

History of NeuroGuide

Robert W. Thatcher, Ph.D.

August 3, 2023

- 1- The central and binding idea of NeuroGuide 1.0 is conventional EEG and qEEG (quantitative electroencephalography) on the same screen at the same time in which qEEG is a lens that can be changed by a click of a mouse. NG 1.0 (1/1/2002) contained all of the eyes open and eyes closed normative databases, re-montaging and automatic artifacting, dynamic Z score edits, ascii export, EEG printout, Lexicor, NeuroData, Mindset, CapScan and BrainMaster imports using calibrated sine waves contained in later versions.
- 2- NeuroGuide 1.1 (3/8/2002): given to a small number of beta testers. NG 1.1 used the Key A and a Key B protection without uninstall and the key Bs will not work with future updates.
- 3- NeuroGuide 1.2 (3/26/02): was the first NeuroGuide to be distributed to be used as a research tool and it was the first to use uninstall/install windows setup files. It added page up, page down, home, end and arrow keys as well as mouse changes in editing. It lacked color topographic maps and add-ons like discriminant functions and connection maps.
- 4- NeuroGuide 1.3.0 (5/29/02 – 6/8/02): included color topographic maps and connection maps and more import file formats and more export file formats and LORETA export with improved processing speed.
- 5- NeuroGuide 1.4.0 – 1.4.4 (7/26/02 – 8/20/02): added connection maps and expansion of the ratios to the gamma frequency band (25 Hz to 30 Hz) and discriminant functions. The TBI and LD discriminant functions and severity indexes were added. A different Lexicor Demo example was selected to help illustrate TBI vs. learning disabilities.
- 6- NeuroGuide 1.4.5 (9/19/02): addition of ASCII import capability and Lexicor and NeuroGuide export formats, saving of the raw and Z score FFT values in tab delimited format and improved printing capability.
- 7- NeuroGuide 1.4.6 (10/20/02): 1- added a clipboard capture option, 2- improved the ASCII import window of text files to automatically look for Tab, Comma & Space Delimiters and not to crash when an import error occurs, 3- FFT Power Spectral Density (PSD) to define microvolts as $\mu\text{V}^2/\text{Hz}$ and setting $Z = 0$ at 0 Hz and, 5 added a second page to the report generator of “Technical Details” that include the epoch length, recording condition and average and individual channel reliabilities.
- 8- NeuroGuide 1.4.7 (11/18/02): 1- about 40% to 60% faster in the report generate program, depending on your computer; 2- imports Cadwell Easy I & II files and 3- The print routine is faster and compatible with more printers than previously.

- 9- **NeuroGuide 1.4.8 (11/22/02):** Corrected blue-red color reversal problem with 1.4.7 and implemented a smarter color matching routine so that users can now use any bit size for their Display Settings. 16 bit settings increase the speed and reduce memory loading with no noticeable change in color quality. Cadwell Easy I & II file import and the other improvements in 1.4.7 are retained.
- 10- **NeuroGuide 1.4.9 (12/18/02):** DeyMed amplifier equilibration when using the Text or ASCII import tool. The NeuroGuide Logo identifies the NeuroGuide formatted output files. LORETA default Montages in the correct electrode order for linked ears and average reference which can be obtained by a mouse click in the Montage window. Export in the File>Export menu in which ASCII files can be saved with or without a header.
- 11- **NeuroGuide 1.5.0 – 1.5.9 (2/21/03):** Multiple windows with dynamic linkage between color topographic maps and the NeuroGuide EEG editor, Mitsar imports, new LORETA export formats, improved Cadwell EEG imports and ability to read and export Lexicor edits, imports of EDF and BDF file format.
- 12- **NeuroGuide 1.6.0 – 1.6.5 (9/12/03):** Option for color EEG tracings that match the dynamic FFT and Z score displays, improved cubic spline color maps, access to workshop EEG exemplars (limited to workshop participants), development and integration of NeuroStat 1.0 – 1.1 (add on product). BESA and Mindset-24 EEG import capability and changes in the FFT processing procedures in which data are high pass filtered at 1.0 Hz (5th order Butterworth which is 6db down at 0.5 Hz) and better amplifier matching of different EEG machines by computing relative power from 1.0 Hz to 30.5 Hz in 0.5 Hz frequency resolution. Signal Generator is included for mouse click aids for the education of students in digital signal processing as well as in validation procedures in general (i.e., phase delays, coherence, frequency, amplitude, and time).
- 13- **NeuroGuide 1.6.6 – 1.6.7 (12/1/03):** Includes NeuroBatch 1.0 (NB 1.0) and group statistics using NeuroStat 1.2. (NS 1.2). NS 1.2 includes text output and color topographic maps of standard deviations and means and t-tests between group means and standard deviations. NeuroBatch provides for automatic processing of hundreds of edited EEG files in batch mode including color topographic maps and tab delimited data for each subject and each group of subjects. LORETA exports are still as digital time series but now in Lexicor format with increased speed of processing and better organization of the menu options.
- 14- **NeuroGuide – 1.6.8 (12/25/03):** The implementation of eyes open norms for EEG coherence, EEG phase and EEG amplitude asymmetry. The implementation of norms for Average Reference and Laplacian EEG coherence, EEG phase and EEG amplitude asymmetry for both eyes open and eyes closed conditions. The exclusive use of the FFT cross-spectrum and not complex demodulation. The reason for the replacement of complex demodulation by the FFT is because of the need for faster computations and because of the greater flexibility of the FFT in comparison to complex demodulation. XLTEK native file imports are now available.

- 15- **NeuroGuide 1.6.9 (12/30/03):** Includes the ability to launch the Key Institute LORETA Viewer from the NeuroGuide edit window with a single mouse click. The cross-spectrum is computed from the edited EEG samples in linked ears or average reference and the 2,394 current densities are computed in NeuroGuide using the Key Institute equations and seamlessly imported into the LORETA Viewer.
- 16- **NeuroGuide 1.7.0 (1/29/04):** LORETA normative Z scores are implemented for eyes closed and eyes open conditions and for linked ears and average reference montages from 1 to 30 Hz in 1 Hz increments. Time domain exports to LORETA are retained so that direct time to frequency comparisons can be made using the same edited data or signal generation sine waves. Dynamic Test Re-Test reliability measures (ratio of variance of 1st half of edits to the 2nd half of the edits) are now in the edit screen so that the changes in brain state such as drowsiness is easier to detect and to quantify. NeuroNavigator Lexicor formatted files are now calibrated with microvolt calibration signals and equated to the NeuroGuide normative database amplifiers. The NeuroGuide manuals are now integrated inside of NeuroGuide under the Help menu option.
- 17- **NeuroGuide 1.7.1 (2/5/04):** Retains previous features with a revision of the Learning Disabilities Discriminant Function (NG 1.4.4). The revision involves recomputing the discriminant function using a broader range of spectral measures than the first version. The cross-validation accuracy is about 85% but the discriminant is more stable than the first release and directly linked to the severity index. Import of Nicolet EEG as text files.
- 18- **NeuroGuide 1.7.2 (2/14/2004):** Retains previous features of NG 1.7.1 but includes two updates: 1- Z Score color maps now range from + 4 St. Deviations to - 4 St. deviations. The range from + and - 2 St. Deviations is colored green in order to highlight statistically significant deviations that are greater than or less than 2 st. deviations. 2- A significant improvement in processing speed. The cross-spectral matrices are computed about 3 times faster than before.
- 19- **NeuroGuide 1.7.3 (2/19/2004):** Retains all the features of NG 1.7.2 and has the following changes: 1- The Brain Performance Index (BPI) is now available as an add on. 2- The color maps are returned to + and - 3 St. Dev. as we develop a more flexible color table GUI that should be ready in a week or two.
- 20- **NeuroGuide 1.7.4 (3/4/2004):** Retains previous features and adds: 1- A Topographic Color preference option in Report > Preferences. This option allows users more flexibility in the scaling of Z scores and the range of normal values, etc. A description is in the NeuroGuide Help. 2- The Brain Performance index now includes a Histogram of predicted neuropsychological test scores and the correct label of Scaled Scores. 3- The 171 connection maps for coherence, phase and amplitude asymmetry are added. The previous, anatomically linked 16 channel coherence and phase maps are retained. Numeric tab delimited data for the 171 combinations is available in the NeuroGuide Analysis window by clicking File > Save > Tab delimited.

- 21- NeuroGuide 1.7.7 (4/21/2004):** Addition of a group paired t-test in NeuroStat, test re-test reliability average and individual channel values on page two of the analysis output, re- scaling of the absolute amplitude based on calibration measurements, revisiting of the Key Institutes equations to be certain that the equations are implemented correctly, re-computation of the normative databases based on absolute amplitude scaling changes and change the Save and Export feature in which File > Save As > NeuroGuide (*.ng) is the only option and File Open > Export > Lexicor and/or ASCII formats with and without adjustments for baseline and filtering to minimize splicing effects.
- 22 – NeuroGuide 1.7.8 – 1.7.9 (June 9, 2004):** Added discriminant and Brain Performance Index values in the tab delimited output file, included LORETA Z scores in the demo, removed average reference and current source density Z scores for coherence and phase.
- 23- NeuroGuide 1.8.0 – (September 10, 2004):** 1- Page numbers are included in all of the bitmaps, 2- A header is placed at the top of the last page of the 1 Hz maps and there is a more logical ordering of the 1 Hz maps on two pages (1 Hz to 20 Hz on page 1 and 21 to 30 Hz on page 2). In the future as part of the subscription service an upgrade will be an expand NeuroGuide to 40 Hz for raw values and then the last page of topograph maps will be filled up, 3- The Gamma band (25 – 30 Hz) is renamed to Hi-Beta (Gamma will be used to designate 30 – 40 Hz in the future), 4- improved stability and speed by reprogramming certain modules, 5- BrainMaster Mini-Q imports are improved and, 6- The Brain Performance Index has been recomputed and upgraded.
- 24- NeuroGuide 1.8.1 – September 21, 2004):** The Active-X control of the scroll bar in the Analysis Output window was replaced with a scroll bar that is more reliable.
- 25- NeuroGuide 2.0 (10/26/04):** NeuroGuide 2.0 marks the creation of an upgrade subscription service that guarantees one year of free upgrades from the date of purchase of NeuroGuide but then charges \$500/year for upgrades beyond one year from the date of first purchase of NeuroGuide. The 2004-2005 changes will include: 1- LORETA statistics including individual, and group paired t-tests, independent t-tests, ANOVA, descriptive statistics, options to display probabilities or t values, 2- Add discriminant and Brain Performance Index values in the tab delimited output file, 3- Add NeuroPrax native file format and 4- Add connection map page to the Brain Performance Index.
- 26- NeuroGuide 2.0.1 (11/9/04):** Retains all of the features of NG 2.0 and adds: 1- NeuroBatch has been expanded for automatic processing of LORETA individual analysis files, 2- A right mouse click on a channel label produces a Brodmann Area hypothesis that can be tested using planned comparison statistics before launching LORETA, 3- Addition of SynAmps 16 bit and 32 bit EEG imports, and 4- A change in the View menu to create the category of "Edit Screen Options".
- 27- NeuroGuide 2.0.2 (11/17/04):** Adds: 1- DeyMed EOG and EKG imports (i.e., item 19 on the update wish list) and 2- a double click on the label of any channel will result in a single EEG trace of that channel to appear. Double click a second time and the full 19 channels will reappear. This update is the first step in the development of JTFA and Bi-Spectral analyses.

- 28- NeuroGuide 2.0.3 (12/8/04):** 1- Flexible scaling of raw EEG topographic color maps with options such as “Global Scaling”, “Individual Map Scaling” and “Manual Global Scaling”. This option provides a lot of flexibility to emphasize different frequency distributions using different topographic colors, 2- Z Score color preferences and color schemes. This includes eight different color schemes to choose from for the Z score topographic maps and, 3- A summary page 3 of 5 columns and 5 rows of summary Z score topographic maps in the Analysis Output window, similar to NxLink which was a feature that was ranked high by users of NeuroGuide. Click Report > Preferences in order to change the color scheme and Z score ranges.
- 29- NeuroGuide 2.0.4 (12/29/04):** 1- Peak Frequency for eight different frequency bands and 19 channels on page 24 of the Analysis Output window. Peak frequency is a default selection in the report menu. Click Report | FFT Spectral Values | Peak Frequency to unselect peak frequency values and, 2- we added percent difference and absolute difference in the group statistics for LORETA inside of NeuroStat. Click Statistics > LORETA Statistics > Group Statistics > Comparative to view this option.
- 30- NeuroGuide 2.0.5 (1/21/05):** 1- Joint-Time-Frequency-Analysis using the Adaptive Gabor Transform, also called “Matching Pursuit”. To activate JTFA click Analysis > Joint Time Frequency Analysis. See the NeuroGuide manual at Help > NeuroGuide Help for a brief description of this new tool. JTFA is used to dissect and explore the fine details of EEG dynamics. The frequency range of JTFA is 0 to 40 Hz. and, 2- changed the appearance of the NeuroGuide edit screen to make the edit screen a little more aesthetic and simpler.
- 31- NeuroGuide 2.0.6 (1/31/05):** 1- Added JTFA absolute values, arrow keys and page up and page down controls and added cursor cross-hairs to identify time and frequency and, 2- improvements in the aesthetics of the NeuroGuide edit window.
- 32- NeuroGuide 2.0.7 (2/10/05):** Added LORETA 3-Dimensional Source Correlation and 2- Changes in the NeuroGuide menu options in which Analysis was changed to “Tools” and “Dynamic FFT” was moved from the “Edit” menu to the “View” menu. All other features are the same. The LORETA Source Correlations allow one to measure the coupling between 3-D brain regions (ROIs) and the rest of the brain. For example, was the anterior cingulate gyrus positively or negatively correlated with the right parietal lobe? or with the hippocampus?, etc. Users can select regions of interest by anatomical name or by Brodmann Area as well as ROIs located in the left hemisphere, right hemisphere or both hemispheres.
- 33- NeuroGuide 2.08-2.09 (3/2/05).** 1- Added the ability to save calibration settings in the Signal Generation program and, 2- Added the option of computing a square root transform of LORETA squared current source vectors.
- 34 - NeuroGuide 2.1 (4/14/05):** 1- Added a LORETA source correlation (LSC) normative database using normal subjects from 6 months of age to 82 years of age. The LSC norms involve the correlation between 48 different regions of interest (ROIs). The skewness, kurtosis and cross-validation accuracies of the normative database are shown in the NeuroGuide Help (see Appendix G). The LSC is an add on product and, 2- Enhancement of the Joint-Time-Frequency-Analysis (JTFA) in which users can deconstruct and reconstruct an EEG time series by selecting and deselecting Gabor “Atoms”. All other features of NeuroGuide are the same.

- 35- NeuroGuide 2.1.1 (5/19/05):** 1- Expansion from 30 Hz to 40 Hz for all raw data analyses, including LORETA current density and LORETA Source Correlations. Normative Z scores will remain limited to 30 Hz; 2- Added a 3-dimensional color contour map for raw LORETA source correlations (LSC) and the LORETA source correlation normative database and, 3- Changed the default for JTFA of Number of Terms = 1. This change makes it easier to learn JTFA. For example, reduced residual values as one adds additional Gabor “Atoms” to the JTFA calculation. All other features of NeuroGuide are the same.
- 36- NeuroGuide 2.1.2 (6/1/05):** Expansion of the Bipolar Montage capability of NeuroGuide to 128 possible bipolar combinations. This means that there are no restrictions for bipolar montage creation and longitudinal (Banana), Transverse, Circular and Mixed Longitudinal and Transverse montages are included among the standard montages in the NeuroGuide Montage window. All other features of NeuroGuide are the same.
- 37- NeuroGuide 2.1.3 (6/16/05):** Fixed a bug in NG 2.1.2 which prevented importing Mindset 24 channel EEG files. Otherwise NG 2.1.3 is identical to NG 2.1.2.
- 38- NeuroGuide 2.1.4 (6/21/05):** Addition of bipolar normative databases and normative databases for all possible common reference montages based on the International 10/20 system of electrode placement. For example, create a CZ referenced montage by clicking Montage > Create Montage and then create the montage using any ordering that one wants to use. Or, create any possible bipolar montage and there will be normative data.
- 39- NeuroGuide 2.1.5 (7/1/05):** The updates are: Calculation of weighted mean frequency for different frequency bands (see NeuroGuide Help > Appendix B), and a normative database with Z scores of weighted mean frequency from 2 months to 82 years of age for each frequency band, 2- change in the default settings to reduce the memory load after clicking Generate Report, 3- default polarity of traces is positive down to be consistent with conventional EEG preferences and, 4- a bug fix in the import of text or ASCII data.
- 40- NeuroGuide 2.1.6 (7/12/05):** The update is: Restore coherence, amplitude asymmetry and phase defaults in Report Generate. Otherwise NG 2.1.6 is identical to NG 2.1.5
- 41- NeuroGuide 2.1.7 (7/22/05):** The same as NG 2.1.6 but the incomplete code for the Video module is temporarily removed because of installation problems on some computers that failed to find certain DLLs. When the Video module is complete then it will be restored in a future update.
- 42- NeuroGuide 2.1.8 (8/29/05):** The same as NG 2.1.7 but with added import capability for Grass-Telefactor, BrainScope and Cadwell Spectrum-32 EEG data files. NeuroBatch was upgraded to automatically process Cadwell Spectrum-32 EEG data files including multiple EEG session recordings.
- 43- NeuroGuide 2.1.9 (9/6/05):** Addition of the ability to save and load report selections. The Report itself also includes more options than it did previously which provides better control over the report. NG 2.1.9 allows users to save report selections that can be retrieved and activated in order to tailor and streamline the report generate function.

- 44- NeuroGuide 2.2.0-2.2.1 (10/5/05): Includes a Time Domain normative database and display. Click View > Time-Frequency Analysis to activate this new feature. Position the mouse over the EEG tracings and depress the left mouse button and drag the mouse to observe the instantaneous power values and the instantaneous Z scores.
- 45- NeuroGuide 2.2.2 (10/28/05): Adds dynamic JTFA color maps that instantly change as one drags the mouse over the EEG tracings. Click View > Dynamic JTFA > Absolute Power and then select Color Maps to view the topographic maps. Instantaneous Z scores are also produced in color maps.
- 46- NeuroGuide 2.2.3-2.2.4 (12/15/05): Adds instantaneous coherence and phase JTFA color maps that change as one drags the mouse over the EEG tracings. Click View> Dynamic JTFA > Coherence or Phase and then select Color Maps to view the topographic maps. Instantaneous Z scores are also produced in color maps. In addition, a JTFA edit option is added in which one can include or exclude features of the EEG that meet specific criteria, e.g., > 2 st. dev. theta in F4 or instances where the theta/beta ratio in a specific channel or a combination of channels exceeds some criteria.
- 47- NeuroGuide 2.2.5 (12/22/05): adds an update for the import of BrainMaster 2.0 EEG files for both the standard 1 or 2 channel recordings and the Mini-Q. Also, Nicolet native formatted EEG files can be imported into NeuroGuide. This includes the Nicolet Bravo Intuition, Nicolet AllianceWorks, Nicolet UltraSom NT and Nicolet BMSI-6000.
- 48- NeuroGuide 2.2.6 (2/24/06): Import of ANT (Advanced Neurosciences Technology) EEG, modification of the Subject Information window where eyes closed and eyes open conditions are specified to access the correct normative databases. Addition of square waves, sawtooth waves and pulse simulations in the Signal Generation program. Expansion of JTFA capabilities including exporting and viewing of JTFA time series. Addition of first and second derivatives of the EEG time series. Addition of first and second derivatives in the JTFA complex demodulation and implementation of Phase Reset (i.e., 1st derivative of instantaneous phase). Expansion of the number of scalp EEG channels to 45.
- 49- NeuroGuide 2.2.7 (4/27/06): Inclusion of absolute amplitude, click View > Dynamic FFT > Absolute Amplitude. Automatic save of the eyes closed, or eyes open selection in the subject information window. Mindset EEG Acquisition ability – a \$500 add on for Mindset users. Acquisition inside of NeuroGuide involves a single mouse click and simplifies and integrates acquisition and report writing. Modified the eyes closed vs. eyes open message in the subject information window.
- 50- NeuroGuide 2.2.8 (5/16/06): Splice correction is added to the print function when one prints edited selections of EEG. Selection of polarity positive up or down will also control the wave polarity when printing the EEG traces. Mindset acquisition bug fix involving the winaspi32.dll. The addition of ManScan EEG format for import.

- 51-NeuroGuide 2.2.9 (6/13/06):** Expansion of number of standard EEG channels to 85 based on the standard 10/10 system of electrode placement with the ability to import 128 channels of EEG upon request. Addition of a vertical wiper to facilitate visual analysis of EEG traces with 85 to 128 channels. Mindset EEG acquisition addition of pause and continue menu items and initial implementation of “Event Markers” with expanded capacity to be added in a future release.
- 52-NeuroGuide 2.3 (6/28/06):** Expansion of the Event Marker capabilities. A variety of events can be marked and later sorted using an Event Marker Table. Events can be sorted by type or time and each event can be quickly located by double clicking the event in the event marker table.
- 53-NeuroGuide 2.3.1 (7/6/06):** NG 2.3.1 updates are limited to NeuroStat and involve the addition of color topographic maps to NeuroStat group statistics for absolute differences and percentage differences. Also, the scaling of topographic maps inside of NeuroStat are now controlled by the Report Option function when one clicks Report > Report Options. This function allows one to change the type of color scaling in the NeuroStat maps the same as for the maps produced by Report Generate.
- 54-NeuroGuide 2.3.2 (8/3/06):** Addition of a time domain LORETA tool to provide for fine detailed 3-dimensional source analysis of EEG events such as theta and beta bursts, spike & wave events, etc. Click View Edit Screen Mode > LORETA Time Domain Capture, then drag your left mouse over the event of interest in the EEG tracings and then launch the Key Inst. LORETA viewer to quickly examine the anatomical sources of the currents that gave rise to the surface EEG event, time point by time point.
- 55-NeuroGuide 2.3.3 (9/1/06):** Improved speed of processing and better memory paging as well as improved BrainMaster Mini-Q safeguards so that coherence, phase and amplitude asymmetry are only computed for simultaneously acquired data.
- 56-NeuroGuide 2.3.4 (9/22/06):** adds a Nexus 32 channel EEG import capability and an add on product called the "Connection Suite". Click Report > Connection Suite and either raw values or Z values of one of the connectivity measures and view the full 171 channel combinations for different frequency bands. Future updates will include Correlation, Cross-Spectral Amplitude and Bi-Spectral analyses.
- 57-NeuroGuide 2.3.5 (11/2/06):** updates include: 1- Improved memory allocation and speed of processing, 2- Update of the signal generator program for EEG “Spindle” simulation using the “Pulse” feature, 3- revision of the TBI discriminant function to include more variables and to enhance the display of relevant variables, 4- addition of correlation “co- modulation”, cross-spectral power, co-spectral power and quad- spectral power to the connectivity suite and, 5- Linking the Save Selections and Report Options for the Connectivity Suite.
- 58-NeuroGuide 2.3.6 (12/13/06):** updates include 1- LORETA save .lor after launching LORETA, 2- Automatic batch processing of LORETA .lor files and automatic reformatting of .lor files to 2,394 rows and forty 1 Hz frequency columns, 3- ability to compute and display averages of JTFA selections and, 4- update of NeuroBatch to include selection of eyes open or eyes closed normative databases.

- 59- NeuroGuide 2.3.7 (1/4/07): updates include: 1- Ability to save in Lexicor, EDF and Text (ASCII) formats in addition to the NeuroGuide format, 2- Expansion of the Grass-Telefactor import capabilities, 3- A new standalone Mindset acquisition module and 4- Improved ability to save and view non-EEG data such as EMG, EOG, HR, etc.**
- 60- NeuroGuide 2.3.8 (3/8/07): updates include: 1- Burst Metrics to measure the number of bursts, mean burst duration, mean burst amplitude and mean inter-burst interval for different frequency bands, 2- Phase Reset metrics inside of the Connectivity Suite, i.e., No. of phase resets/sec; amplitude of phase resets, duration of phase resets, duration of phase locking intervals and average rate of change of phase for different frequency bands and, 3- Nihon Khoden EEG file imports.**
- 60- NeuroGuide 2.3.9 (5/15/07): Updates include: 1- Revision of the normative database to increase the age resolution, 2- computation of normative values for the Connectivity Suite, 3- Ability to launch NeuroGuide by double clicking a .ng file, 4- Expansion of the list of items in the Event table and 5- Import of BrainVision EEG files.**
- 61- NeuroGuide 2.4.0 (6/25/07): Updates include: 1- Addition of a Dynamic Bi-Spectral Analysis as an add on, 2- Expansion of FFT analyses to 50 Hz, 3- Expansion of NeuroStat to 50 Hz, 4- Edit screen mode is rearranged, 5- Amplitude marker added to the dynamic JTFA.**
- 62- NeuroGuide 2.4.1 (8/14/07): Updates include: 1- Expansion of imports to NeuroBatch and generation of .ng files, 2- Improved Grass-Telefactor imports, 3- Improved frequency resolution of the Bi-Spectrum analyses and, 4- Import of BrainMaster 4 channel Mini-Q.**
- 63- NeuroGuide 2.4.2 (10/18/07). Updates include: 1- Addition of Z scores in the Bi- Spectral Analyses as an add on, 2- Improved speed and efficiency of processing, 3- Improved acquisition module for the Mindset EEG amplifiers.**
- 64- NeuroGuide 2.4.3 (11/1/07): Updates include: 1- Programming foundations for longer record lengths and, 2- Addition of Monitor option and montage setup GUI in the Mindset acquisition module.**
- 65- NeuroGuide 2.4.4 (12/7/07): Updates include: 1- Replacement of Report menu selections with a dialog box to make selections easier, 2- added a tool bar to the Mindset acquisition module and expanded the ability to change displayed channels during acquisition, and 3- modified report output page numbering.**

- 66- NeuroGuide 2.4.5 (2/20/08): Updates include: 1- Mouse wheel control of the edit screen, analysis output page and montage window, 2- adjustable color intensity of edit selections, 3- separate download for the Bi-Spectrum and LORETA Source Correlation normative databases and, 4- Remembers selections previously used in the View menu.
- 67- NeuroGuide 2.4.6 (3/15/08): Updates include: 1- Extend the topographic color maps to 50 Hz in Report Generate. This includes Alpha-1 (8-10 Hz); Alpha-2 (10-12 Hz); p Gamma (30 – 40 Hz); Gamma-1 (30-35 Hz); Gamma-2 (35-40 Hz) & Hi- Gamma (40-50 Hz), 2-Extend the same topographic color maps to 50 Hz in NeuroStat, 3- Add a warning about the use of relative power to the analysis output and, 4- Add LORETA time domain Z scores to View > LORETA Time Domain Capture.
- 68- NeuroGuide 2.4.7-2.5.1 (6/12/08): Updates include: 1-Addition of Eye Movement Artifact and Drowsiness Removal option in the Edit menu, 2- Expansion of the adult normative database by 53 subjects, 3- Max and min absolute power values colored red or blue, 4- Improved import of Nicolet native files and import of calibrated Biologic, Phoenix & NeuroVirtual EEG in EDF format; 5- Re-computation of LORETA Source Correlation norms to minimize singularities and, 6- Patient information window has a default setting to retain doctor & technician names.
- 69- NeuroGuide 2.5.2 (7/29/08): Updates include: 1- An update of the Bi-Spectral add on with the addition of the Bi-Spectral Cross-Frequency Power Correlations, 2- Renaming of the menu item Statistics to NeuroStat, 3- Renaming of Batch Analysis to NeuroBatch and 4- Increased speed of processing with new code.
- 70- NeuroGuide 2.5.3-2.5.4 (12/5/08): Updates include: 1- Extend the dynamic Bi- Spectrum from 0.03 Hz to 5 Hz and includes a log-log plot option, 2- Add a Demo option to the Help menu to allow for fast change to the Demo mode, 3- The addition of the Bi-Spectral Cross-Frequency Phase Reset with improved color map controls and, 4- Improved automatic microvolt scaling of EEG imports.
- 71- NeuroGuide 2.5.5 (2/5/09): Updates include: 1- Improvements in the Discovery 24 channel acquisition module, 2- Recognition of additional Telefactor amplifier types for import, 3- More universal recognition of EDF files for import and, 4- Increased speed of processing data files.
- 72- NeuroGuide 2.5.6 (4/10/09): Updates include: 1- New installation program that is more efficient and with desktop short-cuts, 2- Prioritizing eye movement artifact rejection to override automatic rejection, 3- More flexibility in defining the reference using BioSemi amplifiers, 4- First phase of implementation of 19 channel Z score biofeedback for surface EEG (beta test stage), 5- Add the ability to change the security key by clicking Help > Change Security Keys and, 6- Added c:/Program Files (x86) to the search path to launch LORETA for 64 bit computers.

- 73-NeuroGuide 2.5.7 (6/17/09): Updates include: 1- Set the default for Automatic Eye Movement & Drowsiness Rejection level = high , 2- Set default range in the Cross- Frequency Power Spectral Correlations = -0.2 to +0.2 which is $P < .05$ with 60 sec. of edited data, 3- Implemented a Chebyshev lo-pass filter at 52 Hz in the Discovery acquisition module, 4- Implemented new installation software and 5- Updated the 19 channel Z score biofeedback for surface EEG (beta test stage).**
- 74-NeuroGuide 2.5.8 (7/7/09): Updates include: 1- Expansion of 19 channel Neurofeedback metrics to include autospectral and cross-spectral Z scores, 2- Code preparation for Symptom Check list to be implemented in a future update and, 3- Expansion of number of sounds and better coordination of sound duration with reward interval. Neurofeedback module NF1 is ready to for sale with upgrades planned for the next several months.**
- 75-NeuroGuide 2.5.9 (9/1/09): Updates include: 1- Modification of EDF import so that non-EEG channels with different sample rates can be imported, 2- Addition of a Symptom Check list and QEEG Match Mismatch algorithm in the Neurofeedback module, 3- Expansion of the number of progress charts, 4- Addition of DeyMed amplifier acquisition and Neurofeedback control and, 5- Preparation for DVD/Flash 3rd party interfaces in the Neurofeedback module.**
- 76-NeuroGuide 2.6.0 (11/5/09): Updates include: 1- Scaling of the y-axis in the Neurofeedback Progress chart, 2- Addition of a real-time list of electrodes and metrics and Z scores for purposes of monitoring Z scores during 19 channel Z score biofeedback, 3- Expansion of XLTEK imports and 4- Addition of Neuron Spectrum to the list of EDF amplifier imports.**
- 77-NeuroGuide 2.6.1 (2/18/10): NG 2.6.1 updates include: 1- Higher priority given to Drowsiness & Eye Movement artifact so that select all will not select rejected segments, 2- NF2 is added to the 19 channel Z score biofeedback module, 3- Improved sound and progress charts in NF1/NF2, 4- Standalone acquisition and NF1/NF2 modules including full edit capability and 5- Addition Tabs to toggle between the neurofeedback settings panel and the progress charts during EEG biofeedback.**
- 78-NeuroGuide 2.6.2 (6/3/10) updates include: 1- Loreta Z Score Biofeedback with 98 Brodmann areas, 66 Regions of Interest, six Hagmann Hubs and the Default Network, 2- Implementation of Z Tunes for Neurofeedback, 3- Increased sensitivity of the Drowsiness Pattern Recognition module, 4- Improved inter- session users controls for the neurofeedback modules, 5- Added a 'Both' option of surface & LORETA Z scores in NF2, 6- Ability to use the Progress chart of Z scores as visual neurofeedback and, 7- Expansion of the Split-Half and Test Retest reliability windows.**
- 79-NeuroGuide 2.6.3 (6/30/10) updates include: A new add on that is a standalone Symptom Check List and Neurofeedback protocol generator. After making artifact edit selections then click Report > Symptom Check List Protocol Generation to activate this new add on.**

- 80- NeuroGuide 2.6.4 (8/12/10) updates include: 1- Addition of a “No Artifact Detected” message when using the Artifact Rejection pattern recognition routines and no artifact is found, 2- A EEG Playback capability to allow for review of Neurofeedback procedures, 3- Changed the label “Order” to “Sort” in the stand alone Symptom check list and, 4- Add an automatic clear all selections in the Neurofeedback settings panel when one closes the Neurofeedback module(s).**
- 81- NeuroGuide 2.6.5 (11/3/10) updates include: 1- Addition of Neuropsychological Disorders in the symptom check list, 2- BrainMaster DVD activation, 3- Addition of DeyMed 3D Engine, 4- Addition of Trend Analysis to Z tunes and, 5- Use of the hyperbolic sine transform of absolute power and phase differences in the FFT normative database.**
- 82- NeuroGuide 2.6.6 (3/8/11) updates include: 1- Phase shift and Phase lock duration real-time Z scores added to the Surface Neurofeedback module (NF1), 2- Addition of Mitsar acquisition module, 3- Add DeyMed Marker capability, 4- Addition of Trend Analysis to Z tunes and 5- Addition of NeuroField imports.**
- 83- NeuroGuide 2.6.7 (6/13/11) updates include: 1- Addition of Nexus acquisition module, 2- Addition of a Multi-Media player for Neurofeedback, 4- 50 Hz & 60 Hz notch filters for Mitsar and 5- Playback looping of the EEG record.**
- 84- NeuroGuide 2.6.8 (8/25/11) updates include: 1- Addition of real-time LORETA coherence Z scores in pairs of 88 Brodmann areas for the LORETA neurofeedback NF2 module and, 2- Addition of real-time LORETA phase difference Z scores in pairs of the 88 Brodmann areas in the NF2 module.**
- 85- NeuroGuide 2.6.9 (10/25/11) updates include: 1- Addition of an intra-session ‘Rounds’ control panel in NF1 & NF2, 2- Simplification to absolute Z scores for neurofeedback and, 3- Addition of Department of Defense and VA ‘CONUS’ clinical tool kit and Neural Network tabs in the Symptom Check List panel.**
- 86- NeuroGuide 2.7.0 (11/29/11) updates include: 1- Addition DVD capability in the NF1 & NF2 modules and, 2- Return to + & - Z scores in the NF1 protocol panel and Progress Chart.**
- 87- NeuroGuide 2.7.1 (2/6/12) updates include: 1- Improved DVD controls including fast forward and reverse, 2- Addition of multiple plots of inter-round progress, 3- Ability to identify neurofeedback metrics by simply moving the mouse over the inter-session progress chart plots and, 4- Addition of the addiction network to the symptom check list (i.e., substance abuse) and network panels.**
- 88- NeuroGuide 2.7.2 (3/20/12) update are: 1- Modification of the Demo import of tutorial EEG files that are part of the Handbook of QEEG and EEG Biofeedback. Sample EEG files can be downloaded and then opened in the free NeuroGuide Demo for those that want to exercise the tutorials in the book and 2- The first phase of a new database manager that operates in the EEG collection mode. Eliminates having to re-type patient information and helps organize patient EEG and neurofeedback files.**

- 89- NeuroGuide 2.7.3 (5/18/12) update are: 1- Implementation of raw and Z score LORETA coherence and LORETA phase as an add on, 2- the inclusion of the ICN (Intrinsic Connectivity Network) as a tab in the Symptom Check List, 3- The ability to identify all of the real-time Z scores in the neurofeedback Progress Chart by simply moving the mouse over the Z score plot and 4- The addition of Phase Shift and Phase Lock plots in the Inter-Session Progress chart.**
- 90- NeuroGuide 2.7.4 (7/19/12) updates are: 1- Addition of tab delimited output for LORETA coherence, LORETA phase & LORETA current density, 2- Addition of LORETA current density as a contour map as part of the LORETA coherence & phase add on, 3- Multimedia DVD player controls appear before clicking Begin Session in NF1 & NF2, 4- Increased the length of the LORETA Time Domain Capture to 1 minute and 5- Ability to save .ng files when one clicks OK in the subject information window after clicking 'Stop' acquisition.**
- 91- NeuroGuide 2.7.5 (11/29/12) updates are: 1- Addition of tab delimited output for the surface and LORETA Z score NFB protocol, 2- New automatic editing panel that includes both a template and a Z score criteria for the selection of artifact free EEG and, 3- Dynamic JTFA control panel to simplify dynamic selections.**
- 92- NeuroGuide 2.7.6 (4/10/13) updates are: 1- Addition of BrainSurfer-I add on, 2- WinEEG/EEG Studio integration to allow NeuroGuide to be launched from a menu inside of WinEEG/EEG Suite, 3- Advanced Brain Monitoring integration, 4- Enobio amplifier equilibration for EEG import, and 5- Updates of Nexus-32 and Mitsar acquisition DLLs.**
- 93- NeuroGuide 2.7.7 (6/12/13) updates are: 1- BrainSurfer-II is added, 2- NeuroField EEG amplifier integration with NeuroGuide, 3- Addition of Edit Selection Duration in the Automatic Edit panel, 4- Addition of sound and counters to BrainSurfer for neurofeedback, 5- Addition of Tab Delimited outputs for LORETA Source Correlation, and 6- Addition of sound control to the DVD and Video player.**
- 94- NeuroGuide 2.7.8 (9/13/13) updates are: 1- BrainSurfer surface projection of sources and Brodmann area labeling, 2- BrainSurfer mesial surface rendering & mouse control, 3- LORETA Phase reset in Brainsurfer III; 4- Nexus calibration adjustment, 5- Mitsar calibration file re-format and, 6- Addition of BrainAmp NC module.**
- 95- NeuroGuide 2.7.9 (10/14/13) updates are: 1- BrainSurfer symptom check list linked, 2- BrainSurfer zoom by mouse wheel, 3- LORETA Phase reset in NF2; 4- Option to switch between Min/Max Z scores and average Z scores per second and 5- Improved Mitsar EEG file imports.**

- 96- NeuroGuide 2.8.0 (12/20/13) updates are: 1- Addition of DTI, mirror neurons and Mesulam functional networks to NF2 and BrainSurfer, 2- Control to include or exclude Phase Reset in NF2, 3- Automatic Editing added to NeuroBatch; 4- Option to switch between Min/Max Z scores and average Z scores per second, 5- BrainSurfer option to deliver positive feedback or green color when equal to or below threshold and a negative feedback red color when equal to or greater than threshold, 6- Equilibration factors and import capability for data generated by ANI and Evoke amplifier and, 7- Acquisition module for the ANT amplifier.
- 97- NeuroGuide 2.8.1 (6/2/14) updates are: 1- Added a Static LORETA Phase Shift and LORETA Phase Lock normative database add-on, 2- Addition of session rounds and inter-session progress charts in BrainSurfer, 3- Update and simplification of BrainSurfer feedback where green, yellow and red colors represent increased distance from the feedback threshold and 4 - Equilibration factors and import capability for data generated by the BioSignal amplifier.
- 98- NeuroGuide 2.8.2 (12/1/14) updates are: 1- The Automatic Clinical Report Writer (ACR), 2- An update to improve sound control with the DVD and wave sound files in the Neurofeedback modules (NF1 & NF2) so that one can simultaneously use both the DVD and wave sound files, 3- An adjustment of the sign of the LORETA phase shift Z scores so that they are the same direction as the surface phase shift Z scores and 4 – Adjustment of the center voxel location of Brodmann area 9 to increase the distance with respect to the Brodmann area 8 center voxel for LORETA Z score NFB (NF1) and phase.
- 99- NeuroGuide 2.8.3 (12/9/14) updates are: 1- Updated the Automatic Clinical Report Writer (ACR) to include a “no logo” option, a “cancel button” in the Header tab & the manual signature option is remembered upon next launch of the ACR, 2- NeuroGuide now ignores the CVI dlls that may be present in the NeuroGuide folder, 3– Re- adjustment of Brodmann area 7 in the LORETA Z score NFB (NF2) coherence and phase metrics, 4- Return to the same default setting of 2 standard deviations in the “Automatic Editing” program and 5- Event Marker to include “Seizure Onset” & “Seizure Stop” markers and the ability to save the time of events and type of events in a tab delimited file.
- 100- NeuroGuide 2.8.4 (3/9/15) updates are: 1- Updated the Automatic Clinical Report Writer (ACR) to include more LORETA plots & set the company information header page as the 1st page followed by Options, added the ability to change the Z score threshold for LORETA and include more LORETA maps and more NFB recommendations, 3 – Updated the license renewal feature to click Help > Change License Online for the renewable 2nd licensed computer, 4- Updated Mitsar acquisition module to control the latest Mitsar release and 5- Added an Impedance plot for Mitsar in the collection mode.
- 101- NeuroGuide 2.8.5 (5/13/15) updates are: 1- Added an import interface to NeuroLink symptom self-assessment, 2- Added a NeuroLink tab to the Symptom Check List panel to automatically create protocols based on patient/client symptom severity, 3- Added the dry electrode Cognionics to the list of amplifiers that NeuroGuide collects EEG from and, 4- Renewal and Update Subscription Expiration notices appear in advance of expiration.

- 102- NeuroGuide 2.8.6 (10/9/15) updates are: Added the summary page to the Automatic Clinical Report (ACR), 2- Modified Z Tunes to use a linear regression of slope over a 1 second period, 3- Added the Chinese Fistar SNS amplifier to the list of amplifiers that NeuroGuide collects EEG from, 4- Added the Effective Connectivity for the Surface EEG as an add on (ECS), 5- Added the Neural Network Injury Index (NI) as an add on and, 4- Added a Rounds counter to the progress screen in NF1, NF2 and BrainSurfer**
- 103- NeuroGuide 2.8.7 (12/4/15) updates are: 1- Added the ability to backup and retrieve the Subject Database when transferring NeuroGuide to a new computer, 2- Added LORETA Effective Connectivity (ECL) as an add on to measure information flow between all combinations of 88 Brodmann areas, 3- Added a EP/ERP add on module that includes Visual EPs and the P-300 auditory ERP, 4- Added more information in the renewal and update subscription warning messages, 5- Added the ability to automatically renew licenses by clicking a Yes button in the renewal warning message and 6- Replaced the pain network for the Executive Network in the Neural Network Injury Index (NII) add on.**
- 104- NeuroGuide 2.8.8 (2/25/16) updates are: 1- Added Zukor Multimedia and in the future plan to add Zukor Games, 2- Expanded the range of Z score thresholds in NF1, NF2 and Brainsurfer, 3- Reactivated BrainSurfer I that has the advantage of viewing whole networks at single frequencies and metrics, 4- Substituted the Executive Network for the Pain Network in the Neural Network Injury Index, and 5- Changed the Key A encryption for more security and efficiency.**
- 105- NeuroGuide 2.8.9 (4/13/16) updates are: 1- Added the New BrainSurfer Network Viewer (BSV) as an add on, 2- Added the ability to resize the progress charts when used as a display in NF1 & NF2, 3- Improved the correspondence between the dial and the LORETA radar maps in the Neural Network Injury Index, 4- Added the Tinnitus network to NF1, NF2 and BrainSurfer, 5- Added Radar maps of more Brain networks in the ACR, 6- Added counter linked to the auditory threshold control to the BrainSurfer display, 7- Reverted to the 10 second outlier history for Z tunes, 8- Added the Auditory EP (AEP) and Mismatch Negativity (MMN) ERP to the EP/ERP add on, and 9- Enabled DeyMed Games to work with all amplifiers and not be restricted to only the DeyMed Amplifier.**
- 106- NeuroGuide 2.9.0 (8/1/16) updates are: Added the surface EEG Cross-Frequency Coherence (SCFC) as an add on, 2- Added equilibration factors for the Elektra amplifier, 3- Added the ability to read the DeyMed EEG when different sample rates are used, 4- Added "Stop Time" button in the Automatic Editing panel, 5- ERP viewer was added to allow one to import saved EP/ERPs and add or correct age for the norms, 6- Added a viewer to the concussion index so that one does not have to re-compute previously computed NeuroGuide outputs and, 7- Added the ability to collect EEG from the 6 channel Cognionics Dry Headset.**

- 107- NeuroGuide 2.9.1 (10/7/16) updates are: 1- Added impedance checking for the NeuronSpectrum amplifier, 2- Added acquisition and impedance checking for the new Mitsar amplifier, 3- Corrected a Windows 10 conflict that prevented NeuroGuide from properly closing, 4- Updated the concussion index to a per-use capacity. Those that have already purchased the Concussion Index will be given unlimited access on the ANI server, 5- Added LORETA Cross-Frequency Coherence as an add-on and 6- Added Zukor Grind as a Neurofeedback display.
- 108- NeuroGuide 2.9.2 (1/10/17) updates are: 1- Added changeable sample rates for the NeuronSpectrum amplifier, 2- Added new equilibration factors for the Nexus-32 amplifier, 3- Updated the Subject database to create a common file so multiple users can create a shared database, 4- Added surface Cross-Frequency Phase- Amplitude Coupling as an add-on and, 5- Added ANI server identifications inside of Help > License Information.
- 109- NeuroGuide 2.9.3 (4/19/17) updates are: 1- Added the swLORETA Navigator, 2- Added the Brain Function Index, 2- Added new equilibration factors for the Nexus-32 amplifier and, 3- Updated the Concussion Index.
- 110- NeuroGuide 2.9.4 (6/12/17) updates are: 1- Added Networks and the Symptom Check list to swLORETA Navigator, 2- Added *.s05 export from swLORETA for Neurofeedback integration, 3- Added the Brain Function Index (BFI) and Concussion Index (CI) to the Automatic Clinical Report Writer (ACR), 4- Updated Radar Maps in the ACR and, 5-- Integrated the Medicom EEG amplifier collection and Neurofeedback.
- 111- NeuroGuide 2.9.5 (8/2/17) updates are: 1- Added a Rendered Head/Face Model to swLORETA Navigator, 2- Added a Cutting-Tool to Navigate through the Rendered Head Model, 3- Added the Colors to the swLORETA Network and Symptom Checklist sorted Brodmann Areas, 4-- Integrated the Neuroeletrics Enobio and StarStim-20 Amplifiers for collection and Neurofeedback.
- 112- NeuroGuide 2.9.6 (9/16/17) updates are: 1- Added a Scalp Model with Transparency Control to the NeuroNavigator, 2- Added Scalp Electrical Potentials and Laplacian Current Source Density to the Scalp Model in the NeuroNavigator and, 3- Set $Z = 0$ in the NeuroFeedback Symptom Check List Panel.
- 113- NeuroGuide 2.9.7 (12/11/17) updates are: 1- Updated menus and functionality to the NeuroNavigator, 2- Real-time color head maps during acquisition, 3- Added DSI-24 reset controls, 4- Integrated Tor Ghai's "Envelope" that does any image or DVD, etc for NFB and, 5- Added Standalone NeuroNavigator
- 114- NeuroGuide 2.9.8 (1/18/18) updates are: 1- Added Functional Connectivity) Coherence and Phase) to the NeuroNavigator, 2- Added the Ability to view Brodmann area numbers by Shift + Right Mouse Click in the NeuroNavigator, 3- Added "Center Voxels" menu item in the settings config dialog.
- 115- NeuroGuide 2.9.9 (4/18/18) updates are: 1- Tab delimited .s04 for surface NFB, 2- Added Gaussian swLORETA Coherence, 3- Added Gaussian swLORETA Lagged Coherence, 4- Gaussian swLORETA Phase Difference and, 5- Phase-Slope Index Include.

- 116- NeuroGuide 3.0 (5/2018) updates are: 1- A Universal Visual Display tool for NeuroFeedback called the “Streamer”, 2- Updated the visual appearance of the NeuroNavigator, 3- Updated the Connectivity Tab Delimited file in the NeuroNavigator, 4- Updated the Mitsar interface, 5- Added the Thalamus and Thalamic Networks to the NeuroNavigator, 6- Added Dial scores to the Brain Function Index and updated the tab delimited output and 7- Added Dial scores to the Concussion Index.
- 117- NeuroGuide 3.0.1 (8/1/18) updates are: 1- Added Eight Fiber Bundles Produced by Diffusion Tensor Imaging (DTI) to the NeuroNavigator, 2- Added DTI controls, 3- Added YBrain EEG Amplifier Imports to NeuroGuide.
- 118- NeuroGuide 3.0.2 (9/26/18) updates are: 1- Addition of swLORETA to the Automatic Clinical Report writer (ACR), 2- Improved neurofeedback protocol integration with the ACR, 3- Addition of the Center Voxel output file and Center voxel Navigation controls, 4- Added a “NeuroNavigator Time Domain Capture” tool that allows one to investigate epileptic events or spike/waves or any event in the EEG with great depth of analysis and, 5- added the "ANT eego" family of EEG amplifiers to the list of amplifiers that one can use with NeuroGuide for assessment and Neurofeedback.
- 119- NeuroGuide 3.0.3 – 3.0.4 (2/13/19) updates are: 1- Added Full Complement of DTI Bundles to the NeuroNavigator, 2- Added Functional and Effective Connectivity to the DTI Fiber Bundles, 3-Added Real-Time NeuroNavigator , 4-Added Slider Controls for Navigation in the Volume View, 5- Added Cerebellar Structural, Functional and Effective Connectivity, 6- Updated the NeuroNavigator "Time Domain Capture" Tool, 7- Updated the NeuroNavigator Control Panel to Include Icons and other New Controls and, 8-Added Concussion Index and Brain Function Index Session History Import Capability.
- 120- NeuroGuide 3.0.5 (3/21/19) updates are: 1- Added Z scores for Functional Connectivity for the Real-Time and Time Domain Capture NeuroNavigator, 2- Improved DTI User Interface with Groupings (left & right hemisphere) and Fiber Bundle Types (e.g. Fasciculi, Cerebellum, Cross Fibers, etc.), 3- Reactivation of the Brodmann Area Contours for Networks and, 4- Full Scale Values for the Lagged Coherence Functional Connectivity.
- 121- NeuroGuide 3.0.6 (6/19/19) updates are: 1- Sound is added to the Universal ANI Streamer, 2- The Connectome 2D Connectivity map is added to the NeuroNavigator, 3- The ACR Z score threshold is set to $Z = 1.96$ and, 3- the Cognionics 19 channel wet amplifier (CAMP) NC collection module is added to NeuroGuide.
- 122- NeuroGuide 3.0.7 (11/4/19) updates are: 1- Cerebellum, Habenula, Sub-thalamus, Red Nucleus and Habenula “Hubs” added to the NeuroNavigator for current density and functional and effective connectivity, 2- swLORETA Neurofeedback, 3- Update of Symptom Check List and Networks for Addiction, Autism Spectrum Disorder, Depression/Mood) and skilled motor movements, 4- Update of the 2D Connectome to include the cerebellum and other new Hubs, 5- Brain Function Index re-named to “Brain Optimization Index” (BOI).

- 123- NeuroGuide 3.0.8 (3/10/20) updates are: 1- Update of the Parkinsonism swLORETA Neurofeedback with the addition of the Sub-thalamus and Red, 2- An update of NeuroNavigator Time Domain Capture and Real-Time features, 3- The ability to zoom and move the Connectome Display inside of the NeuroNavigator, 4- The Addition of frequency Bands to the NeuroNavigator and, 5- Addition of the Y-Brain Amplifier to the list of calibrated and compatible amplifiers.
- 124- NeuroGuide 3.0.9 (7/31/20) updates are: 1- The addition of the Nucleus Accumbens Habenula connectivity for better reward imaging, 2- Addition of all of the networks and symptoms in Surface and sLORETA into the NeuroNavigator (e.g., ICN, Neuropsychology and DoD/VA protocols), 3- The Dynamic FFT in NeuroGuide added to the NeuroNavigator with the ability to zoom and turn channels on and off and, 4- Integration with the DeMeTec amplifier.
- 125- NeuroGuide 3.1.0 (11/3/2020) updates are: 1- Addition of Cross-Frequency Phase-Amplitude Coupling and Cross-Frequency Power Correlation in swNFB, 2- Update of NeuronSpectrum acquisition impedance module, 3- NeuroNavigator update where the medial part of Brodmann Area 34 is the Amygdala, 4- NeuroNavigator update includes contours around the Sub-Thalamus, Thalamus, nu. Accumbens and the Habenula, and 5- NeuroNavigator update that includes Dynamic surface EEG plots of Absolute Power and the Laplacian.
- 126- NeuroGuide 3.2.0 (Mar. 3, 2021) updates are: 1- Addition “NaviStat” a powerful 3D Statistics package for the NeuroNavigator. One must 1st purchase the NeuroNavigator., 2- Update of the swLORETA Symptom Check List to better align Symptoms and Networks. The Nu. Accumbens will be included in the next release, 3- NeuroNavigator updates to improve navigation, 4- DeyMed NC Module was updated to include compatibility with the latest release of TrueScan and, 5- Update of DeyMed Games.
- 127- NeuroGuide 3.2.2 (Oct. 18, 2021) updates are: 1- User entry and modification of contact information, 2- Addition of the Science Beam E Wave Amplifier to the list of calibrated and compatible amplifiers, 3- Support for data import from the new Mind Media Q32 amplifier and, 4- Parameter saving in NF1 and NF2 to .s04 and .s05 files.
- 128- NeuroGuide 3.2.3 (Nov. 22, 2021) updates are: 1- Added Functional Connectivity (Coherence, Lagged Coherence, and Phase), and Effective Connectivity (Information Flow) to NaviStat and, 2- All Current Source Density and Connectivity Data Can Be Exported from NaviStat.
- 129- NeuroGuide 3.2.4 (Feb. 7, 2022) updates are: 1- Added swLORETA Phase Reset (Phase Shift and Phase Lock) Normative Database to the NeuroNavigator and, 2- Addition of the Nucleus Accumbens to the offline NeuroNavigator.
- 130- NeuroGuide 3.2.5 (Mar. 2, 2022) update is: 1- The NeuronSpectrum 5 has been added to the list of calibrated and compatible amplifiers. As with the majority of the compatible amplifiers one must have the software for the amplifier installed and working with said software, so NeuroGuide has access to the proper drivers for the amplifier.

- 131- NeuroGuide 3.2.6 (June 1, 2022) updates are: 1- No limit to the number of selectable symptoms in the Symptom Checklist; 2-The default z-score value to select outliers in the Symptom Checklist was put back to 0 (all ROIs and all metrics); 3- Update of EDF conversion table; and 4-A New NeuroNavigator Selection Panel.
- 132- NeuroGuide 3.2.8 (Dec. 21, 2022) updates are: 1- 3D Rendering of Brodmann areas in the NeuroNavigator, 2- Updated NaviStat for single network tab delimited output, 3- Integration of new ANT EEGO EEG amplifier, 4- Integration of new Neurosurve EEG Amplifier, and 5- Integration of new NeuroField amplifier.
- 133- NeuroGuide 3.2.9 (Apr. 12, 2023) updates are: 1- swLORETA Z Score Cross-Frequency Neurofeedback, 2- Integration of new NeXus Q32 amplifier.
- 134- NeuroGuide 3.3.0 (Jun. 8, 2023) update is: 1- Added swLORETA BrainSurfer.
- 135- NeuroGuide 3.3.1 (Aug. 3, 2023) updates are: 1- Improved the speed of Automatic Clinical Report generation and formatting. 2- Added Session Score and Score per Minute to swLORETA BrainSurfer., and 3- Integration of Contec amplifier.
- 136- Priorities for the timing and sequence of updates are determined by market demand and development time and expense.

ACKNOWLEDGEMENTS:

We are grateful for the assistance and feedback from Dr. Cory Hammond, Dr. Joel Lubar, Dr. Lukasz Knopka, Dr. J.D. Elder, Dr. Grant Bright, Dr. Thomas Mathews, Doug Youngberg, Dr. Jacques Duff, Rebecca Walker, Richard Curtin, Richard Kinnerly, Wayne Noland, Dr. Ruben Rosenblatt, Dr. Joe Thomas, Mr. Les Abrams, Mr. Bob Gurnee, Dr. Jerry Gluck, Dr. Tom Collura, Dr. Wolfgang Keeser, Dr. Hartmut Baltin, Mr. Vincent Paquette, Dr. Terry Semple, Dr. Harold Schaus and many others. We at Applied Neuroscience, Inc. sincerely thank you and welcome your feedback.