THE OHIO STATE UNIVERSITY COMPREHENSIVE CANCER CENTER – ARTHUR G. JAMES CANCER HOSPITAL AND RICHARD J. SOLOVE RESEARCH INSTITUTE

Pelotonia Institute for Immuno-Oncology

2021 Annual Report

The James

The Ohio State University
COMPREHENSIVE CANCER CENTER

FROM THE DIRECTOR

Zihai Li, MD, PhD
Klotz Memorial Chair in Cancer Research
Professor and Founding Director
Pelotonia Institute for Immuno-Oncology
OSUCCC – James

The Ohio State University Comprehensive Cancer Center – James Cancer Hospital and Solove Research Institute (OSUCCC – James) launched the Pelotonia Institute for Immuno-Oncology (PIIO) in 2019 as a comprehensive bench-to-bedside research initiative focused on life-saving breakthroughs to fight cancer at all levels—from prevention to treatment to survivorship. We strive to be an institute of choice for immuno-oncology (IO) faculty, trainees and staff (Talent). We aim to lead groundbreaking IO discoveries and solutions (IO Research Excellence). We work toward becoming a top site in the world for practice-changing IO clinical trials (Clinical Translation). We aim to be a model for fostering impactful strategic IO collaborations (Partnership and Commercialization). And we are creating a robust and sustainable foundation to advance the strategic priorities of the PIIO (Resource Management). Our efforts support our overarching ambition of being a leader in driving IO breakthroughs.

Research in the PIIO centers on Systems and Translational IO. Through Systems IO, we seek a better understanding of cellular systems to create more efficient and effective immunological tools to fight cancer and to better understand the relationship between cancer genomics and immune evasion. Through Translational IO, we turn discoveries into new or improved cancer treatments and broaden the indications and patient populations that can be treated with cellular therapy. To advance our goals and initiatives, the PIIO is recruiting new immuno-oncology faculty, bolstering shared resources in Immune Monitoring and Discovery, training the next generation of IO researchers, and building collaborations with industry and other IO centers. In two years, the PIIO has recruited 18 new faculty, and our membership has grown to over 100 members.

Our members' annual funding from grants stands at over $32 million, including $19 million from the National Institutes of Health (NIH). More than 90 human clinical trials are underway in the IO space, with the bulk of them being experimental early-stage (phase I and II) trials. Our members have published over 500 articles in peer-reviewed scientific journals over two years and have disclosed over 50 inventions. In addition, our Immune Monitoring and Discovery Platform (IMDP) has amassed $3.8 million in resources and technologies.

Within this annual report, we summarize our progress toward accomplishing our goals and initiatives as they pertain to talent, research, honors and resources.

THE OHIO STATE UNIVERSITY COMPREHENSIVE CANCER CENTER – ARTHUR G. JAMES CANCER HOSPITAL AND RICHARD J. SOLOVE RESEARCH INSTITUTE (OSUCCC – JAMES) LEADERSHIP TEAM

(listed alphabetically)

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WILLIAM B. FARRAR, MD
Chief Executive Officer,
James Cancer Hospital and
Solove Research Institute

RYAN GOERLITZ, MBA, CPA
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MELISSA HALL
Associate Vice President, Growth Marketing and Reputation Strategy

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Executive Director, Clinical Services and Chief Nursing Officer

JENNIFER MCDONALD
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Director, The Ohio State University Comprehensive Cancer Center

PETER SHIELDS, MD
Deputy Director, The Ohio State University Comprehensive Cancer Center

NANCY SINGLE, PhD
Director, Clinical Research Operations

AMY WARE, MHA, MEd
Senior Adviser to the CEO

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THE OSUCCC – JAMES INVITES YOU TO JOIN OUR ONLINE COMMUNITY

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TALENT

The PIIO aims to become an institute of choice for IO talent. To accomplish this, it is recruiting a diverse team of top-tier talent, developing programs to train the next generation of IO researchers, providing robust mentorship and professional development for faculty and staff to increase IO knowledge, promoting innovation and embodying a culture of multidisciplinary teamwork and excellence that empowers faculty and staff to be successful. Below, we have listed updates regarding talent added to the PIIO in its second year, as well as new educational programs.

Margaret Gatti-Mays, MD, MPH, FACP, was appointed as clinical assistant professor in the Division of Medical Oncology at Ohio State in August 2020. As a member of the PIIO's Center for Translational Immuno-Oncology, she focuses on the use of cancer vaccines in combination with other treatment modalities to help the immune system recognize and kill cancer cells. She is a breast oncologist with a focus in immunotherapy and early-phase clinical trials. She has served as an investigator on more than 15 such trials, many of which have laid the groundwork for further use of immunotherapy in breast cancer and other solid tumors. Her clinical research has led her to become a member of the National Cancer Institute (NCI) Breast Immuno-Oncology Task Force, as well as a member of the Society for Immunotherapy of Cancer Breast Immunotherapy Expert Panel. Given the lack of activity seen in breast cancer with single-agent immune checkpoint blockade, her specific research interest is in identifying combinations that may lead to a superior immune response and, ultimately, to improved tumor control.

Jerry Lio, PhD, was appointed as assistant professor in epigenetics and immunology in the Department of Microbial Infection and Immunity at Ohio State in August 2020. Utilizing knowledge from his diverse research background, he characterized several novel pathogenic genes in O157:H7, a potentially lethal *E. coli*; made significant discoveries in the field of thymic regulatory T (Treg) cell development; discovered the thymic Treg cell precursor and proposed a widely confirmed two-step development model. The latter finding has been one of the landmark publications in the Treg field and provides insight into Treg cell generation. Dr. Lio has developed a panel of single-cell transcriptomics and epigenomics in the last few months. This broad perspective and integrative approach will enable him to understand the role of B cells in cancers. His long-term goals are to understand how the dysregulation of epigenome in B cells contributes to pathological conditions such as cancers and how to engineer the epigenome in immune cells to attain desirable immunological responses.

TALENT

Nandini Acharya, PhD,

joined Ohio State in July 2022 as an assistant professor in the Department of Neurology. She was recruited from the Department of Neurology, Center for Neurologic Diseases, Brigham and Women's Hospital at Harvard Medical School in Boston, where she served as a postdoctoral fellow. Dr. Acharya has worked to understand the impact of the neuro-endocrine axis on the immune system and, subsequently, cancer. Her research on the endocannabinoid system's regulation of immune homeostasis was published in the journal *Proceedings of the National Academy of Sciences* (PNAS). Moving forward, she is interested in building her laboratory around the interplay of the neuro-immune-microbiota axis in the context of colorectal cancer.

Mark Rubinstein, PhD,

was appointed associate professor in the Department of Internal Medicine, Division of Medical Oncology. He came to Ohio State from the Medical University of South Carolina and focuses on the development of cancer immunotherapies through three broad research areas: immune checkpoint inhibitors, adoptive cell therapy and understanding tumor-induced immune suppression. He and his research team recently reported in the journal *Lancet Oncology* on the safe administration of ALT-803 with nivolumab entirely on an outpatient basis. The ability of ALT-803 to reinduce responses in patients experiencing treatment failure with PD-1 treatments could have implications in a wide range of cancers.

Andreas Wieland, PhD,

joined the PIIO in October 2021. He received his PhD from the University of Ulm in Germany, where he worked on DNA vaccination strategies for chronic viral infections. He then joined the laboratory of Rafi Ahmed, PhD, at Emory University in Atlanta as a postdoctoral fellow. Dr. Wieland's postdoctoral work has been published in the journals *Immunity* and *Science Immunology*. His current focus is on gaining a better understanding of the cellular and humoral immune response to human papillomavirus (HPV)-related head and neck squamous cell carcinoma, particularly on the biology of intratumoral HPV-specific CD8 T cells and HPV-specific B cells.

Brian Searle, PhD,

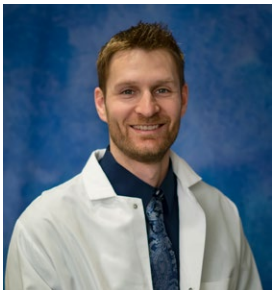
joined Ohio State in April 2021 as an assistant professor in the Department of Biomedical Informatics. He came to Ohio State from the Institute for Systems Biology, where he was an independent research fellow building a program that bridges the gap between genomic and proteomic technologies to study human genetic variation. Dr. Searle's broad research interests span the intersection of proteomics, mass spectrometry, bioinformatics and technology development to interpret the effects of amino acid variants on both a single- and a meta-proteome level. His research findings have been published in such high-impact journals as *Nature Methods* and *Nature Communications*.

Marcos de Lima, MD,

was recruited as professor and clinical director for the Blood and Marrow Transplant and Cellular Therapy (BMT/CT) Program. He was recruited from University Hospitals Cleveland Medical Center and Case Western Reserve University, where he served as director of the Hematologic Malignancies and Stem Cell Transplant programs. A dedicated researcher, Dr. de Lima has extensive experience in developing and conducting clinical trials in the context of stem cell transplantation for cancers beginning in blood-borne tissue, bone marrow or the cells of the immune system. His research focuses on strategies to expand transplantation of blood stem cells from one patient to another and on the treatment and prevention of post-transplant leukemia relapse. He has published approximately 230 manuscripts in scientific journals and has written chapters for nearly a dozen textbooks.

Billur Akkaya, MD, DPhil,

joined Ohio State as an assistant professor in the Department of Neurology. She was recruited from the National Institutes of Allergy and Infectious Diseases (NIAID) at the NIH, where she was an independent research fellow in the laboratory of Ethan Shevach, MD. Her preliminary research revealed that the *LAG3* gene might play an important role in Treg function by facilitating Treg-mediated capture of antigenic peptides, thus inhibiting immune responses through diminished antigen presentation. She hypothesizes that the blockade of *LAG3* might boost T-cell responses by acting on T cells directly, and also indirectly by downregulating the protumor activity of Tregs. She aims to identify the role of *LAG3* in the tumor microenvironment and to characterize the therapeutic effects of targeting its activity. Her research findings have been published in high-impact journals, including *Nature Immunology*.



Andrew Gunderson, PhD,

will join Ohio State in May 2022 as an assistant professor in the Department of Surgery, Division of Surgical Oncology. Dr. Gunderson was recruited from the Earle A. Chiles Research Institute – Providence Cancer Institute in Portland, Oregon, where he served as a postdoctoral researcher in the laboratory of Kristina Young, MD, PhD. They have published in the journal *Nature Communications* a study revealing that *TGFbR1* gene inhibitors sensitize colorectal tumors to radiation therapy by alleviating *CXCR3* gene repression in CD8+ T cells. More recently, Dr. Gunderson published a report detailing the long-term survival benefit in untreated pancreatic cancer patients who spontaneously form mature tertiary lymphoid structures (TLS) with germinal centers, associated with superior humoral immune memory and neoantigen expression. He seeks to build on these studies by researching how B cells directly support antitumor immunity and response to therapy in solid tumors.

Munir Akkaya, MD, DPhil,

was appointed assistant professor in the Department of Internal Medicine, Division of Rheumatology. He came to Ohio State from the NIAID at the NIH. His research focuses on understanding the minute dynamics of signal integration in B cells and identifying the points that second signals prevent B-cell receptor (BCR)-induced mitochondrial dysfunction. Through established collaborations with experts who use solid tumor models and patient specimens, he aims to perform a multilevel investigation to characterize the types and functions of tumor-infiltrating B cells. This project will increase the field's understanding of the role of B cells in antitumoral immunity and possibly yield new prognostic and therapeutic targets. His first-author paper in the journal *Nature Immunology*, "Second Signals Rescue B Cells From Activation-Induced Mitochondrial Dysfunction and Death," was selected for the cover of that issue.

Joyce Wu, PhD,

joined Ohio State in October 2021 as a professor in the Department of Internal Medicine, Division of Rheumatology and Immunology. She was recruited from the University of Arizona Arthritis Center, where she served as an associate professor in the Department of Immunobiology. Trained in the laboratory of Diane Mathis, PhD, at Harvard Medical School and awarded multiple grants from the NIH, Dr. Wu has research interests in microbiome, immune regulation, autoimmunity and cancer.

Xue Han, PhD,

joined the PIIO on March 1, 2022 as an Assistant Professor in the Department of Microbial Infection and Immunity. Dr. Han comes to us from Yale University, where she served as an associate research scientist in the laboratory of Dr. Lieping Chen. Dr. Han has been studying programmed death 1 homolog (PD-1H, also called VISTA) as a promising target for cancer immunotherapy. She is interested in both basic and translational immunological studies and looks forward to collaborating with clinicians and pharmaceutical companies to translate her studies from bench to bedside.

EDUCATION UPDATES

An initiative of our Talent Pillar is providing robust mentorship and professional development for faculty and staff to increase IO knowledge and propel innovation. The following new courses have been developed to support this initiative.

Fundamentals of Oncology (PATHOL 6640)

This is a four-credit-hour graduate-level course consisting of lectures/seminars covering various subjects and recent advances in oncology. Lectures are provided by leading experts in the field. Reading is from primary sources in current scientific literature. Seminars are interactive and encourage critical evaluation of the reading assignments. Course coordinators: Steve Oghumu, PhD, and Anna Vilgelm, MD, PhD (both PIIO members)

Cancer Immunology – Critical Journal Readings (BSGP 7900)

SGP 7900 is a journal club that enables students and postdoctoral fellows to give critical interpretations of research and journal readings on cancer immunology. Participants lead discussion and critically examine recent cutting-edge literature in the field of tumor immunology. Course coordinator: Thomas Mace, PhD (PIIO member)

Analysis and Applications of Genome-Scale Data (BMI 8130)

This course introduces trainees to the fundamental algorithms needed to understand and analyze genome-scale expression data sets. A special emphasis is placed on single-cell data analysis. The course covers three major categories: (i) fundamental and advanced big-data analysis in solving real biological problems; (ii) behind the scenes: classic and cutting-edge algorithms/methods for tool development; and (iii) in-hand practice of using tools and data analysis. The course includes an introduction to, and hands-on experience with, the R statistical software environment and the use of R packages that can be applied to these kinds of problems. Course coordinator: Qin Ma, PhD (PIIO member)

Master of Science in Immunology and Microbial Pathogenesis (in partnership with the Department of Microbial Infection & Immunity [MI&I])

This MS program provides focused, formal, hands-on research training for Ohio residents seeking careers in academic, pharmaceutic, biotech, agriculture, government and public health fields. At the completion of the degree, students can demonstrate a depth of knowledge and practical skill set in immunology and microbial pathogenesis experimental design, laboratory management practices and scientific writing.

OSU PhD graduate program in immunology and immunotherapeutics

The PIIO and the MI&I are developing a PhD degree in immunology and immunotherapeutics (I2GP). The focus of the program will be to educate and train students in both fundamental and cutting-edge principles of immunology and to conduct primary research in the field. Within this broad area, students will have the option to engage in emphasis areas related to both basic and applied aspects of immunological research. These areas include but are not limited to cellular and molecular immunology, immunology of infectious diseases (host-pathogen interactions), translational immunology (immunotherapeutics and immuno-oncology) and systems immunology. The required curriculum will be a combination of didactic, journal club, seminar and research-based coursework, culminating in the successful defense of a doctoral thesis. The curriculum will be consistent with the program's mission to provide the practical knowledge necessary for a career in a research or related environment and for contributing to the improvement of human health. Graduates of the program will have a highly advanced knowledge base and skill set in the fundamental principles and translational aspects of immunology. They also will be prepared to contribute to rapidly growing fields, including basic molecular and cellular immunology research, or to more applied areas, such as the development of diagnostics and immunotherapeutic strategies that target cancer, autoimmunity and existing or emerging pathogens.

PIIO THIRD ANNUAL SYMPOSIUM

On Nov. 2, 2021, the PIIO hosted its Third Annual IO Symposium (Virtual). This year's theme was

Immuno-Oncology Rises to the Challenge: Translating Discoveries Into Effective Therapies

External speakers and their seminar titles were:

Cellular Immunotherapy for Patients with Metastatic Solid Cancer

Stephanie L. Goff, MD, FACS
Head, Clinical Operations for SB cGMP Facilities
Associate Research Physician, Surgery Branch
National Cancer Institute

Fueling Immunity and Immunometabolic Checkpoints in Cancer

Jeffrey Rathmell, PhD
Cornelius Vanderbilt Professor of Immunobiology
Director, Vanderbilt Center for Immunobiology
Vanderbilt University Medical Center

Immune Inhibitory Mechanisms in Cancer

Dario Vignali, PhD
Frank Dixon Chair in Immunology
Distinguished Professor and Vice Chair,
Department of Immunology
University of Pittsburgh

The Symposium Poster Session was held in person on Nov. 1 in the lobby of the Biomedical Research Tower (BRT). Poster presenters had an opportunity to win monetary prizes. Posters were awarded points based on the quality of presentation, scientific content and impact on the immuno-oncology field. First, second and third top-scoring posters in the categories of postdocs/residents/fellows, graduate students and undergraduates/laboratory staff received $500, $250 and $125, respectively. Winners in each category are listed below.

Postdocs/Residents/Fellows

First Place:
Johanna Schafer

Second Place:
Amrendra Kumar

Third Place:
Hongji Zhang

Graduate Students

First Place:
Fiona Brown

Second Place:
Weiwei Liu

Third Place:
Emily Hoskins

Undergraduates/Laboratory Staff

First Place:
Nathan Ryan

Second Place:
Gabriella Lapurga

Third Place:
Aadi Pallerla

SCIENTIFIC ACCOMPLISHMENTS

Eugene Oltz, PhD

PIIO researcher receives NIH MERIT Award

Dr. Eugene Oltz, chair of the Department of Microbial Infection and Immunity and the Samuel Saslaw Professor of Infectious Diseases, Microbial Infection and Immunity, received an NIH MERIT Award from the National Institute of Allergy and Infectious Diseases (NIAID) for his research on topological mechanisms of DNA break repair in lymphocytes. This honor is for his work on defining how the three-dimensional conformation of the human genome can aid or impede broken chromosome ends until they are repaired, thus impacting their potential to produce cancer-causing alterations. The NIH MERIT (Method to Extend Research in Time) R37 is a prestigious award designed to provide stable, long-term support to stellar investigators.

Anna Vilgelm, MD, PhD

Novel link uncovered between tumor metabolic vulnerabilities and antitumor immunity

Inhibitors of cyclin-dependent kinases 4 and 6 (CDK4/6i) delay progression of metastatic breast cancer. However, complete responses are uncommon and tumors eventually relapse. In a study published in the journal *Cell Reports*, **Dr. Anna Vilgelm** and her team showed that CDK4/6i can enhance efficacy of T cell-based therapies, such as adoptive T-cell transfer or T cell-activating antibodies anti-OX40/anti-4-1BB, in murine breast cancer models. Their findings uncover a link between tumor metabolic vulnerabilities and antitumor immunity and support further development of CDK4/6i and immunotherapy combinations.

David Carbone, MD, PhD

Mikhail M. Dikov, PhD

New study will test a novel approach for enhancing efficacy of anti-PD-1 immunotherapy

A study led by **Drs. David Carbone** and **Mikhail M. Dikov** will capitalize on advances in adenosine receptor biology and the understanding of their roles in mediating cancer immunosuppression. It proposes a clinical trial to test inhibition of A2B adenosine receptor with a specific antagonist PBF-1129 as a novel approach to enhance efficacy of anti-PD-1 immunotherapy. The NCI awarded Drs. Carbone and Dikov an R01 grant to support this work, titled "Targeting Immunosuppressive Adenosine in Patients With Metastatic Non-Small Cell Lung Cancer."

Kai He, MD, PhD

Mark Rubinstein, PhD

Lai Wei, PhD

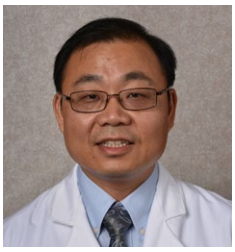
Zihai Li, MD, PhD

David Carbone, MD, PhD

Industry/PIIO partnership established to advance a next-generation checkpoint antibody

The PIIO has developed a partnership with OncoC4 Inc., a clinical-stage biopharmaceutical company engaged in the discovery and development of therapies for cancer. In the first phase of this strategic partnership, **Drs. Kai He, Mark Rubinstein, Lai Wei, Billur Akkaya, David Carbone** and **Zihai Li** will work together to advance clinical knowledge of ONC-392, a next-generation anti-CTLA4 antibody designed to mediate antitumor efficacy without the toxicities typically associated with anti-CTLA-4 antibodies. Dr. He, leader of the study at Ohio State, was appointed national co-principal investigator for the "First in Human Phase I/II Clinical Trial of ONC-392: Preserving CTLA-4 Immune Tolerance Checkpoint for Safer and More Effective Cancer Immunotherapy," a Fast Track Small Business Innovation Research (SBIR) grant awarded by the NCI.

SCIENTIFIC ACCOMPLISHMENTS


Zhiwei Hu, MD, PhD


Joal Beane, MD


Ephraim Ansa-Addo, PhD


Allan Tsung, MD

Study suggests new targets for preventing hepatocellular carcinoma (HCC)

PIIO researchers led a study that revealed a mechanism that could be targeted to prevent liver cancer in patients with nonalcoholic steatohepatitis (NASH). Published in the *Journal of Hepatology* by co-authors **Drs. Allan Tsung, Ephraim Ansa-Addo, Joal Bean** and **Zhiwei Hu**, the study reports a discovery that selectively increased intrahepatic Tregs can promote an immunosuppressive environment in NASH livers. Neutrophil extracellular traps (NETs) link innate and adaptive immunity by promoting Treg differentiation via metabolic reprogramming of naïve CD4+ T cells. Therapies targeting NETs and Treg interactions could offer a strategy for preventing HCC in patients with NASH.


Timothy Cripe, MD, PhD


Elaine Mardis, PhD


Kevin Cassady, MD

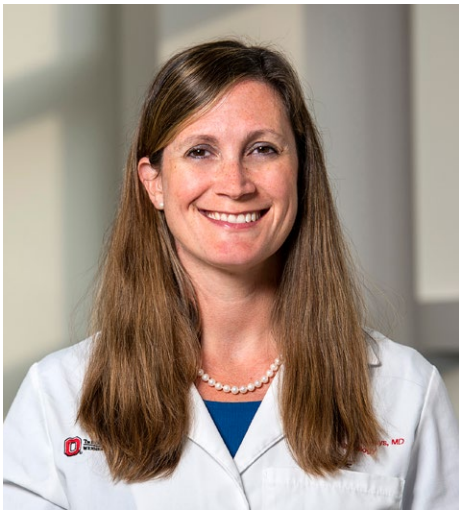
New platform developed to improve immune-mediated antitumor activity

Researchers at Nationwide Children's Hospital have developed a multimodel herpes simplex virus (oHSV) that expresses ephrin A2 (EphA2), a shared tumor-associated antigen (TAA) expressed by many tumors, to improve immune-mediated antitumor activity. In a study published in the *Journal for Immunotherapy of Cancer*, **Drs. Timothy Cripe, Elaine Mardis** and **Kevin Cassady** provided evidence that this flexible viral-based platform enables immune recognition of the shared TAA and improves the immunotherapeutic response, thus making it well suited for low-mutational-load tumors. Drs. Cripe, Mardis and Cassady are members of the OSUCCC – James Translational Therapeutics Program and the PIIO.

Grants Awarded (2021)

Principal investigator	Sponsor	Title	Total award dollars
Carbone, D, Dikov, M	NCI	Targeting immunosuppressive adenosine in patients with metastatic non-small cell lung cancer	$3,023,907
Carson, W	NCI	The Ohio State University as a Lead Academic Organization (LAO) for the Experimental Therapeutics Clinical Trials Network SUPPLEMENT 2	$100,000
Carson, W, Garrido-Laguna, I, Arnold, S	NCI	Evaluation of deoxynucleosides as a novel resistance mechanism for radiotherapy (SUPPLEMENT)	$374,997
Choe, H, Ranganathan, P	NCI	Targeting epigenetic regulation via Bromodomain and Extraterminal (BET) domain inhibition for treatment of GVHD	$2,075,000
Denko, N, Li, Z	NCI	Overcoming hypoxic resistance in non-small cell lung cancer by targeting mitochondrial metabolism	$3,252,030
Denko, N, Li, Z	NCI	Overcoming hypoxic resistance to anti-cancer therapy	$2,913,570
Dubey, P	NIAID; Sloan-Kettering Inst	Identification of novel immunogenic proteins from Bordetella pertussis	$3,894,020
He, K, Zheng, P, Tianhong, Li	NCI	First in Human Phase I/II clinical trial of ONC-392: Preserving CTLA-4 immune tolerance checkpoint for safer and more effective cancer immunotherapy	$1,000,000
Hu, Z	International Myeloma Foundation	Targeting TF (CD142) as a new target for CAR-NK cell immunotherapy of multiple myeloma	$249,999
Hummon, A	Michigan State Univ	Quantitative top-down proteomics of human colorectal cancer cells and tumors	$1,837,925
Li, Zihai	NCI	Targeting GRP94-TGF-beta pathway for cancer immunotherapy	$2,845,800
Ma, Q	NSF Biological Sciences	EAGER: IIBR Informatics: A reinforced imputation framework for accurate gene expression recovery from single-cell RNA-seq data	$300,000
Mundy-Bosse, B	NCI	Dysregulation of Innate Lymphoid Immunity in Acute Myeloid Leukemia	$1,633,125
Oghumu, S	NIDA	X chromosome inactivation in sex disparities to substance use disorder	$2,362,500
Oltz, E	NIAID	Topological mechanisms of DNA break repair in lymphocytes	$2,313,487
Owen, D	LUNGevity Career Development Award	Targeting myeloid derived suppressor cells in lung cancer	$300,000
Pollock, R, Carbone, D, Li, Z	NCI	Cancer center support grant (SUPPLEMENT 2) admin. supp. for NCI P30 cancer center grants to facilitate the development of standardized electronic treatment plan builds for NCI-supported clinical trials applicable across clinical research sites	$276,109
Sizemore, G	Army Medical Res Acquisition Activity	PDGFB in breast cancer initiation, progression and metastasis	$1,560,000
Spakowicz, D	NIA	The microbiome in older adults with lung cancer: association of treatment regimens and diet with protective microbial profiles	$607,770
Stover, D	NCI	Video intervention to address pre-test patient education for tumor genomic testing	$1,979,390
Stover, D, Tamimi, R	NCI - Weill Cornell Medical College	Prediagnostic exposures, germline genetics, and breast cancer mutational profiles	$3,823,235
Sundi, D	Army Medical Res Acquisition Activity	Sex-specific immune biomarkers of bladder cancer	$622,177
Vilgelm, A (Co-I's: Freud, A, Oppong B, Chengly, S, Guimaraes, F, Lee, D)	DOD	Harnessing innate immunity to improve metastatic breast cancer therapy	$708,752
Wang, R	NCI	Modulation of asparagine bioavailability and stress response signaling to enhance T cell robustness and maximize immunotherapy	$2,346,753
Wang, R	NIAID	Dissect and target Arginine-polyamine metabolic axis in T cell mediated inflammation and autoimmunity	$2,001,250
Wen, H	NIAID	Targeting immune inhibitory molecule SUSD2 to reverse immunosuppression	$2,341,818
Yang, Y, Huang, X	NCI	Regulation of tumor-infiltrating T cells by macrophages	$2,207,190
Zhang, J	NCI	Targeting cholesterol metabolism and replication stress response in cancer therapy	$1,784,250

HONORS



Margaret E. Gatti-Mays, MD, MPH, FACP

Dr. Margaret Gatti-Mays is co-author on the first professional guidelines for the use of immunotherapy in breast cancer

Breast cancer has historically been a disease for which immunotherapy was largely unavailable. Immune checkpoint inhibitors in combination with chemotherapy for the treatment of some patients with advanced/metastatic triple-negative breast cancer (TNBC) have been approved by the FDA, expanding treatment options for patients. However, questions remain about the optimal chemotherapy backbone for immunotherapy, appropriate biomarker-based selection of patients for treatment, the optimal strategy for immunotherapy treatment in earlier-stage disease and potential use in histological subtypes other than TNBC. Thus, the Society for Immunotherapy of Cancer convened a multidisciplinary panel of experts to develop a clinical practice guideline for the oncology community on these and other important concerns. **Dr. Margaret Gatti-Mays**, an assistant professor in the Department of Internal Medicine, Division of Medical Oncology, served on this panel, which used the published literature and the panelists' clinical experience to develop evidence- and consensus-based recommendations for providers treating patients with breast cancer.

Dwight H. Owen, MD, MS

Dr. Dwight Owen receives the Bertha A. Bouroncle Distinguished Teaching Award

Dr. Dwight Owen received the Hematology and Oncology Fellowship Bertha A. Bouroncle Distinguished Teaching Award for 2020-21. Dr. Owen is a medical oncologist whose research interests include using immunotherapy in patients with thoracic cancers and developing ways to better identify patients who are likely to benefit most from these treatments while minimizing toxicities. His teaching award is named for the late Bertha Bouroncle, MD, who was an internationally known hematologist and professor emerita of Internal Medicine at Ohio State.

Lieping Chen, MD, PhD

PIIO ESAB chair elected to the National Academy of Sciences

Lieping Chen, MD, PhD, chair of the PIIO's External Scientific Advisory Board (ESAB), was elected to the National Academy of Sciences (NAS). Dr. Chen is the United Technologies Corporation Professor in Cancer Research and a professor in the departments of Immunobiology, Dermatology and Medicine (Medical Oncology) at Yale University School of Medicine. He also serves as co-leader, Cancer Immunology, at Yale Cancer Center. His election brings the number of NAS members on the PIIO ESAB to four.

Zihai Li, MD, PhD named AAAS Fellow for the class of 2021

Please join us in congratulating **Dr. Zihai Li**, founding director of the PIIO, who was among seven OSU faculty named to the **2021 class of Fellows of the American Association for the Advancement of Science (AAAS).** Dr. Li received this honor for his distinguished contributions to the field of molecular immunology, particularly the roles of the heat shock protein 96 in chaperone biology, cancer progression, immune response and tolerance. The 2021 class also includes Drs. Katalin Karikó (BioNTech SE /University of Pennsylvania), Jeffrey Bluestone (University of California, San Francisco (Emeritus)/ Sonoma Biotherapeutics), John Wherry III (University of Pennsylvania), Pramod Srivastava (University of Connecticut School of Medicine – Dr. Li's PhD mentor), and others who have done so much for the advancement science. The new Fellows will be celebrated later this year during an in-person gathering when it is feasible from a public health and safety perspective.

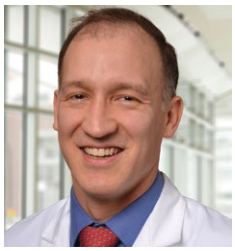

Dongjun Chung, PhD


Zihai Li, MD, PhD

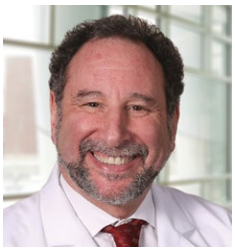

Shan-Lu Liu, MD, PhD


Namal Liyanage, PhD


Qin Ma, PhD


Carlos Malvestutto, MD, MPH


Anna Vilgelm, MD, PhD


Peter Shields, MD


Kevin Weller

The PIIO's Immune Monitoring and Discovery Platform in the fight against COVID-19

The COVID-19 pandemic created a global challenge, but the world has moved from the era of the virus to the era of the vaccine, and there is much more work to do. Members of the PIIO were a part of the fight against the virus, collaborating with Dr. Carlos Malvestutto in an **OncoImmune Phase III clinical trial of CD24Fc** to treat patients hospitalized with COVID-19. CD24Fc is a first-in-class biologic that fortifies an innate immune checkpoint against excessive inflammation caused by tissue injuries. Researchers assessed safety and efficacy in the study, and they reported that CD24Fc exhibits superb therapeutic efficacy and is a potential breakthrough in treating severe and critical COVID-19 patients. Results of this study were published in the Journal of Hematology Oncology (PMCID: PMC8744064) and accepted for publication in *The Lancet Infectious Diseases*.

In addition, several PIIO members participated in the OSUCCC funded COVID-19 Vaccine Study of Infections and Immune REspoNse (SIIREN). Led by Drs. Peter Shields and Zihai Li, the study seeks to better understand COVID-19 infection and immune responses after vaccination among patients with cancer. In a letter published in Cancer Cell (PMCID: PMC8716174), the study team presented results that demonstrate that patients with cancer who received a booster dose of the mRNA vaccine displayed significantly greater neutralizing capacity against Omicron variant compared to recipients of only the two-dose mRNA vaccine.

Correlatives efforts for these studies were led by the **Immune Monitoring and Discovery Platform (IMDP)**. The IMDP gives researchers a 360-degree-view of the immune system to see what is going on in a patient's body when treated with cancer immunotherapy. The IMDP has amassed over $3 million in resources in the areas of immunophenotyping, imaging, single-cell genomics, single-cell proteomics, automation and robotics. The platform is vested in helping clinicians improve correlative science in the trials they lead by assaying IO clinical trial samples for correlative studies and by providing expertise from PIIO investigators toward advancing the science of study agents.

THE IMDP'S LIST OF RESOURCES INCLUDES:

Immunophenotyping

Helios mass cytometer

Mass cytometry with Helios enables deep profiling of translational and clinical research samples to simultaneously interrogate cellular phenotype, function and signaling status in a single tube.

FACS Melody

Cell sorting with the BD FACS Melody facilitates the identification and isolation of rare target cells from patients' blood and serum.

Spectral cytometry

The Cytek Cell Sorter, Aurora and Northern Lights Cytometry systems facilitate greater understanding of complex immune events after single-cell sorting, as well as the recovery of rare and precious cell subtypes that would otherwise be lost during highly multiparametric flow cytometry acquisition.

Imaging

Vectra Polaris

Multiplexed immunohistochemistry via the Vectra Polaris allows researchers to molecularly profile specific tumor-associated immune tissues as a means of predicting response or resistance to cancer immunotherapies.

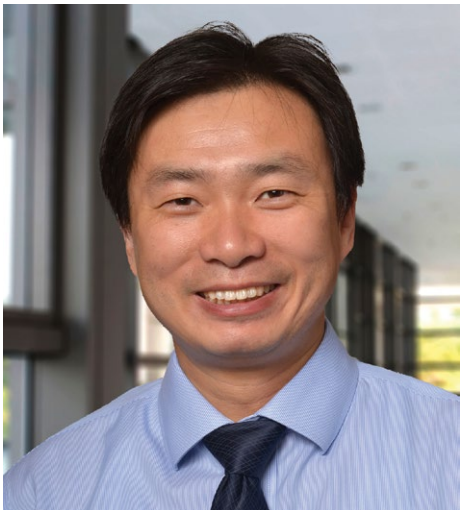
Leica BondRX

The fully automated Leica BondRX immunohistochemistry and *in situ* stainer allows researchers to detect biomarkers in tissue samples, facilitating translation of biomarkers to the CLIA (Clinical Laboratory Improvement Amendments) space and expediting discoveries.

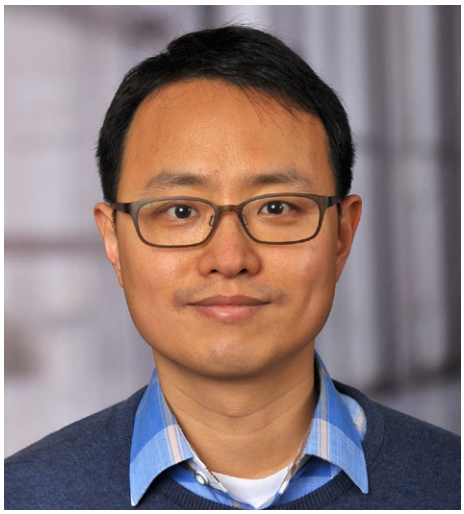
EVOS 7000 with live cell incubator

The EVOS 7000 Multiplex IHC (immunohistochemistry) Imager provides powerful image analysis capabilities for cell segmentation and quantification, and fully integrated time-lapse live-cell imaging, high-speed image acquisition and multiposition well scanning.

PROGRESS IN IMMUNO-INFORMATICS



Lang Li, PhD



Dongjun Chung, PhD

Qin Ma, PhD

IO database

The PIIO has built an Immuno-Informatics Group to leverage big data to improve immuno-oncology research and empower the perception of what's going on inside immune cells and tumors. It is still difficult to predict who will benefit from immunotherapy and who will not. In addition, adverse effects from immunotherapy are still not fully known and understood. To that end, principal investigators **Drs. Lang Li** and **Zihai Li**, with co-investigator **Dr. Dongjun Chung**, have developed an IO database to predict cancer immunotherapy responders and determine adverse effect risk factors. They will do so by using electronic health records data (n=3000 patient records, with an additional 5740 patient records being processed) that include data from cancer patients on immunotherapies. This tool can be used by physicians to guide treatment and by scientists to guide research.

DeepMAPS

Dr. Qin Ma and his team have developed a deep learning-based multi-omics analysis portal for single-cell data (DeepMAPS). The long-term goal of this program is to create an eco-community for archiving, analyzing, visualizing and disseminating immuno-oncology single-cell multimodal omics (scMulti-omics) data. In this novel all-in-one web portal, Dr. Ma and his team have developed a graph attention model to identify cellular heterogeneity and underlying mechanisms from scMulti-omics. This model has excellent performance for single-cell RNA sequencing (scRNA-seq) and single-cell Assay for Transposase-Accessible Chromatin with high-throughput sequencing (scATAC-seq) data analysis. Specifically, a user can carry out multiple functional analyses on DeepMAPS, including but not limited to cell clustering, differential gene expression analysis, key transcription factors and gene regulatory network identification.

PIIO SCORECARD

103
Members

$32M+
Annual funding
($19M from NCI)

564
Publications in peer-reviewed journals, 2019-2021

99
Human clinical trials underway in IO

53
Inventions disclosed, 2019-2021

One vision
To work toward cancer cures by advancing IO

Thank you!

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