BRAINGUIDE: A SOFTWARE SYSTEM FOR ADVANCED BRAIN IMAGE ANALYSIS

A. Stundžia, P. Dufort, M. Ichise*, K. Utsunomiya**, I. Narabayashi**, K. Ishizu***, J. Konishi***.

Advanced Biologic Corp., Toronto, Canada;
*National Institute of Mental Health, Bethesda, USA;
**Osaka Medical College, Takatsuki, Japan;
***Kyoto University, Kyoto, Japan.

Objectives: To develop a set of advanced SPECT brain image analysis modules, BrainGuide, for the cost-effective Windows PC platform. **Methods:** Algorithms were developed to automatically perform the following tasks: 1) Auto-removal in 3D of SPECT brain image background; 2) Brain image auto-orientation in 6 degrees of freedom to the standard Talairach proportional stereotaxic atlas including auto-location of the Mid-Sagittal (MS) plane, MS surface, and the AC-PC line; 3) Establishment of a new *adaptive* Talairach locally proportional stereotaxic atlas specific to *individual* patient brains; 4) MRI + SPECT image auto-coregistration and fusion; 5) Generation of SPECT *global* cerebral blood flow (gCBF) perfusion isosurfaces; 6) “Point and Click” and “User-Drawn” region of interest (ROI) generation; 7) Patient-specific Volume of Interest (VOI) 3D template generation.
Results: Case studies demonstrating BrainGuide functionality in 2D and 3D are presented for ECD, IMP, IMP-ARG brain perfusion and 5IA neuroreceptor imaging in conjunction with MRI T1. These case studies highlight the ability of BrainGuide algorithms to successfully handle brain images exhibiting significant defects, including defects indicative of Alzheimer’s disease, stroke, hematoma, and encephalitis. **Conclusion:** We propose that BrainGuide will provide a major advance in the speed, accuracy, ease-of-use, and data synthesis of brain image analysis in nuclear medicine - in both clinical use and fundamental research.