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## Editorial

### Duly Noted: The Makings of an Inspired Lab Book

By MW Freeman, ORT Science Writer and UHN Research Trainee

The laboratory notebook—the 'lab book'—is ubiquitous in research. If you are in the business of running experiments or tinkering away until something amazing is invented, it is pretty much a given that you keep one. And, if you have navigated the tortuous academic gauntlet from a Bachelor's degree to a post-doctoral fellowship, you have probably authored a great many of them by now.



Image courtesy of MW Freeman <http://www.mwfreemancreative.com/>

So, what does it mean to keep a *good* lab book? And why does it matter?

To start my investigation, I looked to the policies of prominent research institutions; after all, these institutions are the owners of all scientific records drawn up by their scientists.

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April 2016

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# EDITORIAL

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In their [Guidelines for Scientific Record Keeping](#), the National Institutes of Health (NIH) states that research records are to be “complete, accurate and understandable to others” and “should be kept in sufficient detail to allow another scientist skilled in the art to repeat the work and obtain the same results.”

So, how can I do this? What must I write in this lab book? Take it away, [NIH](#): “Records should describe or explain:

- Who did it (the person making the record)
- What you did
- When you did it (clearly stating month, date, and year)
- Why you did it
- What project the research was part of
- How you did it (including the methodology)
- What materials were used
- The findings
- Your interpretation
- The next step”

Great! But, why should I do this? Yes, my supervisor wants to make sure that my successors can pick up my research where I left off, but there has got to be another reason for all of these rules.

There is: lab books can be used as legal documents when things get dicey.

For example, lab books are critical to the process of establishing yourself as the inventor of a particular innovation. In the past, intellectual property claims were awarded under the ‘first-to-invent’ system. In this system, the [onus was on the inventor](#) to keep an airtight record of their pioneering work so that they could claim ownership at any point in time, even if another group had already filed an identical patent. Now, it is more of a race with the ‘first-to-file’ or ‘first-inventor-to-file’ system, instituted by Canada in 1989 and the United States in 2013. Under the current system, as long as you have the necessary documentation—such as a lab notebook that unambiguously records your findings—and you are the first to the patent office, the invention is yours. In either case, comprehensive recordkeeping is essential to the successful development of intellectual property.

Another important legal duty of a lab book is to establish a consistent record of proof as you run through experiments and collect data. Recording your methods and results in a way that leaves nothing in question will serve you very well if the occasion arises when someone regards your findings as, well, unbelievable. Academic journals and research institutions have the [cooperative responsibility](#) to review questionable data. One of the primary pieces of evidence these organizations use for this type of investigation is the lab book.

Lab books are used in research institutions all over the world and, as such, policies governing their use vary widely. But sometimes, even a single institution employs what might be seen as contradictory instructions. For example, the NIH asserts, “A common misunderstanding about a lab notebook is that it is a journal for your scientific or personal musings. It is not.” in one [directive](#), yet it also states, “a laboratory notebook is a record of both physical and mental activity.” in the guideline cited above. To me, ‘mental activity’ sounds a lot like *ideas*, maybe even ‘musings’.

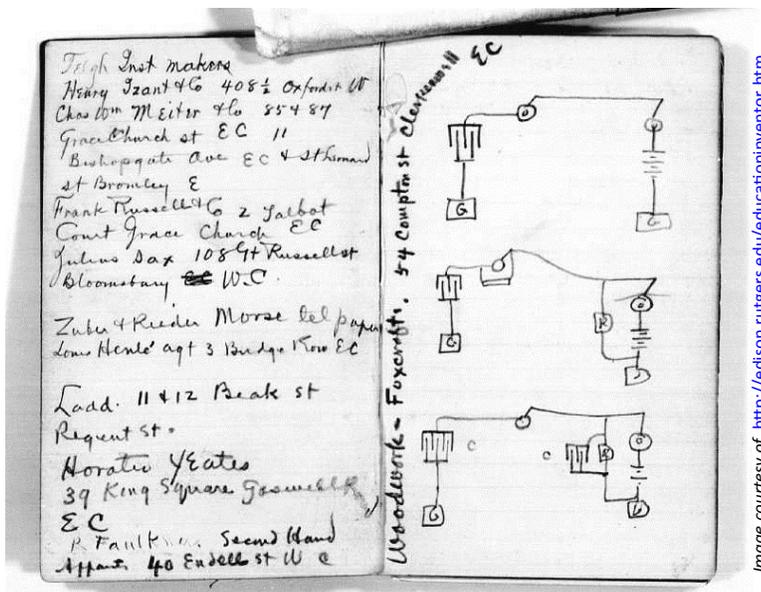


Image courtesy of <http://edison.rutgers.edu/education/inventor.htm>

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# EDITORIAL

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In my opinion, the lab book is not only a place to keep a clear record of your work, but also a place to let your mind run through the possibilities of your research and anything connected to your science. A wonderful example of an inventor who kept meticulous notes through the entirety of his scientific and creative process was Thomas Edison. Author [Michael Michalko noted](#) that Edison's 3500 notebooks “read like a turbulent brainstorm and present a verbal and visual biography of Edison’s mind at work.” Though this seems like a terrible way to enable reproducibility, this style of scientific recordkeeping allowed the notebooks to “...illustrate how Edison conceived his ideas from their earliest inceptions and show in great detail how he developed and implemented them.” A commendable record, I would say.

My advice: be rigorous and methodical with your notes—always aiming to instill transparency and to enable the reproducibility of your research. But, be sure to keep a good record of your thoughts and inspirations as well, whether they directly relate to your current experimental work or not. These passing thoughts may be the makings of your next major breakthrough. If your research institution or supervisor takes a strong stance against these sorts of ‘turbulent brainstorms’ in your lab books, then keep a companion journal and let loose there.

In the words of Alexander von Humboldt, an 18<sup>th</sup> century naturalist and explorer who happened to keep beautiful, animated scientific records, “In this great chain of causes and effects, no single fact can be considered in isolation.”

All of your thoughts count. I suggest you record them.

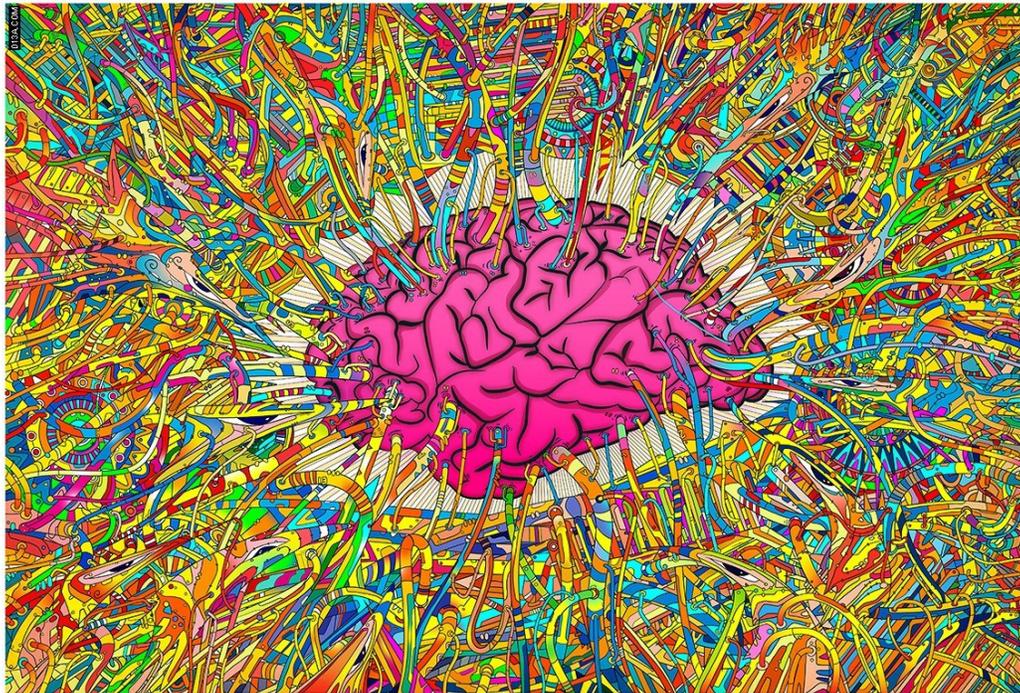


Image courtesy of <https://willakana.wordpress.com/category/uncategorized/page/29/>

# INSIDER



## Ashwini Namasivayam

*PhD Candidate, Swallowing Rehabilitation Research Team, Toronto Rehabilitation Institute*

I am currently a PhD candidate and Research Associate in the Swallowing Rehabilitation Research Team at Toronto Rehabilitation Institute – University Centre. I am currently in my third year of studies and work. As a speech-language pathologist (SLP), I have had the opportunity to work on clinical research projects that focus on understanding and rehabilitating the swallow, either through exercise or compensatory techniques. Most people probably think that those who work in research sit in labs all day, but I have the benefit of interacting with some amazing patients, clinicians and researchers in order to develop novel treatment plans.

**“I love to travel...”**



### **What motivates you to get through the day?**

“Planning my next trip. I love to travel and have been to 33 different countries around the world to date. I’m still waiting to set foot in Africa though.”

### **You’re playing a game of Pictionary and you draw something to describe you. What is it?**

“A frying pan. I love to cook—it is how I unwind at the end of a long day. I very rarely make the exact same dish twice.”

### **If you were not in the research field, what field would you have pursued?**

“I am a clinician first and foremost, so if I was not in research I would be a full-time practicing SLP in a rehabilitation hospital helping my patients communicate and swallow safely. I love interacting with patients and their caregivers.”

### **What is a novel you would recommend?**

“There are two great, and very different, books that I would recommend. The first is called *Flawless*, and it is based on a true story about the largest diamond heist in history; it is hard to put down. For those working with the elderly, I recommend *Being Mortal*, which is an insightful book about dealing with the realities of aging and death.”

# LATEST & GREATEST

## Calming the Brain to Treat OCD

Dunlop K, Woodside B, Olmsted M, Colton P, Giacobbe P, Downar J. Reductions in Cortico-Striatal Hyperconnectivity Accompany Successful Treatment of Obsessive-Compulsive Disorder with Dorsomedial Prefrontal rTMS. *Neuropsychopharmacology*. 2016 Apr;41(5):1395-403.

By Shaalee Dworski, ORT Writer and UHN Trainee

Obsessive-compulsive disorder (OCD) is a debilitating condition that can reduce the quality of life. Episodes of OCD are triggered by an obsession (an anxiety-provoking thought) followed by a compulsion (a repetitive motion). OCD affects 1–3% of individuals, half of which cannot be cured by current behavioural therapies or pharmaceuticals.

The neurological cause of OCD may be excessive signalling in certain brain circuits. One key circuit is the cortico-striato-thalamic-cortical (CSTC) circuit, which manages self-regulation. Changes in this circuit can be visualized by an advanced imaging technique called functional magnetic resonance imaging (fMRI). Using fMRI, clinicians can observe increased and decreased activity in the CSTC circuitry of OCD patients depending on the task tested. This suggests that modulating the activity of this circuitry may be useful in treating OCD patients.

One way to modulate the activity of brain circuits is with repetitive transcranial magnetic stimulation (rTMS). This is a non-invasive technique that uses a magnetic field to influence electrical brain activity. However, not all OCD patients respond to rTMS, and it is difficult to predict which patients will benefit from this treatment.

To address this issue, Katharine Dunlop, a PhD candidate in Dr. Jonathan Downar's lab, and her colleagues developed a set of prediction criteria to evaluate an OCD patient's response to rTMS. They used fMRI to measure the CSTC circuitry in specific brain regions before and after rTMS, and correlated these changes to clinical measures of OCD.

The research team found that, after 20–30 sessions of rTMS, half of the OCD patients responded to the treatment as assessed by traditional clinical measures. The authors found that this correlated with fMRI-observable changes in the circuitry in the dorsomedial prefrontal cortex.

They also developed a framework to use fMRI to measure the success of rTMS. OCD patients who responded to rTMS had a reduction in the activity of the circuitry, while non-responders did not.

This study supports the hypothesis that modulating the activity of the CSTC circuitry can be used to treat OCD and presents fMRI as a tool to measure rTMS success.

[Click here to access the full manuscript.](#)

### **The ORT caught up with Katharine Dunlop:**

**ORT: What is the next step to advance these results into clinical practice?**

*The next step would be to confirm our clinical and imaging findings in a larger, placebo-controlled study.*

**ORT: What other therapies can this be coupled with?**

*You raise a good point of trying to combine rTMS with other therapies. To my knowledge, combining non-invasive brain stimulation with other therapies has not yet been done to treat OCD. I have, however, seen studies that have combined antidepressants with transcranial direct current stimulation to treat major depression; these studies have promising results.*

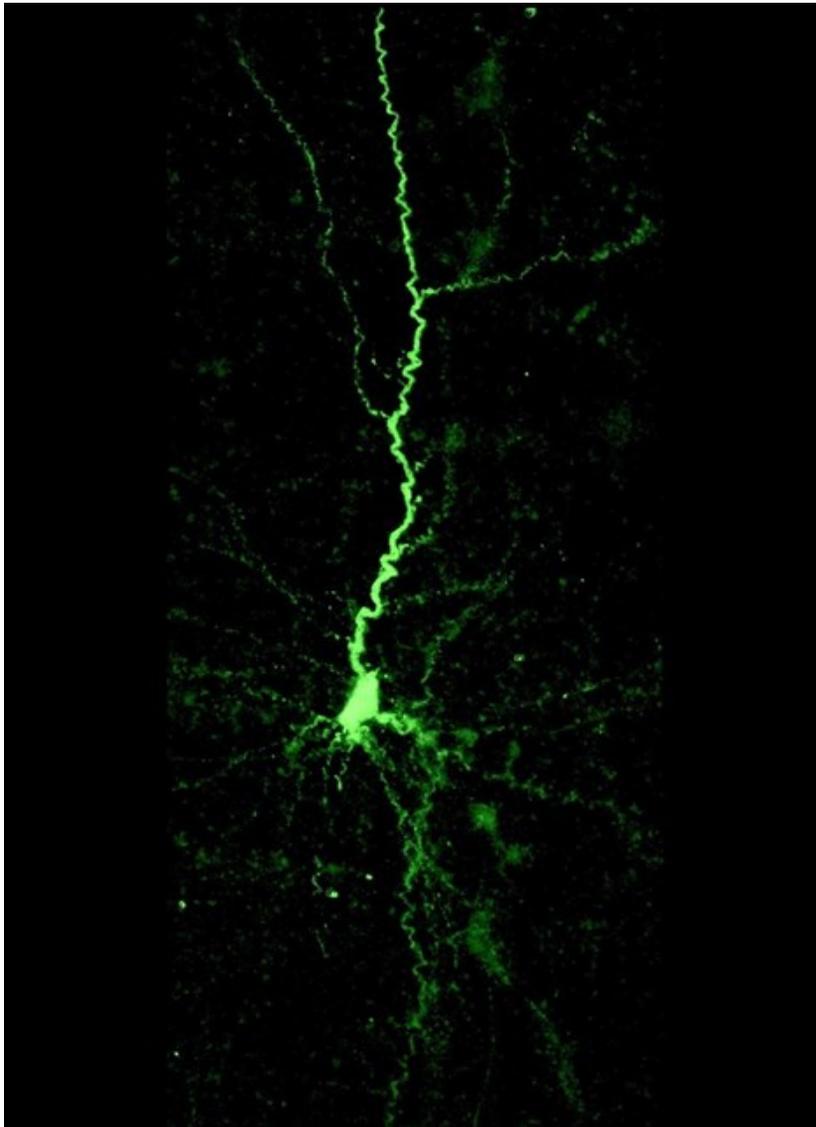


Image courtesy of smokedsalmon at FreeDigitalPhotos.net

# IMAGE OF THE MONTH

Submitted by Michael Chang

A human neuron has been reconstructed into a three-dimensional (3D) model by Drs. Homeira Moradi and Taufik Valiante at UHN. The neuron was isolated from human cortical tissue resected from a consenting temporal lobectomy candidate at the Toronto Western Hospital. The 3D reconstruction of human neurons can be used for quantitative morphological analysis and computational modelling. Knowledge of the neuronal morphology and its associated physiological properties is important for improving our understanding of neuronal function and, structure and how neurons are classified.



3D image of a biocytin-filled pyramidal cell from the human cortex (layer 5), acquired using a Nikon A1R+ confocal microscope at 60X.

**Call for Submission:** Do you have a unique image from your research that you would like to share with the trainee community? Send your images along with a brief description to [ort.admin@uhnresearch.ca](mailto:ort.admin@uhnresearch.ca).

# CONFERENCE REPORTS



**Trainee:** Lauren Agro, PhD Candidate

**Supervisor:** Dr. Catherine O'Brien, PM

**Abstract:** Nrf2 regulates colorectal cancer initiating cells self-renewal and chemoresistance

**Conference:** Keystone Symposium – Stem Cells and Cancer, Mar 6–10, 2016, Breckenridge, Colorado, USA

[Click here to read Lauren's conference report!](#)

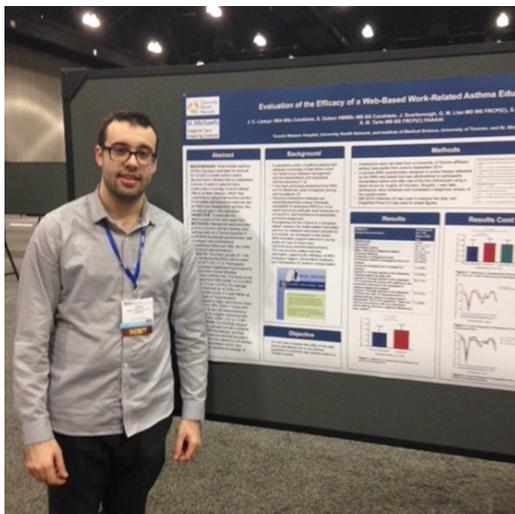
**Trainee:** Elaine Kearney, PhD Candidate

**Supervisor:** Dr. Yana Yunusova, TRI

**Abstract:** Speech Movements and Intelligibility in Parkinson Disease

**Conference:** 18th Biennial Motor Speech Conference, Mar 2–6, 2016, Newport Beach, California, USA

[Click here to read Elaine's conference report!](#)



**Trainee:** Joshua Lipszyc, MSc Candidate

**Supervisor:** Dr. Susan Tarlo, Krembil

**Abstract:** Evaluation of the Efficacy of a Web-Based Work-Related Asthma Educational Tool

**Conference:** American Academy of Allergy, Asthma & Immunology Annual Meeting, Mar 4–7, 2016, Los Angeles, California, USA

[Click here to read Joshua's conference report!](#)



## UPCOMING EVENTS & FUNDING CALENDAR:

**02/05** Juvenile Diabetes Research Foundation (JDRF) Canadian Clinical Trial Network (CCTN) Postdoctoral Fellowship in Clinical Translation in T1D Program

These awards are intended to provide partial salary support for postdoctoral fellows. Click [here](#) for details.

**02/05** Beyond the Professoriate

During this two-day online event, attendees will hear from doctoral-degree holders who successfully transitioned to work beyond the professoriate. Click [here](#) for details.

**06/05** LSCDS Career Day

The 10th Annual Career Day is a full day event featuring keynote speakers, a career panel discussion and much more. Click [here](#) for details.

**29/05** Career Corner at Congress of the Humanities and Social Sciences 2016

A professional development workshop series. Click [here](#) for details.

Visit [www.uhntrainees.ca](http://www.uhntrainees.ca) for more events and funding information.



### QUESTIONS?

Please contact:  
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## Abstract MadLibs!!

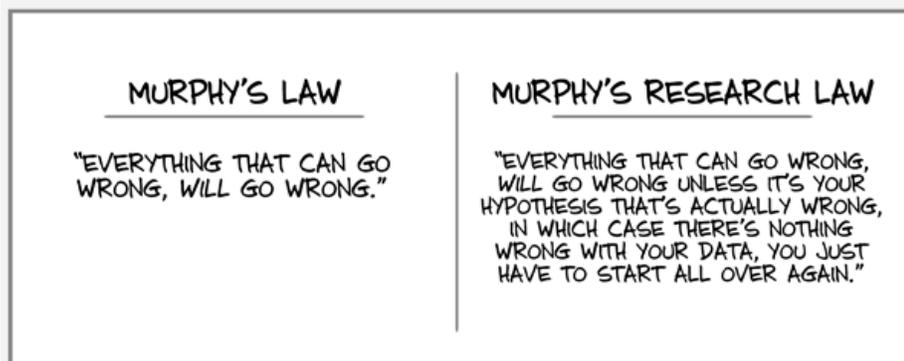
This paper presents a \_\_\_\_\_ method for \_\_\_\_\_  
(synonym for new) (sciencey verb)  
the \_\_\_\_\_. Using \_\_\_\_\_, the  
(noun few people have heard of) (something you didn't invent)  
\_\_\_\_\_ was measured to be \_\_\_\_\_ +/- \_\_\_\_\_  
(property) (number) (number)  
\_\_\_\_\_. Results show \_\_\_\_\_ agreement with  
(units) (sexy adjective)  
theoretical predictions and significant improvement over  
previous efforts by \_\_\_\_\_, et al. The work presented  
(Loser)  
here has profound implications for future studies of  
\_\_\_\_\_ and may one day help solve the problem of  
(buzzword)  
\_\_\_\_\_  
(supreme sociological concern)

Keywords: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
(buzzword) (buzzword) (buzzword)

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