Research Reaps Reward

"Physics, a lot of the time is kind of abstract and disconnected. When you can take that and apply it to something that is going to help people, it is really rewarding," says Jonathan Thiessen, a 27 year old Master of Physics student at the University of Manitoba.

Thiessen's research, targeted at developing a specific test to diagnose Alzheimer's disease at an early stage, earned him the Alzheimer Society of Manitoba's Graduate Student Fellowship award this past year.

"On a personal level it makes you feel good about what you are doing, like this is a good path to take," says Thiessen on receiving the award. "Being able to do this research and having some support for it is very useful."

Thiessen's studies involve Magnetic Resonance Imaging (MRI), and behavioural studies of mice. The Morris water maze is a test which measures spatial memory. The test is used on mice that are genetically modified to develop beta-amyloid plaques, (the signature pathological feature of Alzheimer's disease) at about six months of age. The mice are placed in a pool of water that contains a hidden escape platform. Visual cues are placed on the perimeter of the pool, in plain sight of the mouse. The mouse swims around looking for an exit. Each time it performs the task, the mouse becomes better at finding the platform by using the visual cues. The development of plaques, (seen through MRI), in relation to the onset of memory deficits, observed in the behavioral studies, will help to determine when the plaques are forming and what role they may play in the disease.

"These types of studies will allow us to diagnose AD earlier and with more certainty in the future, allowing for earlier treatment of the disease," says Thiessen.

Recently, Thiessen has been working with Diffusion Tensor Imaging (DTI), a specific MRI technique that measures the direction and amount of water diffusing in brain tissue.

"This technique could be used to compliment the diagnosis," says Thiessen. "How the water moves gives us important information about the underlying tissue structure." "In dense tissue (such as gray matter), water is less mobile. In tissue that's more directional (such as the tube-like bundles of axons in white matter), water tends to move in the direction of the axons," explains Thiessen. "With Alzheimer's disease, there are changes in the brain, pretty large changes as the disease progresses. In gray matter, the tissue density might decrease as the neurons start to die off. Instead of diffusing fairly slowly, the water will diffuse a little faster in the gray matter. Similarly in white matter there is degeneration. Instead of diffusion along the length of the axons, we see diffusion in any direction. Some people think that the white matter changes are happening before we see the development of beta-amyloid plaques. It's actually a really powerful technique."

Dr. Melanie Martin, Thiessen's supervisor, is impressed with all that he has accomplished.

"In one summer, he took my research and brought it ahead several years. I did not anticipate it getting that far," says Dr. Martin. "He always does more than expected, he is that kind of student."

The Alzheimer Society congratulates Thiessen on receiving the Graduate Student Fellowship award and wishes him all the best with his research and future endeavours.