The University of Maryland Physician Scientist Training Program (PSTP)

Program Director: Mark Ehrenreich, M.D. PSTP Research Director: Todd Gould, M.D.

The Physician Scientist Training Program (PSTP) is designed to successfully train physician scientists to be the next generation of leaders in academic psychiatry. The program integrates clinical and research training cementing the resident's identity as both a physician and researcher. The program is open to one resident per year.

Requirements: Successful completion of an M.D. degree and a Ph.D. degree in a relevant scientific area.

Training Program

Overview

PGY 1 & 2

During the first half of the residency training, PSTP residents focus on clinical training, finding a primary research mentor and defining their scientific interests. During the PGY 1 Year the residents will spend 1.5 months on the research unit at the Maryland Psychiatric Research Center (MPRC). In the PG-2 year there are three continuous months of protected research time, during which the resident will not have call duties.

PGY 3 & 4

In the second half of their residency, PSTP trainees will have an extensive mentored research experience. PSTP trainees will continue to design and refine their research project, generate and interpret data, present and publish, and lay the groundwork for an independent career. The PSTP trainee will have 20% (third year) and 75% (fourth year) protected time for research.

Research Training

The primary research training experience will be the mentored research experience. Our research faculty engage in leading research in many disciplines within psychiatry and neuroscience, with research opportunities ranging from the bench to the bedside. Each PSTP trainee will be required to select a primary mentor in the first year of their residency, who will work with the trainee in developing a research project and will engage the trainee in ongoing work within the laboratory of the mentor. The PSTP trainee will also be expected to select a secondary mentor prior to the middle of their second year of residency. The secondary mentor will provide mentorship on career development and augment the training from the primary mentor if needed. The resident, in coordination with their primary mentor, will complete an "individualized development plan" by the middle of their PG2 year. Example template attached.

Courses

Training in grant and manuscript writing is a critical focus for future independent investigators and as such, PSTP trainees will have the option to enroll in courses through the University of Maryland School of Medicine Office of Research Career Development.
https://www.medschool.umaryland.edu/career/

Given the importance of research ethics and the acquisition of scientific leadership skills, PSTP trainees will also take the following courses if they have not taken them during PhD training:

The "Scientific Leadership & Professional Development Symposium for Pre-Clinical and Translational Researchers", which is offered by the University of Maryland School of Medicine K-30 Program and Research Career Development.

The "Course in Research Ethics" (CIPP 907), which is offered through the University of Maryland, Baltimore, Graduate Program in Life Sciences (GPILS).

PSTP Seminar

All PSTP trainees will participate in the monthly Physician Scientist Training Program Seminar. This is a forum where trainees, faculty and invited psychiatry and campus neuroscience researchers discuss current developments in the field, their own research and discuss examine career options over lunch. The PSTP Seminar is a part of the PSTP curriculum for the entire four years. The focus of these seminars is career development, expansion of understanding of the research environment in psychiatry, and expanding core research skills through discussion with successful University and Department faculty and visiting physician scientists.

Training Program Details

Post Graduate Year 1

The intern year consists of 3 months of internal medicine, 1 month of emergency medicine, 2 months of neurology, 1 month of child and adolescent psychiatry, 1 month of addiction psychiatry, 1.5 months of emergency psychiatry, 1.5 months on the research inpatient unit at MPRC, and 1 month of adult inpatient psychiatry. During the first year, residents attend the PSTP Seminar, and identify their primary mentor and research interests.

Rotation	**Rotation Length**	**Research Activities**
Internal Medicine	3 months	
Emergency Medicine	1 month	
Adult Neurology	2 months	
Child/Adolescent Inpatient Psychiatry	1 month	**PSTP Seminar for psychiatry 6 months**
Addiction Psychiatry	1 month	
Emergency Psychiatry	1.5 months	
Adult Inpatient Psychiatry	2.5 months	**1.5 months on the Inpatient research unit at MPRC**

Post Graduate Year 2

The PGY 2 year provides the core training in acute care psychiatry. It includes 1 month of psychiatry emergency service, 1-month rotation in geriatric psychiatry, 4 months of adult inpatient psychiatry, 3 months of the consultation-liaison psychiatry and 3 months of protected research time.

Rotation	**Rotation Length**	**Research Activities**
Emergency Psychiatry	1 month	
Geriatric Psychiatry	1 month	
Adult Inpatient Psychiatry	4 months	
Consultation-Liaison Psychiatry	3 months	
Protected Research Time	**3 months**	**PSTP Seminar for full year**

Post Graduate Year 3

Rotation	Rotation Length	Research Activities
Adult Outpatient Psychiatry	12 months	**20% Protected Time for research**
		PSTP Seminar for full year

Post Graduate Year 4

PGY4 residents complete their forensics psychiatry, adult outpatient, and child psychiatry requirements in addition to 75% protected time for research. They are expected to publish their work by the end of residency, and begin to apply for fellowships, grants and awards. Senior residents continue to attend the PSTP seminar, where they can present their work and ideas to receive feedback from faculty and other residents.

Rotation	Rotation Length	Research Activities
Forensic Psychiatry	8 hours/wk for 3 months	**75% Protected Time for Research**
Child and Adolescent Psychiatry	4 hours/wk for 12 months	**PSTP Seminar for full year**
Longitudinal Adult Outpatient Psychotherapy	4 hours/wk for 12 months	

Additional Benefits: Funding **up to $50,000** to use during your residency for approved research projects and to facilitate your career development will be provided by the department.

The University of Maryland Physician Scientist Training Program (PSTP) Residents

Mark Kvarta, M.D., Ph.D. – 2021 PSTP Graduate

Assistant Professor of Psychiatry and Physiology

University of Maryland School of Medicine

PSTP Project: Stress, Genetics, and Neuroimaging of Depression in Serious Mental Illness
PSTP Faculty mentor: L. Elliot Hong, M.D.

Depression is a devastating, deadly, and costly burden of psychiatric disease. It is most commonly treated, often unsatisfactorily, by manipulating synaptic serotonergic tone, yet the key substrates that mediate antidepressant efficacy are largely unknown and a better understanding of the etiology and neurobiological pathophysiology is needed. One thing is clear, stress plays a role underlying depressive symptoms, with a stress-diathesis model of environment at critical timepoints interacting with genetic vulnerability to contribute to illness. Expanding on my doctoral thesis background in studying the role of chronic stress in perturbing synaptic function in key corticomesolimbic brain areas in depression, I worked with Dr. Hong to train in clinical and translational research in this area, gaining skills in genetics, functional neuroimaging, and stress-based tasks in human participants. I have continued to develop my research projects in these areas now as a faculty member at University of Maryland School of Medicine and the Maryland Psychiatric Research Center, while also attending in the academic outpatient clinic.

My PSTP experience:

As an MD/PhD trainee graduating from the University of Maryland, I knew firsthand the strength of neuroscience research housed at the University of Maryland SOM, the key attraction that brought me here over a decade ago. The training towards clinical excellence is only further sharpened by the unique partnership with Sheppard-Pratt Hospital as a joint residency. The formal research track in psychiatry through the PSTP is a unique opportunity to bridge these two strengths of clinical and research distinction. The outpouring of support and enthusiasm as a research-track resident I constantly enjoyed in the track was remarkable, even more so for the broad scope of clinical training taking place in tertiary, state, private and community hospitals, forensic settings, psychotherapy offices, substance abuse clinics, and emergency rooms. I was fortunate to have developed mentorship from faculty of all interests and experience, from purely clinical to purely research and everywhere in between, extending well beyond the mentorships formally arranged. The dedicated research time and close research mentorship were keys to my research productivity and success during residency. It is clear there is a shared vision to advance psychiatry through development and translation of cutting-edge neuroscience with a new generation of biological psychiatrists.

Gustavo C. Medeiros, M.D. – 2021 Graduate

Mood Disorders Fellow at The Johns Hopkins University School of Medicine

Projects: 1) Impact of psychiatric comorbidities in antidepressant efficacy treatment with ketamine and esketamine: A meta-analysis; and 2) Too much stress; a critical assessment of the use of animal models of stress to study depression.

Primary mentor: Todd D. Gould, M.D.

I am currently involved in two projects. The first one is a meta-analysis assessing the impact of psychiatric comorbidities in antidepressant response with ketamine and esketamine. It is widely known that MDD is often accompanied by other psychiatric comorbidities, which tend to further complicate its treatment. There are some intriguing findings in the ketamine/esketamine literature suggesting a more substantial response in individuals with personal or family history of alcohol use disorder and anxiety comorbidities when compared to individuals without these comorbidities. However, it is still unclear if a broader and systematic review of the literature will support whether some patients may respond more favorably to one over the other. Therefore, our project will answer the following question: Does personal and/or a family history of psychiatric comorbidities (such as alcohol use disorder, substance use disorder, anxiety disorders, post-traumatic stress disorder, personality disorders, etc.) moderate the antidepressant efficacy of ketamine or esketamine?

Our second project is a review of current animal models of depression and the potential excessive reliance on stress-based models. Pre-clinical research is vital to improve the understanding of the physiopathology of MDD but it is surrounded by misconceptions regarding its strengths and limitations. A common misconception in the existence of *animal models of MDD* since MDD in humans is very unique and heterogeneous disorder that cannot to be fully replicated in other species. Animal paradigms model a specific aspect of MDD, and most of them are stress models where depression-like arise secondary to despair and hopelessness. Our review critically examines current animals used to study depression.

My PSTP experience:

Prior to my fourth year I transferred to the PSTP from a similar research track residency at University of Texas Southwestern Medical Center. My experience at the University of Maryland has been very positive. There is a strong interest in developing trainees with a research background, and the fact we have protected time for research and great support from faculty facilitates and expedites our research projects. I am working on reviews and meta-analyses and the resources available are considerable including easy access to Librarians/Informaticians, free access to systematic review software, and logistical support.

The highlight of my experience has been working with my mentor. Dr Gould is a knowledgeable, encouraging and approachable mentor who truly wants the development of his trainees. He has an amazing research network and is very efficient in connecting us with other investigators when needed. Dr Gould is definitely a great role model and I am sure our collaboration will continue beyond my time as a trainee at the University of Maryland.

Eric Luria Goldwaser, D.O., Ph.D. – PGY4 PSTP Resident

Project: Development stress and blood-brain barrier integrity in schizophrenia.

Primary mentor: Elliot Hong, M.D. and Peter Kochunov, Ph.D.

Secondary mentor: Scott Aaronson, M.D.

Endothelial cell monolayers are shared within the body's many vascular systems. A peripheral assessment may provide surrogate information on the blood-brain barrier (BBB) endothelial function in schizophrenia. My doctoral research project was focused on the assessment of endothelial dysfunction in Alzheimer's disease at the molecular and cellular level of the BBB. This current project will extend my prior research experiences in BBB endothelial integrity to schizophrenia at the clinical biomarker level during my PSTP training. The primary goals of this project are to: 1) test the central and peripheral endothelial integrity in schizophrenia which can be assessed with state-of-the-art neuroimaging for BBB integrity, ophthalmologic tools for blood-retina barrier function, and peripheral endothelial assays, and 2) ascertain developmental insults as a significant contributor to the endothelial dysfunction in schizophrenia. Neurocircuitry involved in aberrant processing and connectivity may further be explored at the junction between perfusion and metabolism utilizing various diffusion MRI sequences, and to carve out putative targets for non-invasive neuromodulation.

My PSTP experience:

Clinically, what was important to me in a residency program was that I would develop my interest that drew me to psychiatry initially, insight-oriented psychotherapy. My interests in research have grown from the more basic and translational neuroscience level using animal models and cell culture into human, clinical applicability. My background work was in blood-brain barrier damage in the context of neurocognitive and neuropsychiatric disorders, namely Alzheimer's disease and post-operative delirium, which has developed into an interest in neuroimaging tools to investigate the neurovascular unit on a structural and functional level. Since the beginning of my PGY-1 year, the level of support and encouragement as part of the PSTP has been nothing short of exceptional. Importantly, the funding for a serious research project is available and accessible, the mentorship and collaborations are rich and meaningful, and the protected time to conduct the research is real, from the start. More than anything, however, I find myself having developed a project that I am passionate about, and that I am eager to build the rest of my clinical neuroscience career on. My goals are to develop the skills needed for a robust clinical trial assessing the neuroanatomy of behaviors, neuroimaging biomarkers of psychotherapeutic interventions, and carving out neuromodulatory circuits amenable to non-invasive assays and brain stimulation as a possible adjuvant to psychotherapy.

Andrew van der Vaart, M.D., Ph.D. – PGY2 PTSP Resident

Project: Neuroimaging of Delusions in Schizophrenia: Neural Circuits as a Bridge from Genes to Specific Clinical Subphenotypes

Primary mentor: Elliot Hong, M.D.
Secondary mentor: Seth Ament, Ph.D.

Delusions are a prominent positive symptom of schizophrenia and other psychotic disorders, but the mechanism is not well understood. While it is theoretically possible that a single common pathway underlies all delusions and has merely escaped current detection methods, evidence to date points to the more likely scenario of distinct pathways underlying varied delusional states. To this end, my project seeks to empirically subcategorize delusions and identify corresponding neural circuits and genetic architecture. Among patients with schizophrenia spectrum disorders (SSD), we use the Peters Delusion Inventory (PDI) to assess delusions of multiple types (e.g. paranoid, grandiose, thought insertion/ broadcasting/ withdrawal). Delusion subtypes are then identified with principal component and cluster analyses of responses to the PDI. White matter changes corresponding to distinct delusion subtypes will be investigated via structural MRI. Subsequent task-based fMRI will allow for further delineation of functional connectivity during specific delusion-relevant perceptual tasks. Additionally, genotyping of schizophrenia risk-conferring polymorphisms will be used to assess differential association of individual genetic and polygenic risks with delusion subtypes, and potential genetic mediation of corresponding neuroimaging findings. I believe that mechanistic insights from these studies will contribute to resolving a major problem in psychiatric diagnosis and treatment: the likely etiological heterogeneity of broad diagnostic labels, i.e. "schizophrenia."

My PSTP experience:

I became interested in the University of Maryland PSTP program because of its combined strengths in research and clinical training. The Sheppard Pratt hospital is of world-historic significance in psychiatry, and the Maryland Psychiatric Research Center is a leader in current understanding of psychiatric neuroscience, particularly schizophrenia. I came to this institution with a background primarily in the neurobiology and genetics of addiction, with a dissertation on the molecular pharmacology of ethanol as it relates to risk genes for Alcohol Use Disorder in lab models. During the clinical years of medical school, I became increasingly interested in the phenomenology of psychotic disorders and gained some experience in clinical psychiatry research. When I first came to the MPRC I realized it is truly, not just theoretically, positioned in the space between basic neuroscience and clinical psychiatry. I was upfront about my goal of gaining expertise where I was so far naïve: structural and functional MRI. This was met with unwavering support from the program, faculty, and upper-level residents. Not only that, but I was encouraged to ask my own questions and design my own project, with practical mentorship support. Dedicated research time (and funding) allows this to happen. Such a level of freedom is something that can be hard to even know how to seek out, but is invaluable in research training.