



Discovery

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Institute of Human Virology Awarded \$13M to Strengthen Laboratory Services in Kenya, and \$10M to Enhance Biosecurity Infrastructure in Nigeria

*Baltimore-based Institute leads collaborations to prevent, detect,
and treat infectious diseases in West Africa*

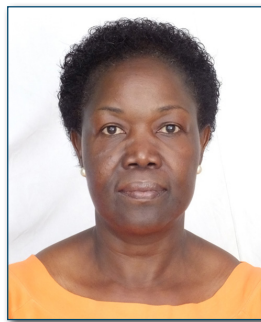


Members of the Kenyan team

The Institute of Human Virology (IHV) at the University of Maryland School of Medicine announced last winter two significant grants comprising \$13 million to strengthen infectious disease laboratory capacities and infrastructure in Kenya, and \$10 million to enable early detection and rapid responses to new and emerging infectious disease threats in Nigeria. This announcement followed last year's IHV milestones including surpassing more than 1 million patients in overseas care and treatment, a \$50 million grant in Zambia, and a \$24.5 million grant in Botswana to combat each country's HIV/AIDS epidemics.

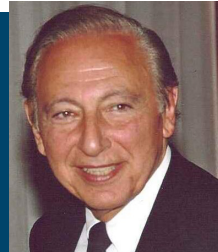
The five-year \$13 million grant for Kenya, led by Sylvia Ojoo, MB, ChB, Assistant Professor of Medicine at the Institute of Human Virology, was awarded by the U.S. Centers for Disease Control and Prevention (CDC), and supports a partnership led by IHV including Kenya's Ministry of Health, the National Public Health Laboratory Services, and the Kenya National Blood Transfusion Service, among others. The collaboration named Boresha Maabara, which is Swahili for "improve laboratory services," will streamline government laboratory guidelines and policies to strengthen effectiveness in diagnostic testing for the prevention, surveillance, and treatment of infectious diseases such as HIV and Tuberculosis, among other HIV-related opportunistic infections. "Dr. Ojoo

continued on page 2



Sylvia Ojoo, MD, ChB

Director's Message:



Robert C. Gallo, MD

For this issue of
Discovery newsletter,
I want to share my
April 14, 2016

commencement address to the graduates of The University of KwaZulu-Natal (UKZN) Nelson R. Mandela School of Medicine in Durbin, South Africa. I was invited by my good friend, Salim "Slim" Karim, Director of the Centre for the AIDS Program of Research in South Africa (CAPRISA) to participate in this most memorable experience.

*"A reflection on the power
and limits of medical
science as seen especially
through the window of AIDS
research"*

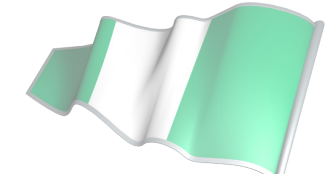
Vice-Chancellor, Council Chair,
Deans, Faculty and Families and
Friends of Graduates, a warm
and hearty congratulations to the
Graduates.

You persevered and succeeded. You
can be proud, as I am too, because
no event in the world could give

continued on page 3



UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE



Institute of Human Virology Awarded \$13M to Strengthen Laboratory Services in Kenya, and \$10M to Enhance Biosecurity Infrastructure in Nigeria

Baltimore-based Institute leads collaborations to prevent, detect, and treat infectious diseases in West Africa

continues to excel in building effective partnerships with the Kenyan Ministry of Health in order to improve the health of Kenya," said Robert R. Redfield, Jr., MD, Professor of Medicine, Associate Director and Division Head, Clinical Care and Research at the Institute of Human Virology.

Additionally, the U.S. Government has a new priority initiative led by the CDC to address growing concerns related to biosecurity in Nigeria. Global gaps were highlighted in the recent Ebola outbreak in West Africa. Building on IHV's extensive global experience, CDC awarded IHV a five-year \$10 million grant to partner with CDC-Nigeria and the Nigerian Ministry of Health to build in-country capacity and expertise to detect biosecurity threats early, and to respond rapidly and effectively to emerging infectious disease threats, such as Ebola.

"This a great opportunity for IHV to build on our longer-term CDC partnership established by the U.S. President's Emergency Plan For AIDS Relief (PEPFAR), and to extend our expertise to help operationalize programs targeting viruses of biosecurity importance," said Dr. Redfield.

"Kenya and Nigeria each have a high burden of HIV, and remain at significant risk for additional epidemics which are dependent on successful biosecurity infrastructures that these awards will help provide."



Members of the team in Nigeria

In Kenya, IHV's Division of Clinical Care and Research already leads a team, in partnership with Kenya's Ministry of Health and the University of Nairobi, which is creating and implementing what has proven to be a paradigm shift in the health workforce of HIV-related training by developing a national HIV integrated training course. The onsite course replaced more than 20 disparate curricula, reducing time away from work for training. The course was piloted and is currently being rolled out nationally, positioned to cut the unit cost of training by about tenfold.

In Nigeria, in addition to IHV's Division of Epidemiology and Prevention's work with the Institute of Human Virology, Nigeria, IHV's Clinical Division has already successfully facilitated the launch of HIV/AIDS training hubs in 13 training institutions for nurses and community health extension workers and 44 military hospitals in Kaduna State. IHV also currently incorporates HIV/AIDS topics in curriculum for MPH students, and launched a short course in HIV/AIDS for Doctors of the University of Nigeria.

"IHV continues to serve as a true global leader that can effectively partner with varying foreign governments and public-private sector entities to combat infectious disease," said Robert Gallo, MD, the Homer & Martha Gudelsky Distinguished Professor of Medicine and Director of the Institute of Human Virology. He continued "IHV's Clinical Division under the leadership of my colleague and fellow IHV co-founder, Dr. Robert Redfield, works to advance global public health for the betterment of mankind and to save countless lives."



A refurbished and newly equipped tuberculosis laboratory at the Umoja Health Center in Kenya

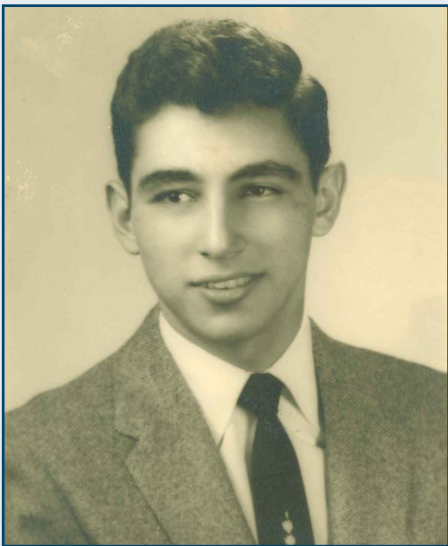
Director's Message *(continued)*



Professor Salim S. Abdool Karim, MD, PhD, DSc (*honoris causa*), Director, Centre for the AIDS Programme of Research in South Africa (CAPRISA), Professor Robert C. Gallo, MD and A. van Jaarsveld, BSc, BSc Hons, PhD, FPSSAF, MASSAF, Vice-Chancellor and Principal, University of Kwazulu-Natal, South Africa

me more inspiration than sharing this experience with you and with the great South African medical professor, Slim Karim. In turn, I hope I am able to provide some inspirational words for you—which I believe should be the main objective of a graduation speaker. The theme of my remarks are based on my experiences in medical science and learning both its powers and its limits.

It begins with my decision in high school when I realized I needed to decide what



Robert C. Gallo, MD in High School

to do with my life. This is early for such a decision and when combined with my lack of any unusual interest in science, I suspect my choice was subconsciously dictated by the agonizing death of my only sibling of leukemia at age six. I was thirteen, but in her final days I saw her dying at a medical school's children's hospital, but there I caught my first glimpse of doctors seeking to do better, not satisfied with the present. In other words—research physicians.



Judith Gallo, Dr. Gallo's only sibling, age 3 years

Now, I first wish to tell you about my early failures. While in my first year of University I began to do experiments. I had heard that no one knew the function of the thymus gland, so I removed this gland from mice to observe what happened. They died. I concluded that at least I knew the thymus was important. However, later examining the mice, I found that they

died because my surgery hit the heart. I learned from this that I should not be a surgeon! A second lesson was that one must learn to walk before flying. Training and technique were important. I had none. Coincidentally, immunologists later discovered that the thymus gland was the center of the generation of T cells, and T cells would later become the central theme of my research throughout my career. This experience also caused me to lose confidence as to whether I could ever be effective in research, and this was not helped by my first research experience in medical school, when I was asked to separate all the cell types of the bone marrow and at all their various stages of differentiation in one summer. No one did it before and no one since. I had an idea. Make solutions of different specific gravity and let the cells separate by gentle centrifugation in long plastic tubings. Then I could cut out sections of the tubing that should harbor different cell populations. I prepared solution upon solution until the lab director screamed at me “Gallo, when will you begin the experiments?” But I never did, because I feared failure and time ran out.

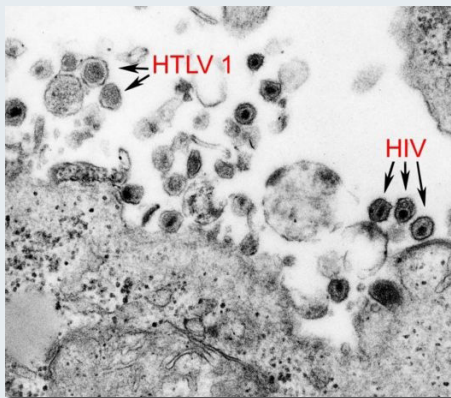
My formal career began at the U.S. National Cancer Institute and it too was not encouraging. One sunny Saturday I was separating some species of RNA by passage of a sample through a very long chromatographic glass column. It was very slow. I tried to hasten the process with the application of a pressure pump. Suddenly, the whole glass cylinder cracked, and all my precious sample was gone. The following Monday, I saw the lab director and spoke of my dismay and that I was losing all confidence. Softly, he told me a story of another young doctor about 15 years before me, who also spent a weekend day in the lab and was also in a hurry when washing the old-time long glass pipettes. He placed the water tubing for water entry and one for exit at the wrong ends. This led to a flood of all the laboratories. The young doctor felt he would not make it in research. Then the Director told me his name: Arthur Kornberg, who was to

Director's Message (continued)

continue research and become a Nobel Prize winner for being first to make DNA in a test tube. He had discovered the enzyme DNA polymerase. Well, I too did persevere and I had strong energy levels, a competitive spirit, and a great desire to do something significant.

I set about for the next five years to learn more technology and more basic science but eventually I knew where my strengths were as well as my passion. I turned to leukemia research and the growth of these cells and eventually to include studies of animal retroviruses which I knew caused leukemia in many different animal species. I also wondered if such viruses infected humans, and if so, did they cause disease in us. This was at that time a very unpopular pursuit mainly because of many past failures and some evidence that humans might be protected against infection by these kinds of viruses. So this was a most difficult time for me and my coworkers, even being ridiculed to the point that I was close to quitting, even though I had uncovered some hints of the presence of these viruses in man. It was the decade of the 1970s.

But in this period, we discovered a way to grow human T cells for the first time due to a finding of a growth factor, a protein we called T cell growth factor, eventually becoming known as Interleukin-2, or IL-2, among the first cytokines. Really, it was the



A sample in the early days of the AIDS epidemic of a co-infected person who was in a car accident and received a blood transfusion in Haiti. As Dr. Gallo and colleagues were trying to find the agent causing AIDS (they had already discovered the HTLVs), they came across a co-infection making it hard to decipher that the agent causing AIDS was different from the HTLVs.

beginning of cytokine biology. Using this T cell growth factor, interleukin-2, to grow T cells we succeeded between 1979-1982. We discovered the first and the second known human retroviruses. We called them Human T cell Leukemia Viruses 1 and 2, or HTLV 1 & 2. Along with Japanese workers we showed HTLV-1 was the cause of a human T cell leukemia, later others showed it also caused a spastic fatal neurological disease. But graduates, my first paper on the discovery was rejected by the *Journal of Virology*. Fortunately, some important scientists helped me and it was published a bit later in the *U.S. Proceedings of the National Academy of Sciences*. So, we had prevailed by perseverance and perhaps good luck.

Then in late 1981, early 1982 we became aware of AIDS. Lectures from public health officials convinced me to get involved. We knew from clinicians that this new disease involved certain cells of our immune system called, CD4 T cells, and we knew from the public health people that risks for AIDS seemed to involve blood, sex, and birth from an infected mother. The retroviruses we just discovered, the HTLVs, targeted these same cells and they were transmitted by blood, sex and mother's milk. Because of this experience and in the midst of heavy arguments and many other ideas, with my collaborator, Max Essex at Harvard's School of Public Health, we first proposed the idea that AIDS was caused by another retrovirus, a new human retrovirus, presumably a relative of the HTLVs. This was 1982.

Then in 1983 the group in Paris, with this information, reported the first isolate of a new retrovirus. Its limits: it was only 1 isolate, the person did not have AIDS at the time so no claim was made or could be made by then that this new retrovirus, later to be known as HIV, was the cause. But later that year my technician, Betsy Read-Cannole, and my co-worker, Mika Popovic, made a technical breakthrough. We were able to permanently grow five HIV isolates from AIDS patients in cell lines, and because of this we could produce great quantities of virus continuously. This enabled us to develop the HIV blood test which could test sera for specific antibodies against HIV. Coupled with finding HIV in many more AIDS cases,



Professor Robert C. Gallo, MD is conferred his 35th honorary doctorate from Mr. André Young, who represents the University of Kwazulu-Natal's Convocation

the blood test gave us verification of the linkage of HIV to AIDS as the cause. This was a necessity for scientific progress, because whereas virus isolation was then quite difficult and few wished to try it, antibody testing of serum was safe, simple and accurate. Verification, that is, reproduction of results by numerous other groups, came rapidly upon publication of our five papers in the spring of 1984. Of course, the blood test also allowed the epidemic to be followed closely and it saved the blood supply. No longer would people get infected and die of AIDS because they were transfused with blood contaminated by HIV. Also, when treatment became a reality, we had a means to identify infected people to treat and to prevent mother to infant transmission.

Many other major advances quickly followed including the historical beginning of anti-HIV drugs which was the first time a systemic virus disease was proven to be improved by antiviral therapy and brought the pharmaceutical industry into the field. This led to the combination of drugs by 1994-1995 that made HIV infection a chronic, but very controlled problem with proper physicians. The speed and power

of the science was great. The late Jonathan Mann of WHO called the years 1982–1985 the fastest pace in the history of medicine from the inception of a new and mysterious disease to its detailed understanding. Yet it was also a turbulent time. Inadequate political will, insufficient early funding, prejudices blocking infected children from school and even patients from some of the hospital wards, gay activists and scientists talking past each other, governmental arguments over patents, the blaming of one group or individual for the pandemic that spawned books, claims of government creation of HIV for evil purposes, poor theories as to the cause, and ridiculous claims that there was no AIDS or there was AIDS but HIV did not exist or that HIV did exist but caused nothing, even though we can safely say that there is more evidence that HIV causes AIDS than we have for the cause of any other human disease. Sometimes the ridiculous had impact, such as influencing some to not favor the anti-HIV drugs. In fact, I personally was involved in or felt the consequences of each of these strange attitudes, and like you, my background was only in medicine and in a research laboratory, so I was not prepared to face such things as the politics, the social issues, the legal issues, and so on. In fact, I did not even have public health experience, and did not realize that as an expert I had the power to make things better such as moving even faster with blood testing before transfusion of people. I also saw people being infected by blood transfusions when we could have prevented it by speaking out. I learned that science may be powerful but it is hardly enough.

Where are we today?

The pandemic continues despite the powerful therapy. Some patents do not stay with the therapeutic programs, some do not take drugs properly or have physicians with inadequate expertise, and some (15%) do not even know they are infected. I believe we need to focus more energy and resources for outreach, testing, testing and testing and then getting people on proper therapy.

As to prevention, we know education alone is not enough. South Africa, led by Slim Karim and his wife, Quarraisha, were the 1st to prove that drugs can prevent infection – this was with microbicides (anti-HIV compounds which can be vaginally inserted). Soon, others followed, including pre-exposure prophylaxis (or PrEP). However, for drug prevention to have a huge impact it will require strong governmental support, and should receive every opportunity.

Vaccines have failed to date, with only one trial out of more than 6 showing a little effect in protection. My colleagues and I have a novel vaccine candidate which has now entered phase 1 clinical trials. We have hopes, but we know that some basic science problems remain to be solved for any vaccine to succeed.

Our Institute is in Baltimore, Maryland, USA but also in 6 countries in Africa and 1 Caribbean nation. This time last year, we announced surpassing 1 million HIV patients in overseas care and treatment. Several other American universities and organizations are also involved. This was made possible by the President's Emergency Plan for AIDS Relief—known as PEPFAR, started by President Bush and continued and enlarged by President Obama, now totaling about 60 billion U.S. dollars over 5 years. But will this program continue

indefinitely with the next U.S. President? Will foundations remain as committed? Will your next President in South Africa? We believe so. We hope so, but more so we hope that you, the new generation, will end the epidemic. It will require more science, but also more than science.

Despite the tragedy—the horror of AIDS—AIDS also resulted in many positive things. Examples in science are too many to enumerate but a few major ones must be mentioned. They include revitalizing vaccine research and showing for the first time that we can have therapy against viruses—not just bacteria, made possible by the advances in understanding details of the replication cycle of viruses and bringing the pharmaceutical industry into the targeting of viruses. There were also many positive social-political spin offs, perhaps the most obvious being our greater understanding of differences in sexual orientation and the far greater involvement of the U.S. with Africa.

Lessons for me:

1. First, step up when you have the expertise (blood test)—don't rely on hierarchy.
2. Second, there is a need for responsible global expertise covering all virus types. This is why I co-founded the Global Virus Network (GVN) in 2011 as well as being more certain that there will be an adequate number and quality of trained virologists for the future.
3. Third, believe in medical research, without interest in it, we become doomed to the acceptance of things as they are. There are many research opportunities still open to you and of course not only in AIDS but throughout medicine, but also remember that though AIDS research accomplished much with the great power science has, it's not enough. No matter our science capacities, we also need to be aware and involved in our communities including the social and political side. Science needs funding. Science needs political leadership. Science also needs to be close to the community as has been demonstrated here in South Africa by the great CAPRISA program.

Graduates,

*I wish you all the best in life—
for your careers and your personal happiness.*

*I hope some of you will form careers
in public health. I hope some
of you will form careers in
medical research, but I know all
of you will work for the better welfare
of your people and all of you will
persevere when faced with challenges.*

You hold the future—

I know you will hold it with care.

Thank you.

Man Charurat Succeeds William Blattner as Director of the Epidemiology and Prevention Division



Man Charurat, PhD, in a meeting with the Executive Director of the International Center on Advocacy for the Right to Health (ICARH)

Man Charurat, PhD, MHS, Associate Professor of Medicine, was appointed Director of the Institute of Human Virology's (IHV) Division of Epidemiology and Prevention in January 2016 following the retirement of William Blattner, MD. After receiving his dual BS in Molecular Biology and Biochemistry from the University of Washington School of Medicine, and a PhD in Infectious Disease Epidemiology from the Johns Hopkins Bloomberg School of Public Health, Dr. Charurat joined IHV in 1998. Currently, he is the Principal Investigator on three NIH R-01 grants, a NIH Fogarty International Center training grant, and a CDC health systems strengthening cooperative agreement. He has also taken the helm as a co-organizer of IHV's prestigious International Annual Meeting.

We recently sat down with Dr. Charurat to learn more about his vision and research initiatives in the Division.

What is your vision for IHV's Epidemiology and Prevention Division (or "EPI Division")?

The core of epidemiology deals with understanding disease incidence, its distribution, and its control. IHV's "EPI Division" has been at the forefront of conducting implementation science research and applying innovative approaches such as molecular epidemiology and genomics in areas of HIV/AIDS, other infectious diseases and cancers. To this endeavor, my vision is to increase our footprint in responding to these diseases in Baltimore while continuing the impact we are making internationally.

What are the Divisions research priorities?

The Epi Division's research efforts are concentrated in five areas: Key and Vulnerable Populations Research; Genomic Research in Cancer and Viral Diseases; Implementation and Dissemination Science Research; Health Systems and Laboratory Strengthening; and Research Training.

How do these research priorities impact the field?

Examples that come to mind include our key population research and genomic research in cancer. Recently, our research on viral phylogenetics has focused on transmission dynamics in an effort to shed light on how HIV

has been spreading and where it will be spreading within and between populations. In practical terms, we are using the sequence of the virus itself as a fingerprint to predict where we should focus our prevention efforts such as treatment as prevention and pre-exposure prophylactic use of antiretrovirals. We are making an impact in Nigeria in a study with men who have sex with men (MSM) and are collaborating in other countries and locally on this effort.

In our genomic research in cancer and viral diseases, we are studying the interaction between vaginal microbiome, host genetics such as epigenetics, and human papillomavirus (HPV) in women. Epigenetics is the study of DNA methylation and histone modifications which leads to changes in gene expression. This is also an emerging field with implications where epigenetics could potentially be used as a biosensor in public health research and disease surveillance, especially in cancers. With advance in sequencing technology in microbiome research, another study just beginning is investigating how local bacterial composition in the anal canal influences the progression of anal cancer among MSM. This has potential implication on improving early detection and management.

How does EPI train the next generation of international researchers?

Since 1998, the Division has been dedicated to advancing the mission of training the next generation of scientists in low- and middle- income countries to address the global health needs of their countries through funding from the NIH Fogarty International Center. In 2016, in response to the UNAIDS Gap Report - Identifying Populations at Greatest Risk of HIV Infection and where there is a gap in implementing evidence-based interventions, we began executing a new 5-year training program sponsored by NIH Fogarty International Center in Implementation and Dissemination Science Research. Implementation Science Research has become increasingly recognized as a major priority for researchers, service providers, and research funders over the past decade. In working with the University of Maryland Graduate School and the School of Medicine's Department of Epidemiology and Public Health, the program will train Master- and PhD-level Nigerian scientists in Implementation Science Research and Epidemiology to build capacity in Nigeria to rapidly engage in addressing the barriers to controlling the HIV/AIDS epidemic. If proven successfully, we hope to expand to other countries through partnership with the Clinical Division's vast global program.

As a leading program organizer for IHV's 18th Annual International Meeting, what highlights do participants have to look forward to this year?

First, I am honored to be this year's co-organizer with Dr. Robert Gallo. This meeting has its root from the early days when Dr. Gallo was at the NCI with the goal of bringing experts together on tumor cell biology, retrovirology, and HIV/AIDS, and this tradition continues today. Every year I look forward to the meeting because of its latest studies and ground breaking developments, and equally important of how it fosters the camaraderie among scientists. This year's meeting, I am personally most excited for the session on HIV "Cure" Research which provides an opportunity for leading experts to share data and debate through panel discussion in order to accelerate research on viral reservoirs and latency.

Institute of Human Virology (IHV) Releases Data Supporting Community-Based Treatment Providers in Fight Against Hepatitis C

Research finds community-based non-specialist providers are effective in the absence of hepatitis C experts and a growing patient population

The Institute of Human Virology (IHV) on April 16 released data at The International Liver Congress™ 2016 in Barcelona, Spain demonstrating that treatment for hepatitis C virus (HCV) can be provided safely and effectively within a community-based and non-specialist setting. The study, sponsored by the National Institutes of Health (NIH), alleviates growing pressure on overburdened HCV specialists by showing that alternative, trained providers are effective.



*Sarah Kattakuzhy, MD
(credit aidsmap)*

“With such a large patient cohort, ensuring that patients can access safe, effective and appropriate treatment is essential,” said Sarah Kattakuzhy, MD, Assistant Professor of Medicine, IHV Clinical Care and Research Division. “Currently, the limited availability of experienced specialists restricts rapid expansion of hepatitis C treatment, compromising the goal of global eradication. As such, care models which bypass this therapeutic bottleneck must be explored.”

The multi-center, open label, Phase 4 clinical trial assessed chronic HCV-infected patients at community health centers in the United States. Patients received non-randomized treatment from a specialist provider, primary care physician or nurse practitioner. According to study protocols, providers underwent uniform three hour training on the Infectious Disease Society of America (IDSA)—American Association for the Study of Liver Disease (AASLD) guidelines for HCV.

To ensure continuity, patients received the same standardized treatments with direct-acting antivirals (ledipasvir and sofosbuvir), with outcomes assessed via unquantifiable HCV RNA viral load 12 weeks after the completion of treatment (SVR12) and by a composite score of attendance.* Patients participating in the study were inclusive of challenging subpopulations; predominantly they were black (96%) and genotype 1a (72%), 24% were co-infected with

HIV and HCV, 18% were treatment experienced and 20% had cirrhosis, or scarring of the liver.

“Availability of new drugs makes treatment for hepatitis C very effective and simple,” said Shyamasundaran Kotttilil, MBBS, PhD, Professor of Medicine, Co-Director, Clinical Research Unit, Associate Director, IHV Clinical Research and Care Division. “However, we need to train new providers other than hematologist and infectious disease physicians to expand care of hepatitis C. This study is the first step toward development of a training paradigm that is tested and proven. We hope this model of care can be adapted to other communities and countries with high prevalence of hepatitis C.”



Shyam Kotttilil, MBBS, PhD

The study found that of the 304 patients, 285 achieved SVR12 (93.8% per protocol; 88.2% intention-to-treat including patients who discontinued medication early), with no significant difference identified between providers for achieving this outcome. SVR12 was achieved by 92.1% of patients receiving care from specialists, 96.7% of patients receiving care from primary care physicians and 94.9% of patients receiving care from nurse practitioners.

“The data presented here is extremely welcome and shows great potential to escalate treatment options and protocols for hepatitis C. We have the therapies, we now need to make sure we can effectively roll them out to patients,” said Professor Tom Hemming Karlsen, EASL Vice-Secretary. “We know we have too few experienced specialists treating HCV and this is severely hampering our ability to eradicate this disease once and for all. This research has the potential to be a genuine game changer in the way we look at HCV treatment across the board, and could provide the opportunity to increase access to care and treatment to many regions of the world.”

**Statistical analysis included chi-squared or Fisher’s exact test and logistic regression using SAS, version 9.3.*

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1. World Health Organization. Hepatitis C Fact Sheet N°164. Available from: <http://www.who.int/mediacentre/factsheets/fs164/en/>. Last accessed: March 2016.
2. World Health Organization. Global Alert and Response—Hepatitis C. Available from: <http://www.who.int/csr/disease/hepatitis/whodcscsrlyo2003/en/index3.html>. Last accessed: March 2016.

Collaboration as Key for Viruses and Cancer Research

Experts from IHV, as well as George Washington University and the National Institutes of Health, presented on HIV/AIDS and cancer research at the inaugural Scientific Symposium on Viruses and Cancer



L to R: Eduardo Sotomayor, MD; Kevin Cullen, MD; E. Albert Reece, MD, PhD; Jeffrey Akman, MD; Douglas Nixon, MD, PhD; and Robert Gallo, MD

Washington, D.C. and Baltimore, MD have many roles: one is the capital of the country and the epicenter of politics while both are entrenched in academia and research; and for those in the health professions, it's the focal point of HIV/AIDS, cancer, and health inequity. To improve the two cities' health quality, researchers from the Institute of Human Virology (IHV) at the University of Maryland School of Medicine, the George Washington (GW) School of Medicine and Health Sciences (SMHS) and the Milken Institute School of Public Health (Milken SPH), along with leaders from the National Institutes of Health (NIH), united their efforts at the inaugural Scientific Symposium on Viruses and Cancer, held April 19-20, 2016 on the GW campus.

"This symposium is a 30-year dream, really, that since the beginning of the HIV epidemic, Washington would be a destination city where we could attract talent, where we would be doing studies that the rest of the country, the rest of the world, would be looking at," said Henry Masur, M.D., Chief of the Critical Care Medicine Department at the NIH Clinical Center and clinical professor of medicine at SMHS, during his introductory remarks.



Henry Masur, MD

As Dr. Masur explained, the last decade has been transformative for D.C. and Baltimore, particularly with HIV/AIDS clinical care and research. Although D.C. has the highest incidence of the disease in the country, researchers presenting at the meeting—including Robert Redfield, M.D., Professor of Medicine, Associate Director and Director of the Clinical Care and Research Division at IHV and Alan Greenberg, M.D., Chair and Professor of the Department of Epidemiology and Biostatistics to Milken SPH—have made significant strides to address the crisis.

In 2009 in D.C., new cases numbered more than 900, but today, Dr. Masur estimates that number to be closer to 400. D.C. also has a robust prevention program and boasts one of the largest cohorts—13 of the area's largest providers working with the D.C. Department of Health database—that has helped to significantly decrease D.C.'s HIV rate. When IHV opened its doors in 1996, approximately 500 patients received care. Today, led by Dr. Redfield, that number has grown to nearly 6,000.

"If you look at the number of people living with HIV—16,000—and you compare that to the number of deaths we've had and new cases, you can see that we're providing better care for patients, we're reducing transmission," Dr. Masur said. "This is a major benefit that all of these collaborations, all this research, is providing to this city."

In 2013, the CDC ranked DC and Maryland as #1 and #2 in estimated rates of HIV/AIDS cases. In Baltimore, one in 42 people over the age of 13 is infected with HIV, according to the Maryland Department of Health and Mental Hygiene. More than 50% of persons living with HIV in Baltimore are not engaged in regular care and treatment. Youth ages 13–24 are the fastest growing group of new HIV infections. About 60% percent of youth with HIV do not know they are infected.

As E. Albert Reece M.D., Ph.D., MBA, vice president for Medical Affairs at the University of Maryland and John Z. M.D., Ph.D., MBA, and Akiko K. Bowers M.D., Ph.D., MBA, Distinguished Professor and Dean of the University of Maryland School of Medicine, pointed out, IHV programs such as the JACQUES Initiative, which is an acronym for “Joint AIDS Community Quest for Unique and Effective Treatment Strategies,” is making a major impact in the Baltimore community.

For example, Erica Davis is a young mother who, when she learned that she was HIV-positive, thought she was “a plague” to her children. If they went to drink from the same glass she’d just used, she’d smack their hands away. She was afraid to speak to them if they were standing in front of her, for fear that her saliva might infect them. However, after receiving treatment, education and support from the JACQUES Initiative, she realized that HIV was not her “curse” any longer. There are dozens of stories like Erica’s.

For Jeffrey S. Akman, M.D., vice president of health affairs, Walter A. Bloedorn Professor of Administrative Medicine, and dean of SMHS, Washington, D.C. and Baltimore, MD have been “Ground Zero” for HIV/AIDS.

“I’ve been involved in HIV work since the early ‘80s,” Dr. Akman said on the first day of the symposium. “I was a resident beginning to see patients with HIV back in the ‘80s. Many of my friends were dying, many of my patients were dying, and it was a very heady time.” He continued, “It’s not just HIV; it’s pretty much every illness: it’s breast cancer, it’s renal disease, it’s hypertension, it’s obesity. Our health disparities are off the charts in D.C. and Maryland,” said Dr. Akman.

Robert C. Gallo, M.D., The Homer and Martha Gudelsky Distinguished Professor in Medicine and director of the Institute of Human Virology at the University of Maryland School of Medicine, has the same vision. He initially proposed a domestic version of the PEPFAR, the President’s Emergency Plan for AIDS Relief in a *Washington Post* op-ed in 2008 and again in 2012, with D.C. and Baltimore as sites for pilot studies, but interest wasn’t vigorous. When Dr. Akman became dean of SMHS, however, Dr. Gallo—through fellow IHV Board Member John Evans—found that Dr. Akman and the university were receptive to collaboration.

“That’s what really fired this [idea of the symposium] up,” Dr. Gallo said.

With high-caliber researchers on GW staff—like Douglas Nixon, M.D., Ph.D., Professor and Chair of the Department of Microbiology, Immunology, and Tropical Medicine and Walter G. Ross Professor of Basic Science Research at SMHS and Eduardo M. Sotomayor, M.D., Director of the GW Cancer Center and Professor of Medicine at SMHS, it was a “no-brainer” for Dr. Gallo. Thus, with enthusiasm from GW and IHV researchers, the idea of the symposium cemented.

Dr. Sotomayor, Dr. Gallo explained, is well-known for his expertise in lymphomas, which can accompany HIV. With those at the forefront of research, sharing results and ideas make the possibility for greater impact on viruses and cancer grow exponentially.

“There is a potential for a number of bridges between GW and IHV and the University of Maryland Marlene and Stewart Greenebaum Center,” said Dr. Gallo.

Over the course of the two days, researchers presented their work. Man Charurat, Ph.D., MHS, Associate Professor of Medicine and Director of IHV’s Epidemiology and Prevention Division, was a presenter at the meeting and instrumental in organizing the meeting. Other presenters not yet mentioned from the University of Maryland, Baltimore campus included Kevin J. Cullen, M.D., Professor of Medicine and Director of the University of Maryland Greenebaum Cancer Center; and from IHV, George Lewis, Ph.D., Professor of Microbiology and Immunology and Director of the Vaccine Research Division; Wuyuan Lu, Ph.D., Professor of Biochemistry and Molecular Biology and Co-Director of the Basic Science Division; Anthony Devico, Ph.D., Professor of Medicine, Division of Vaccine Research; Alfredo Garzino-Demo, Ph.D., Associate Professor of Microbiology and Immunology, Basic Science Division; and, Fabio Romerio, Ph.D., Assistant Professor of Medicine, Basic Science Division.



L to R: IHV’s Anthony Devico, PhD; Alfredo Garzino-Demo, PhD; Fabio Romerio, PhD; Wuyuan Lu, PhD; and, Eric Sundberg, PhD



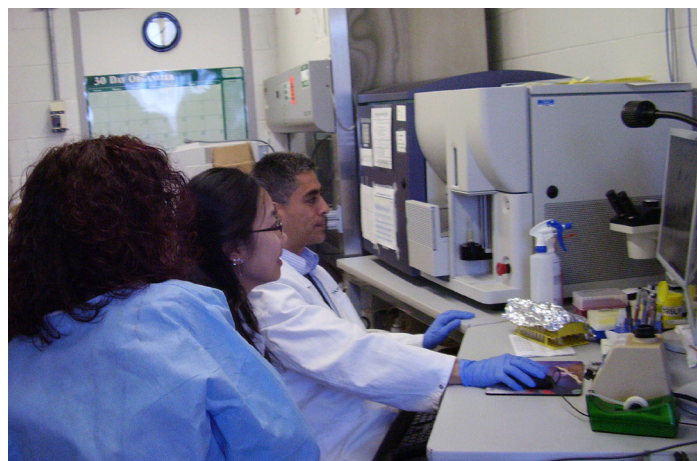
IHV Core Facilities help advance the Institute's research by providing a broad range of services to faculty and staff at IHV, and across the University campus. Services include cutting-edge technologies and laboratory technical support. Each core facility is led by an experienced researcher at IHV. In this issue, we highlight IHV's varying Core Facilities.

Flow Cytometry and Cell Core Facility

The mission of the IHV Flow Core is to serve the IHV community with varying needs associated with flow cytometry. Flow Cytometry has been a critical tool for immunology research over the past 30 years and has become routine. However, the proper design, well-calibrated machine and appropriate interpretation of the collected data are essential for avoiding common pitfalls. The IHV Flow Core is headed by **Yutaka Tagaya, MD, PhD**, Assistant Professor of Medicine, IHV Basic Science Division, who has over 25 years of experience with Flow cytometry technology. The Flow Core has been in operation since Dr. Tagaya's arrival in 2011. Its daily operation heavily depends on Juan C. Zapata, PhD, Research Associate of Medicine, IHV Basic Science Division, as the chief operator/trainer.

IHV has two major instruments:

1. BD's FACSAria (3 lasers—405 nm violet, 488 nm blue and 633 nm red—which allow 12 independent color analysis and fluorescence-based cell sorting including a single cell/indexing methodology).
2. Millipore's GUAVA. GUAVA can handle up to 10 colors (FITC, PE, PerCPCy5.5, PECy7, APC, APC-Cy7, Violet 421, Violet 510, Violet 605 and Violet 650).
3. IHV also has FACSCalibur (4-color) for the common use, but the machine has been officially decommissioned (although maintained by the CORE).



Juan C. Zapata, PhD operates the Aria sorter

The Core offers help in the two areas, including polychromatic (especially over 8 colors) flow data collection/analysis and cell sorting for infectious cells. At the moment, the IHV Flow Core is the only facility that can sort infectious cells at the University of Maryland, Baltimore campus.

The IHV Flow Core not only operates the machine, but will work with each investigator by consulting on the experimental design and by training the researcher for instruments and software (if necessary). The Flow Core will also offer help with basic and advanced data analysis using the FlowJo (common flow cytometry software available from the IT department of the IHV) program.

With the Aria, each investigator can analyze up to 12 color samples, operated by the FlowCore personnel. Cell sorting can be done into two ways, four ways, and into various tissue culture plates. The machine is also capable of sorting a single cell into each well of the 96-well plate (single cell sorting) with fluorescence data from each of the cell recorded (Index sorting). In the past, the Lewis lab (headed by George Lewis, PhD, Professor of Microbiology and Immunology, Director, IHV Vaccine Research Division) has used this function to identify each clone of B cells producing antibodies against HIV components and analyzed the IgG antibody produced from each of the clones.

The GUAVA is open for public access and training is available upon request. This machine can handle up to 10 colors. In addition, this machine can be programmed into a high-throughput mode by automatically analyzing samples that have been prepared in 96-wells. Unlike some clinical flow labs, the IHV Flow Core does not provide high-throughput analyses, but each investigator can do this by using the GUAVA machine.

The IHV Flow Core has worked with investigators from virtually all groups of IHV, as immunology research upon viral infection is a major focus of IHV.

We encourage each investigator by stating that neither a multi-color staining or a fluorescence cell-sorting is difficult. However, proper guidance based on the appropriate understanding on the optical and chemical characteristics of each fluorochrome, their potential interference, and hands-on experience with the expression levels of each molecule of interest would greatly reduce the cost and time for obtaining publication-quality data. Recently, the Core has successfully worked with Dr. Kottlil's group (Shyamasundaran Kottlil, MBBS, PhD, Professor of Medicine, Co-Director, Clinical Research Unit, Associate Director, IHV Clinical Research and Care Division) to conduct a 12-color polychromatic flow cytometry which helped them jump-start their elaborate experiments without wasting too much money and time.

Currently, the Flow Core extensively works with Cristiana Cairo, PhD, Assistant Professor of Medicine, IHV Basic Science Division, and her group for cell sorting and multi-color flow cytometry,



Yutaka Tagaya, MD, PhD, (Head of the Flow Core) discusses data analysis with an investigator

Dr. Kottlil's group by cell sorting and staining for the analyses of the immunity under HCV-infection, the lab of Alfredo Garzino-Demo, PhD, Associate Professor of Microbiology and Immunology, IHV Basic Science Division, by sorting CCR6 positive cells for their research, the lab of Fabio Romero, PhD, Assistant Professor of Medicine, IHV Basic Science Division, for the characterization of the various cellular impacts of anti-sense protein and transcripts encoded by HIV-1, Dr. Tagaya's group for the sorting of leukemic and non-leukemic cells from ATL (adult-T cell leukemia) patients to graft into humanized mouse for immunologic characterization and immunization purposes, the lab of Nicolas Stamatou, MD, Assistant Professor of Medicine, IHV Clinical Care and Research Division, for investigating the relevance of the polysialation in T-cell activation. The Core also has a few labs from the University of Maryland School of Medicine which use our service for cell sorting and flow cytometry.

Testimonials

Bhawna Poonia, PhD, Assistant Professor of Medicine, IHV Basic Science Division

The Core is studying immune dysfunctions in association with chronic virus infection, in particular that with HBV and HCV so that the Core can explore immunomodulatory strategies for viral control and cure. To this end, we need to analyze clinical samples (PBMCs and liver lymphocytes) obtained from HBV/HCV infected patients by multi-parameter immuno-phenotyping and the help from the IHV Flow Core is essential. The Core also conducts FACS sorting for further molecular characterization of CD8 T cells that are specific for HBV/HCV. In short, my project critically depends on collaborating with the IHV Flow Core.

Cristiana Cairo, PhD, Assistant Professor of Medicine, IHV Basic Science Division

My lab is interested in T cell development; in particular, we study function and regulation of gammadelta T cells in neonates. Due to the low frequency of these cells in cord blood (<0.5%

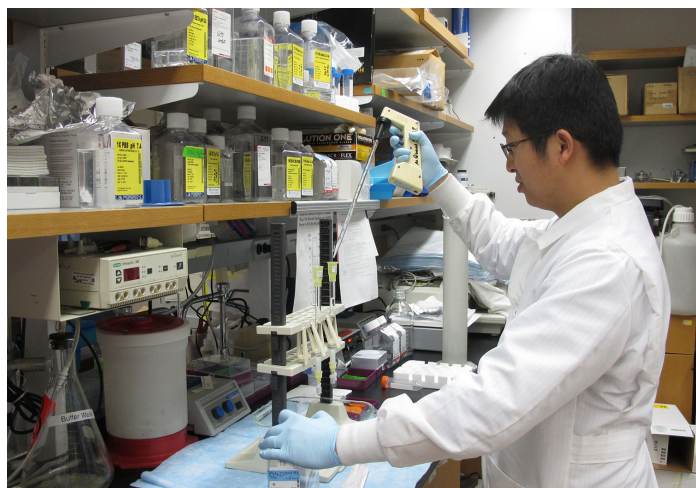
of lymphocytes), multi-parameter flow cytometry is the only viable approach to investigate their phenotypic and functional characteristics. Simultaneous analysis of more than 10 surface or intracellular markers is critical for obtaining detailed single-cell information for a statistically meaningful number of cells. In addition, isolation of high purity target cells (>98%) by fluorescence-activated cell sorting is essential for our studies investigating regulatory mechanisms at the molecular level. Specifically, we are examining epigenetic and transcriptional regulation of the inhibitory receptor PD1. These analyses would not be possible without the support provided by the IHV Flow Core, whose personnel always manage to accommodate our needs regardless of their hectic schedule. Having a dedicated Flow Core here at IHV is essential for advancing our NIH-funded research, and their services certainly improve our scientific productivity.

The IHV Flow Core will continue serving IHV with expert knowledge by facilitating the Institute's state-of-the-art research ongoing.

μ QUANT CORE FACILITY

The μ QUANT Core Facility, launched with the co-founding of IHV in 1996, provides quality immunological analyses of biological analyses to researchers within IHV and the University of Maryland Baltimore (UMB) and to other collaborators locally and nationally. **Ping-Hsin Rex Lin, MS** runs the daily operations of the core with academic oversight from Anthony DeVico, PhD, Professor of Medicine, IHV Vaccine Research Division.

IHV founded the μ QUANT Core Facility to include a variety of centralized cores to provide both cost savings and standardized methods. The Core has devoted significant time to trouble shooting all protocols used and have developed laboratory



Ping-Hsin Rex Lin, MS in the μ QUANT Core Facility

continued on page 12

Highlighting IHV Core Facilities *(continued)*



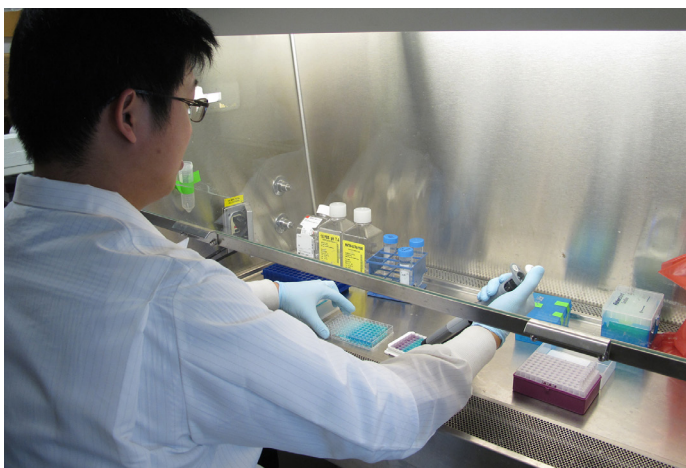
Standard Operating Procedures. Our aim is to provide consistent, cost effective services that allow researchers to compare results generated within a week. The Core has been very successful in meeting these goals, and as such, its existence has optimized the pace and scope of research at IHV.

Core services include: routine immunoassays (e.g. ELISA); endotoxin testing; monoclonal antibody and recombinant protein screening, production, purification, and labeling; production and maintenance of virus and cell stocks; and maintenance of common use equipment. Several new pieces of equipment including SpectraMax M2 ELISA plate reader and qPCR machines are now installed or will be secured in the near future.

The core serves the UMB campus and Baltimore research community on a fee-for service basis and welcomes the opportunity to work with investigators to establish new immunoassay and protein production protocols.

A complete list of μ QUANT core services can be found in the IHV website. (<http://www.ihv.org/research/facility.html>)

The Core lab is heavily involved in supporting a number of IHV programs and projects. The heaviest workload at this time involves protein production and purification; virus isolation and cell production; sample tracking and archiving; and immunoassay performance. Such projects include, protein production and purification for IHV's Full-Length Single Chain (FLSC) HIV vaccine clinical trial including FLSC IgG for Profectus BioSciences, a Baltimore-based biomedical spin-off company from IHV. The Core has also produce gp120 and FLSC for the labs of George Lewis, PhD, Professor of Microbiology and Immunology, Director, IHV Vaccine Research Division, Dr. Anthony DeVico, and Mohammad Sajadi, Associate Professor of Medicine, IHV Clinical Care and Research Division.



Ping-Hsin Rex Lin, MS

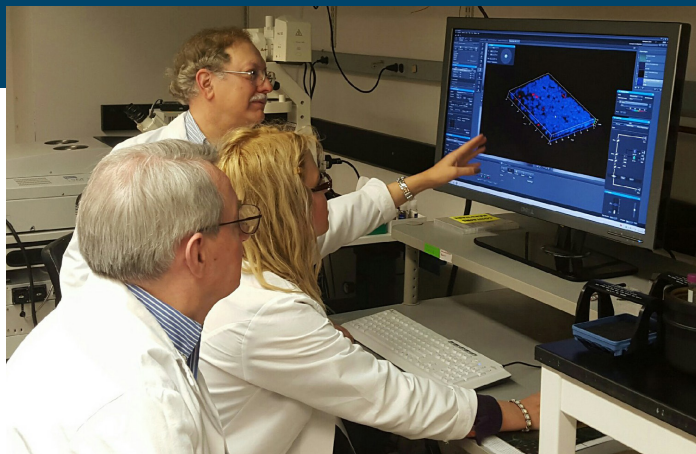


L to R: Harry Davis; Ngeh Toyang, PhD; University of Maryland, Baltimore County student, Lauryn Mitchell; Eugene Ateh, DVM; Joseph Bryant, DVM; and Sandra Navas (seated)

Animal Core Facility

The Animal Core Facility, which opened at the time of the Institute's co-founding in 1996, is led by **Joseph Bryant, DVM**, Associate Professor of Pathology, Director, IHV Animal Models Division while Harry Davis, BS, MS serves as the Core's Facility Administrator. The Core is a unique feature of the Institute, enabling scientists to work with relatively inexpensive models to study AIDS and new drugs or therapies without risk to humans. Developing animal subjects for use in viral research is a science unto itself, and it is essential in taking a discovery from laboratory to clinic. The use of animals as models for human disease has been indispensable in understanding the causes, biology and prevention of disease. As mentioned, all of the Core's models serve a crucial role in understanding the pathogenesis of AIDS and various cancers with the ultimate intent of providing models for pre-clinical testing of new anti-HIV and anti-cancer drugs and treatment.

The Animal Core's major function is to support all research involving in-vivo studies at IHV. The Core also works closely with all IHV Principal Investigators in support of over 20 protocols involving in-vivo studies. Over the past 3 years, the Animal Core team has been working closely with the Basic Science Division and Robert Gallo, MD, The Homer & Martha Gudelsky Distinguished Professor in Medicine and Director of IHV, on the P-17 project which involves the HIV-1 matrix protein p-17 implicated in virally-associated lymphomas, the mycoplasma project, and with Alonso Heredia, PhD, Assistant Professor of Medicine, IHV Clinical Care and Research Division, on the use of humanized mouse models for HIV studies. We continue to work with Walter Royal, MD, Professor of Neurology and Anatomy and Neurobiology, University Of Maryland School Of Medicine



Olga Latinovic, PhD, MSc, Mika Popovic, PhD and Frank Denaro, PhD (Morgan State University collaborator) are viewing a 3D presentation of B lymphomas located in lymphatic tissues of Nude mice

and Director, Maryland Center for Multiple Sclerosis Treatment and Research, on the use of the HIV-1 transgenic rat model for neuro-AIDS studies.

Over the past 5 years, the Animal Core has worked very closely with Henry Lowe, PhD from Jamaica on the isolation of anti-cancer drugs from natural plants from Jamaica. This collaborative effort has resulted in 3 patents, and most recently the Core has isolated a small molecule designated as HLBT-001 from one of these plants that has been shown to have broad anti-cancer properties.

Imaging Studies of Pathogens & Cell Interactions Core Facility

Since the Imaging Studies of Pathogens & Cell Interactions Core Facility's inception in 2012, **Olga Latinovic, PhD, MSc**, Assistant Professor of Microbiology and Immunology, IHV Basic Science Division, has led the Core. The lab is focused on imaging and analysis studies, proper trainings and use of three different microscopes located in three different rooms on IHV's 6th floor: Fluorescent microscope (N 640D), Confocal Microscope (S 615) and Super Resolution microscope (N 636A).

The Core Has several ongoing projects including:

HIV Vaccine

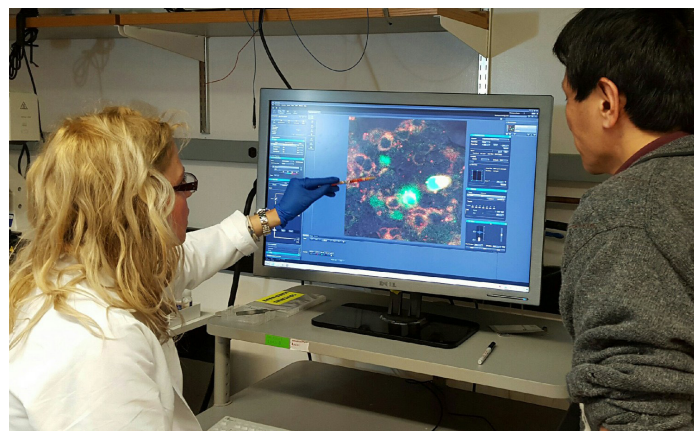
The IHV Vaccine group, led by Dr. George Lewis, has used the superresolution microscope to obtain an unprecedented direct visualization of HIV attached to its target cell. They have been able to determine which antibody binding sites are presented and where this occurs. This valuable information provides them with a virological basis for vaccine development and for understanding how vaccine candidates, including theirs, may offer protection against infection via antibody responses.

P17 Research

Dr. Latinovic uses 3D images via confocal microscopy methods with Mika Popovic, PhD, Adjunct Professor of Medicine, IHV Basic Science Division, Dr. Joseph Bryant, Dr. Robert Gallo and the p17 group for the visualization of B lymphoma growth, termed B-lym. These B lymphomas are located in lymphatic tissues of Nude mice following the exposure to HIV matrix protein p17, (HIV-1 p17). The objective of this ongoing visualization study includes an assessment of p17 variants in this lymphoma mouse model, as well as the detection and monitoring of the B lymphoma growth in close association with antigen-antibody complexes, p17 and anti-p17 antibodies, in lymph nodes.

HIV Latency Research

Dr. Latinovic is utilizing both, super resolution and confocal microscopy methodologies in collaboration with Dr. Fabio Romerio who is investigating the sub cellular localization of the HIV-1 antisense protein, ASP, as well as its interactions with proteins of the inner nuclear membrane. This study may have implications for better understanding of HIV latency.



Dr. Latinovic is discussing localization of HBZ in transfected cell line with Dr. Tagaya.

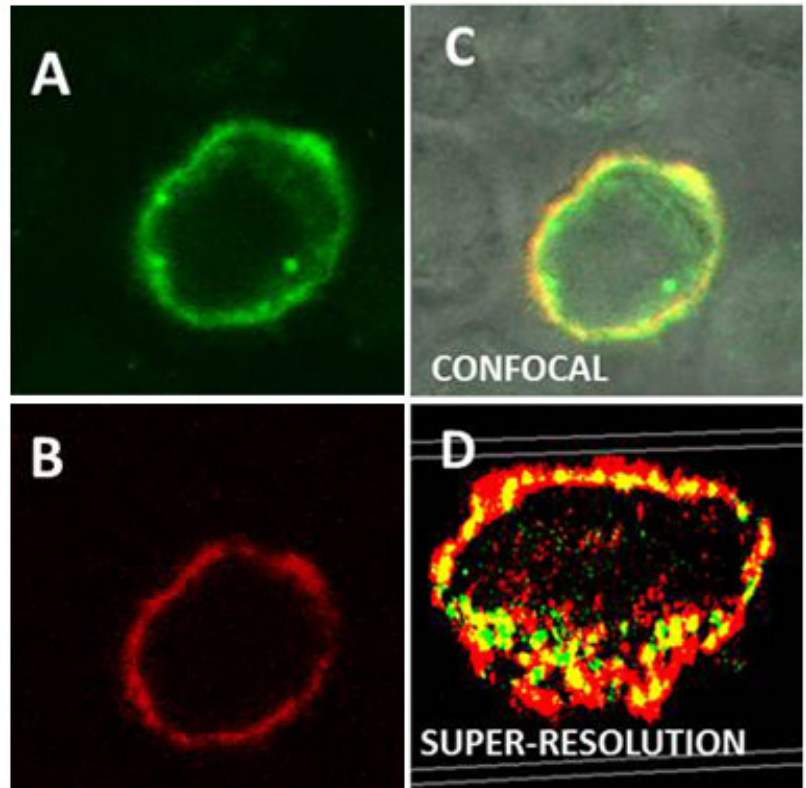
HTLV/HBZ Research

Dr. Latinovic using microscopy methods in the project of the Tagaya Lab on studying the Human T cell Leukemia Virus-1 (HTLV-1), in purpose of establishing novel therapies against a T-cell leukemia caused by this virus. They are targeting a viral protein called HBZ (HTLV-1 Basic Zipper protein) for immunization purpose, and are studying the way to modify its intracellular trafficking for better presentation to T cells. The Imaging Facility is equipped with both, confocal and the state-of-the-art high-resolution microscopes, and both of which greatly facilitates this project's efforts in accomplishing the research goal.



CCR5 conformational changes study

Dr. Latinovic is looking into differences in the conformational states of CCR5 coreceptor. The rationale of the study is that since not all CCR5 mAbs successfully reduce HIV-1 entry (consequently, infection), only some CCR5 populations are permissive for entry. She is characterizing which CCR5 populations are permissive by combining viral binding and entry assays with super-resolution microscopy (~ 20 nm resolution in x-y direction, ~50 nm in z-direction) to precisely visualize cell surface events. Visualizing and quantifying overlapping events between intracellular and extracellular parts of CCR5 via super-resolution microscopy (STORM/TIRF) will allow her to potentially correlate localization, frequency, internalization, trafficking and G-protein association for individual and specific coreceptor conformations. STORM/TIRF will also allow her to identify total CCR5 molecules (internalized plus surface) to obtain a complete picture of whole, total, and conformational sub-populations of CCR5 and their expression within permissive physiologically relevant primary cells and cell lines.



Double labeled CCR5 molecules. (A) Confocal microscopy image of U87.CD.CCR5 cell expressing CCR5-C terminus tagged with an HA epitope and visualized with an anti-HA mAb tagged with green dye Alexa 488, (B) Red dye Alexa 647 nm conjugated with the primary CCR5 mAb against ECL2, (C) Combined confocal image showing co-localized events of CCR5. There is a visible difference between the inner green and outer red parts, with yellow overlaps, (D) The same cell line with the same combination of mAbs and dyes but visualized by 3D STORM/TIRF super-resolution microscopy methods.



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Questions/Comments? Contact Nora Grannell, Director of Public Relations & Marketing, NGrannell@ihv.umaryland.edu

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The Institute of Human Virology is a center of the University of Maryland School of Medicine and is affiliated with the University of Maryland Medical Center.

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Robert E. Fischell, ScD,

Dr. Robert Fischell Bestowed National Honors

IHV Board Member, Robert E. Fischell, ScD Chairman of Fischell Biomedical, LLC this past January received the National Medal of Technology and Innovation by President Obama during a ceremony at the White House. The National Medal of Technology and Innovation (formerly known as the National Medal of Technology) is

the United States' highest honor for technological achievement. Established by the Stevenson-Wydler Technology Innovation Act of 1980, the Medal was first awarded in 1985. The Medal recognizes those who have made lasting contributions to America's competitiveness, standard of living, and quality of life through technological innovation, as well as those who have made substantial contributions to strengthening the Nation's technological workforce. It is awarded annually by the President of the United States in a public ceremony. The National Medal of Technology and Innovation program is administered by the U.S. Patent and Trademark Office.

Dr. Fischell was also inducted as a Fellow this past April into the The National Academy of Inventors (NAI). The ceremony took place as part of the Fifth Annual Conference of the National Academy of Inventors at the United States Patent and Trademark Office (USPTO). Election to NAI Fellow status is a high professional distinction accorded to academic inventors who have demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and welfare of society.

Timothy Moynahan Serves as Guest of Honor and Keynote Speaker

IHV Board Member and Global Virus Network (GVN) Board Chair, Timothy Moynahan, Esq., CEO of The Moynahan Law Firm, was invited as Guest of Honor and Keynote Speaker for the launch of "I'm a Friend" in the Tullamore Court Hotel, Tullamore, County Offaly in Ireland this past April. I'm a Friend (IAF) is a not-for-profit initiative in Ireland founded to raise awareness on the issue of bullying and to hopefully give some comfort and support to



L to R: Gearóid Ó Maoilmhichíl, National Welfare Officer of the GAA (Gaelic Athletic Association); Nicola Byrne, CEO, Cloud 90 and Risk Services; Charlie Wynne, IAF Founder; Timothy C. Moynahan, Chairman, IAF; Charlie McGettigan, Eurovision winner and performer at the event; John Dunican, Student—Gallen Community College.

people who have suffered at the hands of bullies. The mission is to create a more thoughtful, caring society where friends look out for friends. The objective is to establish a group of members who will spread the IAF message of caring, understanding and lending support to those who are suffering and often finding themselves in despair.

Michael Greenebaum Joins Board of Advisors

Michael Greenebaum is President of Greenebaum Enterprises, Inc., a regional real estate development company. Mr. Greenebaum earned his degree in Real Estate and Urban Development from American University and has over 27 years of experience in all facets of the commercial and residential development industry. In addition to his real estate profession, Mr. Greenebaum also oversees the company's venture capital investments. Mr. Greenebaum



Michael Greenebaum

serves as a board member at the University of Maryland Marlene and Stewart Greenebaum Cancer Center, a member of the Board of Visitors of the University of Maryland School of Medicine, a Trustee of the Board of Trustees at McDonogh School, and a member of the Board of Governors of The Associated. Mr. Greenebaum is a Trustee of The Greenebaum Family Foundation, which continues the philanthropy of his family by focusing on the improvement of the human condition through education and medicine. In 2009, Mr. Greenebaum co-founded the Maryland Half Marathon, which has raised over \$2.5 million for the Greenebaum Cancer Center at University of Maryland.

IHV Faculty News

Grants



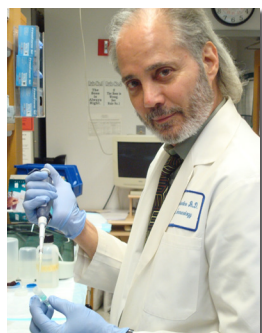
Man Charurat, PhD

Man Charurat, PhD, Associate Professor of Medicine, Director, Division of Epidemiology and Prevention, Institute of Human Virology and **Alash'le Abimiku, MON, PhD**, Professor of Medicine, Division of Epidemiology and Prevention, Institute of Human Virology, received a five-year, \$1.5 million award from the National Institutes of Health entitled "Epidemiology Research Training

for Public Health Impact in Nigeria." With sub Saharan Africa's largest population (over 160 million) and 3.5 million infected with HIV, second in the world for HIV/AIDS, Nigeria is the country whose HIV response will "make or break" the achievement of UNAIDS' "Fast Track to end the AIDS Epidemic by 2030" goals of 90% diagnosed, 90% on treatment and 90% virally suppressed (90-90-90) by 2020. This project engages a singular focus: building research capacity of IHV-Nigeria--a well-qualified LMIC research organization with a current \$7.5M research and \$66M programmatic budget to impact Nigeria's response. This project engages the University of Maryland, Baltimore Graduate School and the Department of Epidemiology and Public Health in supporting the training of 7 Masters and 3 PhD students from the Institute of Human Virology, Nigeria in the implementation of science research and epidemiology, and engaging them in mentored research studies.



Alash'le Abimiku, MON, PhD



Niel Constantine, PhD

Niel Constantine, PhD, Professor of Pathology, Division of Epidemiology and Prevention, Institute of Human Virology, received contracts totaling \$581,000 for 2 years from the United States Agency for International Development (USAID) for work with Family Health International 360 (FHI360, "the USAID Global Health Supply Chain Quality Assurance Program for Rapid and Point of Care Diagnostics"), the Program in Supply

Chain Management ("Proposal to Establish and Implement Procedures to Assure Suitability for Intended Use of Laboratory Supplies, and HIV/AIDS, TB, Syphilis, Hepatitis and Pregnancy

Rapid Test Kits"), and from PFSCM ("Testing Activities"). The studies aim to evaluate a large number and variety of diagnostics test kits for their suitability for use in resource-limited countries and the meeting of manufacturers' claims.



Marzena Pazgier, PhD

Marzena Pazgier, PhD, Assistant Professor of Biochemistry and Molecular Biology, Division of Vaccine Research, Institute of Human Virology, received a four-year, \$1.6 million award from the National Institutes of Health entitled "Structural Targeting of Potentially Protective gp120 Epitopes in the C1/C2 Region." This project will test if a stable immunogens consisting of the inner domain of gp120 expressed independently of outer

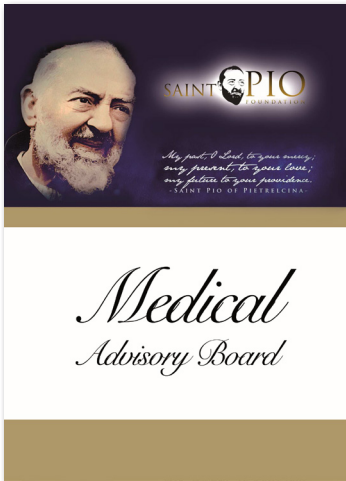
domain and optimized for selective presentation of conformational A32-like epitopes in the C1/C2 gp120 region and linear V2 loop epitopes will elicit potent non-neutralizing protective ADCC antibody responses in a non-human primate virus SHIV162P3 challenge model. If this project is successful, it will shed new light on the role of Fc-mediated effector function in protection and identify a new HIV-1 vaccine candidate.

Awards and Honors

Robert Gallo, MD, The Homer & Martha Gudelsky Distinguished Professor of Medicine, Director, Institute of Human Virology, received the 2015 Leonardo da Vinci Award from the now 40-year-old Italian Heritage and Culture Committee-NY, Inc. Dr. Gallo received the Award for his career in science. The Award is



L to R: Italian Consular General of New York, Natalia Quintavalle; Dr. Robert Gallo; and Joseph Sciame, President of Italian Heritage and Culture Committee-NY, Inc.



named in honor of Leonardo da Vinci, a legendary Italian Renaissance polymath, who was considered a painter, sculptor, architect, musician, scientist, and more, has been described as the archetype of the Renaissance, a man of unquestionable curiosity. The event took place on January 12, 2016 at the Consulate General of Italy in New York City, in cooperation with the Office of the Consul General, under the auspices of Minister Natalia Quintavalle.

Dr. Gallo also joined the Medical Advisory Board of the St. Pio Foundation this past February. The Saint Pio Foundation is a non-profit national charity organization dedicated to the promotion of the spiritual charism of Saint Pio of Pietrelcina, universally acclaimed as one of the most venerated contemporary saints of the Catholic Church.

On March 17, 2016 Dr. Gallo received *The Daily Record* 2016 Influential Marylander Honor during a ceremony in Cockeysville, MD. Influential Marylanders was created in 2006 to honor individuals who have impacted Maryland's business community and have brought services and success to the region. *The Daily Record's* editors select winners in the following categories: Civic leadership, communications, education, finance, freestyle, general business, health care, law, philanthropy, real estate and technology.

On April 14, 2016, Dr. Gallo gave a graduation commencement address, entitled "A reflection on the power and limits of medical science as seen especially through the window of AIDS research," at The University of KwaZulu-Natal (UKZN) Nelson R Mandela School of Medicine in Durbin, South Africa. Dr. Gallo was also honored to receive his 35th honorary doctorate from UKZN for "his contribution as a committed scientist and as a role model for excellence in academia." The School was named for Mandela who valued education as a powerful force that drove individuals and national change. Mandela has said: 'Education is the most powerful weapon which you could use to change the world!'



Clement Adebamowo, BM, ChB, ScD

Publication

Clement Adebamowo, BM, ChB, ScD, Professor of Epidemiology & Public Health, Division of Epidemiology and Prevention, Institute of Human Virology and Associate Director Population Science Program, Greenebaum Cancer Center, was among the co-authors on "The Burden of Hypertension in Sub-Saharan Africa: A Four-Country Cross Sectional Study" in *BMC Public*

Health, 2015 Dec 5;15(1):1211; "Evaluation of Genome Wide Association Study Associated Type 2 Diabetes Susceptibility Loci in Sub Saharan Africans" in *Frontiers in Genetics*, 2015 Nov 24;6:335; "H3Africa multi-centre study of the prevalence and environmental and genetic determinants of type 2 diabetes in sub-Saharan Africa: study protocol" in *Global Health, Epidemiology and Genomics*. 2016;1:e5; "Paucity of HPV-Related Head and Neck Cancers (HNC) in Nigeria" in *PLoS One*. 2016 Apr 6;11(4):e0152828; "Building a Platform to Enable NCD Research to Address Population Health in Africa" in *Global Heart* 2016; 11 (1): 165—170; and, "Luteal versus follicular phase surgical oophorectomy plus tamoxifen in premenopausal women with metastatic hormone receptor-positive breast cancer" in *Eur J Cancer*. 2016 Apr 20;60:107-116.



IHV's Dr. Lori Fantry to Join University of Arizona

In 1987, nine years before the Institute of Human Virology opened its doors, the University of Maryland began to deliver comprehensive outpatient care to HIV-infected individuals in a trailer in a parking lot on Pratt Street. However, the "hut" quickly became too small for the growing number of HIV-infected patients in Baltimore who needed medical care. In addition, the need for services other than medical care such as transportation, help with insurance, counseling, and mental health made it necessary to house the services in a larger facility. The Evelyn Jordan Center (EJC) officially opened its doors on World's AIDS Day, December 1, 1995. The clinic was named after a patient, Evelyn Jordan, who despite her diagnosis, provided emotional support and encouragement to other patients living with HIV.

Months after EJC launched, the Institute of Human Virology (IHV) co-founders, Robert Gallo, MD, Robert Redfield, MD and William Blattner, MD, and their staff officially arrived to Baltimore to open IHV's doors. Dr. Redfield, Associate Director and Head of the Clinical Care and Research Division, quickly worked to improve HIV clinical services by obtaining necessary funds from the Ryan White Comprehensive AIDS Resource Act to ensure that HIV patients, particularly those from lower income areas, could receive necessary HIV treatment. As part of Dr. Redfield's plan to provide comprehensive clinical care to the greater

Baltimore area, he appointed Lori Fantry, MD, MPH as the EJC's Medical Director, and joined forces with her and the EJC clinic to work together against HIV/AIDS.

"Under Dr. Fantry's leadership, the EJC evolved into one of the best clinics in the city. Her leadership and commitment will be deeply missed," noted Dr. Redfield.

The EJC has been and continues to be a clinic that serves primarily the underserved population of Baltimore. Eighty-eight percent of the patients are African American, and 43% are women. However, the characteristics of the patients that the clinic serves have changed dramatically as the HIV epidemic has evolved. The median age of patients steadily increases each year as patients live longer due to highly effective antiretroviral therapy, such that in 2015 the median age of the patient base was 52 years old. Sixteen percent of patients are now above the age of 60 years. CD4 cell counts have steadily increased from 1995, when the majority of patients had a CD4 cell count of less than 200, and now the majority of patients have a CD4 cell count of less than 500. Ninety-one percent of patients have achieved viral suppression, and 90% are on antiretroviral therapy.

When asked to name some of her greatest accomplishments as the Medical Director of EJC Dr. Fantry said, "Before I begin to answer this question, I want to say that none of my accomplishments were 'my' accomplishments. I am part of a dedicated team of professional staff who united with the single purpose of improving the health and lives of HIV-infected patients. I have worked with nurses, social workers, psychiatrists, counselors, and administrative staff who acted as a team to provide the best care possible."

Dr. Fantry continued, "Thanks to new therapy, many patients were brought from the edge of death to lead healthy lives. Many were former drug users and now are productive members of society. Most importantly, our team provided support and comfort to individuals who were infected with a virus which brought



Lori Fantry, MD, MPH

disease and social isolation. We also provided education to many college students, medical and nursing students, residents, and visiting physicians, so that they could learn to provide the best care possible to HIV-infected patients."

This summer, Dr. Fantry will join the University of Arizona's Infectious Diseases Division where she will be Director of HIV Translational Research and Medical Director of the Arizona Refugee Clinic. She will continue to provide outpatient care for HIV patients, and will serve as an attending physician in the hospital.

"Dr. Fantry was a great addition to IHV and I have always enjoyed her energy and engagement," said Robert Gallo, MD, The Homer and Martha Gudelsky Distinguished Professor in Medicine and Director of IHV. "She was dedicated and contributed greatly to HIV infected individuals. She built a great program at EJC and I am really sorry to see the Center's name persist no more as Dr. Fantry and the many others working with her have a tremendous legacy with the EJC program. I wish her and her husband, Dr. George Fantry, the best success and happiness."

When asked if she had some parting words Dr. Fantry said, "Thanks for the opportunity to tell the story of the EJC which for the past 20 years, has been a center for HIV that is unmatched in terms of high quality medical care and compassion."



Lori Fantry, MD, MPH and Veda Moore, RN review patient records

Institute of Human Virology Establishes The Robert C. Gallo Endowed Professorship through Private Gifts and Matching State Funds

Goal is to help recruit and retain top research faculty and enable innovative R&D initiatives



The Honorable Robert Keith 'Bob' Gray and Dr. Robert Gallo.

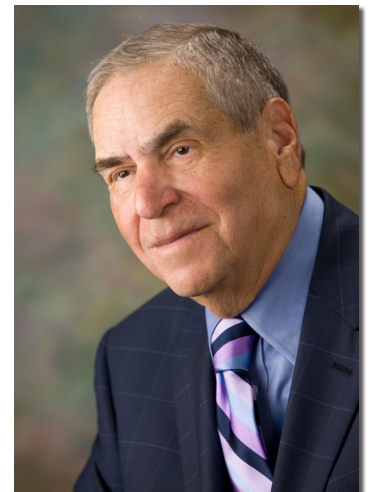
On March 8, 2016, the Institute of Human Virology (IHV) announced that it was awarded matching funds from the Maryland Department of Business and Economic Development (DBED) as part of the Maryland E-Nnovation Initiative Fund program. The E-Nnovation program, which was created as an economic stimulus in 2014, is a special non-lapsing fund designed to help the state's research universities recruit and retain top scientists and investigators. Under the fund, \$8.5 million will be appropriated by the governor each year from fiscal years 2016 through 2021. The funds, combined with private philanthropy, are helping to establish The Robert C. Gallo, MD Distinguished Professorship.

"The generous donation from our close friend Bob Gray provided IHV an opportunity to receive matching state funds through the E-Nnovation program that will help IHV to continue to attract the best and the brightest medical virologists from around the world," said Dr. Robert Gallo, The Homer & Martha Gudelsky Distinguished Professor of Medicine and Director of the IHV. "I am looking forward to announcing this fall how IHV will best utilize and implement the endowment."

The Honorable Robert Keith 'Bob' Gray, who was an original IHV Board member, passed away two years ago this spring. He was a stalwart supporter of the Institute, an HIV/AIDS leader in Florida after he retired from a distinguished and prominent career in Washington and national political life, and an enduring and loyal friend to all the founders of IHV but especially Dr. Robert Gallo. His professional and personal relationship with Dr. Gallo even preceded the founding of IHV by many years. Because of Bob Gray's generous gift of \$1.0 million to establish an endowed distinguished professorship to honor his special friendship with Dr. Gallo, IHV was able to apply for and receive matching funds from the E-Nnovation program. For Bob Gray, the highest personal value was loyalty to the people and causes that gave meaning to his life, and IHV is pleased to see Bob Gray's generous bequest and loyalty to Dr. Gallo live on in perpetuity.

"Board commitment has been a key part of our ability to establish the Gallo Professorship, and Board support will continue to be key as we establish additional endowed professorships at IHV," said Terry Lierman, IHV's Chairman of its Board of Advisors. "Bob Gray's gift enabled us to apply for matching funds while long-time Board member and dear friend of Dr. Gallo and IHV, Stewart Greenebaum, made a generous inaugural gift that also helped establish the professorship."

"The state's E-Nnovation program provides a unique and wonderful opportunity for donors to enhance the impact of their philanthropy and to help advance science and medical research at IHV," said Lori Piccolo, IHV's Director of Development. "We will be looking toward the future for additional opportunities to best harness the E-Nnovations program and all that it has to offer."



Stewart Greenebaum

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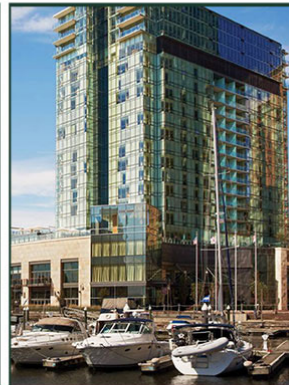
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Dr. Robert C. Gallo, Director, Institute of Human Virology



Please visit WWW.IHV.ORG for more information on the program, registration and abstract submission.