



# The BRAINet SYNAPSE

BRAINet is a friends group of the OHSU Brain Institute (OBI) that helps build community awareness, interest, and support for neuroscience research at OHSU.

**BRAINet Synapse Newsletter**

**March 2016**

## President's Column

Dear BRAINet Enthusiasts,

Brain Awareness Season is upon us. I hope you are able to take advantage of this wonderful opportunity to hear experts talk about the difference between Healthy Pleasures and Unhealthy Habits. Our history in the United States has taught us that banning substances doesn't necessarily work to reduce harm - evidence Prohibition. With the addition of marijuana to our menu of mind-altering substances available for recreational use, we are faced with the dilemma of where to draw the line between use and abuse and how to respond when abuse occurs. Enjoy these thought provoking opportunities.

Warmest wishes,

*Helen Richardson, President*



**OHSU20**

Receive 20% off Brain Awareness Season Tickets with this promo code!

## March Lecture Luncheon

Join us on Monday, March 21 at 11:30 a.m. at the Multnomah Athletic Club for a lecture luncheon with Tavi Choi, M.D., Ph.D. Dr. Choi's presentation is titled, "***Mind-reading with Functional Brain Imaging.***"

Dr. Choi is the OHSU Chief Psychiatrist at Oregon State Hospital and Assistant Professor of Psychiatry.

11:30-11:45 Registration and Social Time

11:45 Lunch Served

12:00 – 1:00 Luncheon and Lecture

Cost

\$25 Members

\$25 Guests of Members

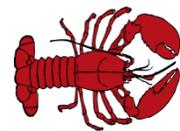
***\$30 Non-Members***

To register and pre-pay to secure your reservation, please visit:

**<https://goo.gl/rGKYid>**

Registration will close at midnight on Wednesday, March 16.

*This month we will be served  
curry ginger crab cakes.*



*Please note there is only one option for all  
vegetarian/vegan/gluten free requests.*

## February Lecture Luncheon

By Julie Branford, Past President

*“Studying brain circuits to quiet that ringing in the ears: New directions for Tinnitus Research”*

Laurence (Larry, as he asked to be called) Trussell, Ph.D., presented a fascinating insight into the research and realities of tinnitus.



About 2/3 of the people attending the BRAINet lecture luncheon raised their hands when he asked who in the group experienced tinnitus.

His early research was in the area of neural control of movement and echolocation in bats. During his first faculty position at the University of Wisconsin, a dynamic researcher introduced him to auditory systems and how auditory synapses work; her enthusiasm led him to focus in this area.

In his current research, his team studies ¼ millimeter tissues of living brain from mice under a microscope to see how nerve cells talk to each other. They look at things in fractions of milliseconds – which is faster than the rest of our brains work! He noted that sound moves at about a foot per millisecond. Auditory systems are “turbo charged” (with receptors and ion channels) in comparison with the rest of the brain’s neurons which move very fast, but not THAT fast.

Dr. Trussell mentioned that his own personal ear pain came after a very loud concert he and his wife attended, and their ears hurt for three days afterward. He has tinnitus in one ear.

There are two kinds of tinnitus (which is pronounced as TIN-i-tus in the Midwest and is pronounced as tin-EYE-tus in the west coast area):

- Objective, which means in very quiet spaces, some people can hear their blood pulsing through their vascular system; and
- Subjective, which amounts to hearing a sound that doesn’t really exist.

In the general population, 35% of people have some form of tinnitus, and most commonly have the Subjective version. Of those people:

- 37.5% report hearing “ringing”
- 11.2% report “buzzing”
- 8.5% report “crickets”
- 7.8% report “hissing”
- 5.3% report “humming”

These sounds are heard at frequencies near those of hearing loss, in the high pitched area.

Dr. Trussell said that there is a graded scale of tinnitus experience, going from faint and intermittent to a medium stage of “persistent, but ignorable” to the “persistent/insistent” level. At the low level, the tone heard can be shimmery or a faint rustling sound or a clicking sound, detectable in quiet spaces. The middle range can be distracting when attention is drawn to it and it competes for attention with external sounds (hearing someone across a crowded dinner table). The most extreme cases have the sound as a dominant sensory experience.



He noted that there are many over-the-counter drugs available on the market, but they are mostly “snake oil” in his opinion.

Subjective tinnitus is much like phantom pain experienced by amputees. The

sensation seems real, but there is no physical source for the experience.

Causes of tinnitus include:

- Noise-induced hearing loss
- Age-related hearing loss
- NSAIDS taken in persistent high doses
- Antidepressants, which can worsen the experience of tinnitus for some unknown reason
- Salicylic acid (found in aspirin) seems to worsen/initiate tinnitus.

As with other kinds of hearing problems, protection and prevention are the best. He commented that the higher the dB (decibel) rating of hearing protection, the better it protects. "Ten dB is not very protective," he said. Normal voices are at about 70 dB; lawnmowers are at 100+ db.

The Dorsal Cochlear Nucleus (DCN) may be the place in the brain where tinnitus starts. Animals exposed to noise show increased activity in the DCN, even in isolated brain tissue. Somatosensory nerves project to the DCN, and tinnitus can be altered by stimulating parts of skin contacted by these nerves. Clenching your jaw tightly closed can affect the intensity of tinnitus, as well as pressing on your head, above your ear.

His lab is working on the hypothesis that if SSRIs (Selective Serotonin Re-uptake Inhibitors) can make tinnitus worse, could serotonin and the SSRI's be affecting the DCN? New research in his lab has discovered that Prozac enhances electrical activity of neurons in the DCN more so than other antidepressants. Why? Perhaps the "selectivity" of various antidepressants varies.

There is much more to learn on this fascinating topic!

## Upcoming Events

*Click on the link for more information.*

**February 29**

[Gaming and the Brain](#)

**March 7**

[Marijuana and the Brain](#)

**March 12**

[Brain Fair at OMSI](#)

**March 21**

[BRAINet Lecture Luncheon](#)

**April 16**

[Teacher Workshop](#)



## Brain in the News

By George Ivan Smith,  
BRAINet Member

“Growing evidence suggests low levels of lithium may strengthen the brain’s resilience to stress and disease,” says Richard S. Jope, Ph.D., and Charles B. Nemeroff, M.D., Ph.D., in the February 1, 2016 issue of *Cerebrum*. They explain that lithium was used in medicine long before it was identified in the early 1800s as a unique element.

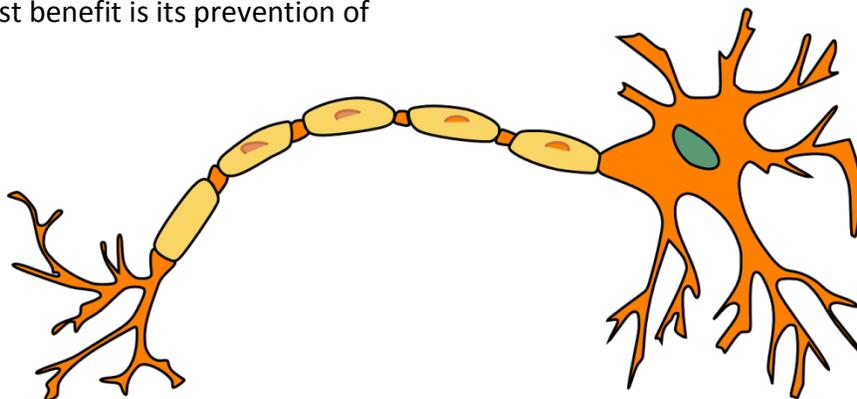
Commonly used today to treat bipolar disorder, lithium is being studied for use in treating other diseases to learn the mechanism of its neuroprotective effect. This was tracked to lithium’s inhibition of the enzyme glycogen synthase kinase-3 (GSK3). That inhibition protects neurons from a wide variety of insults. Neurons undergo degenerative changes that impair their functions long before they actually die.

Now it has become accepted that lithium can sometimes stave off neuronal death, but its greatest benefit is its prevention of

impairments preceding neuronal death. Lithium also increases neuronal production (neurogenesis) in the hippocampus, critical for learning, memory, and stress responses. Lithium helps neurons by inhibiting GSK3, slowing the harm of stress and toxic substances.

Lithium benefits include axonal regeneration, improved mitochondrial function, remyelination, and neurogenesis. And lithium inhibits GSK3, which is linked to the neuropathology of Alzheimer’s disease. Also, abnormal activation of GSK3 in neurons is seen in Parkinson’s disease, stroke, and traumatic brain injury, so lithium’s inhibition of GSK3 could have benefits in these diseases and disorders as well as multiple sclerosis because of lithium’s anti-inflammatory actions.

Read the full article at  
[www.dana.org/Cerebrum/2016/Lithium\\_to\\_the\\_Rescue/](http://www.dana.org/Cerebrum/2016/Lithium_to_the_Rescue/)



### **BRAINet Contacts:**

Kate Stout – Program Coordinator  
503.494.0885 [stoutk@ohsu.edu](mailto:stoutk@ohsu.edu)

Helen Richardson – President of BRAINet  
[gsgam@comcast.net](mailto:gsgam@comcast.net)

Nancy DeGraw – Membership Chair  
[njdegrow@msn.com](mailto:njdegrow@msn.com)



**BRAIN**  
*Institute*