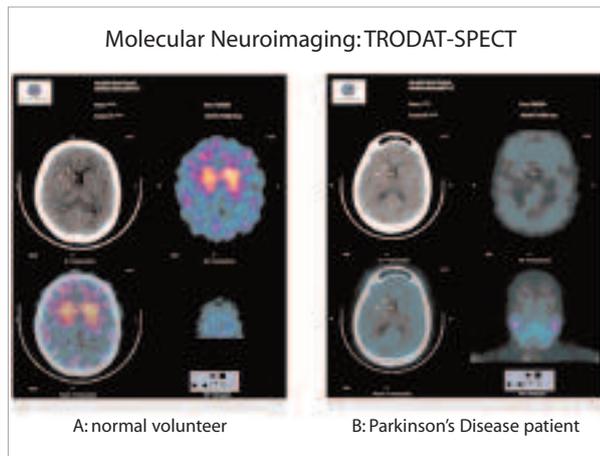


HIGH RESOLUTION STRUCTURAL MRI AND RECEPTOR IMAGING STUDIES IN REFRACTORY TEMPORAL LOBE EPILEPSY : *IN VIVO* AND *EX VIVO* ANALYSES

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Our main goal is the study of refractory mesial temporal lobe epilepsy (MTLE) by High Resolution Structural MRI, Receptor Imaging and historadiological correlations. This approach will allow the development of methods for correlating *in vivo* and *ex vivo* imaging. Accordingly, we devised three projects that will investigate the basis of MRI signal alteration, the profile of serotonin transporters detected by molecular imaging, and full analysis of brain parenchyma in patients with MTLE.

The resources (researchers, technicians, and imaging equipment) involved in the accomplishment of this proposal will make available to the ClnAPCe network (Inter-institutional Cooperation to Support Brain Research): 1) a multidisciplinary team able to integrate clinical and experimental epileptology, innovative imaging acquisition/processing and advanced histopathological analysis; 2) a state-of-the-art core facility for advanced imaging studies; 3) new methodologies for historadiological correlations; 4) new tools for second order imaging processing; 5) expertise on molecular imaging. These technological and scientific resources are applicable to other important areas of biomedical research (oncology, neurodegenerative and psychiatric diseases), and are designed to be integrated into a network environment sharing knowledge with other centers via e-learning. This is an essential requirement for the developing of telemedicine, a key tool for research, education and telediagnostic activities.

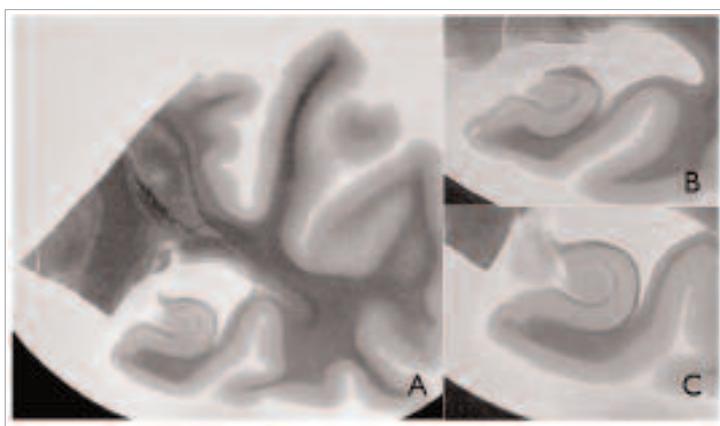
In spite of the importance of epilepsy to public health, the number of researchers and clinically qualified specialists in the related areas of neuroscience remains small. The ClnAPCe network initiative is expected to promote a rapid progress in this field. Consequently, we are also responsible for disseminating the knowledge generated in the network projects in the medical and scientific communities. For this reason, the main educational emphasis of our program is on technology transfer of imaging processing methodologies by using voxel-based morphometry (VBM), molecular imaging acquisition techniques, and neuroimage databasing and data mining.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

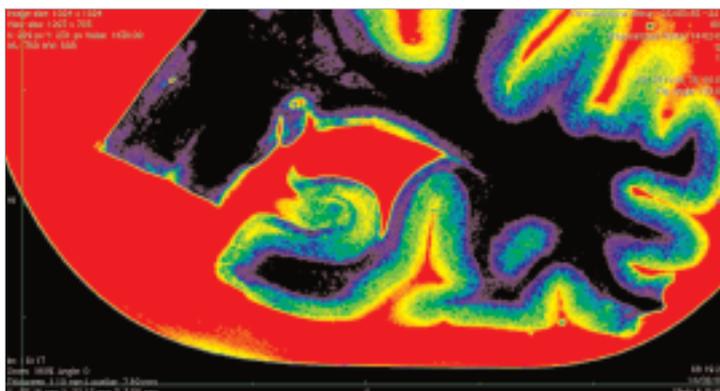
In the firsts months we conducted studies to determine the maximum spatial resolution achievable with our MR system. We have also calculated T2 relaxometry and contrast measurements in the hippocampal region. The figures below illustrate these two main steps. The results show an in plane resolution of $70 \mu\text{m}^2$ which should be sufficient to our aims.

Related Research

The group is also involved in projects related to neuroimaging. The research is mainly related to Parkinson's Disease, neuro-oncology and cephalgia. Molecular imaging of Dopamine transporters, functional Magnetic Resonance Imaging and diffusion tensor imaging are some examples (see figure on front page).



High resolution images of the hippocampal formation. A) Overview; B) and C) detailed information



Relaxometry of the hippocampal formation

MAIN PUBLICATIONS

Shih MC, Amaro-Jr. E, Andrade LAF, Felicio AC, Ferraz HB, Wagner J, Lin LF, Fu YK, Mari JJ, Tufik S, Bressan RA. 2007. Higher nigrostriatal dopamine neuron loss in early than late onset Parkinson's disease? - A [99mTc]-TRODAT-1 SPECT study. *Movement Disorders*. **22**:863-866.

Contreras LFG, Brito GS, Pontuschka WM, Mamani JB, Amaro-Jr. E, Moreira-Filho CA. 2007. Study of the drying process of the ferrofluids for the morphological and nanostructural characterization. *Brazilian Journal of Physics*. **37**:1288-1291.

Amaro-Junior E, Barker G. 2006. Study Design in fMRI: Basic Principles. *Brain and Cognition*. **60**(3):220-32.

Shih MC, Amaro-Jr. E, Ferraz HB, Hoexter MQ, Goulart FO, Wagner J, Lin LF, Fu YK, Mari JJ, Lacerda ALT, Tufik S, Bressan RA. 2006. Neuroimaging of the dopamine transporter in Parkinsons disease: first study using [99mTc]-TRODAT-1 and SPECT in Brazil. *Arquivos de Neuro-Psiquiatria*. **64**:628-634.

Shih MC, Amaro-Jr E, Souza S, Pupo MC, Malta SM, Hoexter MQ, de Garrido GEJ, Bueno OFA, Ferraz HB, Goulart FO, Wagner J, Lin LF, Fu YK, Lacerda ALT, Bressan RA. 2006. Dopamine Transporter Density by [99mTc]-TRODAT-1 SPECT and Neurocognitive Performance a preliminary pilot study. *Alasbimn Journal (Online)*, 8:2-3.

Contreras LFG, Brito GS, Escriba DM, Carneiro SM, Amaro-Jr. E, Pontuschka WM. 2006. Estudo da secagem de sistemas magnéticos coloidais biocompatíveis à base de $\gamma\text{-Fe}_2\text{O}_3$ para a caracterização morfológica e nanoestrutural. *Revista Brasileira de Aplicações de Vácuo*. **25**:149-153.

Gamarra LF, Brito GS, Pontuschka WM, Amaro-Jr. E, Parma AHC, Goya GF. 2005. Biocompatible superparamagnetic iron oxide nanoparticles used for contrast agents: a structural and magnetic study. *Journal of Magnetism and Magnetic Materials*. **289**:439-441.

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