

2018

# Development of fMRI compatible reversible deactivation to examine cerebral networks

BrainsCAN , Western University

Stephen Lomber  
*Western University*

Blake Butler  
*Western University*

Stefan Everling  
*Western University*

Blaine Chronik  
*Western University, [tadam@uwo.ca](mailto:tadam@uwo.ca)*

Follow this and additional works at: <https://ir.lib.uwo.ca/brainscanprojectsummaries>

Part of the [Neurosciences Commons](#)

---

## Recommended Citation

BrainsCAN , Western University; Lomber, Stephen; Butler, Blake; Everling, Stefan; and Chronik, Blaine, "Development of fMRI compatible reversible deactivation to examine cerebral networks" (2018). *Project Summaries*. 3.  
<https://ir.lib.uwo.ca/brainscanprojectsummaries/3>

This Book is brought to you for free and open access by the BrainsCAN at Scholarship@Western. It has been accepted for inclusion in Project Summaries by an authorized administrator of Scholarship@Western. For more information, please contact [wlsadmin@uwo.ca](mailto:wlsadmin@uwo.ca).



# Development of fMRI compatible reversible deactivation to examine cerebral networks

## Background

The development of functional magnetic resonance imaging (fMRI) has greatly expanded our ability to examine neural processing while subjects perform a variety of perceptual, cognitive or motor tasks. It permits the simultaneous examination of functional activity in many different brain regions and provides a better understanding of how multiple regions work together to produce particular behaviors.

## The Problem

The next step is to deactivate a specific region in the brain, while a subject is being scanned, to determine the contribution of this site to the activity in sites throughout its functional network. We can then examine the activity of other network components in the absence of the deactivated region.

To accomplish this goal, we propose to develop a reversible deactivation approach that is fMRI-compatible. Compatibility with fMRI means that a system has to be completely non-metallic. Reversible regional deactivation is possible using the well-established cryoloop technique, which cools specific parts of the brain. Cooling prevents the release of neurotransmitters in the cooled region but rewarming the brain returns normal function.

The cooling process has a number of advantages to other methods of deactivation - it is a controlled and reversible process that is very stable over time (repeated coolings over extended periods show no evidence of harm to or compensation by the brain) and it does not trigger degeneration in the cooled region or other more distant regions that would otherwise impact a study.

## The Project

This study will permit us, for the first time, to examine the effects of deactivation of one cortical site on large-scale neural networks. It will permit neural networks to be functionally disassembled and the consequences of 'reversible' lesions, strokes or tumors to be assessed and modeled before they occur.

The first step of this project is to develop the non-metallic cooling device that can be tested in the imaging equipment here. The second step will be to establish that the device is reliable. When these two steps have been achieved, it will considerably expand the research that can be accomplished in this area.

## Western Researchers

Stephen Lomber  
Blake Butler  
Stefan Everling  
Blaine Chronik

### Funding Program

[BrainsCAN Accelerator Grant: Stimulus](#)

Awarded: \$109,917

### Additional BrainsCAN Support

[Imaging Core](#)

### Western Faculty, Group or Institution

Department of Physiology and Pharmacology, Schulich School of Medicine and Dentistry

### Keywords

[fMRI, novel neuroscience/neuroimaging techniques](#)

### Related

none

### Share this page

[Tweet](#) [Share](#)