How many of the six Neuroscience thesis defenses did you attend last quarter? If you saw 1-2 defenses you get some credit but you know you could do better. 3-4 defenses is a passing grade. 5-6 defenses and you’re as good as Ross Colvin. There are at least three Neuroscience thesis defenses scheduled for the Summer quarter, and you could make it your goal to attend all three of them! Also, check out the recent first-author publications by Matt Kaufman and Phil Jaeger. Starting next quarter, The Neurotransmitter will be under new management. Volume 1 is complete with 4 issues for the 4 academic quarters starting in the Fall. It is the sincere hope of the current management that Volume 2 will set the stage for a consistent, permanent newsletter for the program that highlights student accomplishments and announces important events. Have a great summer quarter, and keep those publications coming!

Christine Guo, lab of Jennifer Raymond
Thursday, July 15, 2pm.

Christine’s research has focused on the neural mechanisms supporting cerebellum-dependent learning using motor learning in the VOR as a model system. Specifically, she investigated the instructive signals carried in the Purkinje cells and climbing fibers in the cerebellar circuit during the induction of learning. She first identified an interactive effect of multiple visual stimuli on climbing fiber responses, a key discovery which led to the disassociation between Purkinje cell and climbing fiber instructive signals. This work, for the first time, demonstrated that motor learning could occur in the absence of climbing fiber signals. Furthermore, she developed several new methods of assessing eye movement responses during motor learning in the VOR and provided novel insights on the effects of motor learning on movement variability.

Christine’s interests in motor learning extend beyond the lab. She always finds herself between learning and enjoying motor skills (with frequent “oops!”), including skiing, cycling, sailing, flying, motorcycling, etc. These experiences further motivate her to understand the cognitive processes underlying complex behaviors from an integrated network point of view. After graduating, she would like to pursue further training in cognitive science, especially using imaging techniques with human subjects.

Kim Salvia, lab of Rich Reimer
Friday, July 23, 2:30pm.

Kim’s thesis research has focused on understanding how neurons replenish their supply of neurotransmitter to meet the metabolic demand of chemical neurotransmission. In particular, she has studied B0AT3, a sodium-dependent amino acid transporter that is expressed on synaptic vesicles in excitatory and some inhibitory neurons. The vesicular localization of B0AT3 may enable it to serve an activity-dependent role in mediating uptake of neurotransmitter precursors including glutamine across the plasma membrane.

Outside of the lab, Kim has been a teaching assistant for the S.I.N. bootcamp and the undergraduate course, “Molecular and Cellular Neurobiology.” Her most memorable Stanford teaching experience, however, is
Laura Prolo, lab of Rich Reimer  
Tuesday, August 10, 2pm.

Laura’s thesis research has focused on developing a mouse model of a rare lysosomal storage disorder called Salla disease. The disease-causing mutation is in a lysosomal transporter protein, sialin, that pumps a sugar, sialic acid, out of the lysosomes after it has been cleaved off of macromolecules undergoing degradation. A prominent manifestation of the human disease is a marked hypomyelination of the CNS. Laura’s curiosity was sparked by how such a ubiquitously expressed lysosomal protein (sialin) could lead to such a specific defect (hypomyelination). After demonstrating that the sialin-deficient mouse faithfully models cardinal aspects of the human disease, she focused on understanding the myelination defect. Laura identified the stage of oligodendrocyte development that is disrupted in the sialin-/- mouse and found a potential molecular mechanism for the reduction in oligodendrocyte number and impaired myelination. Recently, she has established an ex vivo cerebellar slice-oligodendrocyte precursor cell co-culture assay in the Reimer lab to investigate the cell autonomy of the myelination defect.

Laura has thoroughly enjoyed her time with the neuroscience community, which gave her the opportunities to serve as a Seminar Series Representative and as a teaching assistant for Neurobiology 206 and for SIN. While a first-year, bright-eyed student herself in SIN, Laura met MCP student Scott Owen, to whom she is currently engaged with a wedding planned for next summer. Laura is in the MSTP and is looking forward to the last two years of medical school after her thesis defense.

Congratulations to Christine, Kim, and Laura!
Congratulations to the first-authors below for their recent contributions to PubMed!

Phel Jaeger, lab of Tony Wyss-Coray
“Regulation of amyloid precursor protein processing by the Beclin 1 complex”

Autophagy is an intracellular degradation pathway that functions in protein and organelle turnover in response to starvation and cellular stress. Autophagy is initiated by the formation of a complex containing Beclin 1 (BECN1) and its binding partner Phosphoinositide-3-kinase, class 3 (PIK3C3). Recently, BECN1 deficiency was shown to enhance the pathology of a mouse model of Alzheimer Disease (AD). However, the mechanism by which BECN1 or autophagy mediate these effects are unknown. Here, we report that the levels of Amyloid precursor protein (APP) and its metabolites can be reduced through autophagy activation, indicating that they are a substrate for autophagy. Furthermore, we find that knockdown of Becn1 in cell culture increases the levels of APP and its metabolites. Accumulation of APP and APP C-terminal fragments (APP-CTF) are accompanied by impaired autophagosomal clearance. Pharmacological inhibition of autophagosomal-lysosomal degradation causes a comparable accumulation of APP and APP-metabolites in autophagosomes. Becn1 reduction in cell culture leads to lower levels of its binding partner Pik3c3 and increased presence of Microtubule-associated protein 1, light chain 3 (LC3). Overexpression of Becn1, on the other hand, reduces cellular APP levels. In line with these observations, we detected less BECN1 and PIK3C3 but more LC3 protein in brains of AD patients. We conclude that BECN1 regulates APP processing and turnover. BECN1 is involved in autophagy initiation and autophagosome clearance. Accordingly, BECN1 deficiency disrupts cellular autophagy and autophagosomal-lysosomal degradation and alters APP metabolism. Together, our findings suggest that autophagy and the BECN1-PIK3C3 complex regulate APP processing and play an important role in AD pathology.

Matt Kaufman, lab of Krishna Shenoy
“The roles of monkey premotor neuron classes in movement preparation and execution”
Kaufman MT, Churchland MM, Santhanam G, Yu BM, Afshar A, Ryu SI, Shenoy KV (2010). J. Neurophysiol. Dorsal premotor cortex (PMd) is known to be involved in the planning and execution of reaching movements. However, it is not understood how PMd plan activity - often present in the very same neurons that respond during movement - is prevented from itself producing movement. We investigated whether inhibitory interneurons might ‘gate’ output from PMd, by maintaining high levels of inhibition during planning and reducing inhibition during execution. Recently-developed methods permit distinguishing interneurons from pyramidal neurons using extracellular recordings. We extend these methods here for use with chronically-implanted multi-electrode arrays. We then applied these methods to single- and multi-electrode recordings in PMd of two monkeys performing delayed-reach tasks. Responses of putative interneurons were not generally in agreement with the hypothesis that they act to gate output from the area: in particular it was not the case that interneurons tended to reduce their firing rates around the time of movement. In fact, interneurons increased their rates more than putative pyramidal neurons during both the planning and movement epochs. The two classes of neurons also differed in a number of other ways, including greater modulation across conditions for interneurons, and interneurons more frequently exhibiting increases in firing rate during movement planning and execution. These findings provide novel information about the greater responsiveness of putative PMd interneurons in motor planning and execution, and suggest that we may need to consider new possibilities for how planning activity is structured such that it does not itself produce movement.
The following advice, although not directly about science and not spoken by scientists, is remarkably good advice for graduate students. Enjoy 🎈

“Some companies have a motto that reads ‘Failure is not an option.’ I think that is ridiculous. Failure has to be an option. If failure is not an option, someone else would have done it or it must be easy. If something is worth doing, there has to be a possibility that you will fail if you don’t work hard or smart enough. A better everyday motto for success should be ‘Failure is an option’: this motto makes you work harder and smarter, driving you to succeed.”

James Cameron
Filmmaker and director of Avatar, Titanic, and The Terminator

“I don’t skate to where the puck is, I skate to where the puck is going to be.”

Wayne Gretzky
National Hockey League Star

“Rejection is never about you. You can be rejected because of how you come across to one person at one time, but you should never consider it an absolute statement on your well-being. No matter how hard it stings, rejection is about a single moment in time. Learn from it and move on to the next target.”

Mystery
World-renowned pick-up artist

“Life is what happens when you’re making other plans.”

John Lennon
Singer/Songwriter, former Beatle

“We don’t try to create products that are cool, trendy, or what we think people will like. We try to create products that are great, and if we do that, the other stuff will follow anyway.”

Steve Jobs
Chairman and CEO of Apple, Inc.

“Real artists ship on time. They enjoy being artists and take time to pursue and enjoy their crafts, but to be a professional you have to deliver, and you have to deliver on time.”

“Don’t listen much to a personal trainer who isn’t in better shape than you are. All the time I’m seeing people at the gym, confidently spouting advice when they don’t even have anything to show for themselves. I say it’s better to seek training advice from people in better shape than you, not worse.”

Marky Mark
Buff rapper who later became an actor and currently goes by Mark Wahlberg

“Be good at something. It makes you valuable. Have something to bring to the table because that will make you more welcome there.”

Randy Pausche
Professor of Computer Science and author of “The Last Lecture.”

“The six ‘W’s: Work Will Win When Wishing Won’t.”

Todd Blackledge
National Football League Quarterback

“I never think hard about Plan B until I’ve put my heart into Plan A. Working on Plan B before you’ve given Plan A your best shot is a losing man’s strategy.”

Arnold Schwarzenegger
Movie star and governor

“Hope is a good breakfast but a bad dinner.”

Francis Bacon
English philosopher and statesman

“During my 18 years I came to bat almost 10,000 times. I struck out about 1,700 times and walked maybe 1,800 times. You figure a ballplayer will average about 500 at bats a season. That means I played seven years without ever hitting the ball.”

Mickey Mantle
Major League Baseball Star