HEPATITIS B FOUNDATION | Baruch S. BLUMBERG INSTITUTE

2024 ANNUAL REPORT

THE POWER OF COLLABORATION

EDUCATION

ADVOCACY

OUTREACH

RESEARCH

THE POWER OF COLLABORATION

I am proud to write to you today, reflecting on the extraordinary efforts and impact of the Hepatitis B Foundation over the past year. As we close the chapter on 2024, I want to share how the Foundation's tireless dedication has shaped the fight against hepatitis B, improving and saving lives, and offering hope to millions locally, across the U.S., and throughout the world.

In 2024, the Hepatitis B Foundation continued its commitment to reducing the devastating impacts of hepatitis B, hepatitis D and liver cancer. Through its partnerships and capacity building projects, education and training programs, and public health and outreach initiatives, **the Foundation has reached unprecedented numbers of individuals**. This work is as vital today as it was 60 years ago, when the virus was discovered by Dr. Baruch Blumberg and his scientific team.

As you will read in this report, the Foundation continues to respond to the areas of greatest need. In 2024, we focused efforts on **expanding treatment access**; improving access to simplified diagnostic tests; improving **prevention and early detection of liver cancer**; and **increasing community and health systems capacity** in low resource countries. We added 75 new storytellers to our **storytelling program**, and hosted our first in-person B Informed patient conference since 2019! We made presentations at over 120 events, reaching almost 8,000 people with direct education and training. And over 3 million people visited our website to gather information and support in 16 languages. By continuing to provide accessible screening and vaccination resources, the Foundation has directly contributed to decreasing transmission rates and improving diagnosis and care, ensuring that more people receive the care and attention they need to live long, healthy lives.

The strides made in 2024 reflect the power of collaboration.

I would like to take this opportunity to thank the staff, storytellers, partners, advocates, researchers and health care professionals who have worked hand in hand with the Hepatitis B Foundation. Your efforts and commitment continue to serve as a beacon of hope and inspiration for all those affected by hepatitis B, hepatitis D and liver cancer.

To all those who generously supported our efforts in 2024, I hope that you feel proud of your contribution to the successes you read about in the following pages. Thank you for your unwavering support. Together, we will continue to move closer to a future where hepatitis B and liver cancer are no longer a threat to public health. I am confident that with the continued dedication of the Hepatitis B Foundation and partners like you, we can and will achieve a world *free* from the burdens of hepatitis B.

All my best,

Chari Cohen, DrPH, MPH
President, Hepatitis B Foundation

Hepatitis B Foundation hosts B Informed Patient Conference

The Hepatitis B Foundation hosted its B Informed Patient Conference in Philadelphia last summer for people living with hepatitis B, clinicians treating them and public health experts engaged in the field.

The half-day meeting allowed people with hepatitis B to hear from others with lived experience, expert providers and researchers in the field. Topics included **understanding and managing a hepatitis B diagnosis, liver cancer research** ongoing at Sidney Kimmel Cancer Centers, the path towards a cure for hep B and future treatments in the pipeline.

It was the first in-person ***B Informed Patient Conference*** since the pandemic and it was held on July 27, the day before ***World Hepatitis Day***, which is celebrated annually around the globe on July 28 in honor of Baruch S. Blumberg's birthday. A Nobel Laureate, Dr. Blumberg played a key role in helping develop the Hepatitis B Foundation.

Foundation President **Chari A. Cohen, DrPH, MPH**, said this event was a great success. **"We very much appreciate the presenters, particularly our #justB Storytellers, who shared with us their lived experience as people living with hepatitis B."**

Dr. Cohen thanked **Catharine and Rob Williams** for funding the real-time translation service that allowed audience members to listen in Mandarin. She also expressed appreciation to the **Sidney Kimmel Cancer Center at Thomas Jefferson University** for providing a first-rate meeting space.

Conference organizer **Catherine Freeland, PhD, MPH**, the Foundation's associate director for public health research, said more than 75 people from around the region participated, from Washington D.C. to New York City, with many from the Philadelphia metro.

"We've heard considerable positive feedback, and it seems many of those who joined us plan to stay engaged, which is one of our goals," Dr. Freeland said.

Among the experts speaking at the July 27 conference were (L-R) Dr. Jesse Torgersen, Penn Presbyterian Medical Center; Dr. Kenneth Rothstein, University of Pennsylvania; and Dr. Su Wang, Cooperman Barnabas Medical Center and Hepatitis B Foundation.

Policy and Advocacy wins in U.S. and Globally

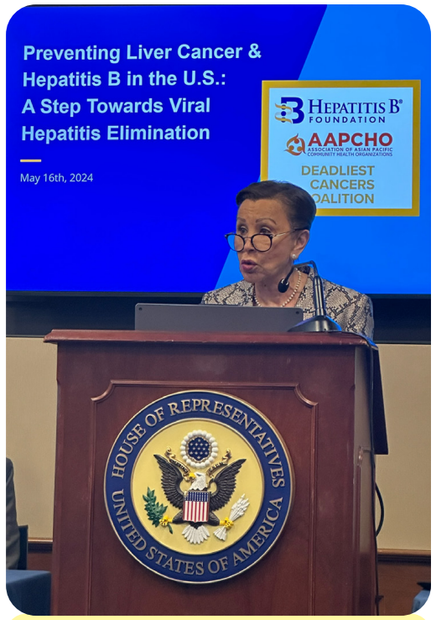
The Hepatitis B Foundation advocated, over the course of many months last year, for hepatitis B to be included in the U.S. Department of Health and Human Services (HHS) final proposal to create and adopt viral hepatitis quality measures for the Medicaid Adult Core Set.

Originally, the proposal included quality measures — which play a significant role in encouraging health systems and providers to implement recommendations— only for hepatitis C. The Foundation swiftly mobilized its action network and prepared responses for the public comment opportunity. As a result of our advocacy, HHS proposed the inclusion of **three new hepatitis B-related screening quality measures**, namely screening rates for all adults, pregnant persons and those experiencing opioid use disorder.

The Foundation also worked on several opportunities to increase hepatitis B screening across the nation. Through meetings with the U.S. Food and Drug Administration (FDA), responding to public comment, and participating in a national diagnostics working group, hepatitis B advocates successfully pushed for the reclassification of the hepatitis B virus diagnostic assays, which will now make it easier for **rapid point-of-care tests** to be brought to the U.S.

The Hepatitis B Foundation hosted its annual briefing in Washington, D.C., on May 16, 2024. **U.S. Rep. Nydia Velázquez of New York,** co-chair of the Congressional Hepatitis Caucus, opened the briefing with a powerful call for legislators to **prioritize hepatitis B elimination** and announced the reintroduction of the **Liver Illness, Visibility and Research (LIVER) Act**.

Jonathan Mermin, MD, MPH, Director of the National Center for HIV, Viral Hepatitis, STD, and TB Prevention Branch at the Centers for Disease Control and Prevention, highlighted the national burden of hepatitis B and liver cancer and described the new universal screening and vaccine recommendations for adults. The Deadliest Cancers Coalition and Association of Asian Pacific Community Health Organizations (AAPCHO) also presented.



Rep. Nydia Velázquez of New York at our May 24 Congressional briefing

At our D.C. briefing (L-R): DeWayne, #justB Storyteller; Jonathan Mermin, MD, MPH, Director, National Center for HIV, Viral Hepatitis, STD & TB Prevention, CDC; Chari Cohen, DrPH, MPH, President, Hepatitis B Foundation; and Megan Gordon Don, Director, Gov. Affairs & Advocacy, Deadliest Cancers Coalition.

The COVID-19 pandemic had derailed initial efforts by **Gavi, the Vaccine Alliance** to launch a **hepatitis B birth dose program**, thereby delaying vital assistance in critical high-risk areas. Over the last few years, the Foundation urged Gavi to follow through on their commitment through letters, meetings with Gavi's Policy Team and Vaccine Programmes Team, and signing on to an open letter published in *The Lancet* urging Gavi to start their hepatitis B birth dose campaign. Gavi launched the campaign in June 2024. The program will provide the hepatitis B birth dose free-of-charge to babies in **32** African countries where hepatitis B is prevalent. **The Foundation is proud to have played a role in increasing global access to this lifesaving vaccin**e.

THE POWER OF
COLLABORATION

Foundation staffer participates in White House forum

The White House Office of Science & Technology Policy convened key health leaders, advocates, physicians, researchers, and administration officials for the White House Minority Health Forum in April.

Frank Hood (front row, far left), the Hepatitis B Foundation's associate director of policy and partnerships and director of Hep B United, was among the invited participants.

The forum was convened for attendees to discuss progress and challenges and to identify new actions from the federal government and the private sector to **improve health outcomes and reduce health inequities nationwide**.

Outreach in Africa by Hepatitis B Foundation staff

Among the many events in Africa supported by the Hepatitis B Foundation is the Africa Hepatitis Summit, which takes place within the African region every two years.

Held most recently in Abuja, Nigeria, from October 24-26, 2023, the summit is organized and led by individuals from the African region with lived experience. Our staff served on the planning committee and helped to promote inclusion of individuals with lived experiences in the hepatitis elimination dialogue. The Hepatitis B Foundation hosted a session focused on **hepatitis B related stigma and discrimination which included several individuals with lived experience.**

Representatives from across the continent at the African Hepatitis Summit in Abuja, Nigeria. From the Hepatitis B Foundation were (third from left), Dr. Catherine Freeland, associate director of public health research, and (far right, front row) Dr. Yasmin Ibrahim, public health program director.

We supported attendance at the summit for more than 10 people, helping them come from across the continent to participate and present during the meeting. The meeting highlighted our perinatal prevention program to enhance hepatitis B birth dose uptake in Enugu and Adamawa States, Nigeria, in partnership with the U.S. Centers for Disease Control and Prevention (CDC), Nigeria Ministry of Health, Nigeria CDC and African Field Epidemiology Network (AFENET).

To improve progress towards hepatitis elimination goals in Low- and Middle-Income Countries (LMIC), the Hepatitis B Foundation partners with civil society organizations in several African nations to drive efforts particularly in areas where hepatitis B is endemic. The Hepatitis B Foundation supports these partners with grants, training, capacity building, technical assistance and resources. Here are details about the progress and impact of these robust, Foundation-supported, country-specific outreach initiates:

In Nigeria, the *Rise Against Hepatitis Global Initiative* is **enhancing community awareness and educating locals** about hepatitis B through interactive sessions and free screenings. The Jenesco Development Initiative is educating, screenings and vaccinating hundreds of people.

In Delta State, Nigeria, the *Hepatitis Advocacy Foundation* is **empowering community pharmacists** as key players in identifying and linking undiagnosed individuals to care. Workshops for pharmacists are aimed at bridging gaps in service delivery.

The Hepatitis Foundation of Ghana is **increasing public awareness and support** for individuals affected by hepatitis through treatment and care initiatives. *The Hepatitis Alliance of Ghana* is advocating and educating key stakeholders to improve prevention of mother to child transmission.

In Uganda, the *National Organization for People Living with Hepatitis B (NOPLHB)* is **advocating for hepatitis B elimination** to improve the quality of life for those affected. They are engaging community members and policymakers to strengthen health systems. With Foundation support, NOPLHB worked to promote **access to treatment and care for hepatitis B patients** that were lost to follow up. The project implemented a patient-peer and self-care network approach and storytelling from individuals who have sustained long term hepatitis B care in two districts in Northern Uganda. Membership exceeded 250 individuals and established a support system that helped spread patient-led accurate information and training on hepatitis B care.

In Mali, the *STOP HEPATITIS B Campaign* is addressing high rates of liver cancer and hepatitis B infection. Awareness campaigns have reached thousands through posters, local media and community screenings.

Also last year, the Hepatitis B Foundation contributed to the *Conference on Liver Disease in Africa (COLDA)*, held in Cairo, facilitating discussions among stakeholders across regions about significant health disparities in hepatitis care. And our team launched a one-stop shop for all resources related to hepatitis B on our website to improve access to resources needed to spread accurate information on hepatitis to areas that need it most.

Overall, we emphasize coordinated, **community-driven approaches to tackling hepatitis B across multiple countries, focusing on education, advocacy and direct health care interventions** to achieve the goal of HBV elimination. In the months ahead, the Foundation aims to formalize its approach in the African region with the development of an African-focused hepatitis B elimination coalition that seeks to empower communities on the grassroots level. The coalition is expected to launch in early 2025.

Hepatitis B live training in West Nile, Uganda, led by the National Organization for People Living with Hepatitis B.

CHIPO and Hepatitis Delta Connect

In 2024, the Coalition against Hepatitis for People of African Origin (CHIPO) grew to over 70 partners across the United States and Africa.

The coalition continued to meet bimonthly to network and share best practices for hepatitis B elimination work. Two webinars were held – the first in April, which featured **Dr. Patricia Jones** of the University of Miami highlighting the work of the African Caribbean Cancer Consortium, and the second in October, which focused on addressing hepatocellular carcinoma in resource-limited settings and featured **Dr. Mark Sonderup** of the University of Cape Town and **Dr. Gibril Ndow** of the London School of Hygiene & Tropical Medicine. Additionally, a number of blog posts featured CHIPO partners, including the Hepatitis Aid Organization in Uganda, the Africa Health Research Initiative in South Africa, and the Hepatitis Outreach Network in New York City.

The **Hepatitis Delta Connect** program also continued to flourish with the publication of manuscripts from our work conducting hepatitis B and delta testing in the harm reduction space, presentation of project results at both AASLD and INHSU (International Network on Health and Hepatitis in Substance Users) conferences, and a series of webinars, featuring **Dr. Melodie Weller** of the University of Utah, discussing limited screening and testing bias for hepatitis delta; **Dr. Ijeoma Ifeorah** of the University of Nsukka in Nigeria, presenting hepatitis delta epidemiology in Africa; **Dr. Maria Buti** of the Hospital General Universitari Valle Hebron in Spain, discussing HDV patient-reported outcomes; and **Dr. Malika Khodjaeva** of the Research Institute of Virology in Uzbekistan, presenting about the profile of hepatitis delta in that country. Hepatitis delta fact sheets were also translated into four additional languages (Urdu, Hindi, Yoruba, and Igbo), and more resources were compiled with HDV testing locations in different countries with high endemicity.

Providing aid to medical students in Nigeria

The Hepatitis B Foundation provided funding to Nigeria's Olabisi Onabanjo University Medical Students' Association to provide free, confidential hepatitis B screening to all enrolled medical students, free vaccination for those in need of protection and linkage to care for those testing positive.

As part of this program, the foundation conducted a **hepatitis B education session for the more than 300 medical students**, discussing the epidemiology, prevention, screening and management/treatment of hepatitis B with these future clinicians.

Hep B United collaborates through a nationwide coalition

The Hepatitis B Foundation, in partnership with the Association of Asian Pacific Community Health Organizations (AAPCHO), created and co-chairs Hep B United (HBU), a nationwide coalition of more than 60 members in 26 states plus Washington, D.C.

HBU organized **11 coalition calls** last year centered on advocacy, emphasizing partner initiatives, fostering collaborations and addressing wins and challenges throughout the year.

The program **hosted 10 *B Informed* webinar sessions** during the year and **provided funding to 15 organizations through its mini-grant program**. Seven organizations received funding in 2023 with projects extending into 2024, and eight organizations were funded in 2024. HBU allocated $63,000 for mini-grants in the 2023 cycle and $60,000 in the latest cycle.

SF Hep B Free in California's Bay Area is one of 60-plus community members of Hep B United.

In early 2024, the coalition hosted a **virtual Learning Collaborative** for community health centers specifically serving the Native Hawaiian and Pacific Islander communities. This four-week intensive capacity-building program brings health centers together in a cohort setting to tackle real world problems their respective organizations are facing.

Our team wins big at the NYC Marathon

We're extremely grateful to the five dedicated runners who completed the 2024 TCS New York City Marathon raising funds for the Hepatitis B Foundation's #justB Storytelling and *B Informed* Patient Conference programs. Our runners brought in more than $26,000, which is big win and an incredible achievement in just our third year of participating in the NYC Marathon.

We extend our heartfelt thanks to the **2024 #Run4HepB team: Justin Chen**, **Ben Gulliver**, **Lara McCusker**, **Aaron Rak** and **Bailey Vogel**.

This group of committed runners came together to raise awareness and funds for hepatitis B and liver cancer. Their participation not only showcased their commitment to health and wellness but also highlighted the importance of prevention, education and destigmatization for a cause that affects millions globally. The team's efforts helped amplify the Foundation's mission and we are so thankful for their contributions.

↗ To learn more about the runners, please visit www.hepb.org/nyc-marathon.

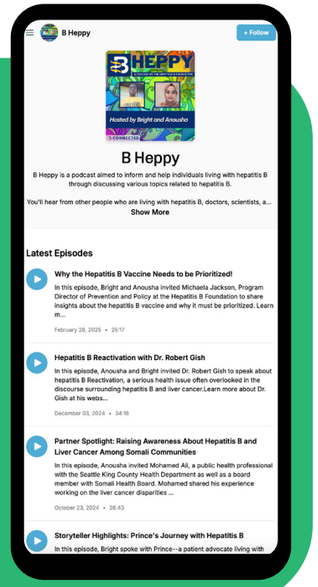
The Foundation will be hosting another group of runners in 2025 – stay tuned to learn about our 2025 runners and how you can support them!

THE POWER OF
COLLABORATION

Our B Heppy podcast continues to grow

Our *B Heppy* podcast is a popular communication channel for providers, public health professionals and storytellers to share insights about hepatitis B and liver cancer.

From 2023 to 2024, listeners downloaded more than 5,700 episodes. The most popular topics were current treatments in development for hepatitis B, how clinical trials work in the U.S., highlights from the International HBV meeting in 2023 and updated CDC screening and vaccine guidelines for HBV. We published 12 episodes that highlighted important topics such as liver cancer screening guidelines and hepatitis B and delta among people who use drugs, and storytellers shared their journeys living with hepatitis B. Our listeners use Apple podcasts, Spotify and Buzzsprout to hear our monthly episodes. You can find it easily by searching for ***"B Heppy"*** on any browser.



HEPATITIS B FOUNDATION

Expanding Our Outreach and Support

A hepatitis B diagnosis can be overwhelming and confusing, but no one has to face it alone. In 2024, our outreach efforts continued to grow, ensuring more individuals received the support and information they need. Our trained staff provided guidance on test results, transmission, vaccinations, and long-term care, helping individuals understand what their diagnosis means for their health and future.

Beyond medical information, we offered compassionate support for those navigating the emotional and social aspects of hepatitis B—whether it's sharing their diagnosis with loved ones, accessing care, or planning for a family. To further strengthen our community, **we've partnered with hepbcommunity.org, an online support group connecting people with experts and others affected by hepatitis B.** This platform provides a safe space to ask questions, share experiences, and receive guidance from those who understand.

Through education, advocacy, and hope, we empower individuals to take control of their health and build a brighter future.

3.1 million website visits

- 84K — Social media followers
- 183.2K — Facebook reach
- 61.8K — YouTube views

- Consults: 4,200
- Email consults: 1,720
- Phone consults: 200
- Social media consults: 2,080

Blumberg Institute Chief Scientific Officer becomes Acting President

Ju-Tao Guo, MD, who is the W. Thomas London Professor at the Blumberg Institute, was appointed acting president of the Baruch S. Blumberg Institute in July of 2024.

Ju-Tao Guo, MD

Dr. Guo, who is the Institute's chief scientific officer, joined the faculty in 2015.

Dr. Guo's laboratory is at the forefront of advancing our understanding of the molecular mechanisms behind HBV replication and pathogenesis. His work is dedicated to identifying novel antiviral and immune-modulating therapies aimed at curing chronic hepatitis B. Dr. Guo's research is aimed at providing a better understanding of how interferons control virus infection and how viruses evade innate antiviral immune responses to colonize their hosts.

Two drug development experts join the Blumberg faculty

Andrea Cuconati, PhD

Dimitar Gotchev, PhD

Two scientists with extensive commercial drug experience joined the Blumberg Institute faculty last year.

Andrea Cuconati, PhD, and **Dimitar Gotchev, PhD**, both came from Arbutus Biopharma Corp.

Dr. Cuconati has focused his career on the treatment of viral diseases and has worked on six different human virus families. He earned a doctorate in molecular genetics at Stony Brook University. As an original faculty member of the Institute for Hepatitis and Virus Research (since renamed the Blumberg Institute), he built a drug discovery program for novel inhibitors of hepatitis B virus and liver cancer. At Arbutus, he initiated drug discovery campaigns and contributed to preclinical development of novel antivirals directed at hepatitis B and coronaviruses, with direct involvement in five clinical candidates.

Dr. Gotchev earned a doctorate from North Carolina State University and did postdoctoral research at the University of Pennsylvania. He began his commercial career as a medicinal chemist at GlaxoSmithKline, then moved to Trevena Inc., where he was a team member and inventor of Olinvyk™ (oliceridine) for the management of severe acute pain. At Arbutus, Dr. Gotchev led research programs across several therapeutic areas including CNS, oncology and virology. He and his team have advanced multiple clinical candidates for the prevention of hepatitis B and coronavirus infections.

THE POWER OF COLLABORATION

The Baruch S. Blumberg Institute's mission is to find a cure for chronic hepatitis B virus (HBV) infection through state-of-the-art research in virology and cancer biology, innovative therapeutic development and creation of entrepreneurial platforms. Our scientists also devote their efforts and expertise to the discovery and development of antiviral drugs to treat some of the world's most challenging viral infectious diseases, such as yellow fever, dengue fever and emerging human coronavirus infections.

The institute has 12 full-time faculty members working on three interactive research programs. ***The Virology and Viral Pathogenesis Program* focuses on uncovering the mechanisms involved in HBV replication, establishment of chronic HBV infection and its immunologic resolution.** We also are working on identifying and validating molecular targets to develop cures for chronic hepatitis B. ***The Drug Discovery and Development Program* has discovered several novel types of HBV capsid assembly modulators (CAMs), one of which has reached phase 1b clinical trial.** Another CAM demonstrates super-potent antiviral activity in a mouse model of chronic HBV infection and has favorable pharmacologic properties. With support from the National Institute for Allergies and Infectious Diseases, an orally available antiviral agent against yellow fever virus, originally discovered at BSBI, is currently in preclinical to phase I clinical development. Yellow fever kills thousands of people every year and has no effective treatment. Development of this antiviral agent into an effective therapy would be a major contribution to reducing morbidity and mortality for thousands of people worldwide. ***The Cancer Biology and Precision Medicine Program* investigates prostate cancer genetics and genetic alterations related to therapeutic responses and develops cell-free DNA and RNA biomarkers for early detection of liver cancer.** Those are the new frontiers of the institute's research and development programs.

The translation of research discoveries into medicines and diagnostics at the Blumberg Institute is illustrated by the five startup companies (Merlin Biotech, Harlingene, Cirna, RimmSting Life Science, Pentravalent) spun out from our labs into the **Pennsylvania Biotechnology Center (PABC)**. Those companies have attracted investments from the State of Pennsylvania's Academic Innovation Zone program.

As a nonprofit research organization, the most dynamic component of our work force has been and will continue to be graduate students and postdoctoral fellows. We are proud that many of our graduate and postdoctoral trainees have developed very successful research careers in academia and industry. Through a seven-year partnership with the local Central Bucks School District, more than 30 high school students annually receive hands-on training by our scientists for the entire school year. They consistently excel in local, regional and national science fair competitions. In collaboration with the Hepatitis B Foundation, we host 10-12 college interns every summer in our 10-week program and we 14-15 area high school students come to the PABC for an intensive two-week lab experience.

Thank you for your interest in the Blumberg Institute. Your generous support helps drive all our programs in the search for a cure, drug discovery and community engagement.

Ju-Tao Guo, MD
Acting President, Baruch S. Blumberg Institute

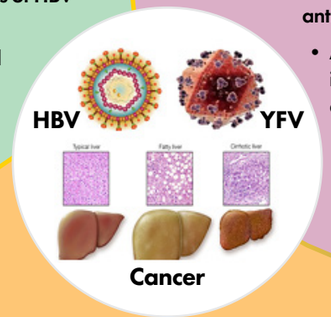
Highlights of Research Programs at
Baruch S. Blumberg Institute

Virology and Viral Pathogenesis

- Understanding the mechanism of molecular events critical for HBV replication and chronic infection, such as cccDNA synthesis and functional regulation, HBV DNA integration, capsid/nucleocapsid assembly and disassembly, virion and subviral particle (SVP) production.
- Understanding the immunological basis of HBV chronicity and resolution.
- Uncovering the mechanism of flaviviral RNA replication and induction of antiviral immune responses

Drug Discovery and Development

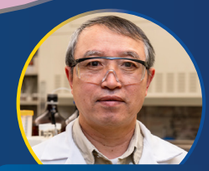
- We are focusing on developing (*i*) Best-in-class HBV capsid assembly modulators, (*ii*) Novel cccDNA and integrated HBV gene editing drugs, (*iii*) HBV virion and SVP production inhibitors, (*iv*) Hepatocyte-targeting HBV RNA destablizers and (*v*) Innate immune modulators to facilitate the cure of chronic hepatitis B.
- A first-in-class HAV antiviral drug demonstrated potent antiviral efficacy in a mice model.
  - A-first in class yellow fever virus NS4B inhibitor is in preclinical to phase I clinical development.



Cancer Biology And Precision Medicine

- Development of cell-free DNA/RNA-based diagnostic assays for liver cancer early detection and precision treatment.
- Prostate cancer genetics and genetic alterations related to therapeutic responses.

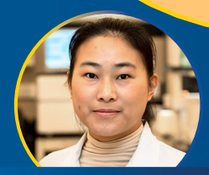

Ju-Tao Guo, MD


Yanming Du, PhD


Jinhong Chang, MD, PhD

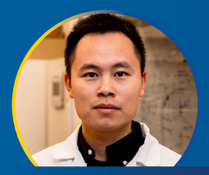

Dimitar Gotchev, PhD

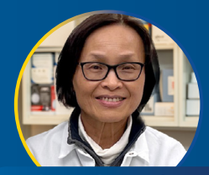

Andrea Cuconati, PhD

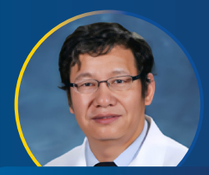

Qiong Zhao, PhD


Richard Pestell, PhD


Jason Clement, PhD


Liudi Tang, PhD

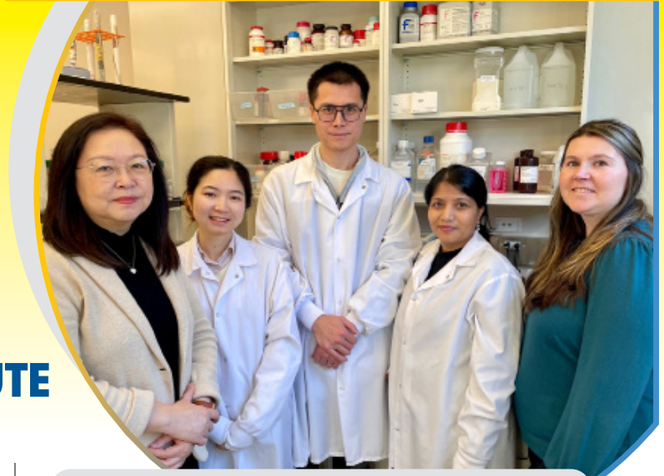

Ying-Hsiu Su, PhD


Xuanmao Jiao, PhD


Aejaz Sayeed, PhD

Research

THE BLUMBERG INSTITUTE RESEARCH PROGRESS *2024*



RESEARCH TEAM *From left to right:*
Jinhong Chang, MD, PhD; Jiaqi Li, MS; Fuxuan Wang, PhD; Sumangala Darsandhari, PhD; and Julianna Deakyne, PhD

The Chang Lab

Blumberg Institute scientists, led by Jinhong Chang, Professor, MD, PhD, Vice President, Drug Development, have discovered a potential therapeutic for yellow fever from scratch, starting with the screening of our in-house library containing 26,000 compounds.

Mode of action studies revealed an unprecedented mechanism leading to potent antiviral efficacy. Modifying the initial hit from screening led to the discovery of new analogs with a 50-fold improvement in potency.

A contract from the National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), Department of Health and Human Services (HHS) has been awarded to develop the drug candidates through Phase 1 clinical testing. Under Contract No. 75N93023C00003, during the current reporting period, we continued working on the Base period with approximately $5.5 million in funding. Additionally, we have reached two major milestones, allowing us to exercise the Option 1 period to produce large-scale quantities of the compound for the next step in pharmacology studies in animals.

In particular, we have demonstrated potent antiviral activity in a disease model of yellow fever in hamsters. Furthermore, working with a CRO, we have developed a chemical process that allows the production of qualified products in sufficient quantities to support animal studies as well as future human studies. We have also developed a formulation that enables us to treat the animals orally with optimal stability and drug exposure.

Chang Rearch Projects

during July 1, 2023, to June 30, 2024

- ***Demonstration of antiviral activity in a disease model of yellow fever in hamsters***
- ***Demonstration of the mode-of-action in cell culture and infected animals***
- ***Worked with a CRO, we have developed a chemical process allowing the production of qualified products in sufficient amounts to support animal studies as well as future human studies***
- ***Developed a formulation allowing us to treat the animals with oral route with optimal stability and drug exposure***

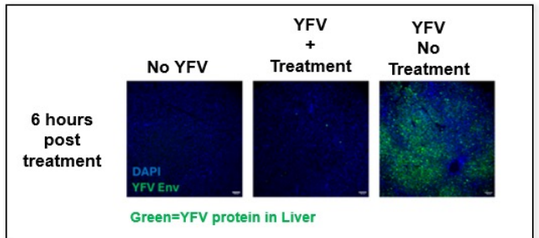
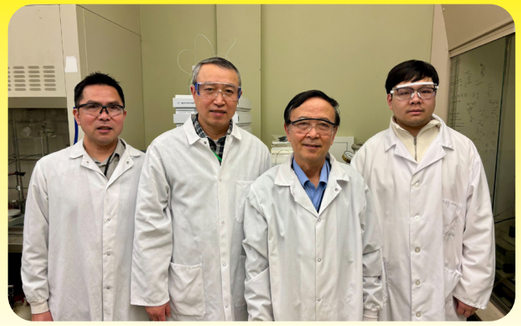


Figure 1: Yellow fever drug candidate treatment leads to rapid clearance or infected cells from the liver of infected hamsters 6 hours post a single dose treatment. The therapeutic potential of the drug candidate was evaluated in the hamster model of yellow fever. The treatment started at 4 days post yellow fever virus (YFV) infection to mimic human disease. Six hours post the single dose treatment, livers were harvested and fixed in 10% formalin, sectioned, and paraffin-embedded onto slides. Slides from each animal were stained for YFV envelope **(YFV Env – green) or nuclei with DAPI (blue).**



The Du Lab

Yanming Du, PhD, professor and director of medicinal chemistry, engaged in a variety of research projects in 2024.

DU RESEARCH TEAM *From left to right:*
Dan Nguyen, MS; Yanming Du, PhD; Yusheng Wu, PhD; and Zhengyuan Jiang, MS

In collaborating with biology partners, we do medicinal chemistry for drug discovery in antiviral and anticancer fields. To address unmet medical needs, our team designs and synthesizes new chemical compounds for either helping to illustrate biological mechanism or evaluation as potential therapeutical agents.

On the yellow fever therapeutic project, working with Jinhong Chang, PhD, MD, the internal management team and outside CROs, Dr. Du and his team have optimized the chemistry synthesis route and transferred that progress to a CRO for process chemistry development. In addition, stable crystal forms of both lead and backup compounds have been identified.

Among the Du lab's work are projects in the hepatitis B area. One project involves ***studying hepatoselective dihydroquinolizinone for reduction of hepatitis B surface antigen with improved safety.*** Another, working with Ju-Tao Guo, MD, involves ***novel capsid assembly modulators with de-assembling functions.***

A third project, in collaboration with University of North Carolina scientists, is ***studying the use of proteolysis-targeting chimera (PROTAC) against both hepatitis B and hepatitis A.***

The Du Lab is in the second year of a two-year Small Business Technology Transfer grant of $600,000 from the National Institute of Allergy and Infectious Diseases (NIAID). The lab also has a $440,00 R21 grant for anti-HBV research.

The Su Lab

Prof. Ying-Hsiu Su, PhD lab's research interests have centered on the development of cell-free DNA assays for HCC screening and liquid biopsy, also to maintain the Bioinformatics Program for analysis of DNA and RNA sequencing data.

RESEARCH TEAM *From left to right:*
Cinnee Liu, BS, MS, research associate, bioinformatics; and Ying-Hsiu Su, PhD, professor and principal investigator;
not pictured: **Ruiyu Zhang**

Hepatocellular carcinoma (HCC) is the world's second leading cause of cancer-related death and one of the fastest-growing cancers in the U.S.; 85% of patients die within 5 years, mainly due to late detection, limited treatment options, and high recurrence.

The team has shown ***HCC DNA detected in urine is a promising biomarker for early detection of HCC*** and have established a standard operating protocol (SOP) for collection and storage of urine samples for biomarker studies in the Early Detection Research Network (EDRN) of the NCI.

One of current projects that Dr. Su is leading investigates urine biospecimen science and tailored sensitive assay platforms, toward ***building a novel urine transrenal DNA platform for HCC liquid biopsy***. This project is based on over 10 years of NCI-funded multi-institutional collaborative projects, including the investigators from The Johns Hopkins University Medical Centers, Thomas Jefferson University, University of Pennsylvania, and Harvard University Medical centers.

HBV infection is a major etiology of liver cancer. The team has detected integrated HBV DNA by liquid biopsy (blood and urine). One of their research focuses is on the role of ***HBV integration in hepatocarcinogenesis and its potential as a biomarker for HBV-related HCC for the early detection*** assessing treatment responses and prognostics. The success of this study will have significant impacts on the development of novel therapies leading to complete HBV cure and HCC liquid biopsy.

The Guo Lab

Ju-Tao Guo, MD, is the *W. Thomas London Distinguished Professor,* Senior Vice President and Chief Scientific Officer of Baruch S. Blumberg Institute.

RESEARCH TEAM *From left to right:*
Honghao Zhang; Hemraj Rimal, PhD; David Renner, PhD; Ju-Tao Guo, MD; Bo Chen, PhD; Jun Lyu, PhD; Yan Yan, PhD

The Guo laboratory's research is focused on investigating the biology of hepatitis B virus (HBV) and discovering antiviral and immune modulating drugs for the cure of chronic hepatitis B and RNA viruses that cause hepatitis and hemorrhagic fever.

Identification of the binding pocket of BDAA, an yellow fever virus (YFV) NS4B inhibitor

Bo Chen, PhD has demonstrated that BDAA directly binds to wild-type YFV NS4B, but not BDAA-resistant YFV NS4B/P219S. Taking a computation chemistry approach, Gideon Tolufashe, PhD identified a BDAA binding site (pocket) that is close to the residue P219 of NS4B. **As illustrated in Figure 1**, the BDAA-resistant P219S mutation increases the molecular surface area of BDAA binding pocket from 598.070 Å^2 in wild-type NS4B to 629.914 Å^2 in P219S mutant NS4B, implying that the mutation opens the binding pocket and makes it bigger but shallower, thus affecting the binding of BDAA.

Investigating the mechanism of HBV DNA integration and inhibition by antiviral drugs

HBV DNA integration occasionally occurs and is responsible for the carcinogenesis of liver cancer and a barrier for the cure of chronic hepatitis B. Yan Yan, PhD, and Qiong Zhao, PhD, have established cell-based assays to investigate the mechanism of HBV DNA integration and identified antivirals that can efficiently inhibit HBV DNA integration for development as therapeutic agents for hepatitis B.

Investigating the mechanism of HBV nucleocapsid assembly/disassembly and discovering new chemotypes of capsid assembly modulators

HBV genomic DNA is replicated in nucleocapsids *via* reverse transcription of viral pregenomic RNA. The assembly and disassembly of nucleocapsids are regulated by many cellular proteins and inhibited by capsid assembly modulators (CAMs). In collaboration with the Du and Chang laboratories, Jun Lyu, MD, and Hemraj Rimal, PhD, discovered new CAMs that very potentially inhibit HBV replication in a mice model of chronic HBV infection. Structure biology studies are under way to uncover the mechanism of novel CAM misdirecting HBV capsid assembly.

Development of a novel gene-editing technology for inactivation/elimination of cccDNA and inte-grated HBV DNA for the cure of chronic hepatitis B

In collaboration with Minghong Zhong, PhD, at GeneLancet Biosciences, Qiong Zhao, PhD, is developing a ligation-guide RNA (LgRNA)-based CRISPR/Cas9 gene editing technology for the cure of chronic hepatitis B. Dr. Zhao has demonstrated that LgRNAs are superior to conventional single guide RNA (sgRNA) in gene editing efficiency and amendable for large scale chemical synthesis and modification. A set of LgRNA with superior editing efficiency to both cccDNA and integrated HBV DNA have been identified for further development. **Figure 2** shows LgRNA can efficiently reduce the amounts of cccDNA as well as HBV RNA and secreted viral antigens.

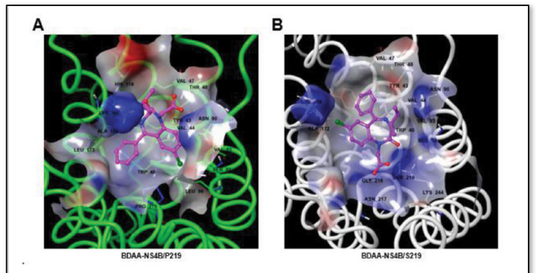


Figure 1. Structure of BDAA binding pocket on yellow fever virus NS4B protein. The surface of BDAA binding pocket with residues 3Å away from BDAA is highlighted for wild-type NS4B (A) and P219S mutant NS4B (B).

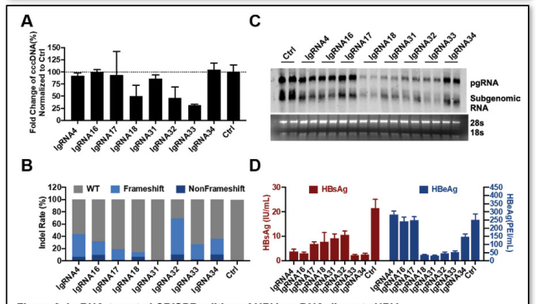
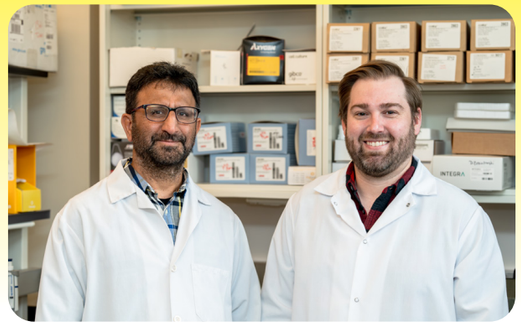


Figure 2. LgRNA-targeted CRISPR editing of HBV cccDNA disrupts HBV replication *via* multiple distinct mechanisms.
HBV infected C3A^{NTCP}-Cas9 cells were treated with control LgRNA (ctrl) or the indicated LgRNA targeting different region of HBV genome for 9 days. (A) The amounts of cccDNA were determined by a qPCR assay. (B) The indels at the targeting site of LgRNA (editing rate) were determined by deep DNA sequencing. (C) The levels of HBV RNA were determined by Northern blotting hybridization. (D) The levels of secreted HBsAg and HBeAg at day 9 were determined by ELISA.

The Sayeed Lab

The lab run by Aejaz Sayeed, PhD, focused on development of a liquid biopsy platform to facilitate early cancer detection using novel mRNA-based circulating biomarkers.



RESEARCH TEAM *From left to right:*
Aejaz Sayeed, PhD, Associate Professor, and Daniel Zezulinski; *not pictured:* **Timothy M. Block, PhD, Distinguished Professor, Cinnee Liu**

Specifically, we are developing a liquid biopsy platform for early detection of cancer using novel circulating biomarkers that are based on mRNA. Our primary emphasis is on surveillance and early detection of HCC, but we are also investigating early detection of pancreatic adenocarcinoma using the same platform. Most current investigational approaches, including ultrasound and imaging, miss as much as 35%-40% of cases of liver cancer during surveillance of people with chronic liver disease. These approaches also offer little information about the tumor itself. Additionally, genetic information from biopsies may be biased because mutations are not uniformly distributed in heterogenous tumors.

In contrast, peripheral blood tumor-derived circulating tumor RNA (ctRNA) carried inside circulating extracellular vesicles represents all tumor variants that are present and captures aberrations not detected in DNA. Detection and characterization of ctRNA additionally may provide information about tumor biology that other methods cannot, with potential therapeutic implications. This noninvasive approach for identifying high-risk patients early on can be very useful in early detection of HCC and effective clinical management.

Mutations in circulating mRNA as a cancer biomarker

The team has demonstrated the value of circulating messenger RNA as a potential biomarker in surveillance, early detection, prognosis and personalized medicine in cancer.

- Analyzing circulating mRNA from patients with liver cirrhosis, with and without HCC, and healthy controls, we detected hundreds of cancer specific mutations (ctmutRNA) that are concordant with matching tumors.
- Using targeted RNA sequencing in patients with liver disease, with and without early- or late-stage HCC, we validated around 75 ctmutRNA variants from a list of 288 test targets.
- We used total RNA sequencing of plasma samples of early- and late-stage HCC and liver cirrhosis to isolate mRNA molecules that can identify, with high diagnostic precision, patients with chronic liver disease who are at high risk for progression to HCC.

Circulating mutant mRNA biomarkers in LR3/LR4 indeterminate liver nodules

Sometimes the imaging results of liver pathology are not clear.

- We collaborated with U Penn physicians to investigate plasma samples from patients who were clinically followed up until the HCC diagnosis.
- We used total RNA sequencing to study patterns associated with very early-stage HCC. This study can potentially identify biomarkers that are specific for very early HCC.

Genome- and Exome-wide characterization of mRNA variants in HCC

In collaboration with Mayo Clinic and Yale University scientists in our laboratory compared DNA and RNA from matching tumors and noncancerous (cirrhotic) adjacent tissues from patients with HCC.

- The objective was to understand the common and distinct mutations in DNA and RNA in HCC tumors.
- We observed a plethora of mutations in RNA with no counterpart in DNA.
- This suggests that some RNA mutations are occurring without a change in the DNA sequence.

Method and assay development

The adoption of cell-free ctRNA markers into clinical practice requires standardization of sample preparation, quality assessment and measurement of mRNA specimens. Using four different approaches, we have demonstrated robust and consistent isolation of extracellular vesicles (EVs) and RNA from human plasma samples.

In summary, we are focused on identification of mRNA variants that correlate with a diagnosis of early-stage HCC and can be candidate "biomarker" analytes for HCC surveillance.

U.S. Patent submission: ***Method and system for use of mutant mRNA in liquid biopsies to risk stratify and manage cancer.***

The Pestell Lab

Richard Pestell, Distinguished Professor, AO, MB, PhD, MD, FRACP, Doctorus Honoris Causa, DMedSci, FACP, FAAAS, FRSB, MBA, FRCP, MA. The Pestell laboratory develops cancer diagnostics and therapeutics. We are defining the mechanisms and translating these findings to the clinic.

RESEARCH TEAM *From left to right, front to back:*
Richard G. Pestell, Ritika Harish, Xuanmao Jiao, Junsong Zhao, Ajay Kundlas, John Spallanzani, Danni Li, Manjit Kundlas, Maulik Vyas, Zhiping Li, Anthony Ashton

Cancer stem cells

Our work with stem cells centers on the processes of autophagy— where cells break down and recycle damaged cell components— and mitophagy, where cells recycle mitochondria (the powerhouses of cells). The current studies examine the molecular mechanisms that link the drivers of mitophagy and autophagy with the mechanisms governing the symmetry of cell division and stem cell expansion. One hypothesis proposes that the symmetry of cell division determines stem cell expansion and that it is the cancer stem cells that give rise to resistance to therapy. We are examining the role of key pathways in this biological interface using inducible deletion mice to study proteins such as cyclins, NFKB and Akt1 that are needed for important cellular processes.

Cell fate determination

We are using the *Dachshund* gene to examine cell fate determination and its role in causing tumors. *Dachshund* plays a major role in specifying the development of organisms and the generation of tissues including the brain. The gene, however also appears to play a key role in causing tumors, in part by mediating DNA repair. As the *Dachshund* gene resides near and is often co-deleted with BRCA2, and loss of DACH1 causes resistance to PARP inhibitors (anticancer drugs), we are defining the role of *Dachshund* in predicting response to cancer therapy.

Non-canonical cyclin functions

The role of cyclins (proteins that regulate the cell cycle) in several types of tumors is being assessed by studying other cellular processes that are not generally considered to be core functions of cyclins. These non-canonical functions contribute to miRNA maturation and expression, stem cell function and heterotypic signals.

Novel therapies for chemotherapy cardio-protection

Our recent findings identified therapies that provide profound protection of the heart in people undergoing chemotherapy.

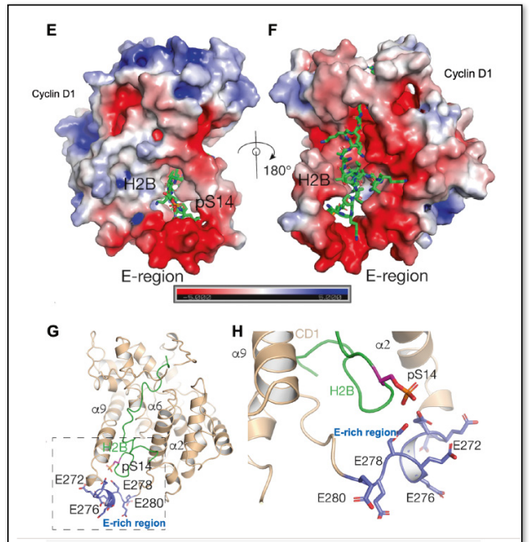


Figure 1: A cyclin D1 intrinsically disordered domain accesses modified histone motifs to govern gene transcription

Grants Active

"Novel mechanisms governing human breast cancer chromosomal instability" ($1,186,294 three years)

"Humanised antibody treatment for breast cancer" StromaGenesis subcontract ($408,037 two years)

"Novel approaches for targeting cyclin D1 in CDKi-resistant cancer" ($2,590,854 four years)

"Improving Outcomes in Cancer Treatment-Related Cardiotoxicity" $1,958,223 two years)

The Tang Lab

Liudi Tang, PhD, assistant professor of experimental therapeutics, is a virologist with a focus on the hepatitis B virus.

Development of a novel HBV reporter system enables unbiased genetic screens to identify host factors determining HBV infection

Development of curative agents to treat chronic hepatitis B virus (HBV) infection depends on the identification of novel viral targets, which in turn requires a better understanding of host-virus interactions that are critical for HBV persistence. Thus far, identification of HBV-hepatocyte interactions is mostly achieved through conventional focused screens or one-gene-at-a-time approaches. Due to the overlapping feature of the HBV genome, unbiased genetic screens by reporter HBV viruses allowing phenotypic selection have not been possible. We recently developed an RNA sensing and editing based HBV reporter system without modifying the viral genome, but instead introduces reporter genes containing stop codon (UAG) that becomes contingently translatable upon precise RNA editing (UIG, translate as UGG) guided by complementary HBV RNA sequences. Our preliminary data demonstrates that his novel cell culture-based HBV infection reporter system permits unbiased genome-wide screens using sgRNA, cDNA and chemical libraries. Comprehensive genetic screening efforts are underway that will likely reveal new knowledge on host virus interactions critical for the HBV life cycle that ultimately provides novel targets for antiviral therapies to combat chronic HBV infections.

Evaluating the restoration of SMC5/6 mediated transcriptional silencing of hepatitis B virus DNA through HBx-targeting agents

The other arm of our research is focused on investigating the role of HBx as a factor underlying cccDNA epigenetics. HBx is absolutely required to initiate and maintain HBV gene expression, and therefore therapeutics that block HBx function or induce HBx degradation can be a significant component of viral functional cure. Currently, we are investigating the cellular regulation of HBx stability, and in the meantime, leveraging chemical and structural biology tools to explore therapeutics opportunities to accelerate HBx decay.

The Zhao Lab

Qiong Zhao, PhD, assistant professor, is focused on understanding the mechanism and significance of double stranded linear DNA (dslDNA), a minor product of HBV DNA replication, in viral replication and pathogenesis.

Determining the molecular pathways of dslDNA-derived cccDNA synthesis

HBV covalently closed circular DNA (cccDNA) exists in the nucleus of infected hepatocytes as a minichromosome to support viral RNA transcription and is the reservoir for persistent HBV infection. HBV genome replication produces predominantly relaxed circular DNA (rcDNA) and dslDNA as a minor species. Prior studies by others and us suggest that although both rcDNA and dslDNA can be converted into cccDNA via distinct DNA repair mechanisms, only rcDNA is accurately converted into authentic cccDNA, whereas dslDNA is circularized into cccDNA by the error-prone non-homologous end joining (NHEJ) DNA repair pathway. Due to the insertion and/or deletion at the junction region, dslDNA-derived cccDNA cannot transcribe functional pregenomic RNA (pgRNA) to support viral replication.

Dr. Zhao reports that, taking advantage of pgRNA launch HBV replication system recently developed in her lab, the team can now investigate the molecular pathway of cccDNA synthesis from dslDNA with distinct structure features simply by transfection of cells with carefully engineered pgRNA. Using this experimental system, we have now demonstrated that dslDNA with extended 5' terminal HBV sequence are converted predominantly into authentic cccDNA, suggesting more comprehensive/accurate DNA repair mechanisms, but not the error-prone NHEJ pathway, involve in cccDNA formation from the engineered dslDNA. Further studies are under way to investigate the mechanism of DNA repair pathway selection in cccDNA biosynthesis.

Developing a CRISPR/Cas9 based anti-HBV gene therapy using LgRNA

Collaborating with Dr. Ju-tao Guo at Blumberg and Dr. Minghongzhong at GeneLancet, we are developing a CRISPR/Cas9 based gene therapy against HBV with the proprietary chemically ligated guide RNA (LgRNA). LgRNA technology produces guide RNA through ligation of two or three short RNA segments *via* non-phosphoramidite chemistry. So far, we have demonstrated that chemically advanced LgRNA can target both HBV integrated genome and cccDNA, showing promising gene editing efficiency and antiviral efficacy on HBV at multiple layers compared to their counterparts classical single guide (sg)RNA.

THANK YOU TO OUR DONORS

Hepatitis B Foundation | Baruch S. Blumberg Institute

The Hepatitis B Foundation's valuable research and programs are made possible by the commitment of our donors. We are grateful to every individual and organization that has generously supported our mission to find a cure and improve the quality of life for those affected by hepatitis B.

Our Donor Honor Roll

JANUARY - DECEMBER 2024

CENTENNIAL ($100,000 AND ABOVE)
Anonymous
Café with Soul Limited
Carol and Edmund Blake Foundation

LEADERSHIP CIRCLE ($20,000 TO $99,999)
CTC Foundation
Michael Daley

VISIONARY CIRCLE ($10,000 TO $19,999)
Timothy and Joan Block
Lu-Yu Hwang
The Kahn Charitable Foundation
Laskin Family Foundation, Inc.
Bruce and Cynthia Maryanoff
Tulchin Family Foundation

GLOBAL CIRCLE ($5,000 TO $9,999)
Chari and Paul Cohen
Loren and Jenny Danzis
Benjamin Jackson
Gary Jacob
Robert Jordan
Debra and Gary Krupp
The Faye and Mayer Krupp Family Charitable Foundation
Linda London
Anand Mehta
Mark Petty
Elizabeth Sigety and Jeffrey Nicholas
Su Wang and Dan Chen
Gunst-Williams Family Fund

FOUNDER'S CIRCLE ($2,500 TO $4,999)
Anonymous
Stan and Gerri Broadbent
Daniel Chen
Joe and Irene Erckert
Anthony and Jane Ford-Hutchinson
David Gruber
Louis and Jeanie Kassa
Yueh-Ming Loo
McCusker Family Giving Fund
Joel Rosen
Elizabeth Seeber
Walter Tsou
Nancy Yaffe
Leland Yee

PRESIDENT'S CLUB ($1,000 TO $2,499)
Anonymous
Karim Assef
Peter Block and Christina Chien
Gang Chen
Michael Child
Robert Christmas
Jason Cohen
Steve and Janet Cohen
Joe and Molli Conti
David Family Charitable Foundation
Daniel Dornbusch
Ellen Egan
Robert Gish
Porter and Julia Gould
Richard and Hie-Won Hann
Patrick Lam
Anna Lee
Jean Miller
Tim O'Cain
Anna O'Connell
Richard Pestell
Florencia Segal
Jonathan and Virginia Shames
Bruce and Mary Thompson
Jeane Vidoni
Michael Wehner
Danielle Wittig
Wayne Yetter
Gary Young
Xiaoshun Yu
Adam Zlotnick

THANK YOU TO OUR MANY IN-KIND DONORS WHO ARE TOO NUMEROUS TO MENTION.

We apologize in advance for any errors or omissions in our Donor List despite our best efforts to be as accurate as possible. Please email info@hepb.org or call (215) 489-4900 so that we can print corrections in our next newsletter. Thank you for understanding.

PATRONS ($500 TO $999)
Anonymous
Barry Arkles
Susan and Greg Braithwaite
Robert Britt
Nathaniel Brown
Alan and Patty Brownstein
Brent Byers
Alaina and Anthony Canino
E. Chang
Danny Chen
Narayan Cheruvu
Jennifer Crawford
Yanming Du
Kathryn Dunaway-Knight
Robert Erwetowski
Catherine Freeland
Julie Gerhardt
Douglas Green
Haitao Guo
Mark Hayden
Anne Heacock
Frank Hood
Anu Hosangadi
Randall Hyer
Maureen Kamischke
Armen Karamanian
Douglas Mayers
Emiljano Musta
Debora Nelson
Charles Rice
Alicia Russo
Steve Santarsiero and Ronni Fuchs
Erica Spence-Umstead
Peter Stahl
David Sul
Liudi Tang
John Taylor
Daniel Templar
Peter and Michelle Vo
Jay Wrobel
John and Kim Wu
Dave Wylie
Jimmy Yeung
Marissa Yu
Ling Zheng

FELLOWS ($250 TO $499)
Ishola Adeyemo
Helene and Emanuel Bachman
Gaeton Biscardi
Silviu Boldeanu
Susan Callahan
Everett and Diana Chambers
Jinhong Chang
Hoi Cheung
Matthew D'Uva
Jim Ference
Robert Frey
Ju-Tao Guo
Ian Henrich
Peter and Judy Hoekstra
Joseph and Maryanne Hediger
Neha Jain
Alicia Jellinek
Amy Jessop
Manohar Katakam
Margaret Keenan
Lisa Krist
Meekers Lee
Danni Li
Edward Lin
Michael McIntosh
Nicholas Meanwell
Catherine Morris
Jessica Nakamura
Roger Ng
Le Nguyen
Lysa Nguyen
Osaeng Park
Jeanne Payumo
Aaron Rak
Wendy and David Rees
Jason Rose
Kenneth Rothstein
Sandhya Salguti
Ronald and Joyce Sanderson
Peter Sandford
Geoffrey Sasso
John Shelly
Michael Sofia
Daniel and Lena Solaiman
Michael Strand
Carolyn Tennant
Richard Towey
C. Theodore Tucker
Tim Wallace
Dennis Wen
Janine Witte
Michael and Wen Yarbrough

SUPPORTERS ($100 TO $249)
Anonymous
Leo Adalbert
Lydia Adu
Sura Alsaffar
Franklin Amuakwa-Mensah
Eileen Beck
Peter Beddoe
Susan Bellaire
Kathryn Berger
Anila Bilbili
Priscilla and Donald Bizer
Rebecca Blackwell
Julia Brines
Kathleen Brunner
Zach Bullock
Robert Cainero
Claudia Campagnolo
Grant Castor
Joseph and Amy Chan
Garrett Chang
Feng Chen
Jimmy Cho
Joe Colletti
William DeStefano
Vicki Dunn
Kurt and Janet Ferguson
Edward Fischer
Daniel and Jamie Fox
Hillary Freeman
Laura Friedman
Roger and Nancy Gallic
Mayank Gandhi
Rajesh Gautam
Michelle Gerber
Daphne Hao
Mark Hayden
Gregory Hess
Joshua Hooks
Yuko Hwang
Yasmin Ibrahim
Amit Jain
Mahesh Jayachandran
Raman Kapur
Alex Kelly
Amber Kirchner
Kathleen Kokolas
Jennifer and Keith Kuenzli
Kevin Lawall
Raymond Lee
Melody Li
Jake Liang
Yi Liu
Wendy Lo
Lai-Ming Ma
Tom Maclin
Brian McMahon
Barb and Mike Miles
Mihai Dan Moga Paler
Loretta Molle
Casey Nichols
Pallavi Nimkar
Allyson Pauly
Mark and Michelle Pearcy
Lorenzo Pellegrini
Claudia Phen
Shyla Rajeev
Heather Richmond
Tony Ristovski
James Ryan
Aejaz Sayeed
Patrick Shao
Chung Song
Thomas and Harriet Stenzel
Rita Maelyn Suba
Michelle Sweeney
Julia Szyszko
Ed Tate
Jacob Trefethen
Gary Triozzi
Natalia Tumidajski
Kathleen Ujvari
Shari Winkler
Jay and Marcia Zinger
Thomas Zipp
Beatrice Zovich

FRIENDS (UP TO $99)
Anonymous
Matthew and Wendy Adlai-gail
Melvis Aka
V. Alexiades
Faisal Ali
Mark Baran
Tim Barshinger
Mohamed Bouguedouma
William Candido
Richard Cavanaugh
Edward Chen
Maura Delaney
John and Sandy Draus
Jenna Fasanella
John Freeland
Alberto Gonzalez
Brad Grove
Wesley Gouldey III
Hunt Hawkins
Imon Hossain
Mark Janzen
Priya Joshi
Srilatha Kallam
Manohar Katakam
Kbrom Kidane
Shubha Kilkarni
Alex Koszycki
Mariemel Latorre
Bob Lowry
Ann Mackenzie
Leovi Madera
Jim Matsunaga
Janice Morris
Meredyth Nash
Vladimir Nestoyanov
Tien Nguyen
Kassie Ockford
Margie Lyn Olonan
Sandra Palleja
Sue Papp
Steve Pelland
Bonnie Rabinowitch
Frank Ratchford
Todd Smith
Jonathan Snyder
Terry Spence
Tammy Sprull
Leaf Sternberg
Sypureddy Subba Rao
Henry Swicord
Ray Tai
Hin Tse
Marie and Gary Urick
Charles Wagner
Brooke Walsh
Carrie Welch
George Woods
Kenny Wu
Rav Yakubov
Christine Yeh
Sudhir Yelamarthy
Cheng Zeng
Jingye Zhou

EMPLOYEE GIVING PROGRAMS
Benevity Community Impact Fund
JP Morgan Chase Employee Giving
Panorama by FrontStream
United Way Calif Capital Region

MATCHING GIFTS
The Blackbaud Giving Fund
Citizens Charitable Foundation
Johnson & Johnson Family Companies Matching Gift Program

OTHER GIVING PROGRAMS
Giving Lively Foundation LLC

SPONSORSHIPS
Assembly Biosciences, Inc.
Bchip
Bee Bergvall & Co.
Bucks County Health Improvement Project (BCHIP)
Corporate Cleaning
Curtin & Heefner LLP
Del Val Power and Light, Inc.
Demusz Brothers Inc.
Dynavax Technologies
EisnerAmper
Exocel Bio
FastSigns of Montgomeryville
Fox Chase Therapeutics Discovery Inc
ThermoFisher Scientific
Fox Rothschild LLP
High Swartz LLP
Precision Biosciences
Rockwood Wealth Management LLC
Rx Outreach
Stockton Real Estate Advisors
The Bracken Group
Univest Financial
VBI Vaccines
Venable LLP
Wojdak Government Relations
Wynne Health Group

DONOR ADVISED FUNDS
The Hepatitis B Foundation and Baruch S. Blumberg Institute accept grants from Donor Advised Funds, and have received distributions from the following organizations in 2024:
Bank of America Charitable Foundation
Fidelity Charitable Brokerage Services
Merrill Lynch Wealth Management
Morgan Stanley
Schwab Charitable
Vanguard Charitable
Wells Fargo Advisors Fin Network

CORPORATE & PRIVATE GRANTS
Asian & Pacific Islander American Health Forum
Clinical Care Options, LLC
Dynavax Technologies
Gilead Sciences, Inc.
GSK
Johns Hopkins University
Paraxel
Peerview
Precision Biosciences
Roche
Vir Biotechnology
Wawa, Inc.

GOVERNMENT GRANTS
National Institute of Allergy and Infectious Diseases
National Institutes of Health
Pennsylvania Department of Health
U.S. Centers for Disease Control and Prevention
U.S. Department of Defense
U.S. Food and Drug Administration

Development

YOUR SUPPORT MATTERS

Where does my gift go? Who benefits? What is my impact and the return on my investment?

These are real questions from real people. Some of you reading this right now have likely asked the same questions, which are valid and important. As a non-profit, we are committed to transparency and the stewardship of the generous resources that each of you has dedicated to the work of the **Hepatitis B Foundation** and the **Baruch S. Blumberg Institute**.

Our answer to you is: your gift benefits the almost 300 million people living with hepatitis B, their families, and their future generations.

Your support drives scientific research in laboratories in Doylestown, nationwide community outreach programs, advocacy efforts in Washington DC, online seminars with medical providers across the country, global training programs and meetings with international health leaders. Your support also makes our storytelling program come to life, so the voices of those with lived experience can be heard. None of these could happen without investments in our mission from you and others who care about our work. Thank you!

The impact of your investment is far reaching and long lasting. Each single data point in that 300 million statistic is a real person whom your support can touch.

It could be storytellers Janet and Kurt, whose video includes their three-month-old, adopted daughter. After contacting the Foundation, they learned about the importance of the birth dose and flew to be present for the birth and to ensure that their child received the proper vaccinations, as her birth mother had hepatitis B. Their daughter is now eight years old and hepatitis B-free, thanks to the birth dose and vaccine series!

It could be an individual in another country seeking information about hepatitis B. This person could reach out through our 24/7 consult line or view our information guide on the Foundation's website, even if the person's native language is Chinese, Swahili, Chuukese, Tagalog or several others.

Your investment also supports individuals who are working to help families affected by hepatitis B.

This could be doctors enrolled in training programs with the Foundation, learning practices for diagnosing and treating hepatitis B and screening for liver cancer. That knowledge spreads from each clinician to multiple patients and families.

It could be lab researchers working on the development of a cutting-edge gene editing technology for permanent inactivation of HBV cccDNA and integrated HBV DNA. This vital research is helping to bring us closer to a functional cure and global elimination of hepatitis B.

You are investing in real people and making a meaningful difference. Thank you again for doing so.

With sincere gratitude for your support of our mission,

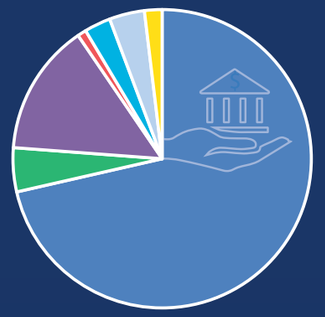
Joe Erckert, Alaina Schukraft, and Brooke Walsh
Your Hepatitis B Foundation and Baruch S. Blumberg Institute development team

Year in Review

FINANCIAL INFORMATION*

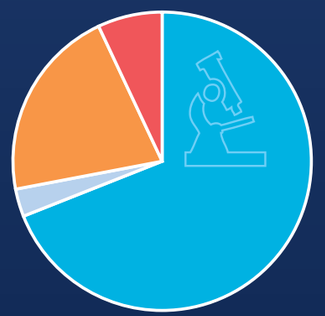
COMBINED **HEPATITIS B FOUNDATION & BARUCH S. BLUMBERG INSTITUTE**[1]**** FOR THE FISCAL YEAR ENDED JUNE 30, 2024

Source of Funds



70%	Grants	$13,353,861
5%	Charitable contributions***	1,046,900
15%	Management fees	2,953,285
1%	Special events	133,929
3%	Research Meeting	504,140
4%	Other Revenue	720,549
<1%	Gain on Sale of Investment	4,027
2%	Investment income**	370,344
Total Revenue		**$19,087,035**

Use of Funds



69%	Research	$12,634,558
3%	Outreach and Education	468,402
21%	Support Services	3,955,774
7%	Rent and Depreciation	1,357,597
Total Expenses		**$18,416,331**

* The financial information presented above does not include the activity from Hepatitis B Foundation's ownership of the net assets of the Pennsylvania Biotechnology Center. At June 30, 2024, this interest was valued at, based on the equity method of accounting, approximately **$14,745,603** per the audited Statement of Financial Position of the Hepatitis B Foundation.

** The financial information presented above excludes unrealized investment related activities.

*** Excludes in-kind donations

**** **Baruch S. Blumberg Institute** is the reseach institute established by the Hepatitis B Foundation in 2004.

The financial information in this report was prepared by management and presented in condensed form from the financial statements of the Hepatitis B Foundation and the Baruch S. Blumberg Institute audited by EisnerAmper, LLP for the year ended June 30, 2024. A copy of each financial statement is available upon request.

The Hepatitis B Foundation (HBF) was established in 1991 and remains the world's only nonprofit organization solely dedicated to finding a cure for hepatitis B and improving the quality of life for those affected worldwide through research, education and patient advocacy. The HBF established the Baruch S. Blumberg Institute in 2003 as an independent, nonprofit research institute to fulfill its research mission. It was named to honor our co-founder Dr. Baruch S. Blumberg, who was awarded the Nobel Prize for his discovery of the hepatitis B virus.

IN MEMORIAM
Baruch S. Blumberg, MD, DPhil, Nobel Laureate
W. Thomas London, MD
William S. Mason, PhD
Bud Tennant, DVM
Edith Mitchell, MD
Paul Witte, Co-founder

HEPATITIS B FOUNDATION | Baruch S. BLUMBERG INSTITUTE

3805 OLD EASTON ROAD, DOYLESTOWN, PA 18902 USA
PHONE +1(215) 489-4900
WWW.HEPB.ORG • INFO@HEPB.ORG
WWW.BLUMBERGINSTITUTE.ORG

/hepbfoundation
@hepbfoundation
hepb.org/blog
/hepbfoundation
@hepbfoundation

Give Online
Scan to send your gift today!
www.hepb.org/donate