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# PROGRAM TO ADVANCE PHYSICIAN- SCIENTISTS AND TRANSLATIONAL RESEARCH (PAPSTR)

## 2023 PROGRESS REPORT





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# OVERVIEW AND EXECUTIVE SUMMARY

The School of Medicine Program to Advance Physician-Scientists and Translational Research (PAPSTR) aims to advance the careers of physician-scientists and improve the impact of translational and interdisciplinary research at the University of Colorado Anschutz Medical Campus. The overall goals of PAPSTR are to expand the training pipeline for physician-scientists, improve retention, enhance recognition, and foster the development of translational, interdisciplinary, and programmatic research. To achieve these goals PAPSTR has developed research training programs, career development opportunities, and grant support programs for physician and PhD scientists that focus on trainees, early and established faculty, translational research, and collaborations between MD and PhD scientists, and in aggregate, serve to establish a community among translational investigators. This program was established in late 2021 and is supported by the School of Medicine.

In 2023, the second full year of the program, we have continued our focus on a variety of initiatives to support physician-scientists and translational investigators at all career levels. We now have a full spectrum of research programs focused on students, trainees, early career MD and PhD investigators, and established scientists focused on programmatic research. Sustaining the careers of physician-scientists requires collaboration among a broad group of MD and PhD investigators and ongoing opportunities in translational and interdisciplinary research. This year we have brought to fruition the programs we launched in our first year. We have doubled the number of funded investigators in our two flagship programs focused on early career faculty (TRSP) and programmatic research (ASPIRE), and renewed support and expanded the scope of our NHLBI supported StARR research training program for housestaff in Medicine, Pediatrics, and Surgery.

One of the highlights of 2023 was the impact of ASPIRE (Anschutz Programmatic Incubator for Research) Program, our incubator/accelerator program for programmatic research. We made new awards to 4 teams of investigators with promising collaborations in a diverse array of medicine and science, including scientists from 8 departments in the School of Medicine. This brings the total number of teams currently funded to 8 research programs. In addition to the funding provided by ASPIRE, we have actively mentored and provided guidance to each of these research teams at least on a quarterly basis. Two of these teams have already submitted programmatic grant applications in 2023, two other teams are preparing their NIH P01 applications for 2024. As evidence of the momentum and reputation of the ASPIRE Program, the Chancellor's Office and the Cancer Center have individually partnered with PAPSTR to expand the number and scope of ASPIRE awardees for the 2023 grant cycle, with the Cancer Center generously funding one of our four 2023 awarded teams.

We have also made significant strides in other initiatives, including the:

- Development of a 2-year post-baccalaureate research training program for students pursuing careers in medicine and science,
- Renewal and expansion of our NHLBI supported StARR program for housestaff in Medicine, Pediatrics, and Surgery,
- Integration of the Medicine, Pediatric, and Surgery Physician-Scientist Training Programs,
- Implementation of a curriculum for monthly interdepartmental discussions with physician-scientists focused on medical students, MSTP and PSTP trainees, and scholars in our Translational Research Scholars Program (TRSP),
- Transition and expansion of the Department of Medicine Outstanding Early Career Scholar Program (OECSP) to the expanded SOM Translational Research Scholars Program (TRSP),
- Development of metrics to evaluate programs and track accomplishments, and Initiation of a communications plan to reach investigators across campus.

Future challenges and opportunities include:

- Institutionally standardize incentives for programmatic research,
- Greater exposure of medical students and clinical trainees to physician-scientists,
- Recognition of research accomplishments of translational scientists in the SOM and across campus,
- Establish CU as a center of excellence for physician-scientists, and
- Establish sustainable support through philanthropic funding of PAPSTR.



**David A. Schwartz, MD**  
**Director**  
**Distinguished Professor of Medicine and Immunology**



**Jennifer Kemp, PhD**  
**Associate Director**



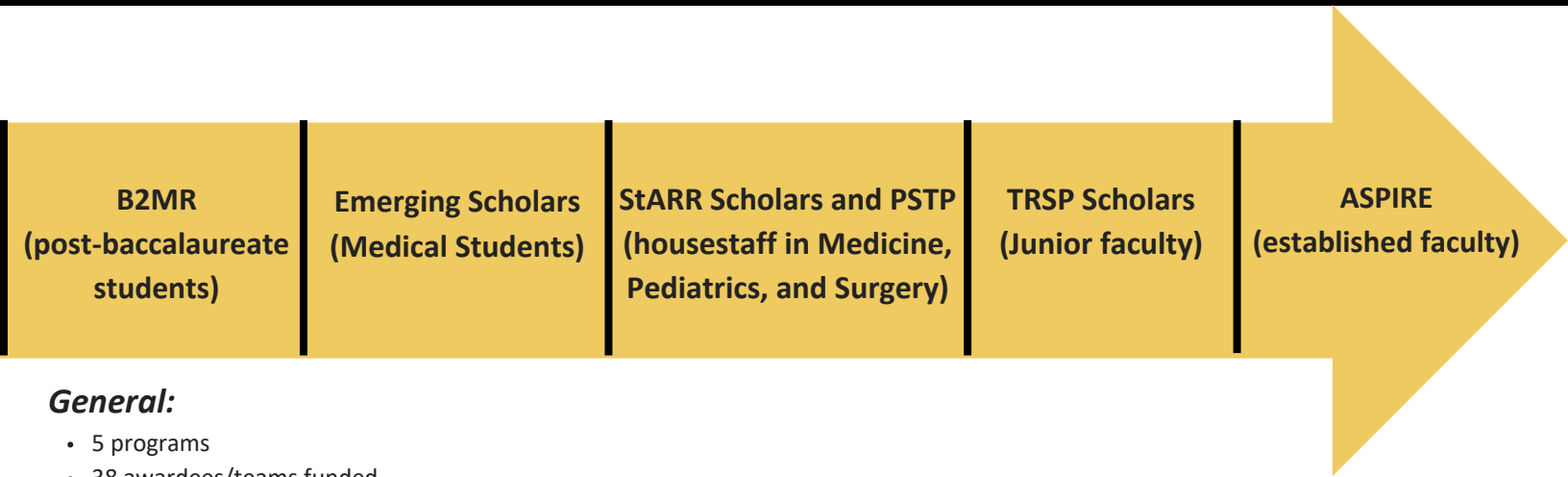
**Paul Wood, MA**  
**Program Manager**



**Sarah Miller**  
**Business Coordinator**

***Contributing Scientists: Drs. Laura Buccini, Sean Colgan, Eduardo Davila, and Lori Sussel***  
***Contributing Staff: Ms. Erin Calhoun, Ms. Diane Ladell, Ms. Jamie Kutner***

# BY THE NUMBERS



## **General:**

- 5 programs
- 38 awardees/teams funded
- 2 programmatic research applications submitted
- ~ 100 publications in 2023
- \$1,780,406 committed as of November 30, 2023

## **B2MR:**

- 18 applications received as of January 2024

## **Emerging Physician Scientists:**

- 4 total scholars
- 1 new scholar awarded in 2024

## **StARR:**

- 4 new scholars awarded in 2024
- 3 publications in 2023

## **TRSP:**

- 13 awardees
- 12 NIH and VA grants in 2023
- 17+ publications in 2023

## **ASPIRE:**

- 8 teams awarded
- 37 investigators total
- ~ 90 publications in 2023
- 2 programmatic research applications in preparation



# SECTION I

## Education, Training, and Career Development

### Post-Baccalaureate Program: B2MR

We developed the Baccalaureate to Medicine and Research Program (B2MR) as a two-year program that will provide a unique training opportunity for recent baccalaureate graduates who are interested in applying to medical school and desire additional experience in biomedical research. The B2MR targets groups traditionally underrepresented (URIM) in the biomedical research enterprise. Trainees will conduct mentored research on the Anschutz Medical Campus to expand their research skills. They will also participate in professional and career development activities that are designed to support their application to medical school.

B2MR is being developed as a partnership with PIKE-PREP, a longstanding program on campus led by Dr. Eduardo Davila that provides a training opportunity for post-baccalaureate students who need more training and experience before applying to graduate school. B2MR will serve as the pre-MD (or pre-MD/PhD) counterpart to PIKE-PREP (pre-PhD). PIKE-PREP typically recruits 8 scholars each year, and B2MR plans to recruit up to 2 scholars annually. We will combine the trainees into a single cohort for most training and curriculum, except for any graduate school/medical school specific topics. For our first B2MR cohort in 2024, applications are due in March 2024 for a July 2024 start date, and we will assemble a panel of faculty from across campus to review applications. Estimated support for each student totals \$50K/year for two years. Total cost of the program will be \$200K/year once we have our full complement of trainees. As of January 2024, we have 18 applications for this program.

### Medical Students: Emerging Physician-Scientists Program

PAPSTR provides funding for the Emerging Physician-Scientist Program, which is led by Dr. Elizabeth Gundersen, associate professor of Hospice and Palliative Medicine at the University of Colorado. In 2022, PAPSTR supported three students (Caitlin Blades, Shaquia Idelett-Ali, and Gordon Matthewson). In 2024, Anna Ha will be joining the program. Support entails up to \$10,000 each (\$2,500 for travel to a national conference or workshop, plus a stipend of \$7,500). These medical students were selected by a committee process through a merit-based review and are involved in mentored research. The students and their mentors meet quarterly with Dr. David Schwartz.



Caitlin Blades



Anna Ha



Shaquia Idelett-Ali, PhD



Gordon Matthewson

# Housestaff Research Program- Colorado StARR program in Medicine, Pediatrics, and Surgery

The StARR program is a residency training program for physician scientists in medicine, pediatrics, and surgery.

The goal of the Colorado StARR (Stimulating Access to Research in Residency) Program is to recruit, train, and retain outstanding clinician investigators focused on translational research in heart, lung, and blood disorders. This Program is supported by an NIH grant (NHLBI: R38-HL143511). The program provides a career-defining research experience by leveraging our successful clinical and research enterprise that includes:

- outstanding residents undergoing rigorous clinical training
- diverse spectrum of accomplished and experienced mentors
- environment of state-of-the-art facilities and resources
- successful fellowship and collaborative training programs in heart, lung, sleep, and blood disorders

Each year, the program selects 3-5 residents to support and engage in mentored research for 1-2 years during their housestaff training. The StARR program protects 80% time for research training. Established in 2020, the StARR program is supported by an NIH NHLBI R38 grant, led by MPIs Drs. Schwartz, Buttrick, and Abman. The program is also supported in part by the Departments of Medicine, Pediatrics, and Surgery.

Our NHLBI supported StARR Program was successfully renewed in 2023 (R38-HL143511). We received funding for five additional years of programmatic support for four scholars each year (total award is \$2,131,745).

To date, the program has made 11 awards, including residents from Medicine, Pediatrics, and Surgery:

- Previous trainees: Drs. Jayce Pangilinan (Medicine), Elizabeth McGinn (Pediatrics), August Longino (Medicine) Alexander Heilman (Medicine), John Iguidbashian (Medicine) and Isabel Hardee (Pediatrics)
- Current trainees: Drs. Lindsay Thomas (Pediatrics), Natalie Longino (Medicine), Katarina Leyba (Medicine), Jack Zakrzewski (Surgery), Kellen Gil (Medicine), and Kaitlyn McLeod (Medicine)
- Future awarded trainees: Drs. Caitlin Eason (Surgery), Ryen Ormesher (Medicine), Bo Chang Wu (Surgery), and Lauren Maloney (Pediatrics)



**Peter Buttrick, MD**  
*Senior Associate Dean for  
Research Affairs  
S. Gilbert Blount Endowed Professor*



**David A. Schwartz, MD**  
*Distinguished Professor of Medicine  
and Immunology*



**Steve Abman, MD**  
*Director, Pediatric Heart-Lung Center  
Founder and co-director,  
Pediatric Pulmonary Hypertension Program  
Professor of Pediatrics*

# Newly Awarded Scholars



**Caitlin Eason, MD**  
Department of Surgery  
*Effect of miRNA's and EV's on angiogenesis*



**Lauren Maloney, MD**  
Department of Pediatrics  
*Age-specific differences in the immune response to obstructive cholestasis*



**Rylen Ormesher, MD**  
Department of Medicine  
*Biomarkers in COPD predisposing to pulmonary hypertension*

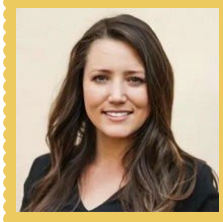


**Bo Chang "Brian" Wu, MD**  
Department of Surgery  
*Protective role of mitochondrial transplantation in an in vivo murine middle cerebral artery occlusion stroke model*

# Current Scholars



**Kellen Gil, MD**  
Department of Medicine  
*Pro-inflammatory signaling axis in myelodysplastic syndrome (MDS)*



**Katarina Leyba, MD**  
Department of Medicine  
*Heart failure subpopulations and phenotyping*



**Natalie Longino, MD**  
Physician Scientist Training Program  
*Comparing NK cell profiles within melanoma tumors and pregnancy: Implications for novel immunotherapies*



**Kaitlyn McLeod, MD**  
Department of Medicine  
*Cardiology clinical trials and outcomes*



**Lindsay Thomson, MD**  
Department of Pediatrics  
*Proteomic profiling and comprehensive proteomic pathway mapping: a systems biology approach to cardiovascular failure and multiorgan injury following Extracorporeal Membrane Oxygenation (ECMO) in congenital heart disease*



**Jack Zakrzewski, MD**  
Department of Surgery  
*A murine heart transplant model to study therapeutic potential of SP1 delivery to donor hearts*

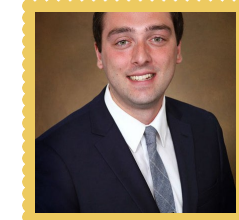
# Former Scholars



**Isabel Hardee, MD**  
Department of Pediatrics  
*Airway Molecular Endotypes and Viral Infection in Toddlers Hospitalized for Wheeze*



**Alexander Heilman, MD**  
Department of Medicine  
*Address gaps in the care of diabetes patients early after diagnosis, specifically regarding the appropriate initiation of statin medications to mitigate cardiovascular risk*



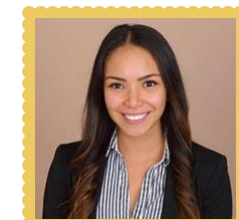
**John Iguidbashian, MD**  
Department of Surgery  
*Role of sphingosine-targeted therapies in cardiac transplantation and potential therapeutic role in preventing and rehabilitating donor organs from ischemia-reperfusion injury*



**August Longino, MD**  
Department of Medicine  
*Clinical Utility of Longitudinal Measurement of Hemodynamic Incoherence and Endothelial Glycocalyx Breakdown Among Critically Ill Patients with Early Sepsis*



**Elizabeth McGinn, MD**  
Department of Pediatrics  
*Defining developmental dysanapsis in an animal model of bronchopulmonary dysplasia*



**Jayce Pangilinan, MD**  
Department of Medicine  
*Corticosteroid effect on inflammatory profiles in severe COVID-19*



# Educational Opportunities for MSTP, PSTP, and StARR trainees...career development seminars and training

MSTP students, PSTP trainees across the campus, StARR scholars, and TRSP scholars can take advantage of a variety of offerings through PAPSTR. Over the past year, we provided educational opportunities for aspiring and accomplished physician-scientists focusing on key aspects of scientific career development, including seminars, town halls, and small group discussions. This includes a well-attended seminar series initiated in 2021 focusing on the scientific and career development aspects of translational research and team science. Topics have included mentorship, balancing clinical duties and research, grant proposal development, publication strategies, and navigating early career transitions in academic medicine. Seminars are led by faculty physician-scientists from diverse scientific fields, and topics are selected based on feedback received from those attending these discussions. These educational opportunities typically include smaller group discussions in an informal setting.

Additional offerings for MSTP students have included mentoring opportunities, along with opportunities to build and sustain community among physician-scientists through networking, social events, and scientific conferences.

### Additional topics include:

- Stories of discovery
- Women and under-represented minorities in academic medicine
- Career transitions
- Science communication with the public
- Bench to Industry
- Managing priorities - when to say no
- Team science and engaging collaborators
- Identifying and filling gaps in expertise



Several StARR scholars, MSTP students, and pulmonary and critical care medicine fellows, discussed issues involved in 'bench to industry', with Drs. Schwartz and Baler (Managing Director of Strategy & Operations, CU Innovations), at Dr. Schwartz's home in November.



## ASCI/AAP Review and Nominations

The ASCI and AAP are long-standing societies that honor the accomplishments of physician-scientists through nomination and election into each of their organizations. This process is highly competitive, and the number of ASCI and AAP members enhances the reputation of the medical center. During Dr. Schwartz's tenure as Chair of the Department of Medicine, the department supported a review and nomination process that doubled the membership of CU faculty in both the ASCI and AAP. In 2022, PAPSTR expanded this longstanding process from the Department of Medicine into a school-wide initiative. In the summer of 2023, we solicited potential nominations from departmental and divisional leadership, and we assembled a review panel of senior faculty to evaluate each nominee's potential for election to ASCI or AAP. We then facilitated the nomination process for candidates deemed to have a high potential for admission, including advice and encouragement regarding submitting a comprehensive application. In 2023, the following faculty members were nominated as a result of our review process:

ASCI: Drs. Lilia Cervantes and Michael Ho

AAP: Drs. Joshua Thurman, Michael Choncol, Cara Wilson

Results: Dr. Cervantes has been accepted into the ASCI. Results of the AAP selection process are expected in February 2024.





# Section II

## Research Programs

### Translational Research Scholars Program (TRSP)

#### Metrics at a glance:

- Total number of TRSP scholars (includes those completing the DOM Outstanding Early Career Scholar Program): 13 current scholars, 3 current OECSP scholars, 14 former OECSP scholars
- 2022: 42 LOIs from 8 departments, 6 awarded (representing 5 SOM departments)
- 2023: 55 LOIs from 9 departments, 7 awarded (representing 3 SOM departments)
- 2024: 29 LOIs from 9 departments, full applications due Feb 1, 2024

Launched in 2021, the purpose of TRSP is to foster translational research among outstanding early career investigators in the School of Medicine. The primary goal of this program is to facilitate successful early career faculty in pursuing new lines of exploration and to elevate and expand the scope of their research in translational sciences. This program is intended to support our most promising early investigators who have already demonstrated a high level of achievement and substantially advance their careers in translational research. The program is directed by Dr. David Schwartz and co-directed by Dr. Sean Colgan.

Scholars must have a research program focused on translational research and must commit 75% of their effort to scholarly activities in translational research. TRSP provides each Scholar with \$75,000 annually for up to 4 years (research support only, no scholar salary allowed). The Scholars meet monthly for 90 minutes as a group to discuss their research and career development. Each month, two scholars present their research and discuss their challenges in career development. They are advised by their peers and a group of senior physician-scientists, including Drs. Schwartz, Colgan, Aggarwal, Buttrick, Henson, Higgins, Holers, Holguin, Weiser-Evans, and others.

In the second TRSP cycle in 2023, we made 7 awards that began in July 2023, bringing our total number of TRSP scholars to 13 (plus 3 OECSP scholars from the parent program). We received 29 letters of intent from 9 departments for the 2024 cycle and expect to make at least 6 awards in 2024.

The awardees will be conducting translational research in a variety of fields. The following page lists OECSP and TRSP scholars from 2020-2023.

#### TRSP Program Co-Directors:



*Sean Colgan, PhD  
Distinguished Professor of  
Medicine/Gastroenterology*



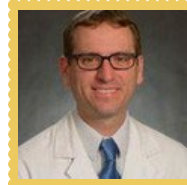
*David A. Schwartz, MD  
Distinguished Professor of Medicine  
and Immunology*



# 2020 OECSP SCHOLARS



**Sridharan Raghavan, MD, PhD**  
Associate Professor  
Department of Medicine  
*Leveraging genetic variation to improve  
type 2 diabetes prevention and care*



**Frank Scott, MD**  
Associate Professor  
Department of Medicine  
*Understanding delays in initiation of biologic therapies  
in inflammatory bowel disease (IBD)*

# 2021 OECSP SCHOLARS



**William Cornwell, MD**  
Associate Professor  
Department of Medicine  
*Advancements in Understanding of Right  
Ventricular Pathophysiology Among  
Individuals with Cardiopulmonary Disease*



**Katharina Hopp, PhD**  
Assistant Professor  
Department of Medicine  
*The metabolic state of polycystic kidneys  
is a trigger for renal T cell immune-  
suppression and consequent cyst growth*



**Christine Swanson, MD**  
Assistant Professor  
Ludeman Family Center for Women's Health Research  
*Night Shift Work and Other Novel  
Risk Factors for Osteoporosis*

# 2022 TRSP SCHOLARS



**Shanlee Davis, MD, MSCS**  
Associate Professor  
Department of Pediatrics  
*Identifying and targeting aberrant  
metabolism in Klinefelter syndrome*



**Jasper Heinsbroek, PhD**  
Assistant Professor  
Department of Anesthesiology  
*Optimizing Deep Brain Stimulation  
Treatment for Opioid Use Disorder*



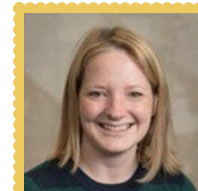
**Sujatha Jagannathan, PhD**  
Assistant Professor  
Department of Biochemistry and Molecular Genetics  
*Therapeutic target and biomarker development for  
fascioscapulohumeral muscular dystrophy*



**Hunter Moore, MD, PhD**  
Assistant Professor  
Department of Surgery  
*Treatment of Extravascular Fibrin Deposition in  
Macrosteatotic Livers to Narrow the Donor  
Recipient Gap in Abdominal Transplantation*



**Erin Schenk, MD, PhD**  
Assistant Professor  
Department of Medicine  
*Determining peripheral immune cell  
populations as markers of treatment  
response in oncogene driven lung cancer*



**Mia Smith, DVM, PhD**  
Assistant Professor  
Department of Pediatrics  
*Immunophenotyping of blood and thyroid  
gland in autoimmune thyroid disease patients*

# 2023 TRSP SCHOLARS



**Shaikh M. Atif, PhD**  
Assistant Professor  
Department of Medicine  
*Role of Aspergillus nidulans in Sarcoidosis*



**Ian Cartwright, PhD**  
Assistant Professor  
Department of Medicine  
*Dissecting neutrophil-derived mediators to promote inflammatory resolution*



**Seth Creasy, PhD**  
Assistant Professor  
Department of Medicine  
*Chrono-exercise: Time-dependent targets and mechanisms to optimize the effectiveness of exercise for treating metabolic diseases*



**Nathan A. Dahl, MD**  
Assistant Professor  
Department of Pediatrics  
*CDK12 links radiation response to PARPi sensitivity in pediatric glioma*



**Edward Lau, PhD**  
Assistant Professor  
Department of Medicine  
*Developmental contributions of RBM20-mediated dilated cardiomyopathy*



**Fredrick Rosario-Joseph, PhD**  
Assistant Professor  
Department of Obstetrics and Gynecology  
*Adiponectin and fetal islet 8 cell programming in maternal obesity*



**Fan Zhang, PhD**  
Assistant Professor  
Department of Biomedical Informatics  
Center for Health Artificial Intelligence  
*Using AI to elucidate novel pathogenic programs underlying chronic inflammatory diseases for precision medicine*

As indicators of the success of our TRSP/OECSP scholars, we note the following selected examples:

- Beth Tamburini, PhD, a former OECSP scholar (TRSP's predecessor program), who received an ASPIRE award in 2022, submitted an application in June 2023 for an NIH PPG with an interdisciplinary team (see below). The application was scored and will be prepared for resubmission in 2024. Dr. Tamburini's career trajectory is an example of how the 'pipeline' of our PAPSTR programs can help the career development and research success of scientists and physicians in the School of Medicine.
- Kristine Erlandson, MD, a former OECSP scholar, has been recognized widely for her groundbreaking work on Covid and has become a national leader in this field.
- Larry Allen, MD, a former OECSP scholar, has recently been awarded a \$7 million grant for a nationwide study on improving heart-failure treatment and was recently appointed Division Head in the Department of Medicine's Division of Cardiology.
- Sachin Wani, MD, a former OECSP scholar, has been named the inaugural director of the new Esophageal and Gastric Center of Excellence and recipient of the Katy O. and Paul M. Rady Esophageal and Gastric Center Chair.
- Kristi Kuhn, MD, PhD, a former OECSP scholar, has made substantial scientific contributions in understanding the role of mucosal immunity in autoimmunity and was recently appointed Division Head in the Department of Medicine's Division of Rheumatology.

# ASPIRE Program: Anschutz Programmatic Incubator for Research

## Metrics at a glance:

2022: 14 applications, 4 teams awarded, including faculty from 8 SOM departments and NJH; 2 have submitted programmatic applications in 2023 and the other 2 are planning to submitted programmatic applications in 2024  
2023: 17 applications, 4 teams awarded, including faculty from 7 SOM departments  
2024: 12 letters of intent received, applications due Jan 16.

The ASPIRE Program was launched in 2022 with Dr. David Schwartz as director and Dr. Lori Sussel as co-director. The goal of the ASPIRE Program is to increase submission and success of program project, center grants, and large multi-investigator programs by supporting milestone-driven collaborations between investigators across campus. ASPIRE is designed to facilitate collaborative research groups working on unmet needs in basic science or clinical medicine that can only be addressed by a team of investigators. The program funds teams of 3-5 investigators with complementary expertise, providing up to \$100K/year for up to 2 years to be used for research support to generate collaborative preliminary data for a P01 or similar grant application. During the second cycle of the ASPIRE program in 2023, we made awards to 4 teams in July 2023 (Team 5-Boettcher, Team 6- Jordan, Team 7-Lyons, and Team 8-Sucharov), including investigators from 7 departments in the SOM. Applications were evaluated by a panel of senior faculty from across the SOM in an NIH-style peer review and study section. Each of these teams of investigators have established milestones with the goal of submitting an NIH P01 (or equivalent) by the end of the award period. Each research group meets at least quarterly with selected members of PAPSTR (Drs. Schwartz, Sussel, Buccini, and Kemp) and other colleagues with expertise in programmatic research to discuss their progress and next steps. Currently, all 4 teams from the first award cycle in 2022 are in the data-generating and strategic planning phase, 1 team (Tamburini) is preparing to resubmit their NIH P01 grant application that was scored and is awaiting the written critique, and 2 teams (Miller and Holguin) are preparing to submit P01 applications in 2024. Additionally, 1 team (Nagaraj) has submitted a program-type proposal to the DOD based on their ASPIRE proposal. The 4 teams from the second award cycle in 2023 are all in the data- generating and strategic planning phase in preparation for upcoming P01 or equivalent submissions. The ASPIRE Program has garnered considerable excitement on campus, and we are pleased that both the Chancellor’s office and the Cancer Center have independently partnered with PAPSTR for the 2023 grant cycle. These partnerships will allow us to expand the scope, number of programs, and impact of ASPIRE across the entire Anschutz Medical Campus. In 2023, the Cancer Center joined us in supporting the newly-awarded ASPIRE team led by Dr. Traci Lyons. In 2024, we anticipate funding another 2-4 research programs. We issued the RFA in late 2023 and receipt date for applications is Feb 1, 2024.



*Laura Buccini, DrPH, MPH, MA  
Assistant Vice Chancellor for  
Research Development and Strategy  
Anschutz Medical Campus*



*David Schwartz, MD  
CU ASPIRE Program Director  
Distinguished Professor of  
Medicine and Immunology*



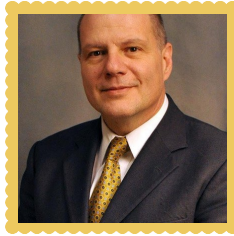
*Lori Sussel, PhD  
CU ASPIRE Program Co- Director  
Assistant Vice Chancellor for Basic Science Research  
Professor of Pediatrics and  
Cell & Developmental Biology  
Sissel and Findlow Stem Cell Chair*



## Team 1: Holguin



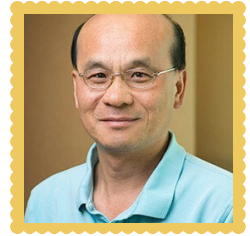
*Chris Evans, PhD  
Professor  
Division of Pulmonary Sciences  
and Critical Care Medicine*



*Fernando Holguin, MD  
Professor  
Division of Pulmonary Sciences  
and Critical Care Medicine  
Director Asthma Clinical and  
Research Programs*



*Max Seibold, PhD  
Associate Professor  
Co-Director, Mucosal  
Inflammation Program  
Director, Regenerative Medicine  
and Genome Editing Program  
National Jewish Health*



*Hong-Wei Chu, MD  
Assistant Vice President,  
Academic Affairs  
Research Director, Office of  
Research Innovation  
National Jewish Health*

## Interactions of IFN/IL-36, succinate and palmitic acid pathways in obese asthma

The team led by Dr. Holguin seeks to understand the interactions of IFN-g/IL-36, succinate and palmitic acid pathways in the airways of obese asthmatics. This project is a collaboration between the Severe Asthma Program at the University of Colorado, Anschutz Medical Campus and National Jewish Health. The ASPIRE grant will catalyze an already productive interdisciplinary collaboration between Chris Evans PhD, Hong Wei Chu PhD, Max Seibold PhD and Fernando Holguin MD MPH, to understand how obesity-related metabolic changes in airway epithelial cells link to inflammatory and paracrine mechanisms that ultimately promote bronchial hyperresponsiveness.

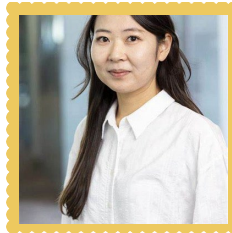
## Team 2: Nagaraj



*Mingxia Huang, PhD  
Associate Professor  
Department of Dermatology*



*Ram Nagaraj, PhD  
Professor  
Department of Ophthalmology*



*Mi-Hyun Nam, PhD  
Instructor  
Department of Ophthalmology*



*Alon Poley-Polsky, MD, PhD  
Assistant Professor  
Department of Physiology and  
Biophysics*

## Mechanistic understanding and therapeutic targeting of TBI-caused vision loss

The unifying scientific theme of the team led by Dr. Nagaraj is to understand molecular mechanisms and develop targeted therapies to prevent TBI-caused RGC death with the eventual goal of preserving vision in TBI patients. Their multidisciplinary project combines the expertise of three established investigators and is built on the findings from their ongoing collaboration. With the CU-ASPIRE funding, Drs. Nagaraj, Nam, Poley-Polsky, and Huang will investigate mechanisms of vision loss from traumatic brain injury (TBI) and develop viral-based methods to preserve vision after TBI. They will also examine the role of excitotoxicity in TBI-induced retinal damage and the introduction of non-invasive visual acuity tests, as well as the efficacy and mechanisms of CtBP inhibitors in preventing TBI-caused retinal ganglion cell death.

## Team 3: Tamburini



*Jenna Guthmiller, PhD  
Associate Professor  
Department of Immunology and  
Microbiology*



*Jay Hesselberth, PhD  
Professor  
Department of Biochemistry and  
Molecular Genetics*



*Thomas "Tem" Morrison, PhD  
Professor  
Department of Immunology and  
Microbiology*



*Beth Tamburini, PhD  
Associate Professor  
Gastroenterology  
Co-Director, Immunology  
Program; Completed Mentor  
Training Course*

### Mechanisms of immune protection and pathology by lymph node stromal cells

The team lead by Dr. Tamburini builds on established collaborations between CU Anschutz investigators (Tamburini, Morrison, Guthmiller, and Hesselberth) to (i) define mechanisms of interplay between LNSCs and immune responses, (ii) understand how viruses co-opt LNSCs to thwart immune responses, (iii) determine the consequences of antigen retention by LNSCs to B cell and T cell responses, and (iv) develop and apply the latest molecular tools to understand LNSC heterogeneity and function. The approaches will synergize to yield an in depth understanding of the consequences of LNSCs to immunity following infection and immunization.

## Team 4: Miller



*Eric Clambey, PhD  
Associate Professor  
Department of Anesthesiology*



*Moumita Ghosh, PhD  
Associate Professor  
Pulmonary Sciences and Critical  
Care Medicine*



*Robert Keith, MD  
Professor  
Pulmonary Sciences and Critical  
Care Medicine*



*Daniel Merrick, MD  
Associate Professor  
Department of Pathology*



*York Miller, MD  
Professor  
Pulmonary and Critical Care  
Medicine*

### The Epithelial-Immune Landscape and Therapeutic Targets in Pulmonary Premalignancy

The team led by Dr. Miller is focused on identifying factors within the lung that determine the evolution of premalignant lesions to either spontaneous regression or progression to cancer. The primary objective of the program is to gain a mechanistic understanding of how alterations in epithelial progenitors and immune cells that occur during premalignancy determine long-term outcomes. These studies are powered by parallel investigation of: i) at risk patients, either followed for the natural history of lesions or enrolled in chemoprevention trials and ii) mechanistic studies using mouse models of lung carcinogenesis and ex vivo precision cut lung slices. By integrating a team of experienced investigators with complementary expertise and established collaborations, this program provides unique opportunities to gain cellular and molecular insights from patient trials (bedside to bench) and to identify new therapeutic targets to limit pulmonary premalignancy and reduce lung cancer risk (bench to bedside). The ASPIRE grant will promote new initiatives within the Colorado Pulmonary Premalignancy Program comprised of Moumita Ghosh, PhD (epithelial stem cell biology), Eric Clambey, PhD (Immunology), Dan Merrick, MD (molecular pathology), Meredith Tennis, PhD (cancer biology and preclinical models), Robert Keith, MD (mouse models and clinical trials) and York Miller, MD (clinical trials and premalignancy). Their investigators are members of the Pulmonary Sciences and Critical Care Medicine Division, Department of Medicine (University of Colorado and Rocky Mountain Regional VAMC), and Departments of Pathology and Anesthesiology.

## Team 5: Boettcher



*Brianne Bettcher, PhD  
Associate Professor of Neurology*



*Nichole Carlson, PhD  
Director, Center for Innovative  
Design and Analysis*



*Brice McConnell, MD, PhD  
Assistant Professor of Neurology*



*Huntington Potter, MD  
Kurt N. and Edith von Kaulla  
Memorial Professor of Neurology*



*Ashesh Thaker, MD  
Chief of Neuroradiology,  
Denver Health and Hospital*

## Leveraging Microstructural Neuroimaging Techniques to Understand Biological Pathways of Decline: A Neuroimmunological Approach to Alzheimer's Disease

The team led by Dr. Bettcher aims to elucidate how immune dysfunction and Alzheimer's disease-related pathology impact cognitive decline in late life, with an emphasis on microstructural changes to neuritic density and complexity in the brain as potential mediators of clinical progression.

Their interdisciplinary team includes Drs. Bettcher, McConnell, Thaker, Potter and Carlson, combining unique interdisciplinary expertise in the fields of neuropsychology, immunity, neurology, Alzheimer's disease biomarkers, neuroimaging and biostatistics. While interest in immune and neuroanatomical mechanisms of late life decline have garnered significant research interest in the past decade, no studies to date have utilized the multimodal techniques this team will employ – including Neurite Orientation Dispersion and Density Imaging (NODDI) - in tandem to understand pathways of decline in late life. By investigating how an immuno-neuritic nexus of dysfunction interacts with canonical Alzheimer's disease biomarkers, Bettcher's team will be able to better characterize and understand complex microstructural events in vivo that presage gross neuronal loss.

## Team 6: Jordan



*Michael Alberti, MD, PhD  
Assistant Professor  
Department of Pathology*



*Maria Amaya, MD, PhD  
Assistant Professor  
Division of Hematology*



*Craig Jordan, PhD  
Nancy Carroll Allen  
Professor of Hematology  
Chief of Hematology*



*Eric Pietras, PhD  
Associate Professor  
Division of Hematology*



*Brett Stevens, PhD  
Research Associate Professor  
Division of Hematology*

## Targeting therapeutic vulnerabilities in myeloid pathogenesis

Despite decades of research, chronic and acute forms of myeloid disease are frequently lethal and there remains a significant lack of therapeutic options. Extensive efforts have described the many genetic mutations contributing to myeloid pathogenesis. However, therapies developed from these efforts have largely failed to improve patient outcomes. As an alternative approach, we are focused on two aspects of myeloid disease biology. First, the developmental biology of myeloid disease clearly mirrors the hierarchical structure of normal blood formation, where a relatively small pool of stem cells gives rise to the overall myeloid cell population. Thus, the malignant stem cells giving rise to myeloid disease represent a key therapeutic target. Second, our studies have demonstrated that aberrant regulation of specific metabolic processes is a hallmark of malignant myeloid stem cells. Consequently, we propose that targeting the metabolic features of malignant stem cells represents an important strategy towards improving therapeutic outcomes.



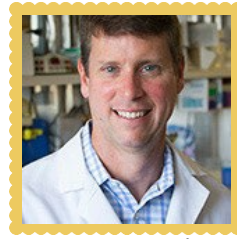
## Team 7: Lyons



*Virginia Borges, MD  
Professor  
Division of Medical Oncology*



*Traci Lyons, PhD  
Associate Professor  
Division of Medical Oncology*



*Weston Porter, PhD  
Professor, and Director,  
Texas A&M Center for  
Environmental Health Research*



*Jennifer Richer, PhD  
Professor  
Department of Pathology*



*Jill Slansky, PhD  
Professor  
Department of Immunology and  
Microbiology*

## Breast Cancer Co-opts Reversible Physiologic Programs of Immune Suppression

The team led by Dr. Lyons aims to reduce breast cancer-related deaths by targeting mechanisms of therapeutic resistance in estrogen receptor-positive breast cancers. (ER+BC) comprise most BC-diagnosed and BC-related deaths. Their group proposes the novel hypothesis that breast cancer cells co-opt normal developmental mechanisms of immune modulation and create a tumor permissive microenvironment that contributes to disease recurrence.

Their results are expected to lead to novel mechanistic insights into immunosuppression during normal breast development, which is co-opted by breast cancer. Since immune suppression during pregnancy, lactation, and postpartum mammary involution is controlled and reversible, their studies are designed to identify novel targeted adjuvant therapies to relieve immune suppression and prevent mortality.

## Team 8: Sucharov



*Sarah Faubel, MD  
Professor  
Division of Renal Diseases  
and Hypertension*



*Shelley Miyamoto, MD  
Professor  
Division of Cardiology*



*Eva Nozik, MD  
Professor  
Division of Pediatric  
Critical Care Medicine*



*Brian Stauffer, MD  
Professor  
Division of Cardiology*



*Carmen (Kika) Sucharov, PhD  
Professor  
Division of Cardiology*

## Organ crosstalk in the cardio-pulmonary-renal axis and the effect on heart mitochondrial and cardiac function

The team led by Dr. Sucharov seeks to understand the effect of organ injury on heart mitochondrial and cardiac function. They propose that mitochondrial dysfunction is a central driver of cardiac dysfunction in models of direct cardiac injury as well as injury to remote organs, including the lung and the kidney. The team will investigate the effect of organ injury on cardiac cellular and transcriptional landscape, the contribution of circulating factors to cardiomyocyte dysfunction, and the effect of mitochondria-targeted therapies on cardiac function in in vivo models of organ injury. The team combines expertise in lung (Nozik), heart (Stauffer and Miyamoto) and kidney biology (Faubel), mitochondrial function and treatment with mitochondria target therapy (Stauffer), and role of the secretome on cardiomyocyte biology (Sucharov).

# SECTION III:

# CHALLENGES AND OPPORTUNITIES

## **Metrics to Evaluate Programs and Track Accomplishments**

As an initial step to evaluate our programs, we conducted a survey in late 2023 of the awardees from all our funding programs. We received 41 responses. Overall, the feedback was largely positive, and we also received thoughtful and constructive feedback suggesting possible areas for future growth and improvement of these programs. Common themes we identified included:

### **Positive feedback**

Awardees appreciated the guidance and mentorship they received from the leadership teams. They also appreciated the connections with other researchers that were enabled through monthly meetings. They noted that the advice received regarding obtaining external funding was valuable.

### **Areas for growth and improvement**

Awardees asked for even more opportunities to create connections with other researchers and brainstorm ideas and grant submission strategies, in addition to those provided by the program. They requested more guidance on how to get manuscripts published. Several ideas for programmatic process improvement were provided. We will evaluate feasibility and implement these improvements as appropriate moving forward.

## **Recognition of Research Accomplishments in the School of Medicine**

We could do more to celebrate the success of our investigators and the impact that they have had on their chosen field. We have made this case to leadership at AMC and the Chancellor's office has established a series of awards for impactful contributions to science and medicine. These awards and campus-wide talks will be initiated in 2024. These awards could be made annually in conjunction with a seminar given by an invited Nobel or Lasker recipient and a faculty reception.

## **Standardized Institutional Initiative for Programmatic Research**

While granting organizations provide fundamental support for the research program, research programs are in need of additional support from our institution. This additional support not only creates a competitive advantage for the application, this additional support allows research programs to meet unmet financial needs which are often capped budgetarily, supports investigators in the program to explore new areas of research and take on trainees, and provides support for shared equipment. In other words, institutional support helps to build and develop programs and make them more competitive for future funding. Moreover, it provides an incentive for faculty to apply for programmatic research.

Currently, PIs pursuing programmatic research negotiate one-off agreements with Department Chairs, Center Directors, and the SOM Dean to support their research program if they succeed in obtaining funding. PAPSTR would like to initiate consideration of a campus-wide policy to create a consistent approach to institutional programmatic support that would be tied to indirect funds generated by each of the programs. PAPSTR has initiated these discussions and will continue to pursue this goal.

## Exposure of Trainees to Physician-Scientists

A key attribute of physician-scientists is their excitement about medicine and the interface between medicine and science. Unfortunately, medical students and trainees are infrequently exposed to the exciting research questions posed by physician-scientists, and don't get to experience that interface between medicine and science. To consider novel approaches that would bring trainees in contact with physician-scientists, we created and circulated a formal survey to housestaff in medicine and pediatrics. Approximately 60% of the housestaff participated in this survey and the survey showed good to excellent overall satisfaction with current training but also provided valuable ideas for improvement. At this point, we're leaning toward establishing a consulting service in 'molecular medicine' that we would trial in the Department of Medicine but could be extended to other departments.

The consulting service in molecular medicine would be led by a physician-scientist and could be offered as an elective for medical students and housestaff. Patients evaluated by this team could include unusual presentations or cases that need an in-depth literature review. However, this concept needs to be developed further, and we need to further consider the results of the survey before moving ahead with a formal proposal.

## Establish CU as a Center of Excellence for Physician Scientists

The investment and success in program development has been substantial but our recognition even on the Anschutz Medical Campus is limited. While PAPSTR is planning to get more involved in the Physician-Scientist Support Foundation, ASCI, AAP, and ACCA, we would benefit from strategic planning for the growth and development of our program. Elevating the stature of this program would enhance our competitiveness for extramural grant support (e.g. HHMI and Burroughs Wellcome Fund) and would serve to attract top trainees pursuing a career in medicine and science.

## Establish Sustainable Support through Philanthropic Funding

Supporting the development of translational research and supporting the career development of physician-scientists is an attractive opportunity, especially given the impact of physician-scientists on understanding human health and disease, the limited available federal funds, and the dwindling number of physician-scientists. PAPSTR would like to initiate conversations with the CU Foundation to establish an enduring stream of support for the career development of physician-scientists.



Photo courtesy of @cuanschutz Instagram



# SECTION IV: FINANCIAL OVERVIEW

The PAPSTR Program began in November, 2021. During the initial 8 months, we hired staff and established/initiated RFAs. Consequently, we were able to carry forward funds from year 1 and develop the post-bac program (B2MR) and expand the TRSP in years 2-5. In addition, we were successful in renewing and expanding the NHLBI StARR program which allowed us to reallocate funds to the ASPIRE program. The SOM has provided support to audit our programmatic budget, and we are able to support our programmatic goals for all our programs – B2MR, Emerging Physician Scientists, StARR Scholars, Translational Research Scholars, and ASPIRE Program – as well as support our operational needs. Further details are available upon request.

