The Pew-Stewart Scholars for Cancer Research
Annual Report

Prepared for

The Alexander and Margaret Stewart Trust

September 2022

Introduction

In 2014, The Pew Charitable Trusts and The Alexander and Margaret Stewart Trust came together to form an initiative aimed at supporting scientists who are researching the causes, diagnosis, and treatment of cancer. The Pew-Stewart Scholars for Cancer Research program has had a foundational impact on the early careers of 48 scientists from 23 unique institutions, whose research areas have ranged from cancer biology and gene regulation to cancer immunology and genomics. The Stewart Trust's steadfast partnership has been integral to the program's success for nearly a decade, and we remain tremendously grateful.

In March, the program graduated its fifth class (class of 2018), expanding the Pew-Stewart alumni group to 25 individuals who continue to tackle critical cancer-focused investigations and garner support and recognition for their work. This June, Pew announced the ninth class of Pew-Stewart Scholars. For the 2022 cycle, we invited 93 institutions to nominate a candidate, 72 of which did so, and 66 applicants submitted applications. In total, the national advisory committee reviewed 70 applications, with four additional applications resulting from the alumni nomination process.

Six individuals were chosen for funding this year as opposed to the standard five. We want to express our appreciation to the Stewart Trust for electing to utilize unspent funds from recent years in order to a support a sixth scholar. Three nominating institutions were added for the 2022 cycle: University of Vermont Cancer Center, Boston University, and Howard University Cancer Center. A list of the six 2022 scholars and their affiliated institutions is provided below. Projects by this stellar group include researching why a small subset of pre-cancerous cells drive the development of blood cancers; investigating the underlying T cell responses from a new immunotherapy to develop safer and more effective treatments for melanoma; and determining how cancer cells adapt their metabolic processes to resist therapy. Previous Pew-Stewart classes and complete biographies of the newest class are attached as **Appendix I.**

It has been another notable year for the Pew-Stewart Scholars partnership—from convening in person once again for our annual meeting to establishing a national advisory committee leadership transition plan—and we are delighted to provide you with the following highlights as well as a financial update (the budget and expenses since the project's launch in February 2014 through June 30, 2022) in **Appendix VII.**

Class of 2022 Pew-Stewart Scholars

Monther Abu-Remaileh, Ph.D., Stanford University
Alexander Bick, M.D., Ph.D., Vanderbilt University Medical Center
Shasha Chong, Ph.D., California Institute of Technology
Alexander Huang, M.D., University of Pennsylvania
Chengcheng Jin, Ph.D., University of Pennsylvania
Christina Towers, Ph.D., The Salk Institute for Biological Studies

Pew-Stewart Scholars News and Updates

Pew-Stewart scholars continue to be recognized for their excellence in cancer research. The following section highlights Pew-Stewart scholar distinctions, accolades, and publications over the past year.

Class of 2021

Anders Hansen published an article in the journal *Science,* which was recently covered by the research news outlet *Science Daily*. The work reveals new knowledge on the regulation of gene expression. The human genome resembles a dynamic "string" where loops form and dissemble to control when genes are activated. Hansen and his group developed a method to visualize loops over a long period of time, rather than short snapshots. They found that the looping of the genome is much rarer and shorter-lived than previously thought, suggesting that current theories of how loops influence gene expression may need to be revised. Since aberrations in the mechanisms that help to control gene activation have been found in various cancers, Hansen's work offers exciting insight on new methods to control cancer growth.

David Van Valen was named a Moore Fellow by the Gordon and Betty Moore Foundation for the development of new tools and technologies that promise to accelerate scientific discovery. His invention—deep learning-enabled optical barcodes—aims to make genetic variations in cells identifiable with imaging. If successful, it will dramatically increase the speed and scale at which we can connect genes with behaviors at the cellular level and enable faster detection of genetic changes that are associated with cancer, before it takes hold.

Liling Wan recently received two awards: the NIH New Innovator Award and the 2022 ASH Scholar Award from the American Society of Hematology. Wan received the ASH award in the Basic/Translational Junior Faculty category, which is intended to help individuals dedicated to careers in hematology research as they transition from training programs to careers as independent investigators. The Wan lab studies basic chromatin and gene regulatory mechanisms and how these mechanisms are dysregulated in cancer, with the goal of harnessing these insights for therapeutics.

Ansuman Satpathy was a recipient of Stanford University's Cancer Grant Challenge. Satpathy is part of a team of four researchers who will develop next-generation immunotherapies for children with solid tumors. Pediatric cancers are biologically distinct from tumors in adults, so immunotherapy techniques engineered for adult cancers often fail to help children. The researchers

plan to engineer therapies that specifically target pediatric tumors, focusing on cell surface markers and lab models specific to pediatric disease. Pew-Stewart advisor Howard Chang is also a recipient of this funding and will be working with a separate research team to study extrachromosomal DNA in cancer.

Class of 2020

Shruti Naik was featured in a piece from *Forbes* about her research on the factors in the human immune system that allow early cancer cells take root and the search for early-interventions that could stop tumors in their tracks. In the article, she explains the strong link between cancer and inflammation, as many cancers develop at sites of active inflammation, infection, or irritation.

Srinivas Ramachandran and colleagues published a study in the journal *Science Advances* on a less invasive method to obtain information about a patient's breast cancer by a simple blood draw. The study found that plasma cell-free DNA, DNA that is released from tumors cells into the blood stream, contains molecular fingerprints of the tumor and can be used to define the progression of the disease and predict treatment outcomes. The team looked at a type of breast cancer that expresses estrogen receptor to learn about its molecular signature, information that can be used to inform therapies for treating the disease.

Class of 2019

Luke Gilbert is part of a team of researchers who received a $25 million Cancer Grand Challenges award to investigate the very early stages of cancer development. Cancer Grand Challenges is a global funding platform, co-founded by Cancer Research UK (CRUK) and the National Cancer Institute (NCI) in the U.S., that supports a community of diverse, global teams in taking on some of cancer's toughest challenges. Gilbert will co-lead the PROMINENT team, which unites advocates and scientists with expertise in epidemiology, genetics, imaging and more, across five institutions in the U.S., U.K., Sweden, Spain, and France.

Gilbert was also the co-author of a paper in the journal *Cell* which describes a novel CRISPR-based tool called "CRISPRoff," which allows scientists to switch off almost any gene in human cells without making a single edit to the genetic code. CRISPRoff accomplishes this by targeting the epigenome, the chemical changes that takes place on genes, which help to regulate their expression. Because cancers can arise when genes are aberrantly expressed, CRISPRoff technology may one day lead to powerful therapies against the disease by controlling the way genes are turned on or off.

Diana Hargreaves published a paper in *Proceedings of the National Academy of Sciences* revealing a method for controlling inflammation at the genetic level. Macrophages, a type of immune cell, can induce a number of genes in response to an infection. At the same time, some of these responses can lead to unintended inflammation in underlying diseases such as atherosclerosis and obesity. The study found a novel way to better control inflammatory responses, by inhibiting the BRD9 protein, which limited the level of inflammation by reducing the activation of specific interferon genes. This work has important clinical implications for treating cancer as well, since

the BRD9 protein belongs to a protein complex that is frequently altered in cancer. Furthermore, the work also provides additional insight on novel ways to control immune responses to cancer.

The Pershing Square Sohn Price for Young investigators in Cancer Research was awarded to Piro Lito. Lito and his lab study proteins that drive cancer growth, focusing particularly on KRAS, a small enzyme that acts as an 'on'/'off' switch to control a number of cellular functions. Mutations of the KRAS protein are found in nearly a third of cancer patients and lead to uncontrolled cancer growth. It is believed that genetic mutations keep KRAS "locked" in an 'on' state, but new data from the Lito lab suggest certain cellular proteins can physiologically interact with KRAS to control its activity. Through his project, Dr. Lito aims to explore this further and identify novel regulators of KRAS activity, thus opening new directions for potential therapeutics.

Lito has also joined the scientific advisory board of Frontier Medicines Corporation—a precision medicine company co-founded by Pew-Stewart scholar Roberto Zoncu seeking to unlock the proteome to advance breakthrough therapies against otherwise undruggable disease-causing targets. One of the leading programs at Frontier Medicines is to advance the development of a potent inhibitor of mutant KRAS, which can be frequently found in patients with non-small cell lung cancer, colorectal cancer, and pancreatic cancer. The board is comprised of industry leaders in oncology, drug development, and discovery research.

Gabriel Victora was interviewed by *Nature* for one of their Career Q&A features. In the piece, he discusses his transition from concert pianist to immunologist and how music informs his approach to scientific research.

Program Alumni

Cigall Kadoch ('15) was chosen as one of the 2021 Howard Hughes Medical Institute's Investigators. This support provides outstanding researchers with generous and flexible funding for significant periods of time. Kadoch's lab studies a molecular machine that alters DNA's 3-D structure to control gene activity, using human disease genetics as an entry point to study how SWI/SNF works (SWI/SNF is a diverse family of protein assemblies that governs the architecture of the genome, turning genes on and off, and dialing activity up or down at the right times). A major focus of her lab is to investigate how the protein complex influences the remodeling of our chromatin in cancer and identify new therapeutic strategies to control the progression of hard-to-treat malignancies.

Michael Birnbaum ('18) and colleagues devised an experimental tool that allows researchers to precisely pick out interactions between a particular immune cell and its target antigen. The new technique allows a much closer look at the distinct ways different immune cells recognize foreign invaders and distinct markers on cancer cells; work that can help dissect the complex immune recognition in a variety of diseases. This work was recently published in the journal *Nature Methods*.

Program Highlights

Pew Biomedical Scholars Innovation Fund

Alumni of the Pew Scholars, Pew-Stewart Scholars, and Pew Latin American Fellows programs, as well as former program advisors, were invited to apply to the 2022 cycle of the Innovation Fund Award. Alumni from Pew-Stewart classes 2014 to 2017 were eligible to apply. There were four applications involving at least one Pew-Stewart scholar with six Pew-Stewart scholars applying in total. Three of the proposals focused on cancer research; the fourth was on the gut microbiome and immunity. The 2022 class was announced in September of this year. While no Pew-Stewart scholars were selected for this cycle, their proposals were competitive, and the opportunity allowed for further engagement within the broader Pew biomedical community. Additionally, there has been a multi-year extension of the Pew Biomedical Scholars Innovation Fund, to which Pew-Stewart Scholars are eligible to apply for research awards annually.

Pew-Stewart Scholars National Advisory Committee

Jennifer Pietenpol, from the Vanderbilt-Ingram Cancer Center, completed her term on the committee. For the 2023 award cycle, the program welcomed Navdeep Chandel, the David W. Cugell Professor of Medicine, Biochemistry and Molecular Genetics at the Feinberg School of Medicine at Northwestern University. Dr. Chandel has an expertise in cell metabolism and mitochondria research, with a focus on the relationship between metabolism and tumor growth.

Peter M. Howley, the Shattuck professor of pathological anatomy at Harvard Medical School, will be completing his term as chair of the advisory committee with the March 2023 selection. Helen Piwnica-Worms, Professor of Experimental Radiation Oncology at MD Anderson Cancer Center, has been selected as his successor. The baton will be passed at the March 2023 annual meeting.

See **Appendix II** for a full list of committee members.

Annual Meetings and other Convenings

For the first time since the onset of the COVID-19 pandemic, the Pew biomedical programs resumed their in-person annual convening in March 2022 after a canceled meeting in 2020 and a virtual meeting in 2021. It was heartening to be together at the Pelican Hill Resort in Newport Beach, California, and we were thankful that the Stewart Trustees and staff were able to attend. The conference itself was well received—for most participants, this was their first in-person convening since before the pandemic and attendance was high considering the extenuating circumstances of COVID-19. We were also thrilled to feature the new program logo on the annual meeting giveaway for the first time!

The program continues to take advantage of virtual opportunities for engagement. The newly selected 2022 class of Pew-Stewart scholars and Pew scholars participated in a meet-and-greet event in August. The Stewart trustees joined to provide introductions and a welcome to the Pew-Stewart group.

In December, the group will have a community-building event for the scholars and fellows who were most impacted by COVID meeting cancellations. The meeting will take place from December 6-10, 2022 at the Los Sueños Marriott Ocean & Golf Resort in Costa Rica. Pew-Stewart

scholars will be joined by advisors and Stewart trustees and the broader Pew biomedical program scholars and fellows at this special event.

The next annual meeting is scheduled to take place in San Juan, Puerto Rico from March 24-29, 2023. The Pew-Stewart classes of 2019-2022 are invited to attend the event, along with advisors and Stewart trustees. The 2022 class will give an introductory talk and a poster while the graduating Pew-Stewart class of 2019 will give a 10-minute talk about their research. The 2020 and 2021 classes will be presenting posters at the meeting.

Class of 2023 Selection Process

The application process for the 2023 Pew-Stewart Scholar awards is underway. In the spring of 2022, Pew invited 93 cancer research centers and institutions to nominate a candidate for the award. There were no new institutions added to the list this cycle. 72 institutions nominated candidates for the 2023 award and Pew received 67 completed applications. The institutional participation list is attached as **Appendix III**. As in previous years, applicants from the Pew alumni nomination process and from the Pew scholar institutional nomination may be considered for the Pew-Stewart Scholars program. These applications are examined on a case-by-case basis for cancer relevance and will be evaluated by both the Pew and Pew-Stewart advisory committees. Reviews will kick off at the end of September and a final selection meeting will take place virtually in March 2023.

External Communications

Pew has published various articles highlighting the work of the Pew-Stewart scholars throughout the past year. In November 2021, a piece was published entitled "Pew-Stewart Scholars Explore Intricacies of Drug Resistance in Lung Cancer" which focused on two scholars who are working to uncover promising new treatments for this deadly disease—Piro Lito and Stefani Spranger.

In May of 2022, the program interviewed Pew-Stewart advisory committee chair Peter Howley, along with chairs of the scholars and fellows programs ahead of the new class announcement about their take on what makes each program unique.

A quiz to test the reader's knowledge on research photos was published on the Pew website in July 2022, which consisted of microscopy images followed by a multiple choice to identify the subject. 2022 Pew-Stewart scholar Christina Towers was profiled with an image depicting the metabolic recycling process (known as autophagy) in mammalian connective tissue.

In August 2022, a Q&A was published with 2022 Pew-Stewart scholar Alexander Huang, whose lab at the University of Pennsylvania is examining a promising new melanoma therapy. In the piece, Huang talks about his research on a type of immunotherapy for melanoma with the potential to lessen side-effects and toxicity.

Pew-Stewart Program Trends and Updates

From the program's inception in 2014 to the announcement of the new class in 2022, the partnership between Pew and The Alexander and Margaret Stewart Trust has supported 48 stellar early-career cancer investigators. Below please find highlights from several aspects of the program.

Nomination Process

Applicants for the inaugural class in 2014 were drawn from the Pew Biomedical Scholars pool. The following year, the program developed its own list of nominating institutions based on a list of cancer centers designated by the National Cancer Institute (NCI). Since its establishment, our list of nominating institutions has grown from 71 institutions to 93, and we continue to update it as new additions are made to the NCI list. Additionally, each year, the advisory committee reviews requests from institutions asking to be added to the nominating list and selects only those with strong cancer research programs to join. Additionally, we have examined HBCUs with strong research programs and previously added the Howard University Cancer Center to the list.

Awarded Institutions

Pew-Stewart scholars and alumni come from 23 distinct institutions. The institutions that have produced the highest number of awardees are the Massachusetts Institute of Technology (five); Caltech (four); and New York University, Stanford University, University of California, Berkley, University of California, San Francisco, and University of Pennsylvania (three each).

The full list of represented institutions can be found in **Appendix IV.**

Applicant Demographics

Since the program's inception, gender data has been collected and the number of female applicants has ranged from 27-43%, with the 2022 cycle having the highest percentage (43%) of female applicants applying. The total percentage of female awardees stands at 35% (17 out of a total of 48 awards). For the 2022 cycle, 43% of the applicants were female and three out of six awarded were women. Pew remains committed to supporting the careers of female scientists and improving diversity, equity, and inclusion in our programs by selecting a diverse group of grantees, encouraging a variety of nominees from nominating institutions, and providing an inclusive and family friendly environment at the annual meetings.

Starting with the 2022 cycle, the program expanded demographic data collection of applicants with the addition of race/ethnicity, disability, and open response questions. For the 2023 cycle, the program made further adjustments to include questions on socioeconomic status and LGBTQIA+ status.

Research Focus

Pew-Stewart Scholars employ diverse scientific approaches to address critical questions in cancer research. Whether through experimentation in the field of biomedical engineering, chemical biology, cell biology, immunology, genomics, or metabolism, an early analysis of scholar research demonstrates a strong focus on understanding cancer etiology, the tumor microenvironment, and the pathways that govern cancer progression. In the last several years, there has been increasing interest the role of the immune system in fighting cancer. Pew-Stewart scholars also have a sustained interest in understanding how genes are controlled and regulated in cancer. We are thrilled to see the Pew-Stewart program evolving alongside evolutions in cancer research; a chart showing funded research fields over time is attached as **Appendix VI.**

Cancer Research in the Pew Scholars Program

The Pew Scholars program continues to stand alongside the Pew-Stewart Scholars program in supporting cancer research. The number of cancer-focused Pew scholars remains unaffected by the Pew-Stewart Scholars program, ranging from one to three every year between 2007-2022. Since 2015, the Pew Scholars program has funded 14 researchers to pursue funded projects in the cancer research field.

Conclusion

As we reflect on the Pew-Stewart Scholars program, we remain tremendously grateful for the Stewart Trust's guidance and support—ensuring the project's stability and ingenuity for nearly a decade. The scholars continue to have a measurable impact on the field with their groundbreaking research and dedication to finding therapies and, potentially, cures to a category of disease that causes millions of deaths worldwide each year. With six new impressive scholars, we look forward to seeing all that this group accomplishes in the years ahead. Thank you for the Alexander and Margaret Stewart Trust's sustained partnership on this extraordinarily important work.

APPENDIX I: 2022 Pew-Stewart Scholars for Cancer Research

Monther Abu-Remaileh, Ph.D. The Abu-Remaileh lab will determine how lysosomes help to orchestrate the rewiring of metabolic processes to fuel tumor growth in KRAS-driven cancers. Cancer cells gobble up nutrients from the tumor microenvironment to support their rapid growth, and in order to keep up with demand, they must undergo certain adaptations. It has been observed that cancers driven by a mutant form of the KRAS protein, especially pancreatic and non-small cell lung cancers, are highly dependent on the function of lysosomes—organelles filled with digestive enzymes—for their survival. By combining novel biochemical and genomic approaches along with KRAS-driven cancer mouse models, the lab will characterize proteins within lysosomes during tumor development and pinpoint which lysosomal proteins are essential for cancer cell growth. Furthermore, the lab will classify the different types of nutrients that lysosomes supply to fuel cancer cells, work that has the potential to identify vulnerabilities that can be exploited as novel therapeutic targets in KRAS-driven cancers.

Alexander Bick, M.D., Ph.D. The Bick lab will develop an algorithm to determine why and how only a small subset of pre-cancerous cells drive the development of blood cancers. Hematopoietic stem cells give rise to a repertoire of different blood cell types in our body. As people age, a process known as clonal hematopoiesis (CH) can occur, where hematopoietic stem cells acquire mutations and begin making a substantial portion of blood cells with that particular mutation or mutations. These blood cells have the potential to progress to blood cancers, yet not all experience this outcome, a phenomenon that the Bick lab seeks to understand. Previously, the lab identified certain mutations that seem to "drive" CH. Now, the lab will use state-of the-art genomic techniques and computational biology to identify CH in 1 million individuals and characterize the mechanisms that allow hematopoietic stem cells to rapidly expand in number and become cancer-causing. Work from the lab could have significant impact on early intervention strategies toward cancer and identify individuals who are most at risk for developing malignant disease.

Shasha Chong, Ph.D. The Chong lab will investigate how the expression of a transcription factor in Ewing sarcoma, a rare type of bone cancer, drives the expression of genes causing cancer development. Proteins that are known as transcription factors (TFs) come together at sites of key genetic sequences to regulate the expression of genes. In Ewing sarcoma, a mutant transcription factor known as EWS/FLI1 is formed by the fusion of two genes. Specific protein regions within the EWS/FLI1 TF allow it to interact with other proteins and form a critical "hub" to activate gene expression and drive cancer, yet how this occurs is unclear to researchers. Using a suite of single-cell and single-molecular imaging techniques, the Chong lab aims to visualize how the EWS/FLI1 hub assembles to drive oncogene expression and map the different interacting partners that participate in this bustling gene expression center. Furthermore, the lab will identify small molecules that have the potential to disrupt these interactions, work that could open new lines of research toward the development of novel approaches for treating Ewing sarcoma.

Alexander Huang, M.D. The Huang lab will investigate the underlying T cell responses from a new immunotherapy to develop safer and more effective treatment for melanoma. Immune checkpoint inhibitors (ICIs) help our body's own immune cells effectively target tumors by inhibiting the action of checkpoint proteins, which normally keep immune cells in check and prevent them from being overstimulated during an inflammatory response. In a recent clinical trial,

the combined use of ICIs that target the PD-1 and LAG-3 checkpoint proteins showed less toxicity in patients with melanoma than another drug combination targeting PD-1 and CTLA-4, while retaining similar effects on tumors. Since LAG-3 is a new target, it is unclear how its inhibition contributes to tumor control and whether it contributes to the decrease in adverse effects in patients. Using cutting-edge sequencing technologies and a melanoma mouse model, the Huang lab will examine the distribution of LAG-3 in melanoma tumors and determine changes in the makeup of tumor-fighting immune cells under LAG-3 inhibition. The lab will complement mouse studies with data from immunotherapy clinical trials to unveil critical T cell responses with the new therapeutic combination, work that has important implications on the development of safe and effective treatments for melanoma.

Chengcheng Jin, Ph.D. The Jin lab will determine how the nervous system regulates immune responses to lung cancer. Various types of solid tumors are threaded with neurons, which sense and respond to stimuli around the tumor. The lung also harbors a diverse community of airborne microbes, along with important immune cells to provide defense against pathogens. However, little is known about how these two essential systems are integrated during lung cancer development. The Jin lab will investigate how sensory neurons—the same nerve cells that control cough and pain—communicate with the tumor microenvironment and vice versa. Using a genetically engineered mouse model of human non-small cell lung cancer, the lab will integrate techniques from immunology, genetics, neuroscience, and microbiology to determine the role of sensory neurons in initiating tumor growth and progression. The lab will also determine how key immune cells and lung microbes influence the communication and activity of nerve cells and the immune system, work that has the potential for identifying novel strategies for controlling lung cancer and improving responses to immunotherapy.

Christina Towers, Ph.D. The Towers lab will explore how cancer cells adapt their metabolic processes to resist therapy. Cancers have the remarkable ability to adjust to diverse conditions, even when certain essential processes are turned off. The lab recently discovered that when the metabolic recycling process known as autophagy is blocked in cancer cells, a small proportion of cells will continue to grow and can sidestep this critical pathway. To determine how cancer cells adapt and maneuver their metabolic switches to survive, the lab will first build an optogenetic system—a method to rapidly control autophagy using light. The next step will be combining a genetic barcoding system and single-cell RNA sequencing techniques to identify the population of cancer cells that are poised for adaptation and the alternate metabolic pathways that are adopted by these cells to resist therapy. Work from the lab could uncover a novel mechanism driving acquired cancer resistance and offer new insights on approaches to prevent and control resistance before it takes shape.

Previous Classes of Pew-Stewart Scholars

Class of 2021 Pew-Stewart Scholars

Francine Garrett-Bakelman, M.D., Ph.D., University of Virginia
Anders Sejr Hansen, Ph.D., Massachusetts Institute of Technology
Ansuman Satpathy, M.D., Ph.D., Stanford University
David Van Valen, M.D., Ph.D., California Institute of Technology

Liling Wan, Ph.D., University of Pennsylvania

Class of 2020 Pew-Stewart Scholars

Shruti Naik, Ph.D., New York University Langone Health
Srinivas Ramachandran, Ph.D., University of Colorado School of Medicine
Mara Sherman, Ph.D., Oregon Health and Science University
Xuebing Wu, Ph.D., Columbia University
Jihye Yun, Ph.D., MD Anderson Cancer Center

Class of 2019 Pew-Stewart Scholars

Michel DuPage, Ph.D., University of California, Berkeley
Luke Gilbert, Ph.D., University of California, San Francisco
Diana Hargreaves, Ph.D., The Salk Institute for Biological Studies
Piro Lito, M.D., Ph.D., Memorial Sloan Kettering Cancer Center
Chao Lu, Ph.D., Herbert Irving Comprehensive Cancer Center, Columbia University
Stefani Spranger, Ph.D., Massachusetts Institute of Technology
Gabriel Victora, Ph.D., The Rockefeller University

Class of 2018 Pew-Stewart Scholars

Michael Birnbaum, Ph.D., Massachusetts Institute of Technology
Kivanç Birsoy, Ph.D., The Rockefeller University
Aaron M. Ring, M.D., Ph.D., Yale University
Alex K. Shalek, Ph.D., Massachusetts Institute of Technology
Rebecca M. Voorhees, Ph.D., California Institute of Technology

Class of 2017 Pew-Stewart Scholars

Daniel A. Bachovchin, Ph.D., Memorial Sloan Kettering Cancer Center
Nadya Dimitrova, Ph.D., Yale University
Charles Y. Lin, Ph.D., Kronos Bio, Inc.
Robert K. McGinty, M.D., Ph.D., University of North Carolina, Chapel Hill
Sabrina L. Spencer, Ph.D., University of Colorado, Boulder

Class of 2016 Pew-Stewart Scholars

Stephanie Dougan, Ph.D., Dana Farber Cancer Institute, Harvard University
Dirk Hockemeyer, Ph.D., University of California, Berkeley
Paul Northcott, Ph.D., St. Jude Children's Research Hospital
Richard L. Possemato, Ph.D., Perlmutter Cancer Center, NYU School of Medicine
Ömer H. Yilmaz, M.D., Ph.D., Koch Institute for Integrative Cancer Research at MIT

Class of 2015 Pew-Stewart Scholars

Trever Bivona, M.D., Ph.D., University of California, San Francisco
Adam de la Zerda, Ph.D., Stanford University
Mitchell Guttman, Ph.D., California Institute of Technology
Cigall Kadoch, Ph.D., Dana-Farber Cancer Institute and Harvard Medical School
Min Yu, M.D., Ph.D., University of Southern California

Class of 2014 Pew-Stewart Scholars

Arvin Dar, Ph.D., Icahn School of Medicine at Mt. Sinai
Shawn M. Douglas, Ph.D., University of California, San Francisco
Andrew J. Holland, Ph.D., Johns Hopkins University, School of Medicine
Agnel Sfeir, Ph.D., Memorial Sloan Kettering Cancer Center
Roberto Zoncu, Ph.D., University of California, Berkeley

APPENDIX II: The Pew-Stewart National Advisory Committee

Peter M. Howley, M.D. (chair)
Shattuck Professor of Pathological Anatomy
Department of Microbiology and Immunobiology
Harvard Medical School

Navdeep S. Chandel, Ph.D.
David W. Cugell Professor of Medicine & Biochemistry and Molecular Genetics
Feinberg School of Medicine
Northwestern University

Howard Y. Chang, M.D., Ph.D.
Investigator, Howard Hughes Medical Institute
Virginia and D.K. Ludwig Professor of Cancer Research
Professor of Dermatology and Genetics
Stanford University

Susan Kaech, Ph.D.
Professor and Director
Nomis Foundation Chair
Nomis Center for Immunobiology and Microbial Pathogenesis
The Salk Institute for Biological Studies

Helen Piwnica-Worms, Ph.D.
Professor of Experimental Radiation Oncology
MD Anderson Cancer Center

APPENDIX III: 2023 Institutional Nominations

Institutions that nominated a candidate:

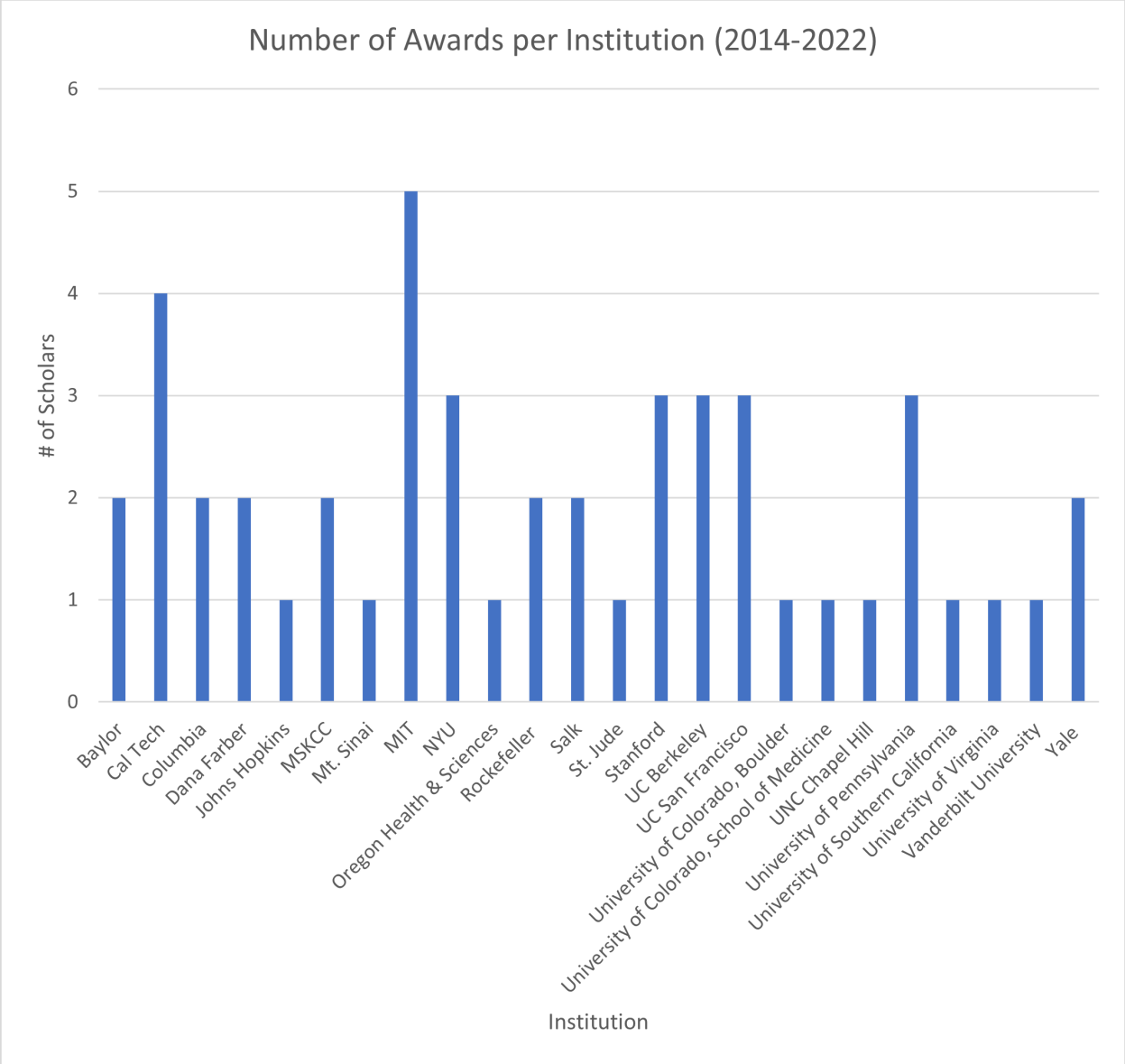
1. Albert Einstein College of Medicine
2. Baylor College of Medicine
3. Beckman Research Institute of the City of Hope
4. Boston University School of Medicine
5. California Institute of Technology
6. Case Comprehensive Cancer Center, Case Western Reserve University
7. Cedars-Sinai Medical Center
8. Children's Hospital of Philadelphia
9. Cold Spring Harbor Laboratory
10. Columbia University
11. Dana Farber Cancer Institute
12. Dartmouth College
13. Duke University
14. Fox Chase Cancer Center
15. Fred Hutchinson Cancer Center
16. Georgetown University
17. Icahn School of Medicine at Mount Sinai
18. Indiana University
19. Johns Hopkins University
20. Massachusetts Institute of Technology
21. Mayo Clinic
22. MD Anderson Cancer Center
23. Medical University of South Carolina; Hollings Cancer Center
24. Memorial Sloan Kettering Cancer Center
25. Moffitt Cancer Center and Research Institute
26. New York University Grossman School of Medicine
27. Northwestern University
28. Oregon Health Sciences University
29. Roswell Park Comprehensive Cancer Center
30. Salk Institute for Biological Studies
31. Sanford Burnham Prebys Medical Discovery Institute
32. St. Jude Children's Research Hospital
33. Stanford University
34. The Ohio State University Comprehensive Cancer Center
35. The Rockefeller University
36. The University of Chicago
37. The University of Texas at Austin
38. The Wistar Institute
39. University of Alabama at Birmingham

40. University of Arizona
41. University of California, Berkeley
42. University of California, Davis
43. University of California, Irvine
44. University of California, Los Angeles
45. University of California, San Diego
46. University of California, San Francisco
47. University of California, Santa Cruz
48. University of Colorado School of Medicine
49. University of Florida
50. University of Illinois at Chicago
51. University of Illinois at Urbana-Champaign
52. University of Kansas Medical Center
53. University of Kentucky
54. University of Massachusetts Medical School
55. University of Miami Miller School of Medicine
56. University of New Mexico Comprehensive Cancer Center
57. University of North Carolina, Chapel Hill
58. University of Oklahoma Health Sciences Center
59. University of Pennsylvania
60. University of Pittsburgh
61. University of Rochester
62. University of Southern California
63. University of Texas Southwestern Medical Center
64. University of Utah
65. University of Wisconsin-Madison
66. Van Andel Research Institute
67. Vanderbilt University Medical Center
68. Virginia Commonwealth University
69. Washington University in St. Louis
70. Wayne State University
71. Weill Cornell Medicine
72. Yale University

Institutions that did not nominate:

1. Fred and Pamela Buffett Cancer Center, University of Nebraska Medical Center
2. Holden Comprehensive Cancer Center, University of Iowa
3. Howard University Cancer Center, Howard University
4. Marlene and Stewart Greenebaum Cancer Center, University of Maryland, Baltimore
5. Masonic Cancer Center, University of Minnesota
6. Mays Cancer Center, University of Texas Health San Antonio
7. National Cancer Institute
8. Penn State Cancer Institute, Pennsylvania State University
9. Purdue University Center for Cancer Research, Purdue University
10. Sidney Kimmel Cancer Center, Thomas Jefferson University
11. Stowers Institute for Medical Research
12. The Cancer Institute of New Jersey, Rutgers University
13. The Jackson Laboratory Cancer Center
14. The University of Texas Medical Branch
15. University of Hawaii Cancer Center
16. University of Michigan Rogel Cancer Center
17. University of Vermont Cancer Center
18. University of Virginia Cancer Center
19. Wake Forest Baptist Comprehensive Cancer Center
20. Winship Cancer Institute, Emory University
21. Winthrop P. Rockefeller Cancer Institute, University of Arkansas for Medical Sciences

APPENDIX IV: Awards by Academic Institution



APPENDIX VI: Funded Research Fields Over Time

This chart represents the scope of research fields addressed by 48 Pew-Stewart scholars between 2014-2022. Seven separate research areas are represented. Most classes consist of five awardees, except this year, where six were awarded and 2019, where seven were awarded.