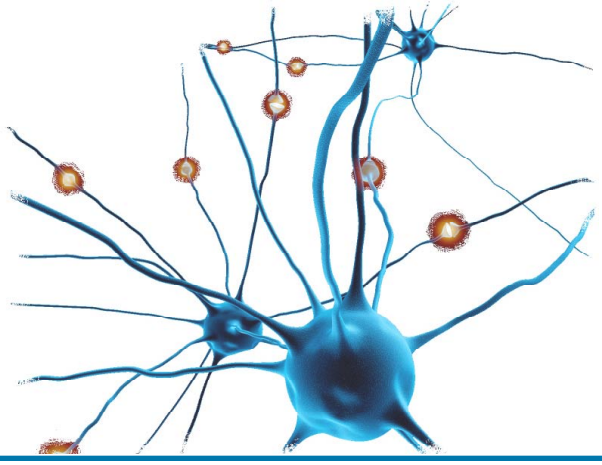
Synapse Connecting Neuroscience in Nova Scotia **Fall** 2011

Inside this Issue



Synapse is a newsletter created by BioNova. This publication promotes neuroscience in Nova Scotia, industry successes and the connectivity of the community. For more information, questions, or requests to be featured in Synapse, contact communications@bionova.ca.

Neural Networks

Nova Scotia creates neural networks with Israel through new partnerships

Late last year, Prime Minister Harper and the Prime Minister of Israel, Benjamin Netanyahu met, recognizing the economic potential contained by strengthening and improving collaboration through technology innovation in three key areas: water, renewable energy and brain research. Since then, the NRC Institute for Biodiagnostics (Atlantic) on behalf of the Government of Canada along with Dalhousie University have been working to build beneficial partnerships for Nova Scotia.

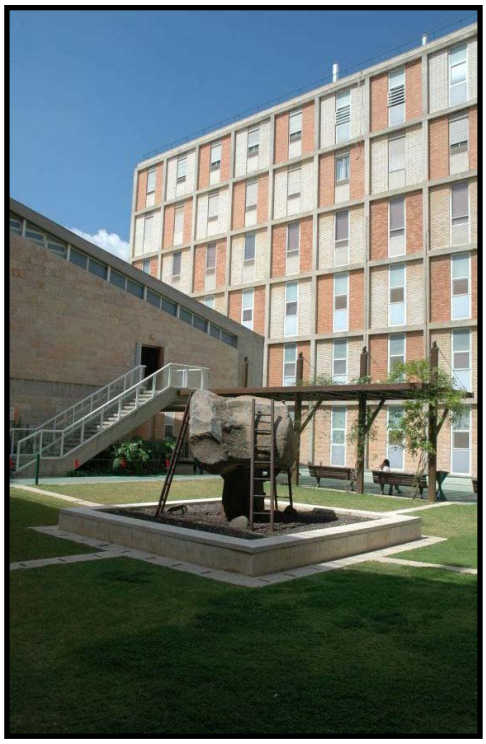
Dr. Ryan D'Arcy from NRC-IBD (Atlantic) along with Dr. David Clarke and Dr. Aaron Newman of Dalhousie were selected to engage in the initiative. The new partnerships that would be facilitated through the initiative include The Adams Super Center for Brain Studies at Tel Aviv University and the Israel Medical Simulation Center (MSR) at Sheba University.

The Adams Super Center for Brain Studies is the leading neuroscientific research institute in Israel, providing a research umbrella that encourages collaboration. MSR is a world leader in simulation-based medical education and patient safety training. Their combined competencies compliment NRC-IBD's (Atlantic) experience in developing surgical simulation devices by ensuring access to the most experienced professionals in the world who are developing future technologies.

Another partnership being facilitated by the NRC-IBD (Atlantic) is with ElMindA Ltd., based in Herzliya. ElmindA's technology uses electrophysiological signals to create 3D images of activity, aiding in the treatment and management of mental illnesses such as Alzheimer's disease, attention deficit hyperactivity disorder, depression, epilepsy, and stroke. A strategic collaboration between ElMindA, NRC-IBD (Atlantic), and its industry partner, Elekta is being explored to ensure access to the best research available for local Magnetoencephalography (MEG) research.

...Israel continued

This fall a team led by Premier Darrell Dexter embarked on a trade mission to Israel which produced a signed memorandum of understanding between Dalhousie University and the Hebrew University of Jerusalem, establishing research collaborations. The partnership is intended to create a mutually beneficial relationship by combining Nova Scotia's strength in cutting-edge research and Israel's strength in technology commercialization.



The Hebrew University - Hadassah Medical School
Photos courtesy of the Hebrew University of Jerusalem.
Photographer, Douglas Guthrie.

Strategic collaborations between Nova Scotia and Israel are providing researchers and industry with a platform to strengthen current research and allow for the exploration of new opportunities in neuroscience. Two of these partnerships will be nurtured during the **Biopartnering Mission**, being held in Halifax in November. The *neuro-contingent* from Israel includes ElMindA's founder and CTO, Professor Amir Geva, and CogniFit Ltd's, Dr. Evelyn Shatil, Head of Cognitive Science.

image from cognitfit.com

How fit is YOUR brain?
Israel's CogniFit specializes in "brain fitness".

Click **here** to try the test.

Smell Test Might Help Detect Parkinson's Disease

Photo and article courtesy of the Brain Repair Centre

Dr. Harold Robertson, a leading world expert in the disease, says people who develop Parkinson's gradually lose their sense of smell. This loss can happen two to five years or longer before an actual diagnosis.

A simple scratch and smell test and a breakthrough in the imaging of the olfactory tract could have major implications for the early treatment of Parkinson's disease.
Research groups that include Dalhousie BRC members Harold Robertson (Pharmacology), Kim Good (Psychiatry) and Ron Leslie (Anatomy & Neurobiology) have published two papers that could lead to an earlier identification of the debilitating disease that affects 8,500 people in the Maritimes alone.

Diagnosis only comes when patients are showing movement-related symptoms, such as a trembling of limbs and head. Brain damage may already be irreparable.

The research team began to ask whether an earlier diagnosis is possible, before motor symptoms appear and the brain has not suffered extensive damage.

The study used a simple test for smell, developed by the University of Pennsylvania. The Smell Identification Test consists of four booklets of microencapsulated odors. Fourteen study participants with very early Parkinson's disease were asked to "scratch and sniff" the odour and pick one of four options that best represented it, regardless of whether they could smell the odour.

The scratch and sniff test was then followed with magnetic resonance imaging (MRI) scans of the olfactory tract and the substantia nigra area of the brain, where dopamine-producing cells are lost in Parkinson's disease.
Dr. Robertson says the study showed significant impairment of smell. The imaging confirmed changes in the brain in Parkinson's disease, meaning a combination of the two tests could hold promise for earlier diagnosis.

The scratch and sniff test is especially promising because it is non-invasive and easy to administer.
"The test is cheap – probably less than $10," says Dr. Robertson. "It's easy to do and we could even mail it out. A person could take the test, mail it back to us and we can score it. That would be followed with an MRI to identify early stages of Parkinson's disease."

The study, "Diffusion Tensor Imaging and Olfactory Identification testing in Early-Stage Parkinson Disease," is published in the Journal of Neurology.

It was supported by the Parkinson Society of Canada, Dalhousie University (Departments of Psychiatry and Medicine) and the Canadian Institutes of Health Research.
The second research paper, "Diffusion tensor fiber tractography of the olfactory tract" is published in Magnetic Resonance Imaging and available online at ScienceDirect (www.sciencedirect.com/). It grew out of another study and the research was done with colleagues in Sweden.

Dr. Robertson says one of the major difficulties in determining whether the olfactory tract, or our pathway for our sense of smell, is affected by Parkinson's disease is getting a picture of it.

MRI studies of the tract involve two different types of imaging – standard anatomical and diffusion tensor imaging, which measures the movement of water in the brain. Both can indicate where there could be an abnormality, Researchers then try to co-register the two images so they know they are looking at the tract.

"Until we did this study, we didn't have any way of testing whether we had managed to

(Continued on page 5)

PET/CT Installation is Complete at the Biomedical MRI Research Lab

"More and more drug regulatory agencies are demanding that therapeutics be accompanied by diagnostics to show not only that drugs can work, but how they work and for which patients they are most effective. This can greatly reduce the cost of drug development,"

Dr. Chris Bowen, Molecular Imaging Specialist & Researcher at NRC-IBD (Atlantic).

The long-anticipated installation of a pre-clinical PET/CT system to the NRC-Institute for Biodiagnostics (Atlantic) and the IWK's Biomedical MRI Research Lab (BMRL) is now complete. It is considered to be the clinical *gold standard* for cancer staging, evaluating many neurological diseases, such as Alzheimer's, and for providing diagnostic guidance for accelerating therapeutics to market.

PET (positron emission tomography) is based on the principle of introducing a tracer which will accumulate in the targeted organ or area of the body, localizing, characterizing and quantifying metabolic or biochemical activity, while computerized tomography (CT) produces highly detailed anatomical images. Combining the two images into PET/CT allows for simultaneous evaluation of molecular processes and its exact anatomical location. For diseases such as cancer, it offers the capability to identify, locate and to track changes over time. An emerging area of use is the development of therapeutic products; the technology becomes a diagnostic tool to evaluate whether or not the drug is where it needs to be and is it working.

The BMRL is a multi-user lab and serves scientists from industry, academia, and government who individually could not afford the high purchase and operational costs. The technology cluster presents a collaborative opportunity for researchers developing new therapeutics and diagnostics. For this industry it is a means of growth - from new product development and the addition of highly qualified personnel.

Atlantic Canada is gaining and strength and recognition in health research and the neurosciences. For many of the therapeutic companies in the region performing drug discovery in advance of clinical trials, the diagnostic products created will provide a competitive regional advantage. Preparations are underway for companies such as Treventis, Immunovaccine, and Halifax BioMedical to obtain preclinical PET/CT data to support the development of their therapeutics.

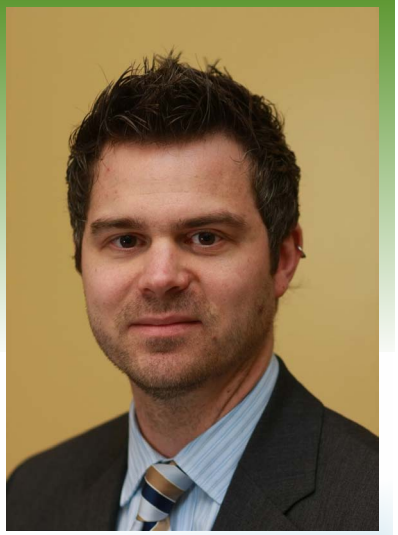
The system is valued at $1.1M and was made possible by the combined efforts of a needs-based, grass-roots initiative. The fund contributing partners include ACOA, through the Business Development Program, GE, IWK, Dalhousie Medical Research Foundation, QEII Foundation (Bust-A-Move Fund), QEII Diagnostic Imaging, Sultan Darvesh and Immunovaccine.

do this successfully," says Dr. Robertson. The breakthrough came because one of the subjects didn't have an olfactory tract and so his imaging profile didn't have one. The other subjects did have olfactory tracts and the researcher could then compare, measure and "see" them, using the missing one for comparison.

The two studies serve as companion pieces to the advancement of using a simple smell test and sophisticated imaging techniques to look for the early stages of Parkinson's disease.

"What we are really interested in is whether the combination of the sniff test with the MRI Test can be used to detect Parkinson's disease in subjects who don't yet show motor symptoms – that's crucial for diagnosis of Parkinson's," says Dr. Robertson. "If so, we can start treating them much, much earlier and slow the disease down."

Focus on Dr. Shaun Boe



Shaun Boe, has just received the green light for his second research project this year. Both projects, "The role of neural networks in motor recovery: paving the road to post-stroke rehabilitation" and "Atlantic Canada Modified Constraint Induced Movement Therapy Trial", have been awarded major grants to begin the long process of collecting data. Additionally, Dr. Boe was recently awarded infrastructure funding from CFI to support his work examining brain recovery and rehabilitation after stroke.

Dr. Boe's research focuses on optimizing recovery of individuals with diseases of the nervous system, including stroke, by creating the ideal treatment methods for rehabilitation.

The man behind the research is a newcomer to Halifax. Dr. Boe completed his undergraduate degree in Kinesiology at Brock University followed by graduate and clinical training at the University of Western Ontario. He came to Nova Scotia for a position at Dalhousie University as an assistant professor but states he will, "stay for the opportunity."

The opportunity Dr. Boe refers to is multifaceted – the functionality of world-class collaborators being within such close proximity to one another, the infrastructure and technology the neuroscience community has at its disposal and the many disciplines which make up the identity of the community.

Dr. Boe credits his success to his collaborators and mentors that have guided him through the process including neuroscience veterans Gail Eskes, Aaron Newman and Ryan D'Arcy.

From his work on other projects, Dr. Boe has seen first-hand and utilized the state-of-the-art technology that is available in the community.

"The capabilities of these modern technologies such as the 4T MRI and MEG system within the National Research Council Institute for Biodiagnostics as well as the equipment that will be housed in my laboratory are unparalleled in regards to innovation," he says.