# Computer Program Continues to Bring Hope to Epileptics

Hugh Thompson

It affects 300,000 Canadians – approximately 45,000 in Quebec alone. Yet this condition, which occasionally produces brief disturbances in the normal electrical functions of the brain and is characterized by sudden, brief seizures, often falls off the radar as other health conditions compete for headlines.

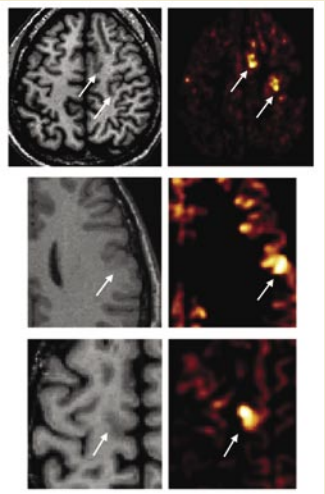
**The condition is epilepsy.**

While drugs exist to control seizure problems, they don't work for 40% of Canadian epileptics. As a result, these patients have to consider surgical removal of the brain lesions, or scar tissues, that cause seizures. Magnetic resonance imaging (MRI) is used in hospitals across the country to help neurologists and neurosurgeons find the lesions. MR images are produced using a radiology technique and display internal images of the body on screen. However, it is not always easy to find the lesions in standard MR images. So, Dr. Andrea Bernasconi at the Montreal Neurological Institute (MNI) created a computer program that helps remedy this problem.

First developed in 2001, the program, which is nicknamed Texture, intensifies MR images, highlighting areas of abnormal brain tissue in patients' scans (Figure 1). This makes it easier for neurological teams at the MNI to detect seizure-causing brain lesions in certain epileptics – and then to remove the problem to potentially reduce or eliminate seizures. Texture is continually evolving so that it can become even more helpful in the detection of brain lesions and useful for other hospitals.

"With MRI, you are dealing with a picture," explains Dr. Bernasconi, a researcher funded by the Canadian Institutes of Health Research (CIHR). "A clearer picture, in a sense, helps neurologists or neurosurgeons understand what should be done with epileptic patients. If they find something abnormal, like a lesion, they can take it out."

**Figure 1. Computer-based models of focal cortical dysplasia (FCD)**



**The left panels show three different conventional magnetic resonance image slices in which the arrows point to the FCDs. On the right, the computer-based analysis maximizes the visibility of the same areas of FCDs.**

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Surgery is not always proposed to some epileptics precisely because of lesion detection problems, but Dr. Bernasconi's computer program offers the needed clarity in MR images. "I think that this tool can provide the support and make a difference for those patients who are sent home with the answer, 'You are not a surgical candidate because we don't find a lesion,'" says Dr. Bernasconi. So far, Dr. Bernasconi's research tools have been applied to the pre-surgical evaluation of approximately 300 epileptics and have provided significant findings in a large proportion of them.

Peter Maitland, a CIHR employee who has dealt with epilepsy for the majority of his life, is one of those people. "For years, four subtle lesions in my brain were virtually undetectable using MRI," Mr. Maitland says. "All of this changed when I went to the MNI. The computer program developed by Dr. Bernasconi helped the neurological team find the lesions. As a result, one of them was removed late last year."

While seizure relief is not guaranteed, Mr. Maitland remains hopeful. "I will have to wait about a year to determine whether the surgery was beneficial for my system," he notes. "While I want my seizures to disappear, I also hope that this research will provide hope to other epileptics who have suffered from similar lesion detection problems." HQ

**About the Author**

**Hugh Thompson** is a senior writer with the Canadian Institutes of Health Research.