COMPUMEDICS™ NeuroScan

*An Interview with **John Ebersole, MD** about his use of **CURRY** in Clinical Epilepsy.*

How long have you been using Curry in your evaluation of epilepsy cases?

I've been using Curry for over ten years. I was initially attracted to Curry because of its superb means of handling and incorporating both functional EEG data and structural MRI and CT data. I had been looking for a program that could easily and accurately display source models of EEG spikes and seizure waveforms in the patient's own brain MRI. At that time, Curry was the best software program for processing structural data, creating 3D cortical images, creating realistic head models, and co-registering these anatomical data with EEG analysis. It still is.

What role does Curry play in your pre-surgical workups?

The key to pre-surgical evaluation is functional localization of the epileptic focus. Often there is not an obvious structural lesion and localization by EEG is really critical. We use Curry to create 3D source models of epileptiform EEG activity to localize its origin in the patient's brain. We typically use equivalent current dipoles as the model for both epileptic spikes and early ictal waveforms. Source analysis of these potentials clearly provides more localization information than traditional visual inspection of EEG traces. Simply looking at EEG may provide lobar accuracy, but with source analysis sublobar precision is commonplace. This degree of localization accuracy is critical for planning surgery or intracranial electrode implantation.

How has Curry changed the way you handle epilepsy cases?

Given the added functional localization provided by Curry we can often expedite our pre-surgical evaluations. It is important that a variety of data converge in these workups. If you have really good localization from EEG, you often need fewer other types of data to provide enough information to determine if surgery can proceed and whether invasive electrode implantation will be necessary. Because an EEG discharge is a direct manifestation of epileptiform activity, we rely upon localization by it more than other functional imaging techniques, such as SPECT or PET that are based on secondary measures of blood flow or metabolism. We have also noted that source localization of epileptiform activity can direct our search for associated structural abnormalities. When you know where to look, you often find subtle lesions or cortical malformations that were missed.

Curry offers what benefits over more typical methods?

EEG data abounds with information. Not only are spikes and seizure potentials a direct measure of epileptiform activity, but these data are recorded in real time with a millisecond temporal resolution. No other functional imaging technique, except physiologically-related MEG, can visualize rapid spike or seizure propagation. As epileptologists, we need to know where the abnormal activity starts and not just where it goes. All of the information needed to characterize the location and activity of an epileptic focus is found in the contours of the EEG voltage fields and how they change over time. However, to exploit this information fully requires a sophisticated program that can analyze EEG with a variety of source models using individualized, realistic head shapes, and display source solutions in 2D and 3D MRI reconstructions of the brain. This is what Curry does. Simply looking at the EEG “wiggles” is no longer adequate.

What is your impression of the latest version of Curry?

Many new features have been added to Curry over the years. The Curry developers are very responsive to input from clinicians regarding suggestions for how to make their program easier to use and better at answering questions of clinical importance. For example, the digital EEG analysis part of Curry has evolved such that it is fully functional for basic EEG reading as well as advanced analysis. Sensitivity, filtering, display duration, remontaging, event marking and notation are all under user control. Sequential voltage maps displayed in 2D or 3D are just a click away. Event averaging and a variety of source models from dipoles to current density displays follow a logical progression of additional button clicks. Similarly, segmentation and reconstruction of anatomical data is becoming easier. I can remember when multi-shell realistic head models took hours to create. In the current version of Curry these models can be can be generated automatically in a matter of a minute or two with a very little required user interaction. Co-registration of functional and multiple anatomical data sets, such as MRI, CT, or PET, is equally simple. Typically the complexity of grid and multiple overlapping strip electrodes makes it very difficult to appreciate the spatial distribution of intracranial EEG data. Accurate localization and visualization of intracranial electrodes on a 3D model of the patient’s cortex is another very useful Curry development. Spike and seizure potentials can be mapped onto these electrodes, providing an easily interpreted display of the active cortical regions. Whether it is scalp or intracranial EEG data, Curry can provide answers that clinicians need.