



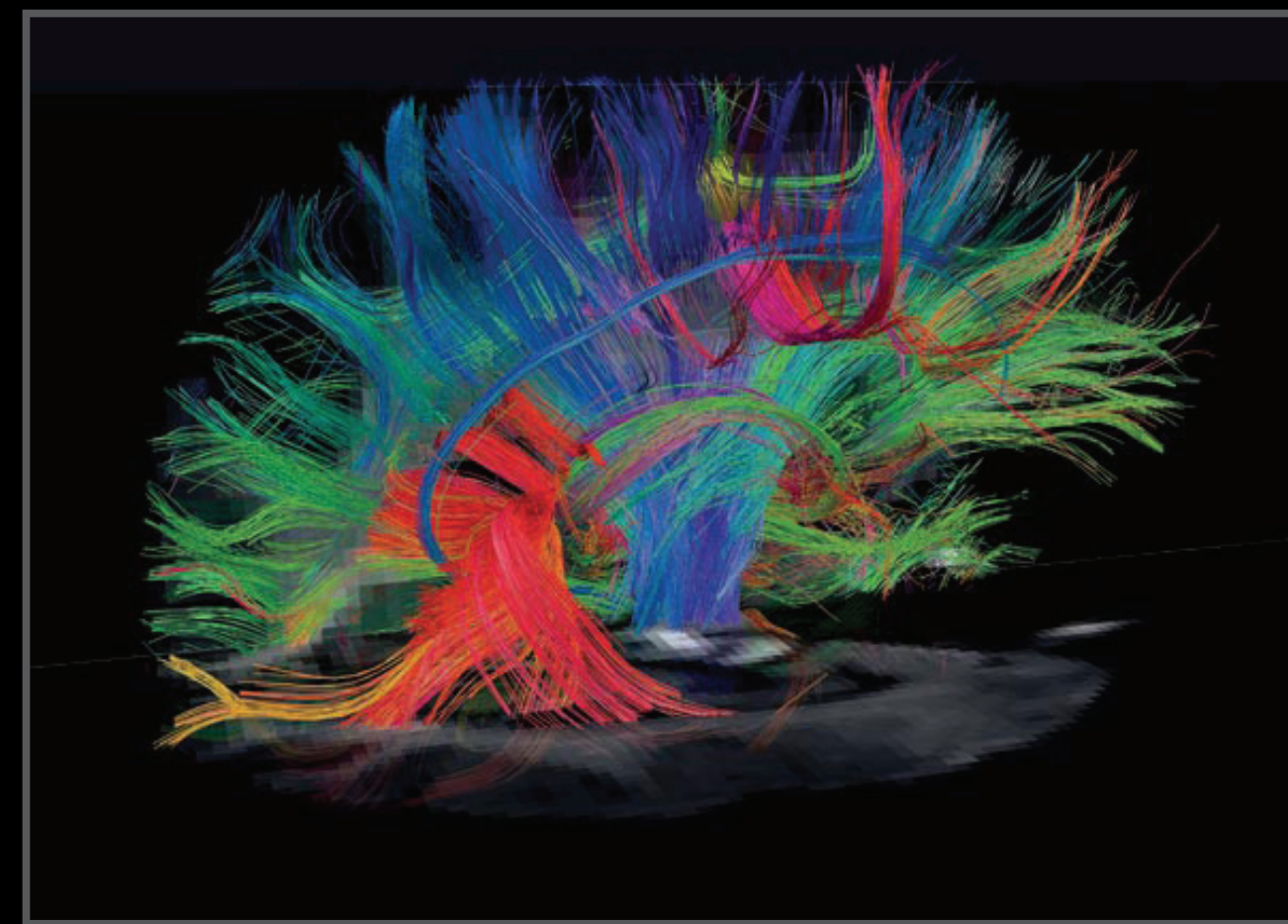
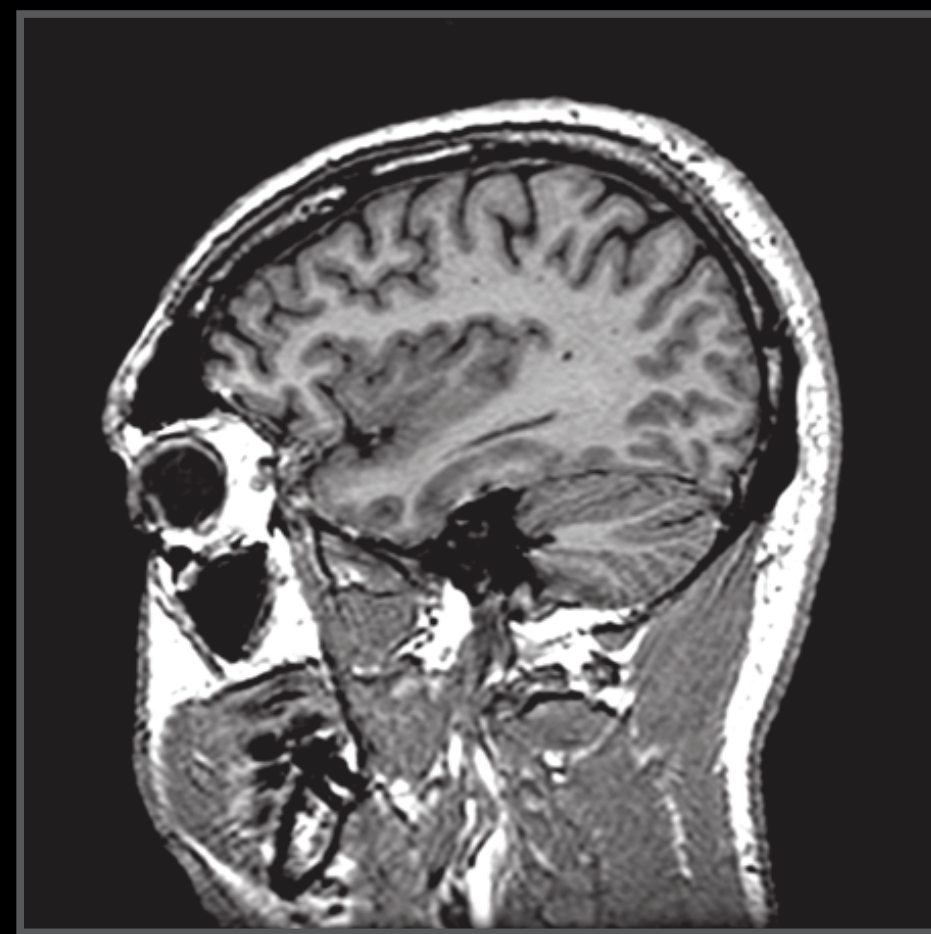
uOttawa

Effect of mindfulness-based stress reduction on the brain in breast cancer survivors with chronic neuropathic pain

Eve-Ling Khoo | Supervised by Andra Smith and Taylor Hatchard | School of Psychology, University of Ottawa

INTRODUCTION

- Chemotherapy and surgery are common treatments for breast cancer, but what many don't know is that even after full recovery, many experience chronic neuropathic pain (CNP).
- CNP consists of various painful symptoms, including spontaneous continuous pain, paroxysmal pain, evoked pain, or paresthesia. It is often comorbid with other disorders like depression, anxiety and insomnia.
- Mindfulness-based stress reduction (MBSR) training is a systematic group intervention that involves meditation and focuses on improving awareness and acceptance of moment-to-moment experiences in order to manage pain, stress and difficult emotions.



IMPORTANCE

- There are an estimated 165,000 to 200,000 breast cancer survivors in Canada.
- An estimate of over 50% of breast cancer survivors experience CNP following surgery .
- CNP severely correlates directly with reduced health-related quality in life.
- Even with optimal treatment, many continue to report disabling pain.
- This research will help investigate the potential MBSR may have as a psychological treatment for the comorbidities that may in turn impact the pain experienced in CNP.

PURPOSE

- To evaluate the effectiveness of the Mindfulness-Based Stress Reduction (MBSR) treatment on quality of life of breast cancer survivors suffering from chronic neuropathic pain.
- To investigate if any alterations in neural activity, white matter integrity, or biomarkers of stress in breast cancer survivors with CNP occur after MBSR treatment.

HYPOTHESES

1. We anticipate that MBSR will result in a clinically significant reduction in the amount of interference pain has on daily life and improved quality of life for breast cancer survivors following MBSR participation.
2. It is hypothesized that at baseline, participants will show increased brain activation in areas related to attention, pain, and emotional processing when completing the pain version of the Emotional Stroop.
3. We anticipate that following MBSR intervention, participants will have developed increased emotional self-regulation and, by extension, reduced attentional bias to difficult emotional words that are presented during the task. As a result, we anticipate that the patterns of brain activation will be reduced in these brain regions relative to performance prior to treatment.
4. We also anticipate that MBSR participants will have faster reaction times and make fewer errors (i.e. wrong colour choices) than control participants at the post-treatment assessment.
5. It is also hypothesized that neuropathic pain will result in low white matter integrity in areas of the brain involved in the multidimensional experience of pain and reward and this will be characterized by low fractional anisotropy (FA) and high mean diffusivity (MD) (Gustin et al., 2010; DeSouza et al., 2013). We anticipate that the reduction in white matter integrity in these areas will improve following participation in the MBSR program.

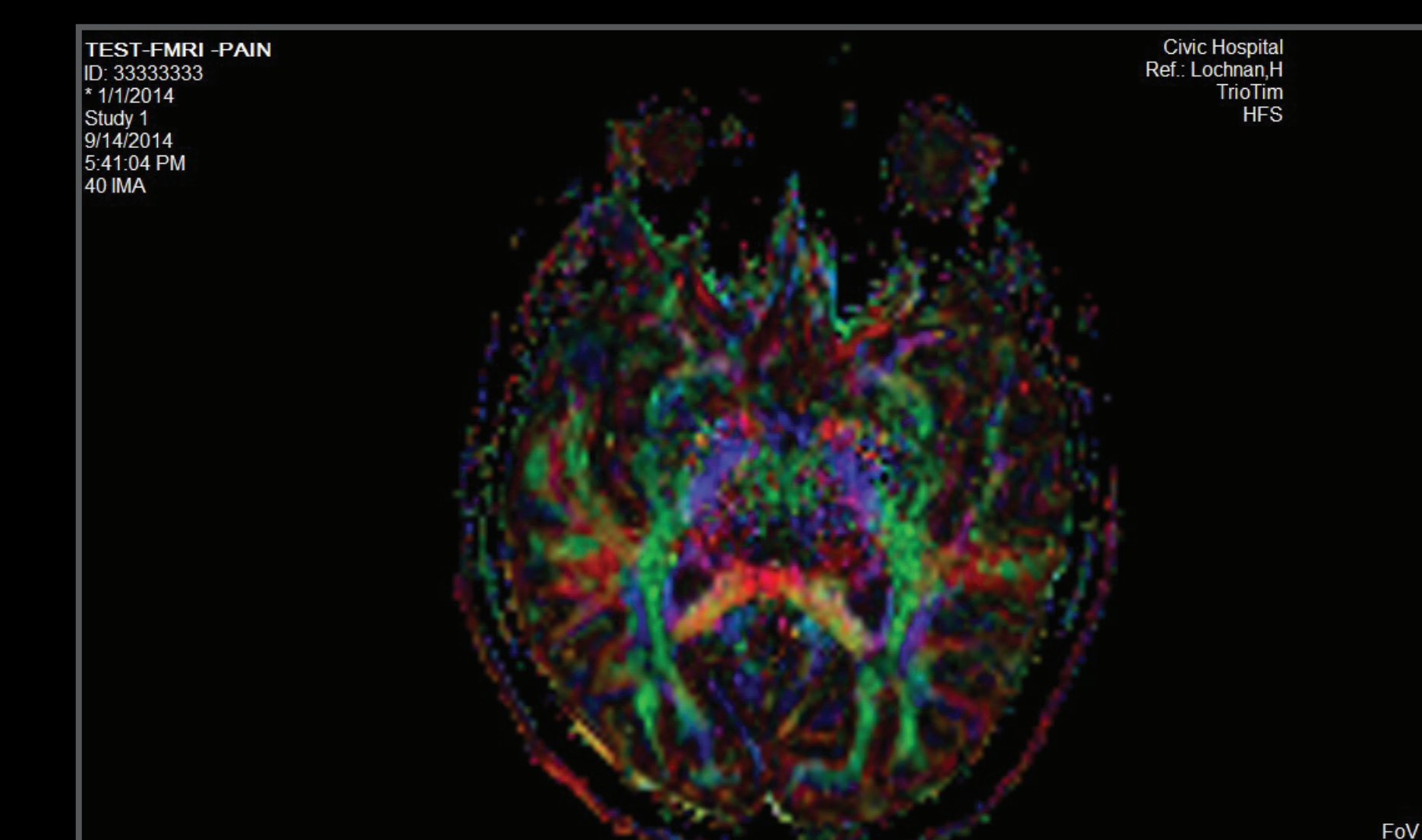
METHODS

Participants

- Female breast cancer survivors living with neuropathic pain who are 1-year post-treatment from first cancer occurrence.
- Experienced pain for more than 6 months with a baseline pain severity of >4 (moderate to severe) on the Brief Pain Inventory.
- Underwent surgery and received chemotherapy over the course of their treatment.

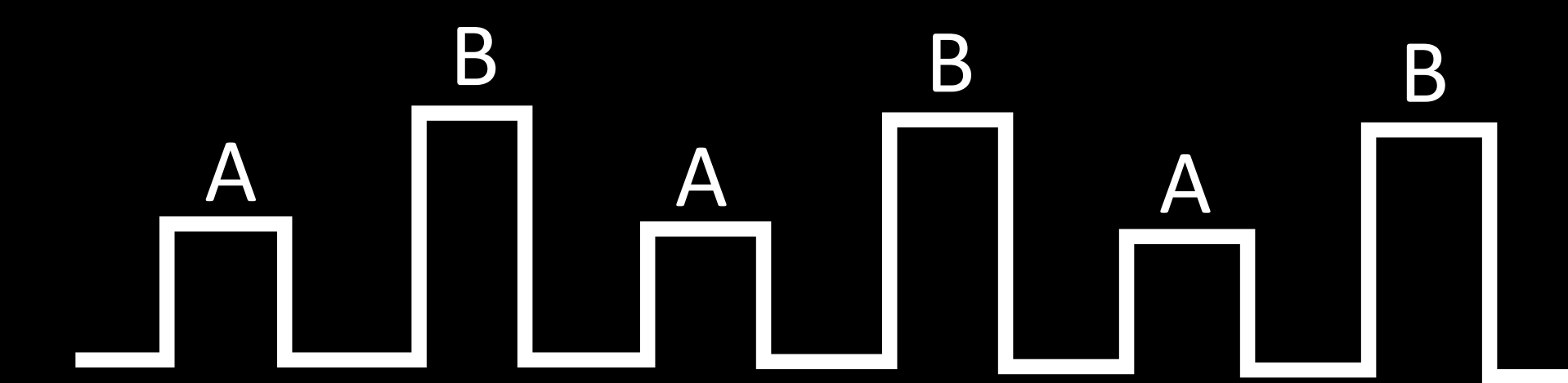
Neuroimaging

- 3T Siemens TRIO MR scanner
- Diffusion Tensor Imaging (DTI) : Structural MRI technique to measure white matter integrity and anatomical connectivity patterns by detecting changes in water through the nerve fibres.



Emotional Stroop Test

- fMRI is an imaging tool to observe the brain as it works. It is a measure of changes in blood flow that occur during stimulus presentation. In this study the Emotional Stroop Test will be administered with neutral words - A (for example table) and sensory pain words - B (for example hurt).
- Eight runs, which will consist of 4 blocks of pain words and 4 blocks of neutral words. Responses will be made using the first two index fingers of each hand on a four-button response pad held on the abdomen. Instructions state to respond to the colour of the ink with the appropriate button response.



MBSR

- After the initial fMRI scan, patients will undergo a clinical intervention program for the treatment of their neuropathic pain called Mindfulness-based stress reduction (MBSR).
- The program takes over 8 weeks with each session taking 2.5 hours with the exception of one full day session on the sixth week.