. Since the year 2000, he has worked for Neuroscan. Michael works at Compumedics' office in Hamburg, Germany. His main field of work is with the CURRY software, where he is involved with research, software development, training, and helpdesk.

### Dr. Manfred Fuchs

Manfred Fuchs received his M.S. and Ph.D. degrees in Physics from the University Goettingen, Germany, in 1982 and 1985 respectively. He later joined the Philips Research Laboratories in Hamburg, Germany in 1986, where he advanced to the role of Senior Scientist and Project Group Leader of the CURRY (CURrent Reconstruction and Imaging) software project. In 2000, he joined Neuroscan, where he is responsible for the research and development of the EEG and MEG source reconstruction packages – SOURCE and CURRY.

### Jörn Kastner

Jörn Kastner studied Electrical Engineering at the University of Dortmund, Germany. In 1999, his fascination in applied computer science led him to the Philips Research Labs in Hamburg. He joined Neuroscan, now a division of Compumedics, in the year 2000 and has worked at the Hamburg, Germany office ever since.

His main area of concentration is with the CURRY software, where he is involved with research, software development, and helpdesk.

### Reyko Tech

Reyko Tech graduated from the University of Applied Sciences in Wedel, Germany, in 2007 with a degree in Media Computer Science. Whilst at the Philips Research Laboratories in Hamburg, Germany, Reyko wrote his diploma thesis about physical simulation of human tissue in a radio therapy environment.

In early 2008 he joined Compumedics Neuroscan and is working in software development for the CURRY project in Hamburg, Germany.



From left to right:

**Michael Wagner** - Senior Scientist

**Manfred Fuchs** - Senior Scientist

**Jörn Kastner** - Scientist

**Reyko Tech** - Software Developer

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