



Message from the Director Dr. John Wherry, PhD



*Chair, Department of Systems
Pharmacology & Translational
Therapeutics*

*Richard and Barbara Schiffrin President's
Distinguished Professor*

*Director, Institute for Immunology and
Immune Health (I3H)*

*Co-Program Leader, Immunobiology
Program, Abramson Cancer Center*

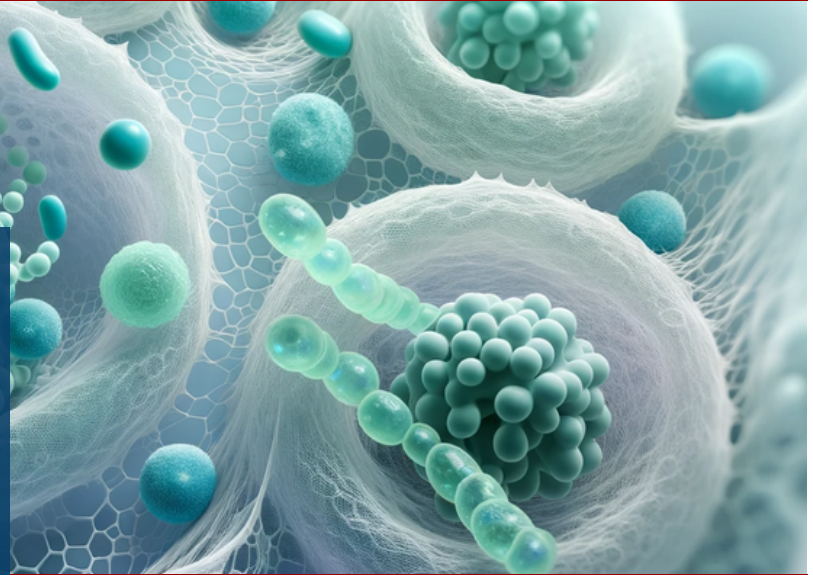
*Co-Director, Parker Institute for Cancer
Immunotherapy*

*Director, Colton Center for Autoimmunity
Consortium*

Welcome to the first edition of the Penn Medicine Institute for Immunology and Immune Health (I3H) newsletter! We're thrilled to launch this endeavor to keep our I3H community current with the latest Immunology community advances and events. In this issue, we proudly spotlight the growing Colton Center for Autoimmunity. We also profile the groundbreaking research of our esteemed immunology faculty, including our recent pilot grant awardees.

Mark your calendars for three key events: the Dirty Mice Symposium on March 6th, the Lynch Syndrome Symposium on March 11th and the Colton Center for Autoimmunity Retreat on April 30th. Each of these gatherings promises to be not only enlightening but also inspiring.

We hope you enjoy this newsletter and look forward to connecting with you at our upcoming gatherings and celebrations!



Upcoming Events 2024

- **Dirty Mice Symposium** – March 6 – *Smilow Center for Translational Research*
- **Lynch Syndrome Symposium** – March 11 – *Smilow Center for Translational Research*
 - Keynote Speaker: [Dr. Matthias Kloor](#)
- **Colton Center for Autoimmunity Retreat** – April 30 – *The Villanova Conference Center*
- **Year in Review Symposium** – June 6 – *Smilow Center for Translational Research*
 - Keynote Speaker: [Dr. Kizzmekia Corbett](#)
- **Colton Center for Autoimmunity Consortium Retreat** – July 15-17 – *Lakota Oaks*



2023 I3H Symposium Recap

Lynch Symposium Recap – The 2nd annual Lynch Syndrome Symposium was held this year on March 22, which was also Lynch Syndrome Awareness Day. We had more than 300 registrants for the symposium, with a fantastic group of attendees both in-person and virtually. The patient-focused talks in the morning included breakout sessions focused on both women's and men's health, and there was also a riveting hour-long multidisciplinary panel discussion that answered numerous questions from attendees. After multiple lunch breakout sessions, our Borrelli Family Keynote Talk was delivered by Dr. Eduardo Vilar Sanchez from MD Anderson Cancer Center. The talk was focused on opportunities for vaccine development in Lynch syndrome. The afternoon was research focused with talks ranging from exploring the impact of psychological stress on colorectal cancer in Lynch syndrome, to outcomes of genetic testing among all individuals with colorectal cancer, to the results of universally performed gastric biopsies in patients with Lynch syndrome who are undergoing upper endoscopy.

Year in Review Recap – The 2023 I3H Year in Review Symposium drew a crowd of more than 150 participants on June 7th. Our distinguished keynote speaker was Dr. Daniel Mucida, a renowned expert in Immunology, Virology, and Microbiology, serving as the Head of the Laboratory of Mucosal Immunology at the Rockefeller University. The event featured seven internal speakers, five of whom are recipients of prestigious awards.

Cancer Retreat Recap – The Clinical Trials Retreat of 2023 took place on July 13th, attracting an audience of about 50 participants. During the event, 10 internal speakers shared their work through brief 10-minute presentations, allowing ample time for engaging Q&A sessions. Drs. Marco Ruella, Laura Vella, and Warren Pear served as the hosts for the retreat.

Year in Preview Recap – The 1st Annual 2023 I3H Year in Preview Symposium saw a strong turnout with more than 150 attendees. Eight of our recently joined faculty members presented their research and future plans during the event. Following the symposium, a student reception provided an opportunity for interaction.

Faculty Spotlight

Hajera Amatullah, PhD

Assistant Professor of Pharmacology

Affiliate Member, Center of Excellence in Environmental Toxicology

Member, PENN-CHOP Lung Biology Institute

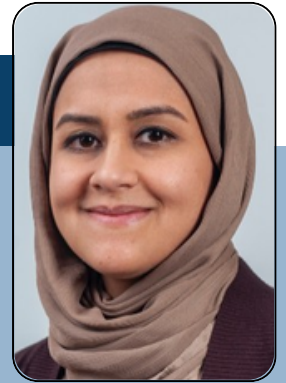
Member, PENN Epigenetics Institute

Hajera Amatullah, PhD is one of the most recent additions to Penn's growing immunology community. Dr. Amatullah received her BSc, MPH, and PhD from the University of Toronto before moving to Boston to pursue postdoctoral research at Harvard Medical School. She is now starting her own research group here at Penn.

Dr. Amatullah came to immunology through an interest in biochemistry and environmental science, and her work continues to focus on the intersection between immunology and environment. "There is rapid rise in the prevalence of various complex immune disorders like asthma, allergies, and diabetes," she notes. "One of the key research interests of my lab is how epigenetic processes, which lie at the nexus of gene-environment interaction, contribute to these immune disorders." Increased environmental stochasticity under climate change is also exposing our immune system to unpredictable stressors from geographic redistribution of existing and novel allergens, pathogens, and anthropogenic pollutants, Dr. Amatullah explains, so a secondary focus of her research is on the impact of these factors on the innate immune system, particularly on innate immune memory, and the implications for systemic disease development.

Ultimately, Dr. Amatullah hopes that her lab's basic scientific insights will lead to new therapeutics and better clinical outcomes. "There's been a lot of appreciation lately of how dysregulated epigenetic enzymes or epigenetic landscapes are the sentinel events in cancer," she says, "but our understanding of their contribution in immune-mediated diseases is fairly limited, and the potential for therapeutic intervention remains untapped."

"Penn has this amazing immunology community, which broadly spans fundamental basic immunology all the way to innovative translational science," she remarks. "I've always been interested in doing multidisciplinary research, and it's exciting to be part of this cutting-edge research community where I'm able to incorporate expertise from faculty across disciplines. I feel like people are rooting for my success."



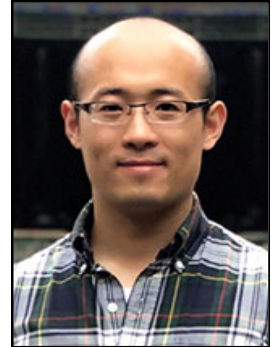
Research in Autoimmune Diseases and Cancer Immunotherapy

The Institute of Immunology and Immune Health (I3H), the Colton Center, and the Parker Institute for Cancer Immunotherapy are proud to highlight four remarkable research projects that are at the forefront of autoimmune and cancer immunotherapy studies. These projects are not only expanding our understanding of the fundamental mechanisms of complex diseases, but paving the way for novel diagnostics and treatments.



Dr. Montserrat Anguera's pioneering research on "High-Dimensional Immune Profiling of Sex Differences in Systemic Sclerosis," funded by I3H, is a novel study focusing on sex-specific immune system differences in Systemic Sclerosis. While women are more likely to develop the disease, it is more severe in men. Dr. Anguera's work is instrumental in identifying immune signatures associated with disease severity and progression, providing a gender-focused perspective that may guide future research.

Dr. Leyuan Ma, in collaboration with the Colton Center, is working on a groundbreaking "CHO-cell based surface display platform for comprehensive serological profiling." Dr. Ma's research utilizes a high-throughput system that leverages CHO cells to present human proteins, thus profiling autoantibodies more effectively. The integration of CRISPR-Cas9 technology for library construction holds great promise for the future of autoimmune disease diagnosis and treatment.



Dr. Roddy O'Connor's research examines the intricate connection between metabolic health and immune system efficacy, particularly in T cells, which are pivotal in combatting conditions like cancer and metabolic diseases. Dr. O'Connor aims to develop new metrics for assessing CAR T cell potency, thereby enhancing immune health and treatment success. This innovative work offers hope for integrating these findings into standard assays, improving the therapeutic landscape for serious diseases.

Dr. David Allman's research on multiple myeloma seeks to understand how specific immune system characteristics—particularly the role of T and B cells—correlate with the timing of relapse in patients in early remission. This approach could lead to more personalized therapy choices, enhancing patient outcomes. The findings have the promise of significantly impacting clinical decisions for patients facing the imminent threat of relapse.



Colton Center Symposium Recap



The Colton Center for Autoimmunity at Penn launched its inaugural Symposium on April 18 and followed with an offsite Colton Consortium Symposium on July 17-19, 2023. This latter event saw interdisciplinary experts from Yale, NYU, Tel Aviv University, and Penn convening to exchange knowledge and explore recent breakthroughs in autoimmune research. Sessions covered the effects of interferons on autoimmune diseases, the advancement of CAR T-cell therapy, and the role of personalized medicine in rheumatic disease management. Additional breakout sessions delved into CAR T-cell potential, AI's transformative role in research, and strategies for patient-specific interventions. The "Flash Talks" sessions provided concise, high-impact presentations on precision immunotherapies, single-cell technology applications, advanced diagnostic imaging, and the identification of new therapeutic targets. Together, these symposiums showcased a wealth of innovative research, fostering a collaborative approach to addressing the complexities of autoimmune diseases.

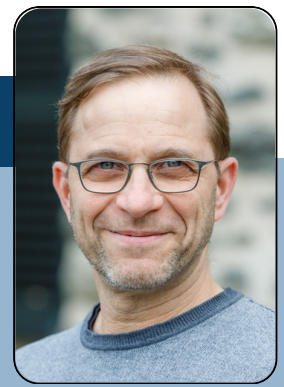
Faculty Spotlight

Amit Bar-Or, MD

Director, Center for Neuroinflammation and Neurotherapeutics

Chief, Multiple Sclerosis Division

Melissa and Paul Anderson President's Distinguished Professor



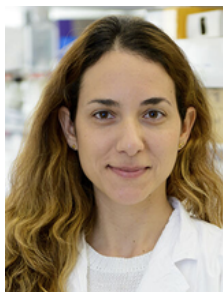
Amit Bar-Or, MD, FRCPC is the Melissa and Paul Anderson President's Distinguished Professor of Neurology at the Perelman School of Medicine, where he directs the Center for Neuroinflammation and Experimental Therapeutics and serves as Chief of the Division of Multiple Sclerosis and Related Disorders. Dr. Bar-Or first became interested in MS in part because of the early life onset compared to most neurological conditions. He saw an opportunity to develop interventions that could make a significant and long-lasting impact on health outcomes for young people.

Dr. Bar-Or's research over the last twenty-five years has reshaped our understanding of MS, highlighting the roles of both peripheral and central nervous system cellular interactions in its progression. He discovered that B cells regulate T cells and myeloid cells and that B cell depletion can prevent MS relapse. His lab's innovative work includes developing a precision neuroimmunology platform, which utilizes single-cell profiles for a deeper understanding of MS and to evaluate treatment responses. This platform has been instrumental in advancing new medications that target both relapsing and progressive MS.

Dr. Bar-Or sees a bright future for MS research and treatment. To get there, he says, we must embrace the complexity and non-linearity of the immune system and its interactions with the nervous system. We must also recognize the heterogeneity that exists across patients with the same diagnosis, and start thinking laterally across diseases. "The Colton Center for Autoimmunity creates a unique environment where experts, although sharing a common language, come with diverse specific interests. This aligns perfectly with a concept I'm passionate about: 'How can the insights from my area of study inform your work, and vice versa? What can we learn from each other's conditions?'" When it comes to MS, he says, "I can think of no better place than Penn and CHOP to do this type of interactive, multidisciplinary, and collaborative research and care."

2023 Inaugural Colton Cohort Pilot Initiatives

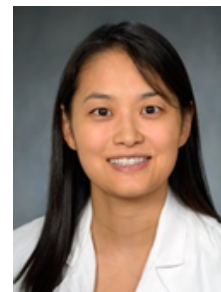
We have awarded three cohort pilot grants to advance research in autoimmune health by designing and creating new patient cohorts. Each of these pilots is strategically designed to fill critical knowledge gaps in our understanding of the immune system's role in complex diseases. Collectively, these projects represent a significant step towards more effective, individualized treatments, enhancing the quality of life for patients.



Dr. Maayan Levy will explore the hypothesis of viral persistence in Long COVID by exploring chronic inflammation signatures and applying high-dimensional phenotyping in a patient cohort.



Dr. Blanca Himes aims to recruit patients and healthy controls to compare immune profiles and assess the impact of biologic treatments on patient immune changes.

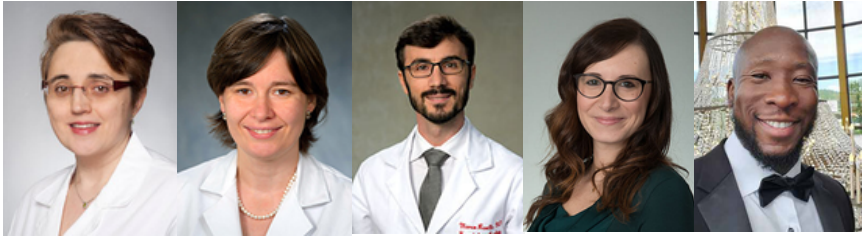


Dr. Rennie Rhee will investigate molecular changes in the upper airway mucosa and circulating immune cells to predict clinical relapse in ANCA-associated vasculitis, using an existing cohort for longitudinal deep immune profiling.

Exciting Advances: Announcing Our Second Cycle of Colton Center Pilot Award Recipients

As we continue our journey towards groundbreaking discoveries in immunology, we are delighted to share the names of the awardees from our second cycle of Colton pilot grants. These individuals are at the forefront of pioneering research, and their projects hold great promise for advancing our understanding of immune-mediated diseases.

Our New Awardees



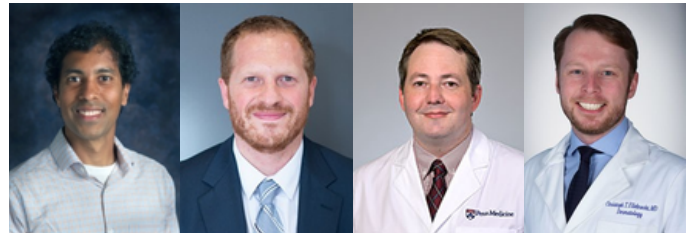
(From Left to Right)

- **Dr. Katalin Susztak** will examine the complexities of IgA nephropathy, exploring potential targeted therapies with multi-omics analyses.
- **Dr. Daria Babushok** seeks to unravel the autoimmune pathogenesis behind acquired aplastic anemia, aiming to craft an in vitro disease model.
- **Dr. Marco Ruella** is developing cutting-edge cellular therapies to combat pathogenic B-cells in Systemic Lupus Erythematosus.
- **Dr. Michela Locci** is pioneering a monoclonal antibody approach against activin A to treat Rheumatoid Arthritis.
- **Dr. Cornelius Taabazuing** is focused on a universal cure for inflammasomopathies, exploring the cytokine maturation process during inflammasome activation.

Reflecting on Our Inaugural Year

- **Dr. Vijay Bhoj** spearheaded the development of an engineered T cell immunotherapy aimed at curing Autoimmune Thrombotic Thrombocytopenic Purpura.
- **Dr. Benjamin A. Abramoff** analyzed the role of autoantibodies in patients suffering from the long-term sequelae of SARS-CoV-2 infection.
- **Dr. Jonathan J. Miner** innovated with therapies targeting nucleic acid sensors to treat various autoimmune diseases.
- **Dr. Christoph T. Ellebrecht** applied genome-wide CRISPR screening and AI to identify autoimmune T cell treatment targets.

(From Left to Right)



2023 Colton Fellowship Spotlight

The Colton Fellowship has been granted to two promising research initiatives in autoimmune studies, led by innovative and dedicated junior researchers who are emerging as experts in their respective fields.



Sokratis Apostolidis, MD
Instructor of Medicine
Department of Medicine
Division of Rheumatology

Biomarker discovery for early prediction of autoimmunity in immunotherapy patients through deep immune profiling and temporal graph convolutional networks

This project focuses on addressing immune-related adverse events (irAEs), Associated with cancer immunotherapy, irAEs are serious autoimmune toxicities that can lead to discontinuation of treatment or reduced effectiveness of immunotherapy. Leveraging a comprehensive dataset from the University of Pennsylvania, including clinical assessments and multi-level immune profiling, the team employs advanced machine learning and AI techniques, particularly temporal graph machine learning, to analyze complex data. The goal is to develop a predictive model to identify irAEs early, assess their occurrence, and discover potential biomarkers for early detection and intervention, ultimately improving patient outcomes in cancer immunotherapy.



Joseph Romano, PhD
Assistant Professor
Department of Biostatistics,
Epidemiology and Informatics

An integrative multi-modal approach to define and diagnose pediatric autoimmune neurological disorders

This project on Pediatric Autoimmune Neurological Disorders (pediatric-ANDs) focuses on a group of autoimmune disorders affecting the central nervous system, which cause acute or chronic neurological disabilities in children, with an incidence of 1-5 cases per 100,000 children annually. These disorders pose challenges in clinical diagnosis and treatment due to the varied immune mechanisms involved. The team plans to employ integrative analyses using flow cytometry and scRNA-seq data to construct a detailed neuroimmune landscape of pediatric-ANDs. This approach aims to clarify the diverse immune mechanisms underlying these disorders and to advance the ability to predict diagnoses in patients with previously unidentified neuroimmune conditions.



Rui Li, MD
Research Associate
Department of Neurology



Mengyuan Kan, PhD
Research Associate
Department of Biostatistics,
Epidemiology and Informatics

Celebrating Success: Faculty Members Awarded for Outstanding Contributions



Dr. Katalin Karikó and Dr. Drew Weissman, Penn's Historic mRNA Vaccine Research Team, were awarded the 2023 Nobel Prize in Medicine

These faculty members have been recognized for their outstanding contributions, receiving prestigious awards that reflect their impactful contributions to the field.



Dr. Yeong Shin Yim was selected as one of the four 2023 Suh Kyungbae Science Foundation (SUHF) Fellowship recipient



Dr. Carl June was named a recipient of the 2024 Breakthrough Prize in Life Sciences for the development of chimeric antigen receptor (CAR) T-cell immunotherapy



Dr. Robert Vonderheide was one of five Penn faculty elected to the National Academy of Medicine in recognition of his work in developing novel cancer therapeutics



Dr. John Wherry was recognized with the 2023 AACR-Cancer Research Institute Lloyd J. Old Award in Cancer Immunology and was inducted into the American Academy of Arts and Sciences



Dr. David Fajgenbaum celebrates 10 years in remission and a decade of influential research. His inspiring journey is now being adapted into a motion picture

