INSTITUTE OF HUMAN VIROLOGY

Discovery

Laboratory • Clinic • Community • World • Fall 2019

IHV Experts Researching Experimental Drug to Curb Opioid Cravings

Institute of Human Virology (IHV) at the University of Maryland School of Medicine researchers, in collaboration with scientists at the National Institutes of Health, recently completed an early phase investigation to test an experimental drug to curb opioid cravings.

Sarah Kattakuzhy, MD

The experimental drug, ANS-6637, potentially works to inhibit the neurochemical responsible for the feeling of craving, which is an important part of addiction. The drug is currently being evaluated in a range of disorders, but investigators at the IHV are focusing on opioid use disorder (OUD) given the overlap between opioid use and infectious disease.

Elana Rosenthal, MD

The phase I clinical trial in healthy adults was completed at the National Institutes of Health Clinical Center, and was led by IHV investigators **Sarah Kattakuzhy, MD,** Assistant Professor of Medicine, and **Elana Rosenthal, MD**, Assistant Professor of Medicine, both of the Division of Clinical Care and Research. The trial assessed how the drug, ANS-6637, is processed in the body when given with another drug that is processed by the same liver enzyme pathway. The results of this investigation demonstrated that ANS-6637 is processed by the liver in a way that does not interfere with several important drugs, which paves the way to begin testing the drug in the population affected by opioid use disorder. These projects are funded through NIH's Helping to End Addiction Long-Term (HEAL) Initiative, a comprehensive program to accelerate research efforts to stem the public health crisis of OUD.

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Director's Message:

Robert C. Gallo, MD

Chinese-American Scientists are Invaluable to U.S. Biomedical Research: Collaboration and Openness Fuels Advances in Biomedical Research

Several cross-currents are forming a dangerous storm that not only threatens advances in biomedical research, but also the American value of fairness and an open society.

Some politicians are instigating fear against students and scholars of Chinese origin. These elected officials allege a sinister link between the Chinese student and scholar association and the Chinese government.

Last year, and most recently this past June, Congress held hearings during which law-enforcing officers selectively cast Chinese scientists in a dismal light. During a December 2018 U.S. Senate Judiciary Committee hearing, FBI officials broadly claimed that scientists of Chinese origins are agents of intellectual theft. This is especially alarming, as the FBI filed baseless charges against American

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UNIVERSITY of MARYLAND SCHOOL OF MEDICINE

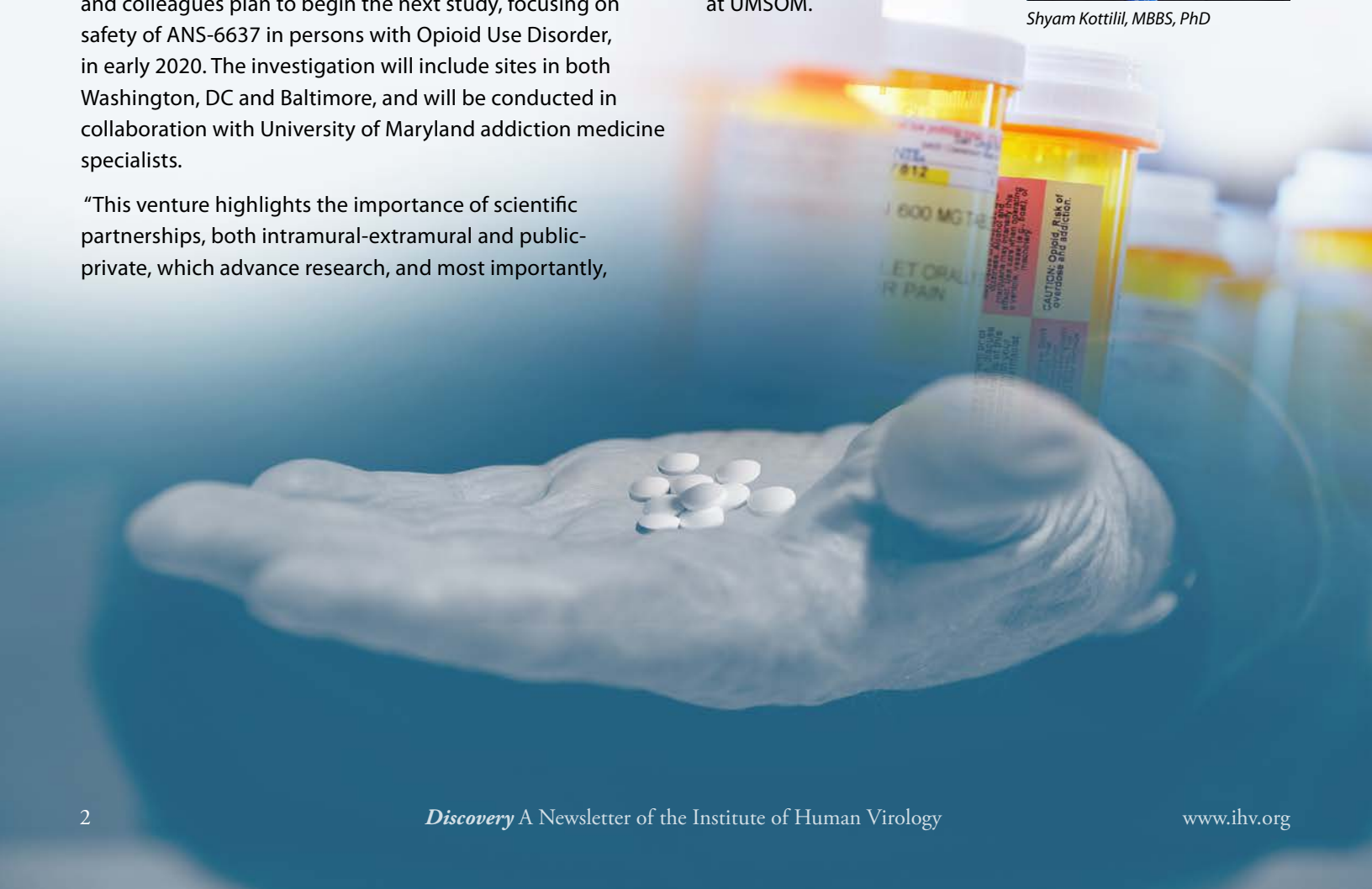
IHV Experts Researching Experimental Drug to Curb Opioid Cravings

"Opioid use disorder is a treatable medical illness that, much like in the early days of HIV, has been held back from scientific advancement by stigma and misconception," said Dr. Kattakuzhy.

"Opioid use disorder is a treatable medical illness that, much like in the early days of HIV, has been held back from scientific advancement by stigma and misconception," said Dr. Kattakuzhy. "With the support of the HEAL Initiative and NIAID, we can now assess a novel potential therapeutic in the treatment of OUD. If proven effective, ANS-6637 could be part of a comprehensive package of services, including harm reduction, opioid agonist therapy and behavioral interventions, enabling us to offer our patients the highest level of evidence-based therapy." Drs. Kattakuzhy, Rosenthal and colleagues plan to begin the next study, focusing on safety of ANS-6637 in persons with Opioid Use Disorder, in early 2020. The investigation will include sites in both Washington, DC and Baltimore, and will be conducted in collaboration with University of Maryland addiction medicine specialists.

"This venture highlights the importance of scientific partnerships, both intramural-extramural and public-private, which advance research, and most importantly, aim to improve the health of marginalized communities," said **Shyam Kottilil, MBBS, PhD**, Professor of Medicine, Director, Division of Clinical Care and Research, Institute of Human Virology (IHV) of the University of Maryland School of Medicine (UMSOM) and Chief of the Division of Infectious Diseases at UMSOM.

Shyam Kottilil, MBBS, PhD



biomedical scientists of Chinese origin, all of which were later dropped or cleared by the courts.

As a senior scientist in biomedical research and an American, I am deeply disturbed by the unfair targeting of Chinese-American colleagues.

In over half a century of directing biomedical research with numerous Chinese colleagues, I have not seen any examples of espionage in biomedical research. The U.S. government should produce hard data about the number of all foreign researchers committing espionage along with the percentage of different nationalities before a large, productive segment of our biomedical community is targeted.

Simply put, science knows no boundary, and foreign influence in science is not only good, but also necessary.

To give an example, in 2015 *JCI insight* published that on average 47% of biomedical research papers in top journals over the past ten years, are produced jointly by institutions from more than one nation. Among them, joint publications between the U.S .and China exceed any other bilateral collaborations. To eliminate such foreign influence would amount to smothering nearly 50% of high quality research in the last 10 years.

The collaboration between the U.S. and China not only benefits advances in biomedical science in China, but also that in the U.S. For nearly two decades, U.S. biomedical research R&D is largely flat, while China has increased with an astonishing annual growth of more than 30%, according to an article in *Nature*, February 2018. As a result, China has contributed progressively more to our common knowledge, the knowledge that we can all use to treat diseases such as AIDS, Alzheimer's, multiple sclerosis, Parkinson's, cancer, heart, diabetes and genetic disorders. The increasing Chinese financial support also means more opportunities to collaborate and solve medical problems together.

Some of my most important discoveries are advances from open, international collaborations. For much of my career, I held collaborative, international laboratory meetings. In the heydays of AIDS research, scientists from around the world joined us at the NIH, to share their latest results on AIDS.

Robert C. Gallo, MD

These open meetings have been credited as a driving force for major advances in AIDS research, including the cause, diagnosis and treatment of AIDS. To expand this tradition, I became founding director of this international virus research center, the Institute of Human Virology, in Baltimore, Maryland, where we host similar large, international meetings. The Institute employs scientists and clinicians from 5 continents with a multiplicity of religious and racial backgrounds. Furthermore, I also co-founded the Global Virus Network (GVN), a non-profit organization, to fight the threat of emerging viral epidemics. The GVN's mission includes bridging the world through scientific proven data without political influence. It now encompasses 51 Centers of Excellence and 9 Affiliated Institutions from 30 countries around the world. Of course, this includes China and Russia.

As a personal anecdote, I decided that I would describe some of my experiences with select examples from the numerous Chinese and Chinese-Americans I have worked closely with over the past half-century, and who made significant contributions to human health.

At the National Institutes of Health (NIH)

Flossie Wong-Staal, PhD—Born in Cantonese Province of China, she was my associate for about 20 years. In September, she was named a member of the National Women's Hall of Fame. She contributed in multiple ways to our understanding of the molecular biology of human cancer viruses, such as HTLV-1, and HIV as well. She now spends much of her time back in China. She had several patents filed for the U.S. government.

Nancy Chang, PhD—She developed what is referred to as the "2nd generation" HIV blood test with me in the mid 1980's. With other colleagues, we had already developed the first generation test. Both generated tens of millions of dollars from royalties of our patents. None of the technology was sent to China until well established in the U.S. All royalties go to the U.S. government, the French government and modest amounts to us (the discoverers).

Robert Ting, PhD—From MIT and Cal Tech, he came to NIH and personally guided me into virology. He came to the U.S. from Shang-Hai, but spent his life in the U.S., though he died prematurely. Not only is he responsible for my career movement into virology, for several decades he was a significant contributor at the National Cancer Institute (NCI) in basic cancer research.

At the Institute of Human Virology (IHV) at the University of Maryland School of Medicine

Wuyuan Lu, PhD

Wuyuan Lu, PhD—Professor Lu came to the U.S. as a young student from the Shang-Hai region. He is now Director of IHV's Division of Basic Science as well as the Assistant Director of IHV. Prof. Lu is one of the top peptide chemists in the U.S., and IHV relies on him greatly. He has brought several students from China to us paid for by Chinese sources, which have been invaluable to IHV. All patents developed by Prof. Lu have been to the University of Maryland, Baltimore (UMB) despite help from China. However, we stand to lose Prof. Lu to Fudan University in Shang-Hai, mainly, because of what he considers unfairness in NIH grant management selectively questioning Chinese Americans. He is not be replaceable. This would be a very serious loss.

Lai-Xi Wang, PhD

Lai-Xi Wang, PhD—I recruited Professor Wang from MIT where he was a young post-doc. His origin is also the Shang-Hai region. Prof. Wang is the top carbohydrate synthetic chemist in the U.S. He has numerous NIH grants. He was "wooed" away from IHV to University of Maryland (UMD), College Park a few years ago, where he now heads a large group and, of course, teaches. His many patents are all to UMD. Alongside Members of Congress, I supported his son for entry into the U.S. Naval Academy (USNA). I find Prof. Wang's son to be one of the most remarkable young men I have ever met. When I asked him why he wished to go to the USNA he replied that it was his dream since boyhood, as he observed them from his home near Annapolis. He actually said, "No greater thing can one do than die for a country like the U.S.!"

Yang Liu, PhD

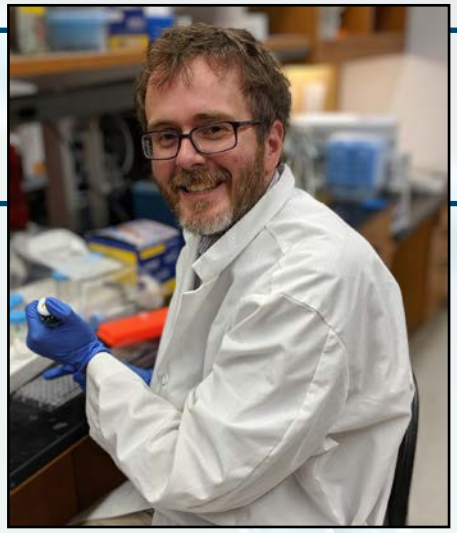
Yang Liu, PhD and Pan Zheng, MD, PhD—I have coupled them as they work closely together and are married. Both are full Professors at IHV, and Professor Liu is Director of IHV's Division of Immunotherapy. Remarkably, Prof. Liu began as a farm boy but came to the U.S. where he headed centers of immunotherapy against cancer, in graft versus host problems, and in autoimmune diseases at the University of Michigan, Ohio State and the Children's National Pediatric Hospital, affiliated with George Washington University, before we recruited him to Baltimore. They have many patents. All are U.S. based despite collaborations with Chinese colleagues. Their work is at the apex of the field and promises to make significant differences in therapies of several diseases, especially cancer.

Pan Zheng, MD, PhD

I strongly encourage our U.S. political leaders to take great care in directing policies that may very well lead to great harm, not only for our nation's science and technology and future generations, but a blow to the safe-keeping of the freedom and democracy that the U.S. inherited as protectorate from our earliest ancestors. These are the highest values of western civilization. The U.S. is a bastion of light and the hope for people from all sources that seek liberty and opportunity. I hope it will always remain so.

Targeting CEACAMs: Their Role in Bacterial Adhesion and Cancer

By **Daniel Bonsor, PhD**, Research Associate, Lu Lab, Division of Basic Science



Daniel Bonsor, PhD

Bacterial adhesion is a mechanism that allows bacteria to endure in a constantly changing environment. When I joined the Sundberg lab in 2009, we developed an interest in the bacterium *Helicobacter pylori*. *H. pylori* resides within the stomach and has to deal with the acidic environment, the constant churning and rapid turnover of epithelial cells. They have evolved several mechanisms to escape and neutralize the acid, and move through the mucosal barrier towards the epithelial cells where the pH is approximately neutral and a more supportable environment. Once here, they anchor themselves to host cells through several different interactions between certain outer membrane proteins and host cell surface ligands and/or proteins. One important protein from *H. pylori* is HopQ. HopQ is an essential for the delivery of CagA, an oncoprotein, into host cells. CagA aids in transforming the local environment which is more beneficial for *H. pylori* through perturbing host cell signaling pathways. This causes gastritis, peptic ulcers and in a small group of those chronically infected (approximately 1-2 %) gastric cancer can develop.

HopQ interacts with carcinoembryonic antigen-related cell adhesion molecules (CEACAMs) from the host cell. CEA (CEACAM5), was the first CEACAM to be discovered in the mid-1960s. This protein was soon found to be elevated in people suffering from certain forms of cancer. The CEA blood test (a multi-billion-dollar industry) is still routinely used today in aiding the diagnosis and treatment of cancer even though we are unsure of its normal cellular function. There are eleven other CEACAMs found in humans which are displayed on cell surfaces. CEACAMs can self-associate through either homodimerization if it is the same CEACAM or heterodimerization if they are different CEACAMs. Dimerization of CEACAMs occur through their N-terminal domains. I have determined several X-ray crystal structures of CEACAMs engaging in both hetero- and homodimerization. Although these structures are found to be remarkably similar, the strength of hetero- or homodimerization can vary widely. We observed very tight homodimerization in CEACAM7 to none for CEACAM3 and CEACAM8. The latter CEACAM however interacts modestly with CEACAM6. Overall the affinities of these interactions can vary over a 10000-fold range. This allows certain cell types to clump together, move more freely, or different cell types to engage with each other.

My collaborators from the University of Munich and I identified that HopQ only recognizes certain CEACAMs, specifically CEACAM1 and CEA and that it disrupts the dimer and binds the dimerization interface. These two CEACAMs are always found to be exploited by bacteria for adhesion. The human immune system has however evolved a way of fighting these infections. CEACAM3 shares a high sequence similarity to CEACAM1 and CEA, and most bacteria that bind these two CEACAMs often binds CEACAM3 (*H. pylori* HopQ interacts with CEACAM3 as well). CEACAM3 is exclusively found on phagocytes. Bacteria which accidently bind CEACAM3 are internalized by the phagocytes and destroyed.

I have also probed other bacterial adhesion molecules and their interactions with CEACAMs. One is found in *Moraxella catarrhalis*, a bacterium which resides in the nasopharynx. This bacterium can cause otitis media, sinusitis and worsening of chronic obstructive pulmonary disease (COPD) symptoms. *M. catarrhalis* uses a protein called UspA1 to engage with CEACAMs. UspA1 is a trimer which is over 600 Å long. I am investigating the interaction of CEACAM1 with UspA1 through X-ray crystallography to determine the structure and measure the strength of the binding interaction. Currently, all known bacteria adhesins that bind CEACAMs are from Gram-negative bacteria. My collaborators from Imperial College and the University Medical Center Utrecht have recently identified the first proteins to bind CEACAMS from Gram-positive bacteria found to be involved in puerperal sepsis. Like HopQ, these proteins bind to the CEACAM dimerization interface with a similar affinity as determined by X-ray crystallography and isothermal titration calorimetry. Although it engages with the same CEACAM dimerization residues as observed with HopQ, it does so in a different way. Structures are known for other bacterial adhesins such as the Dr Adhesin from *Escherichia coli*, Opa60 from *Neisseria gonorrhoeae* and OMP P1 from Haemophilus influenza but not in complex with any CEACAMs. All of them, including HopQ, are different from each other structurally and in their sequences. But remarkably they

Targeting CEACAMs: Their Role in Bacterial Adhesion and Cancer *(Continued from page 5)*

all appear to bind the dimerization interface of CEACAMs as determined through mutagenesis. By exploiting the CEACAM dimerization interface, bacteria may have given us a new target to prevent adhesion, colonization and infection. Indeed, drugs or peptides that are found to bind the CEACAM dimerization interface could potentially block all CEACAM-dependent bacteria from establishing a foothold or reversing colonization within the human body.

I have recently transferred to the Wuyuan Lu, PhD, lab where I am continuing to work on preventing bacteria adhesins binding to CEACAMs. I am using phage display technology to identify peptides that bind CEACAM1 and CEA. These peptides will be synthesized by members of the Lu lab, experts in peptide synthesis, and will be tested for CEACAM dimerization inhibition and the prevention of bacterial binding. We have also begun work identifying peptides which also bind the dimerization interface of CEACAM6. Like CEA, CEACAM6 is upregulated in cancer but at far greater levels. It is observed in many different types of cancer including colon, pancreatic, stomach, breast, lung, thyroid, acute B lymphoblastic leukemia, and prostate. Peptides that bind to CEACAM6 can be coupled to cytotoxic drugs to efficiently deliver them directly to and kill cancer cells.

Eric Sundberg, PhD

A Q&A with Sundberg As He Moves to Emory University

When did you come to IHV and in what role?

I joined IHV's Division of Basic Science and Vaccine Research, which is now divided into two divisions, as an Associate Professor of Medicine in April 2011. I also held a secondary appointment in the Department of Microbiology & Immunology. Prior to coming to IHV, I had been at the Boston Biomedical Research Institute for the previous six and half years, where I held my first independent faculty position.

How has IHV transformed your career?

Being part of the IHV family allowed me to do two critical things for my career. First, with excellent research infrastructure and a superb intellectual environment, my research program expanded significantly into numerous aspects of studying molecular mechanisms of infection and immunity that we did not previously work on. With that, came publications and grants, as well as recognition by the international scientific community. Second, when IHV was restructured in 2014 to split the Division of Basic Science and Vaccine Research into two divisions, Bob Gallo had the confidence to name me, along with Wuyuan Lu, as Co-Directors of the Division of Basic Science. This leadership position allowed me to grow in ways that I could not have foreseen, and it paved the way to my transition in my new position.

What are your greatest accomplishments at IHV?

Bringing cocktails to the IHV Retreat! ;-) Actually, being a mentor to many fantastically talented and successful students and postdocs, as well as being an effective leader to recruit and promote faculty in my division, are my real accomplishments at IHV.

What is your new position?

As of September 2019, I am Chair and Professor of the Department of Biochemistry at the Emory University School of Medicine in Atlanta, Georgia.

Will you collaborate with IHV in your new role?

Of course! Once a member of the IHV family, always a member of the IHV family.

the THRIVE program

Together Healing, Reaching, Inspiring, to achieve Victory over illness, and Embrace life

Highlight on IHV's THRIVE Program

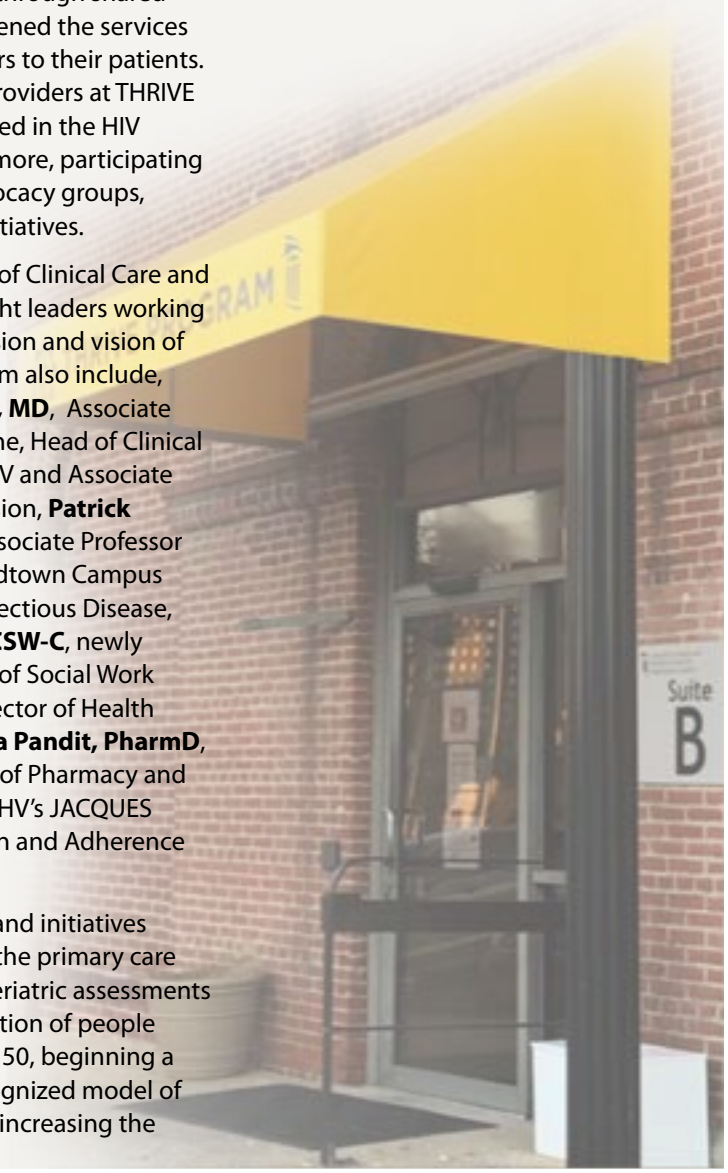
In 2016 the Institute of Human Virology (IHV) moved its outpatient practices including the JACQUES Initiative, the Evelyn Jordan Center, The General Infectious Disease Clinic and the IHV Clinic within the Family Health Center at Midtown, to form the University of Maryland Center for Infectious Diseases, located on Midtown Campus. The HIV arm of the Center has since been named The THRIVE Program of the Institute of Human Virology. The new name was unveiled on World AIDS Day 2018 and serves to highlight the mission of patient wellness and empowerment. THRIVE stands for **T**ogether **H**ealing, **R**eaching, **I**nspiring, to achieve **V**ictory over illness, and **E**mbrace life. A new memorial honoring Evelyn Jordan, Joseph Jacques, and other deceased patients of the former and current clinics was revealed on June 5th, 2019, Long Term HIV Survivors Day. The memorial also includes a plaque dedicated in honor and memory of all current and former IHV faculty, staff and patients locally and globally, for their contributions in the fight against HIV.

Sarah Schmalzle, MD

The THRIVE Program, led by Medical Director **Sarah Schmalzle, MD**, Assistant Professor of Medicine in the Division of Clinical Care and Research, is at the forefront of ending Baltimore's fight against HIV. Strong collaborations with the city and state health departments and with other major HIV clinics in Baltimore through shared grants has strengthened the services that each clinic offers to their patients. Staff and medical providers at THRIVE are integrally involved in the HIV community in Baltimore, participating in multiple HIV advocacy groups, committees, and initiatives.

Additional Division of Clinical Care and Research key thought leaders working to advance the mission and vision of IHV's THRIVE Program also include, **Anthony Amoroso, MD**, Associate Professor of Medicine, Head of Clinical Care Programs at IHV and Associate Director of the Division, **Patrick Ryscavage, MD**, Associate Professor of Medicine and Midtown Campus Division Chief of Infectious Disease, **Robyn Palmeiro LCSW-C**, newly appointed Director of Social Work **Tiffany Moritz**, Director of Health Programs, and **Neha Pandit, PharmD**, Associate Professor of Pharmacy and Clinical Director of IHV's JACQUES Treatment Retention and Adherence Center (TRAC).

Recent focus areas and initiatives include expanding the primary care model to include geriatric assessments for the large proportion of people living with HIV over 50, beginning a new nationally-recognized model of mental health care, increasing the number of medical providers offering specialty services such as fibroscan and buprenorphine for medication-assisted-treatment, developing a streamlined program to transition patients from University of Maryland's adolescent HIV clinic to THRIVE, and increasing use of high-resolution anoscopy to detect and treat anal cancers in same-gender loving men and at risk women. THRIVE will soon be rolling out a process to identify patients at risk of transmitting HIV to their partners, offering targeted prevention education to this group, and



Highlight on IHV's THRIVE Program

(continued from pg. 7)

L to R: Michael Obiefune, MBBS, a patient and Robyn Palmeiro, LCSW-C

offering referrals for HIV testing and prevention services to their partners. The THRIVE program is also strengthening its long term collaboration with IHV's JACQUES Initiative, partnering on initiatives to link sexual assault victims to follow up care for HIV post-exposure prophylaxis, provide in home nursing and social work care to our most socially and medically frail patients, increase linkage to THRIVE for high-risk HIV negative people needing HIV pre-exposure prophylaxis and integrating our JACQUES treatment coaches into THRIVE's multi-disciplinary care teams to improve patient retention.

Through various federal and private grants, IHV's THRIVE Program is able to offer extensive services to eligible patients living with HIV. As needed, an individual patient's THRIVE team may include their medical assistant, nurse, social worker, nutritionist, housing coordinator, employment counselor, mental health counselor, doctor of pharmacy, and IHV JACQUES Initiative treatment & retention coach, in addition to their medical provider who can offer expert HIV specialty care, primary care, and treatment of many infections including Hepatitis C. Additional medical services include buprenorphine maintenance therapy, medical cannabis certifications, cervical cancer screening (Pap and colposcopy), anal cancer screening (anal Pap and anoscopy), and liver fibrosis staging for Hepatitis C and non-alcoholic fatty liver disease.

All patients are also eligible to receive services at IHV's JACQUES Initiative Treatment Retention and Adherence Center, a directly-administered antiretroviral pharmacy. For eligible patients, THRIVE can offer free Ensure dietary supplement, food vouchers, over the counter medications, housing assistance, tokens for public transportation and can connect patients to various resources in the city to meet other needs. Laboratory services are available on site as well.

THRIVE serves as the primary clinical site for the AIDS Education and Training Center's (AETC) HIV-Interprofessionalism course; this newly re-structured curriculum, open to students of the medical, nursing, pharmacy, dental, social work and law schools, allows students to take part in a longitudinal educational experience that includes clinical time at THRIVE, HIV tester training, interprofessional course-work and JACQUES outreach events. Once the pathway requirements are complete, the student is offered funding for attendance at an HIV related conference or for the costs of an examination for certification as an HIV specialist. THRIVE also serves as a robust training program for students and residents of various disciplines outside of the AETC track. Our infectious disease fellows rotate through THRIVE and six fellows are assigned to THRIVE for their HIV continuity clinic, serving as patients primary care and HIV specialty doctors for the course of their two year fellowship. The law students are able to offer free legal aid and representation, focusing on legal name change for transgender patients, advance directives and social security disability cases. Ryan White funded dental services are available at the dental school's PLUS clinic, which many THRIVE patients also take advantage of.

General ID referrals come both from our inpatient consults and from a wide catchment area in Maryland and beyond, and encompass both common and esoteric or travel related infections. THRIVE is a major site for follow up of patients receiving outpatient parenteral antibiotic therapy (OPAT) following hospital admission for serious infections. The Center also can provide antibiotic infusions on-site and skin testing for penicillin allergy.

THRIVE recognizes the benefits to patients, the scientific community, and public health that can be gained by having an active and collaborative research program in place, and actively recruits THRIVE patients to research opportunities available through the IHV.

A new memorial honoring Evelyn Jordan, Joseph Jacques, and other deceased patients of the former and current clinics was revealed on June 5th, 2019, Long Term HIV Survivors Day. The memorial also includes a plaque dedicated in honor and memory of all current and former IHV faculty, staff and patients locally and globally, for their contributions in the fight against HIV.

UM School of Medicine's Institute of Human Virology Releases Data from the HIV Population Survey Showing Smaller HIV Epidemic in Nigeria than Once Thought—Highlighting Key Gaps

IHV Awarded Additional $40 Million Grant to Conduct HIV Population Surveys

Front Row (L to R): Man Charurat, PhD, MHS; Professor of Medicine, IHV Director of the Division of Epidemiology and Prevention and Director of the Center for International Health, Education & Biosecurity; Prof. Lloyd Mulenga, MD, HIV lead/National ART Coordinator, Zambian Ministry of Health, MD; Kumbutso Dzekedzeke, MD, Project Director ZAMPHIA 2020, University of Maryland, Baltimore (UMB), Zambia National Population HIV Impact Assessment (ZAMPHIA 2020) Project Director; Stanley Kamocha, MS, CDC Zambia
Back Row (L to R): Suilanji Sivile, MD, MSC, ZAMPHIA 2020 UMB Linkage to Care Technical Lead; Robert Sheneberger, MD, IHV, UMB Zambia Country Director; Drew Voetsch, PhD, General Population Surveillance Team Lead, CDC Atlanta; Chinedu Agbakwuru, MD, MSC, UMB Senior Technical Advisor, PHIA Projects; and, Simon Agolory, MD, CDC Country Director

In partnership with the government of Nigeria, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), U.S. Centers for Disease Control and Prevention (CDC) released new data from the Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS), one of the largest population-based HIV/AIDS household surveys ever conducted. The NAIIS directly measured HIV prevalence and viral load suppression. According to the NAIIS results, the HIV prevalence in Nigeria is lower than previously thought, allowing the country to focus on providing services to the areas of greatest need to control the HIV epidemic.

The NAIIS found that in Nigeria the HIV prevalence—the percentage of people living with HIV in Nigeria—among adults age 15-64 years was 1.5 percent (1.9 percent among females and 1.1 percent among males), and among children age 0-14 was 0.2 percent. HIV prevalence was the highest among females age 35-39 years at 3.3 percent and among males age 50-54 years at 2.3 percent. The disparity in HIV prevalence between females and males was greatest among younger adults, with females age 20-24 years (1.3 percent) having more than three times the prevalence of males in the same age group (0.4 percent).

The NAIIS also found that the prevalence of viral load suppression (VLS), a widely used measure of effective HIV treatment in a population, among all people living with HIV age 15-64 years in Nigeria was 44.5 percent (46.2 percent among females and 40.9 percent among males). The disparity in VLS between females and males was greatest among those age 25-34 years, with females age 25-34 years (40.0 percent) being twice as likely to have VLS compared to males in the same age group (20.3 percent).

The President of Nigeria Muhammadu Buhari released the NAIIS results on March 14. The NAIIS was led by the Government of Nigeria through the Federal Ministry of Health and the National Agency for the Control of AIDS; conducted with funding from the U.S. President's Emergency Plan for AIDS Relief and the Global Fund to Fight AIDS, Tuberculosis and Malaria and technical assistance from CDC; and implemented by the NAIIS Consortium, led by the the Institute of Human Virology at the University of Maryland School of Medicine with supervision from the NAIIS Technical Committee. The survey reached more than 250,000 respondents in nearly 100,000 households.

Led by **Man Charurat, PhD, MHS**, Professor of Medicine, Director, Center for International Health, Education, and Biosecurity (CIHEB), and Director, Division of Epidemiology and Prevention, Institute of Human Virology (IHV) at the University of Maryland School of Medicine (UMSOM), the University oversees a consortium comprising of ICF International, the Population Council, the African Field Epidemiology Network, the Association of Public Health Laboratories, and the African Center for Disease Control. In collaboration with the CDC Division of Global HIV and TB, the consortium plays a key role in designing and implementing the PHIA surveys which includes lending expertise in epidemiology, laboratory science, health informatics, survey statistics, and workforce training.

Further, Dr. Charurat has been awarded a five-year grant from the U.S. Centers for Disease Control and Prevention (CDC) to conduct HIV population-based HIV impact assessments worldwide to measure the progress towards the control of the HIV epidemic. The University will receive $40 million in the first year.

"This grant allows us to build on our expertise in technical assistance for improving service delivery for HIV/TB prevention, care, treatment, and for associated infectious and non-communicable diseases, and provides more in-depth insights into the HIV epidemics globally," said Dr. Charurat.

With this new award for a project titled "Regional Strengthening of HIV-focused Population-based National

Surveys and Size Estimations (RESPONSE)," the Center will focus survey implementations in several priority countries heavily affected by HIV. The survey combines household visits with key questions and cutting-edge technologies to directly measure national HIV incidence, HIV viral load suppression, and other selected infectious diseases such as HBV, HCV, TB, and syphilis. Under the leadership of each country's Ministry of Health, survey teams travel door to door to collect risk behavioral data along with biomarkers. Survey results from each country will become available as they are completed over the next five years.

"Dr. Charurat's important leadership and research in this area will help set the stage to better understand how to intervene and bring an end to HIV prevalence. This is particularly important for the most vulnerable populations. His research team has already conducted significant research and surveillance in Nigeria, which will help form evidence-based HIV intervention policy," said UMSOM Dean E. Albert Reece, MD, PhD, MBA, who is University Executive Vice President for Medical Affairs, and the John Z. and Akiko K. Bowers Distinguished Professor.

INSTITUTE OF HUMAN VIROLOGY

UNIVERSITY of MARYLAND SCHOOL OF MEDICINE

Dear Friend of IHV,

Alash'le Abimiku, PhD

At the Institute of Human Virology (IHV) at the University of Maryland School of Medicine, women have played a strong role in our HIV research for more than two decades through many researchers, including through the work of Dr. Alash'le Abimiku. Dr. Abimiku's work in Nigeria has led to changes in the way HIV-infected women receive treatment and how their children are fed. Her research has saved thousands of lives.

When I first met Dr. Abimiku more than 20 years ago, she was a post-doc in my laboratory at the National Institutes of Health. She was passionate about battling the disease in West African communities and was responsible for a major research breakthrough, which was shared in our 1994 AIDS Research and Human Retroviruses co-publication.

Dr. Abimiku remains a leader in HIV/AIDS research in West Africa, and is instrumental in running a research facility I am honored to say is nicknamed the Gallo House in Nigeria. In 2001, a partnership between a Nigerian ambassador, Harvard University, the Gates Foundation and IHV funded Dr. Abimiku's research on mother-to-child HIV transmission.

I am pleased to introduce you to Dr. Abimiku, in her own words.

"It was very obvious to me the link between research and care. A group that was really ignored at the beginning was pregnant women. Not much was known in terms of mother-to-child transmission, and so that was an area we were interested in. We followed a cohort of 300 to 400 HIV-infected pregnant women until their children were 2 years old to track transmission patterns and develop a behavior story.

That was a really important study because we could show very clearly that infants get infected in utero, through delivery, through breastmilk, and all three ways were significant. We also showed it was very important to keep Mom alive so that the kids, infected or not, can thrive. Our study really pushed the use of antiretroviral (ARV) drugs not just doing during delivery, but after to help Mom become healthier to take care of the children, and to breastfeed. A child who is breastfed is less likely to get infected because Mom is now taking ARV drugs.

There's a lot of trust in all this. We were pushed to think outside the box. We also created a mother-mentorship program to pair very young, inexperienced mothers with more experienced mothers, and that had a significant positive effect on the children of these women. They're so vulnerable, so confused, but to have somebody who's gone through this saying, 'You're fine, your child is fine, they're not going to be HIV-infected,' is very important."

Please support researchers and caregivers like Dr. Abimiku, whose work emphasizes the bond between mother and child.

As Dr. Abimiku's cohort model—now in its third cycle—is being adapted in other parts of Africa, your donation to the IHV Against the Tide Fund has the potential for global impact.

"We all have our little bit to do," *Dr. Abimiku says, and I hope you will join us in supporting IHV for mothers* around the world.

With thanks,

Bob Gallo

Robert C. "Bob" Gallo, MD

The Homer & Martha Gudelsky Distinguished Professor in Medicine, Co-Founder and Director, Institute of Human Virology at the University of Maryland School of Medicine

P.S. If you prefer to mail in your gift, please make your check out to **UMBF, Inc./IHV Mother's Day**, and send it to

University of Maryland School of Medicine
Office of Development
31 South Greene Street, Third Floor
Attn: Traci Morgan
Baltimore, MD 21201

Alternatively, you may call 410.706.8503 to discuss other ways to give.

Gifts to support the University of Maryland School of Medicine are administered by the University of Maryland Baltimore Foundation, Inc. (UMBF, Inc.)

A portion of any contribution to the University of Maryland School of Medicine may be used to enhance advancement efforts.

Publications

Alash'le Abimiku, PhD

Alash'le Abimiku, PhD, Professor of Medicine, Division of Epidemiology and Prevention was a co-author on, "Laboratory medicine in Africa since 2008: then, now, and the future," in *Lancet Infect Dis.* 2018 Nov; 18(11): e362-e367.

Alash'le Abimiku, PhD, Professor of Medicine, Division of Epidemiology and Prevention and Senior Technical Advisor for Laboratory Programs at the Center for International Health, Education and Biosecurity (CIHEB), was among co-authors on, "Strategies for Good Retention Rates in HIV Exposed Sero-Negatives (HESN) Individuals: Important Consideration for HIV Biomedical Prevention Trials in Nigeria," in *World Journal of AIDS,* 8, 160-176.

Clement Adebamowo, BM, ChB, ScD, FWACS, FACS

Clement Adebamowo, BM, ChB, ScD, FWACS, FACS, Professor of Epidemiology and Public Health, Division of Epidemiology and Prevention and Associate Director of Population Science, the Marlene and Stewart Greenebaum Comprehensive Cancer Center and **Sally Adebamowo, MBBS, MSc, ScD**, Assistant Professor, Department of Epidemiology and Public Health, University of Maryland School of Medicine, were among other co-authors on, "Prevalence and Incidence of Genital Warts and Cervical Human Papillomavirus Infections in Nigerian Women," in *BMC Infectious Disease*, 2019 Jan 7; 19(1):27.

Sally Adebamowo, MBBS, MSc, ScD

Florence Bada, MBBS, MPH Fogarty Scholar, Division of Epidemiology and Prevention, **Patrick Dakum, MBBS, MPH**, Assistant Professor of Epidemiology and Public Health, Division of Epidemiology and Prevention and **Alash'le Abimiku, PhD** Professor of Medicine, Division of Epidemiology and Prevention and Senior Technical Advisor for Laboratory Programs at the Center for International Health, Education and Biosecurity, were among other co-authors on, "Cost of three models of care for drug-resistant tuberculosis patients in Nigeria," *BMC Infectious Diseases* 2019 19:41.

Patrick Dakum, MBBS, MPH

Olga Latinovic, PhD, MSc

Olga Latinovic, PhD, MSc, Assistant Professor of Microbiology and Immunology, Division of Basic Science, is a first author and joined by colleagues, **Alonso Heredia, PhD**, Assistant Professor of Medicine, Division of Clinical Care and Research and **Marvin Reitz, PhD,** Adjunct Professor of Medicine, Division of Basic Science on "CCR5 Inhibitors and HIV Infection," *Journal of AIDS and HIV Treatmen*t. 2019;1(1):1-5.

Olga Latinovic, PhD, MSc, Assistant Professor of Microbiology and Immunology, Division of Basic Science, is a first author and joined by colleagues, **Alonso Heredia, PhD**, Assistant Professor of Medicine, Division of Clinical Care and Research, **Marvin Reitz, PhD**, Adjunct Professor of Medicine, Division of Basic Science and **Joseph Bryant, DVM**, consultant, on "Suppression of active HIV-1 Infection in CD34+ Hematopoietic Humanized NSG Mice by a Combination of Combined Antiretroviral Therapy and CCR5 Targeting Drugs," *AIDS Research and Human Retroviruses.* 2019 Aug; 35(8):718-728.

Alonso Heredia, PhD

Rebecca Nowak, PhD

Rebecca Nowak, PhD Assistant Professor of Epidemiology and Public Health, Division of Epidemiology & Prevention and **Man Charurat, PhD, MHS**, Professor of Medicine, Director, Division Epidemiology and Prevention, Director, Center of International Health, Education and Biosecurity (CIHEB), among other co-authors on, "Individuals and Sexual Network Predictors of HIV Incidence Among Men who Have Sex With Men in Nigeria," in *Journal Acquired Immune Deficiency Syndrome (JAIDS)*, 2018 Dec.

Man Charurat, PhD, MHS

Grants


Alash'le Abimiku, MON, PhD

Alash'le Abimiku, PhD, Professor of Medicine, Division of Epidemiology and Prevention, Executive Director, International Center of Research Excellence, Institute of Human Virology, Nigeria (IHVN), has been awarded a Centers for Disease Control (CDC) grant, $3,743,164, to support efforts for, "Accelerating Malawi's PEPFAR Laboratory Logistics and Infrastructure for Quality (AMPLIFY)."

Man Charurat, PhD, MHS, Professor of Medicine; Director, Division of Epidemiology and Prevention, Director, Center for International Health, Education, and Biosecurity (CIHEB) was awarded a one-year, approximately $1.8 million subcontract to support the Afya Kamilifu work under Amref Health Africa and the CDC. This project focuses on trainings and support of local facilities in Tanzania providing HIV treatment, especially in high-volume areas.


Man Charurat, PhD, MHS


Joel Chua, MD

Joel Chua, MD, Assistant Professor of Medicine, Division of Clinical Care and Research, was awarded $490,977 for three years to support efforts for "Summit (Oxford) Limited" to assist Comparison of ridinilazole versus vancomycin treatment for Clostridium difficile infection through clinical trials.

Joel Chua, MD, Assistant Professor of Medicine, Division of Clinical Care and Research, was awarded $427,992.00 for two years to support the efforts for "Gilead Sciences , Inc." to assist with their clinical trials To evaluate the efficacy of FDC B/F/TAF in adult subjects coinfected with HIV-1 and hepatitis B, as determined by loss of HIV-1 RNA suppression (≥50 copies/mL) and/or lack or loss of HBV DNA suppression (≥29 IU/mL) at Week 24 by FDA Snapshot analysis.

Niel Constantine, PhD, MT (ASCP), Professor of Pathology, Division of Epidemiology and Prevention, was awarded $457,395 for one year to support efforts for "The USAID Global Health Supply Chain QA Program" to assess the performance characteristics of diagnostic test kits and to provide technical assistance.


Niel Constantine, PhD, MT (ASCP)

Niel Constantine, PhD, MT (ASCP), Professor of Pathology, Division of Epidemiology and Prevention, has been awarded a corporate grant from Trinity Biotech Inc. in the amount of $90,925 for "Clinical Trial for the Trinity Biotech Uni-Gold Syphilis Treponemal (Tp) test." This FDA clinical trial will focus on the suitability and accuracy of a rapid test to detect specific Treponemal antibodies in finger stick, whole blood, and serum samples at CLIA-waived sites.


Jennifer Husson, MD, MPH

Jennifer Husson, MD, MPH, Assistant Professor, Division of Clinical Care and Research was awarded $57,556 for one year to support the efforts of "American Gene Technologies International Inc." to assist with the clinical trials that will obtain clinical specimens to facilitate process development leading to production of an FDA-approved autologous, genetically modified CD4 T cell preparation.

Mohammad Sajadi, MD, Associate Professor of Medicine, Division of Clinical Care and Research, was awarded a one-year, approximately $700,000 grant by the Bill and Melinda Gates Foundation to develop a new family of potent and broad neutralizing antibodies to serve as a preventive therapy as an alternative to an HIV-1 vaccine.


Mohammad Sajadi, MD


Poonam Marthur, DO, MPH

Poonam Marthur, DO, MPH, Assistant Professor, Division of Clinical Care and Research, was awarded $117,000 for two years to support the efforts of "Merck Sharp & Dohme Corp" to assist with their clinical trials that can determine the change in cardiovascular risk from baseline to after functional cure of hepatitis C among HCV mono-infected and HIV/HCV-co-infected patients, using high-sensitivity C-reactive protein.

Roscoe Moore Joins Board of Advisors

Until his retirement, **Roscoe M. Moore, Jr., DVM, MPH, PhD** served with the United States Department of Health and Human Services (HHS) and was for the last twelve years of his career the principal person responsible for global development support within the Office of the Secretary, HHS, with primary emphasis on Continental Africa and other less developed countries of the world (e.g. Indonesia, Malaysia, and Vietnam). Dr. Moore was career officer within the Commissioned Corps of the United States Public Health Service (USPHS) entering with the U.S. National Institutes of Health (NIH) and rising to the rank of Assistant United States Surgeon General (Rear Admiral, USPHS) within the Immediate Office of the Secretary, HHS. He was selected as Chief Veterinary Medical Officer, USPHS, by Surgeon General C. Everett Koop. Dr. Moore served as an Epidemic Intelligence Service Officer with the U.S. Centers for Disease Control and Prevention (CDC). He was with the Center for Veterinary Medicine, U. S. Food and Drug Administration before becoming Senior Epidemiologist within the National Institute for Occupational Safety and Health, CDC. Dr. Moore is the Founder and President of PH RockWood Corporation, which is focused on the prevention, treatment and control of infectious diseases worldwide. He is a Senior Fellow of the Potomac Institute for Policy Studies.

John McHutchison Moves to Assembly Bio

John McHutchison, MD joined Assembly as President and Chief Executive Officer in 2019 and was also appointed as a Director. He most recently served as Chief Scientific Officer and Head of Research and Development at Gilead Sciences. During his nine years at Gilead he led the organization in the successful filing of numerous New Drug Applications (NDAs) and supplemental label updates across multiple therapeutic areas including the curative treatment regimens for chronic hepatitis C (HCV), and treatment of chronic HBV. Prior to Gilead, Dr. McHutchison held numerous positions at Duke University Medical Center, including Associate Director of the Duke Clinical Research Institute, Professor of Medicine in the Division of Gastroenterology, Director at Duke Clinical Research Unit and Co-Director of the Duke Clinical and Translational Science Award. Earlier in his career, Dr. McHutchison spent nearly a decade at Scripps Clinic and Research Foundation, and was previously an Assistant Professor of Medicine at the University of Southern California in Los Angeles. Dr. McHutchison received his degrees in medicine and surgery from the University of Melbourne in Australia, completed an internal medicine residency and gastroenterology fellowship at the Royal Melbourne Hospital, and a post-doctoral fellowship in Liver Diseases at the University of Southern California. He is a member of the Royal Australasian College of Physicians, and in 2018, he was appointed an Officer of the Order of Australia (AO).

IHV Adds New Members to Its Scientific Advisory Board

Jeffrey Schlom, PhD

National Cancer Institute, National Institutes of Health

Jeffrey Schlom, PhD, is Chief of the Laboratory of Tumor Immunology and Biology, Center for Cancer Research at the National Cancer Institute, National Institutes of Health. He directs a translational research program focusing on the design and development of new cancer immunotherapies and immunotherapeutic strategies. The program takes advantage of the latest advances in genomics and immunology through hypothesis-generating preclinical research and translates these findings into paradigm-shifting science-based clinical trials. Novel immunotherapies designed or developed in this program include therapeutic cancer vaccines, checkpoint inhibitors, immune modulators, and agents to inhibit immunosuppressive entities. Emphasis is placed on the development of "off the shelf" therapeutics that can be widely distributed and evaluated at multiple cancer research centers. Dr. Schlom's program has also developed a spectrum of immune assays that interrogates numerous components of the immune system, to help identify which patients will most

likely benefit from immunotherapy either before treatment is initiated or early in the therapeutic regimen. Dr. Schlom serves on the editorial boards of numerous scientific journals, and has received numerous awards. He holds a wide range of patents in the area of immunotherapy and has authored more than 700 scientific publications.

Anna Marie Skalka, PhD

Fox Chase Cancer Center, Temple Health

Anna Marie (Ann) Skalka, PhD is Professor Emerita and former W.W. Smith Chair in Cancer Research at the Institute for Cancer Research at the Fox Chase Cancer Center in Philadelphia, where she served as Sr. Vice President for Basic Science from 1987 until 2008. She received a Ph.D. degree in Microbiology from New York University Medical School. Dr. Skalka is internationally recognized for her contributions to our understanding of viral oncogenesis and for the biochemical mechanisms by which retroviruses (including the AIDS virus) replicate and insert their genetic material into the host genome. Work from her laboratory provided fundamental groundwork for development of antiviral drugs to treat AIDS. Dr. Skalka has published more than 240 scientific papers and scholarly reviews, has edited several scientific books, and organized and spoken at numerous national and international meetings and conferences. She is also author of Discovering Retroviruses: Beacons in the Biosphere, a history-focused book for the science-interested public published in 2018 by Harvard University Press, and is coauthor of the widely acclaimed, two-volume textbook, Principles of Virology. In addition to service on numerous scientific advisory boards, Dr. Skalka has been deeply involved in state, national, and international advisory groups concerned with the broader, societal implications of scientific research, including the NJ Commission on Cancer Research, which she chaired from 2008-2013. In recognition of her outstanding accomplishments, she has been honored by election to the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the New York Academy of Science, and the American Academy of Microbiology, and by several prestigious awards including the 2018 Sigma Xi William Procter Prize for Scientific Achievement and Communication.

Keynote

Robert C. Gallo, MD, the Homer & Martha Gudelsky Distinguished Professor in Medicine, director, Institute of Human Virology, was keynote speaker during the 19th International Congress HTLV 2019 in Lima, Peru on April 24, 2019.

Awards

Robert C. Gallo, MD, the Homer & Martha Gudelsky Distinguished Professor in Medicine, Director, Institute of Human Virology, received the International Society for Antiviral Research (ISAR) Award of Excellence and presented "Human retroviruses (HTLV-1 and HIV): Current therapy and prevention" during the 32nd International Conference on Antiviral Research (ICAR) on Monday, May 13 in Baltimore, Maryland.

ISAR

IHV2019

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Dr. Robert C. Gallo
Director, Institute of Human Virology

Dr. Shyam Kottilil
IHV2019 Co-Organizer

Dr. Man Charurat
IHV2019 Co-Organizer

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