

Mentorship Statement – Jason Shepherd, Ph.D.

I launched my independent lab in January 2013 at the University of Utah in the Department of Neurobiology and Anatomy, after completing my Ph.D. at the Johns Hopkins School of Medicine with Rick Huganir and Paul Worley and a postdoctoral fellowship at MIT with Mark Bear. The goal of our research is to understand how brains learn and store information, from the molecular level through *in vivo* neuronal networks and how these processes go awry in neurological disorders. In particular, we are focused on elucidating the gene program that is induced by learning and required for long-term forms of brain plasticity and memory consolidation. My lab utilizes coordinated biochemical, cell biological, electrophysiological and imaging studies both *in vitro* and *in vivo*.

Mentoring philosophy

My overall goal in mentoring is that trainees learn the necessary skills to thrive in their future careers, including the fundamental skills of communication (writing and oral), data analysis, and working in a team environment. However, I tailor my mentorship to the individual, based on their future career goals and particular strengths/weaknesses. Training in the sciences is a long-term investment for trainees, with Ph.D. students and postdoctoral fellows averaging 5-6 years in a lab. I believe intentional mentorship is key to the success of my trainees and subsequently for the success of my research program. I also take the approach that “once a mentor, always a mentor”, and see mentorship as a life-long role.

My mentorship philosophy stems from my experiences and drawing from excellent mentors; past and present, and facilitated by an advisory group of colleagues who have successfully transitioned postdocs to leading academic/industry careers. My mentorship philosophy is constantly evolving; I benefit and learn just as much from trainees as they do from me. I constantly strive to be a better mentor, knowing I will make mistakes along the way and that there is never an end to the learning process.

Career development

Long past are the days that Ph.Ds. only end up in academic careers. While my expertise is firmly in an academic setting, I encourage trainees to seek opportunities to network and learn about diverse career paths. This can be through local groups or events, conferences, and workshops. My department is a young and thriving group; we initiated a postdoc group led by postdocs themselves. I am the faculty advisor for this group, which has already successively lobbied for a formal department policy on salary and hiring of postdocs. In addition, this group has organized outside speakers from diverse career paths as well as internal workshops on grant writing and job searches. We have also initiated a formal mechanism that allows postdocs to form a postdoc committee that allows mentorship/career advice from a number of faculty.

I encourage lab members to use individual development plans to self-assess their progress and career goals. I have also recently initiated a formal annual review that includes self-assessment and feedback on my mentorship and the lab environment as a whole. Once we have established career goals, I then guide them towards concrete steps that will put them on the best trajectory to achieve their goals. In most cases, this means having a strong publication record and external funding. However, I also prioritize teaching professional skills such as writing and oral communication that are critical for any career path. All my trainees write their own grants and I give feedback on repetitive/key weaknesses. We iterate this process many times before the final product is submitted. I also make sure to provide opportunities for trainees to write review articles, commentaries and to help in reviewing papers. We also go through their presentations for department research in progress seminars, followed by external mentorship from other members of the department. I believe that reading papers and keeping up with the current literature relevant to the lab is important. As such we alternate data presentations and journal club presentations in lab meetings. We also have a dedicated “publications” channel in Slack where we post papers of interest and discuss them.

For trainees that have a clear goal of staying in academia, we also have frank discussions about what running a lab will entail. This is especially important for postdocs, who often do not get any formal training managing a

group. I encourage postdocs to take leadership roles and they gain mentorship experience through peer mentoring in the lab environment.

Project management, communication and teamwork

My role as mentor and PI is to enable lab members to carry out their projects. Each lab member works on their own project, where intellectual ownership and investment is key. They choose the main questions they would like to pursue; we then design the studies together. Their project is also embedded into a larger framework within the lab, which encourages team work. Indeed, I encourage collaboration, sharing, and idea-discussion amongst all the members of the lab. Since the lab works across multiple domains of analysis and methodologies, no person can be an expert in everything. Thus, projects move forward in collaboration and lab members mentor each other. This is exemplified by our paper published in *Cell* (first author Elissa Pastuzyn), which was only possible through the direct contribution of almost every lab member at the time. However, some trainees also take their projects and “run with them”. This was the case for my first graduate student, Kyle Jenks (now a postdoctoral fellow at MIT), who completely drove his project (which was awarded an NIH NRSA F31), and setup an *in vivo* 2-photon imaging system in the lab. This culminated in a two-author paper in *Cell Reports* (2020).

In our weekly lab meetings, each lab member gives a quick update on their project in a “roundtable” style. This not only facilitates communication between lab members, but is also good practice for being able to convey their science without the “crutch” of a formal slide presentation. Lab communication and discussion are also facilitated by using a lab “Slack” channel, especially during the COVID pandemic where in person meetings went virtual. Slack allows “real-time” feedback, group discussions on specific topics and is another communication method between lab members. I also have an open-door policy and we formally meet as a group every week for general lab meetings. In addition, I conduct individual meetings twice a month to facilitate project development and troubleshooting.

I also actively seek out external collaborators that can help facilitate the progress of projects in areas I am not an expert in. For example, we have fruitful collaborations with John Briggs (expert on the structures of viral capsids), Cedric Feschotte (expert on the evolution of transposable elements), Ed Campbell and Tom Gallagher (virologists that are part of our transformative R01 team - **R01 NS115716**), and Jennifer Phillips-Cremens (Role of the 3D genome in activity-dependent gene expression - **R01 NS114226**). This collaborative spirit is also exemplified in my Chan Zuckerberg Ben Barres award, which has created numerous opportunities for lab members to network in the area of neurodegeneration. In one example, we are collaborating with Bradley Hyman’s lab to determine the mechanisms of the spread of tau pathology. Lab members are also encouraged to attend conferences, career development workshops and weekly seminars run by the CZI neurodegeneration network to expand their own networks.

Experimental rigor

Rigor in science comes from knowing how the scientific methods works and being able to design experiments with interpretable results. This is key to my training, I set the standard for what constitutes reliable data. There’s no substitute for practice, instead of telling trainees what they should be doing, I allow them the freedom to make mistakes and learn from them. I “course correct” through feedback in lab and individual meetings, where we go over the raw data, experimental design and interpretation of the data. Lab members also periodically present their work in department “research in progress” seminars and at conferences for external feedback.

Science is hard and trainees often face technical hurdles or challenges that can be demoralizing. My job is to try and normalize failure. Mistakes are a given, but they should be learned from and trainees know they are ultimately accountable for the work they produce in the lab. There’s no short cut to producing solid data.

Communicating Science

Integral to a successful career in science (and many others) is the ability to communicate ideas and one’s work. This can take many forms; from the usual academic seminar to outreach in local high schools. The experience

of coaching TEDx talks for the general public and recording a TEDMED talk has improved my academic presentations immensely and this knowledge I pass on to my trainees.

Social media has also become an integral tool to network and discuss science. This is particularly evident on Twitter. While this is a relatively new avenue to disseminate scientific information, it has fast become an important tool in the scientist's arsenal to both directly interact with the general public, highlight trainee successes to their peers and for in-depth scientific discussion that is sometimes on par with conferences.

Diversity in Science

Running a lab comes with privilege. I grew up in South Africa during the Apartheid era, where I witnessed first-hand the effects of institutionalized racism. Indeed, my family immigrated to New Zealand because of it. Having lived in Africa, Oceania, Europe and North America, I have been immersed in diverse cultures and experiences. These experiences have led me to embrace diversity in all forms. The goal of all my academic endeavors is to create open learning environments, where all are encouraged to contribute and to be recognized. This also includes acknowledging that implicit bias exists in various aspects of career advancement. As such, I encourage continual education on the challenges and barriers that face under-represented groups. I seek out opportunities to enable scientists of all backgrounds to work in my lab. I also enjoy diversity of thought; my lab is inherently interdisciplinary and has brought together scientists from all over the world with unique tool kits that span protein biochemistry, virology and systems neuroscience.

This philosophy is encompassed by our lab diversity statement, in which all members contributed: *"The Shepherd lab considers diversity to be one of the most important aspects of a thriving and successful lab. We are smart alone, but together we are innovative. Talent is spread across the globe, but opportunity is not. We are committed to seeking and supporting scientists from diverse backgrounds, including under-represented groups. We are dedicated to creating an inclusive, thoughtful and caring environment. We are driven by the core principles of inclusivity, openness, respect and honesty. We draw on our differences to create an environment that serves everyone, by including everyone, and have fun along the way."*

Summary

Academic research can be stressful and often a hypercompetitive environment. My goal is not to hide this reality but to prepare trainees within a supportive environment that still allows them to successfully navigate future career paths and to even improve upon them when given the opportunity in the future. There's often this misconceived idea that science transcends the subjective reality of humans. In the end, though, the process of doing science is just as much a human endeavor as any else. I care deeply about the people in my lab, and see mentorship as crucial to their well-being and future. Since the first year of running my lab, I have held an annual retreat in an outdoor setting. These retreats are a highlight for the lab; these are not meant for science but for getting to know each other. Past trips have included exploring Yellowstone, to hiking up Utah's highest mountain King's Peak.

While I've always stressed balancing a life outside of the lab, managing a lab through an unprecedented pandemic has also brought home the reality that mental health is paramount and that we should do better as a profession to create environments that destigmatize mental illness, providing more resources to alleviate common stressors. Going forward, my goal will be to lead a happy and productive lab through kind and supportive mentorship.