



L'Institut de recherche
du Centre universitaire de santé McGill
The Research Institute
of the McGill University Health Centre



Sector: Diagnostic
Sub-sector: CNS imaging

Software for Diagnosis of Neurological Diseases

Information Summary

Reference code:	ROI 04062
Technology overview:	Image processing software for computer-aided diagnosis.
Applications:	Neurological diseases and disorders.
Validation:	Method validated in Alzheimer's dementia (AD) research in two studies and in Temporal Lobe Epilepsy research in another study.
Inventors:	Dr. D. Louis Collins Dr. Simon Duchesne
Needs/Opportunity:	Early and accurate diagnosis for AD and other neurological diseases and disorders.
Deal terms:	Exclusive or non-exclusive license to pending patent.
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Technology Summary

Researchers at McGill have developed a computer-aided diagnosis (CAD) system that automatically compares a patient's Magnetic Resonance Imaging (MRI) image with a database of images using advanced image processing and statistical analysis to offer an aid to diagnosis for neurological diseases and disorders. This system can prospectively and retrospectively analyze MRI results.

Benefits

- **Accuracy** – Proven highly accurate in Alzheimer's dementia (AD) research as a diagnostic tool in two studies. First, the system *separated* a group of 20 normal aging volunteers from a group of 17 amnesic mild cognitive impairment (MCI) and mild AD patients with 90% accuracy. In a second study, cross-validated trials on MCI patients were 87% accurate to *predict future clinical state* using MRI comparison, *vs.* 63% for age and

Mini Mental State Examination.

- **Early Detection** – In the latter MCI study, prediction was on average *2.6 years before clinical diagnosis* of AD.
- **Ease/Flexibility of Use** – Completely automated process using standard resolutions and protocols reduces the dependency on expert knowledge.
- **Increased Sales** – Early and more effective diagnosis would increase prescription rates and significantly impact the market potential of AD drugs.
- **Cost Savings** – The CAD method in a clinical trial could enrich the study population by screening incoming trial patients based on their disease state, thus reducing trial sample size, decreasing costs, and improving the statistical significance of the outcome.

Market Need

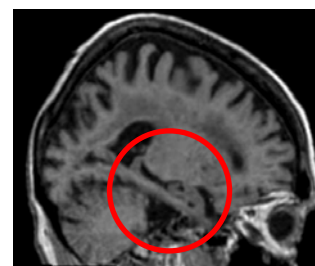
- **Growing Number of Alzheimer's Patients** – AD prevalence in the USA is estimated at 4.5 million people; this number is expected to grow significantly due in part to the aging population.
- **Diagnosis of Other Neurological Diseases** – The methodology has been demonstrated successfully in Temporal Lobe Epilepsy. It should be applicable to a wide range of neurological disorders.

Applications

- Screening for clinical trials.
- Monitoring and management of therapy outcome.
- In the future, general population screening.



Normal aging



Alzheimer's dementia

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Dr. Louis Collins uses computerized image processing techniques such as non-linear image registration and model-based segmentation to automatically identify structures within the human brain. These techniques are applied to a large data base of magnetic resonance (MR) data from normal subjects to quantify anatomical variability. In image-guided neurosurgery (IGNS), these techniques provide the surgeon with computerized tools to assist in interpreting anatomical, functional and vascular image data, permitting the effective planning and execution of minimally invasive neurosurgical procedures. Automated atlasing is essential in IGNS for thalamotomy and pallidotomy in the treatment of Parkinson's disease, or temporal-lobe depth electrode implantation in the diagnosis of epilepsy, since tissue targets in these procedures cannot be viewed directly on MR. Computerized atlasing

minimizes trauma to the patient and allows resection of the smallest amount of brain tissue necessary for effective therapeutic treatment.