

# **Overview of the Global Virus Network**

We represent centers of excellence for research in virology from across the globe. Our work is dedicated to understanding, preventing and eradicating viral disease threats to mankind. Today, we affirm the need for new programs to coordinate, support and promote research that bridges the gap between virus surveillance and public health implementation. We gather in Washington, D.C. to support goals and ideals of the Global Virus Network, a new approach to fostering true collaboration among all regions and all peoples of the world. Seeking to improve the immediate responses to emerging viral threats, train future generations of virologists, and advise governments or non-governmental organizations on viral disease threats and their control, the Global Virus Network fills a critical need in international health for today and into the future.

GVN declaration of support was signed March 3, 2011, Washington, D.C.

www.gvn.org



"The 1918-1919 influenza pandemic killed more people in absolute numbers than any other disease outbreak in history. A contemporary estimate put the death toll at 21 million, a figure that persists in the media today, but understates the real number. Epidemiologists and scientists have revised that figure several times since then. Each and every revision has been upward. Frank Macfarlane Burnet, who won his Nobel prize for immunology but who spent most of his life studying influenza, estimated the death toll as probably 50 million, and possibly as high as 100 million. A 2002

epidemiologic study also estimates the deaths at between 50 and 100 million (Johnson and Mueller, 2002). The world population in 1918 was only 28 percent of today's population. Adjusting for population, a comparable too today would be 175 to 350 million. By comparison, at this writing [2005] AIDS has killed approximately 25 million, and an estimated 40 million more people are infected with the virus." [John Barry, "<u>1918 Revisited: Lessons and Suggestions for Further Inquiry</u>." From the 2005 Institute of Medicine Workshop, <u>"The Threat of Pandemic Influenza. Are We Ready?</u>

ISSUED BY THE PROVINCIAL BOARD OF

# PATH TO THE CURRENT COVID-19 PANDEMIC

In hindsight, the world of 1918 might be excused for having been so quickly and devastatingly overwhelmed by a new virus emerging from the cauldron of world war. Yet, a century later, nations and global health agencies still are routinely surprised by the sudden emergence of a novel virus from some obscure jungle, pig, chicken, bat, tick or mosquito. It happens with surprising regularity.

Just in the last few years two obscure mosquito-borne viruses (Chikungunya and Zika) have invaded the Western Hemisphere to cause serious chronic arthritis, and microcephaly, respectively. Other newly discovered viruses (i.e., Middle East respiratory syndrome coronavirus and highly pathogenic avian influenza viruses) have the potential to cause epidemic respiratory illnesses with high mortality. A recent (2016) report from the Commission on Global Health Risk Framework for the Future estimated that the annualized expected loss from potential is more than \$60 billion, and the Commission proposes an incremental spending of about \$4.5 billion per year to respond to those pandemic risks, only a fraction of what we expend on other risks to humankind.

Emerging and re-emerging viruses and their vectors continue to represent a major national and international security concern. Today, the Ebola virus is spreading within the Democratic Republic of the Congo and is a potential major threat. Although we have a vaccine for Yellow Fever for many years, we are still unable to fully control this infection.

In late fall 2019, a novel acute respiratory disease, called coronavirus disease 2019 (COVID-19) emerged in Wuhan, China. COVID-19 is caused by severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2). COVID-19 has been declared a pandemic by the World Health Organization on March 11, 2020 and continues to spread across the globe. As of April 8, 2022, 494,587,638 confirmed cases of COVID-19, including 6,170,283 deaths have been reported. Consequently, the current COVID-19 pandemic has impacted global health and economies to unprecedented levels. This indicates that we are still lacking infrastructure for health, research and surveillance. The GVN has quickly organized collaborative meetings for leading global experts of virology and vaccinology in the Centers of Excellence and its affiliates, and has provided scientific knowledge and strategies to contain the pandemic. Some highlights include the creation of the SARS-CoV-2 Task Force to (1) implement international efforts and promote cooperative activities in response to the current SARS-CoV-2 pandemic, (2) translate research into practical applications to improve diagnostics, disinfectants, and effective therapy and to develop vaccines, (3) facilitate clinical trials between industrial partners and center scientists, and (4) serve as a world-wide resource to governments and international organizations seeking advice regarding the current COVID-19 outbreak. The GVN's collaborative efforts also extend to prepare for future pandemics.



# Major Emerging and Reemerging Infectious-Disease Outbreaks, Epidemics, and Pandemics, 2002 through 2020

Adapted from Sands P. et al, N Engl J Med. 2016

# THE GENESIS OF THE GVN

The concept of a Global Virus Network (GVN) began back in the 1980's when Dr. Robert Gallo realized that virtually no working virologists had a global directive for researching the cause of AIDS during the earliest years of the epidemic. Conversely, important groups such as the World Health Organization which did have a global mandate for combatting the new disease had virtually no resident expertise in human immunodeficiency virus (HIV) that Dr. Gallo and his colleagues subsequently shown to be the cause of AIDS. Examining the history of other great epidemics of the 20th century, Influenza and Polio reveal similar disconnects between available expertise and the urgent public need to identify causation and prevention modes.

In March, 2011 thirty of the world's leading virologists gathered in Washington, DC to pledge their support for a coalition of virology institutions worldwide, poised to act in times of viral outbreaks and committed to advancing knowledge on human pathogenic viruses. The Global Virus Network is that outcome.

GVN Centers, with strong working relationships among them, are poised to engage in any outbreak situation by providing the world's only network of top basic virologists from around the globe covering all classes of human viral threats. GVN is also committed to training the next generation of virologists in order to meet the critical need posed by the graying of members of the field's own discipline, and to inform and educate policymakers and

members of the public about the role of virologists in mitigating viral illness and preventing infections from taking hold in populations. This is especially important as longtime, expert virologists worldwide have noticed a significant decline in medical students entering the field of virology.

GVN was co-founded by Robert Gallo, MD of the Institute of Human Virology (IHV) at the University of Maryland School of Medicine, William Hall, MD, PhD of University College Dublin and the late Reinhard Kurth, MD, PhD, of the Robert Koch Institute. GVN was "incubated" within the IHV until it became fully organized in 2011. IHV is led by one of the GVN co-founders, Dr. Robert Gallo, who is renowned for his pioneering discoveries of human retroviruses (HTLV- 1/HTLV-2) and in particular with his co-discovery of HIV as the cause of AIDS and development of the HIV blood test, which enabled health care workers for the first time to screen and rapidly diagnose for HIV. Dr. Gallo's personal and institutional support for the GVN has allowed the coalition to take shape and to become operational. GVN's mission is also advanced by the commitment and dedication of its Centers of Excellence. Christian Bréchot, MD, PhD, former President of France's internationally renowned Institut Pasteur, assumed the GVN Presidency on October 1, 2017.

# **THE VISION**

The GVN vision is "A world prepared to prevent, contain and control viral epidemic threats, through the collaboration of a global network of expert virus laboratories."

#### **THE Mission**

The GVN mission is to strengthen medical research and response to current viral causes of human disease and to prepare for new viral pandemic threats.

The GVN mission is achieved by:



# THE NETWORK

The Global Virus Network (GVN) is a coalition of top experts in virology in more than 37 countries on six continents, collectively working to advance knowledge about how viruses cause disease, and to develop diagnostics, drugs and vaccines to prevent illness and death. No single institution in the world has expertise in all viral areas that can initiate epidemics. GVN brings virologists together in innovative ways to leverage individual strengths and to focus global teams of scientists on key scientific problems. The power of GVN lies in its global reach, the depth of its science, the speed with which it can tackle new research problems, and its commitment to solving viral challenges facing the human population.

No other entity exists like the GVN. The GVN is a unique non-profit 501(c)3 organization because it is global, science driven, reactive and independent. GVN is integrated by more than 69 Centers of Excellence and 11 Affiliated Institutions in more than 37 countries (see map on next page). In addition, the GVN has now initiated Virus Watch Groups and Regional Chapters, reinforcing surveillance and collaboration with existing institutions.

#### Map of Centers of Excellence and Affiliated Institutions



	the Great St. Petersburg Polytechnic University
Senegal	IRESSEF
Singapore	Duke-NUS Medical School
South Africa	National Institute for Communicable Diseases, Johannesburg; CAPRISA
South Korea	International Vaccine Insitute; Korea National Institute of Health's Center for Infectious Diseases Research; Institut Pasteur Korea (IPK)
Spain	Centro de Biología Molecular Severo Ochoa (CBMSO), Madrid; Centre de Recerca en Sanitat Animal (CReSA), Barcelona
Sweden	Scandinavian-Baltic Consortium, Karolinska Institute
Uganda	Uganda Virus Research Institute (UVRI)
U.K.	MRC-University of Glasgow, Scotland; The Pirbright Institute, England
USA	University of California San Francisco; Scripps Research Institute; J. Craig Venter Institute; Colorado State University, Fort Collins; University of Miami; Emory University; Tulane University School of Medicine; Institute of Human Virology at the University of Maryland; Johns Hopkins Bloomberg School of Public Health; University of Michigan; Icahn School of Medicine at Mt. Sinai; University of Rochester Medical Center; University of Buffalo; University of Pittsburgh Cancer Institute; UTMB Galveston National Laboratory; University of Nebraska Medical Center; University of Wisconsin-Madison (UW-Madison) Global Health Institute; U.S. Food and Drug Administration/Office of Vaccines Research and Review, FDA/OVRR; Wyss Institute for Biologically Inspired Engineering at Harvard University; Lerner Research Institute at Cleveland Clinic; Harvard T.H. Chan School of Public Health/The Broad Institute; University of Arizona – Aegis Consortium

Affiliated Institutions	
Estonia	University of Tartu
Grenada, W.I.	St. George's University
India	Molecular Virology Laboratory Rajiv Gandhi Centre for Biotechnology; Dr. GM Institute for Advanced Virology
Jamaica	University of the West Indies, Mona
Monaco	Scientifique Centre de Monaco (CSM)
Nigeria	Institute of Human Virology-Nigeria
Trinidad and Tobago	University of West Indies, St. Augustine campus
Uzbekistan	Research Institute of Virology Ministry of Health of the Republic of Uzbekistan
Vietnam	National Institute of Hygiene and Epidemiology, Hanoi
Zambia	Africa Center of Excellence for Infectious Diseases of Humans and Animals (ACEIDHA), School of Veterinary Medicine, University of Zambia
Zimbabwe	Antiviral Pharmacology Laboratory and Clinical Trials Research Center Virology Program at the University of Zimbabwe

# **BENEFITS OF MEMBERSHIP**

- Research Collaboration: Opportunities to identify new collaborations with leading virologists from around the world. Members of the GVN meet annually to share information and ideas, including pre- publication data, and to work as teams on critical issues. Regional meetings offer additional opportunities for networking and coalition building, in addition to webinars and other Internet-based forums. Joint grant applications involving multiple GVN Centers have been submitted or are on the drawing board. Individual Centers will benefit from working collaboratively through the network on priority programs and projects.
- Training Future Virologists: Intensive Short Course in Virology, one-week course taught by GVN leaders. To be adapted for non-US settings.
- New Strategic Partners: GVN brings new partners and resources into the field, thereby leveraging funds and expanding impact.
- Visibility and Impact: GVN members are associated with a leading scientific brand. GVN outreach activities, including those with the press, receive significant attention.
- **9** Participate in joint initiatives: work in collaboration on grant application, regional unites, joint grant applications, Virus Watch Groups and Task Forces.

# **GVN HEALTHCARE & PHARMA CENTERS OF EXCELLENCE COALITION**

In 2019, we created the GVN Health Care and Pharma Centers of Excellence Coalition which was officially launched with the announcement of Abbott as the inaugural member. GVN has successfully expanding the centers with participants of Sanofi, Gilead, Unilever, and Johnsons & Johnsons. The Coalition is a way to bring together the world's foremost virologists and prominent companies to catalyze and facilitate the development, evaluation and testing of diagnostics, therapeutics, treatments and vaccines for viral epidemics and pandemics that pose a threat to public health. Importantly, the Coalition also pursue to build up the collaborative networks for monitoring emerging and re-emerging pathogens for current and future pandemics.

# ADDRESSING LOCAL PROBLEMS BY THE CREATION OF THE REGIONAL GVN CHAPTERS

The GVN is currently working on the development of Regional GVN Chapters. Although the GVN is headquartered in Baltimore, we believe our presence needs to be truly global and therefore each regional GVN needs to meet specific geographic challenges found particularly in Southeast Asia, South America, Europe, and Africa. The idea is to move towards a more flexible, global organization.

We have recently established the Africa GVN Regional Unit, in a meeting co-Organized by Dr. Pontiano Kaleebu, Director, UVRI and Dr. Glenda Gray, President, MRC South Africa. We strategically outlined the local programs in order to:

- 1. Build local capacity
- 2. Identify the local gaps
- 3. Build consensus with key stakeholders



First Africa GVN meeting, Entebbe, Uganda, May 2019.

# **GVN REGIONAL HEADQUARTERS**

GVN Regional Headquarters office is to collaborate with the GVN global headquarters. Each regional headquarter provides organizational support and leadership by (1) acting as an "ambassador" of GVN in their respective region to promote and support GVN's mission and goals, (2) offering administrative and financial support for the daily operation of the regional office, (3) supporting and promoting research in virology and advocating for public health in their regions and (4) supporting training and mentoring the next generation of regional and global leaders in virology and infectious diseases.

# **Programs**-

# **INTERNATIONAL MEETINGS**

Fostering global collaboration of the GVN scientific leadership meets annually in order to address the Network's priorities. The GVN has convened general meetings of the entire network on eight occasions, including the launch of the GVN in 2011 (2011—DC, USA and Dublin, Ireland; 2012—Naples, Italy and Baltimore, USA; 2013—Munich, Germany and Moscow, Russia; 2015—Beijing, China; 2016—Sapporo,

Japan; 2017—Melbourne, Australia; 2018—Annecy, France; 2019—Barcelona, Spain; 2020-GVN Special Annual



meeting (zoom), and 2021-Monaco (GVN-Monaco COVID19 Diagnostic Conference). It was well-understood from the outset that such a diverse, dispersed international group of virologists would need to hold regular meetings in order to further organize the group, plan for the future and learn about each member's current research and concerns. Since the formal establishment of the GVN, the general meetings have become a critical platform for identification or program priorities and the exchange of ideas. Please check **www.gvn.org** for upcoming meeting dates and information.

Drs. Bosch, Gallo, and Brechot participating in the press conference during the 2019 GVN meeting in Barcelona, Spain

The main objectives of the GVN annual meetings will include:

- 1. Present and discuss the most current findings in virology, include expert presentations on cutting-edge research in virology, and a progress report from the Executive Committee, an introduction to new GVN member Centers, selected updates and scientific reports from GVN members and discussion bringing their expertise in order to advance the knowledge to prevent, diagnose and treat viral challenges.
- 2. Address GVN and future directions: A special Welcome Session for new Centers and Affiliates will be held. New programs are announced and there is an open discussion regarding ways to advance the GVN mission.
- 3. Provide the framework to increase collaborations between world experts: The meeting fosters collaborations that would not otherwise come to fruition.

# **REGIONAL MEETINGS**

GVN is supporting the regional research activity by establishing the regional meetings and promoting networking activities among the regional scientists. GVN initiated the GVN Latin America-Caribbean Regional Meeting in March and June, 2021 and the GVN Africa Regional meeting in July 2021. The major aims of the meetings were to obtain updates on center's research and education programs and other activities, to learn more about the regional capacity among our centers and to look for potential collaborative opportunities.

# **TASK FORCES**

# SARS-CoV-2 RESPONSE TASK FORCE

Following the outbreak of SARS-CoV-2, the GVN shaped a COVID-19 Task Force with representatives from 40 GVN centers in 16 countries. The task force meets through conference calls monthly to share the most recent and advanced research findings, and to discuss developments in diagnostic, serological tests, therapeutics and vaccines.



Recent developments of the task-force include: the contribution of research updates from GVN centers globally, including key actions taken in response to SARS-CoV-2; Updates on emerging variants of concerns and their characterization, long COVID, and vaccine efficacy and effect of boost on protective immunity; GVN Center collaboration in multiple clinical trials, advancing treatment and vaccine research; and the launch of GVN's biobank, working with 10 centers to validate and interpret serological assays, and analyze immune responses and genetic variability of the virus.

The GVN's webpage also presents many resources available to the public by highlighting the GVN's key insights and distributing information regarding COVID-19. This includes Dr. Brechot's GVN-USF Blog, GVN SARS-CoV-2 Perspective

pieces, GVN The other side of virology: Beyond the COVID-19 Pandemic,



GVN Center & Member Spotlights, and further resource sharing. Most recently GVN began hosting its Forefront of Virology Webinar Series, featuring the work of leading virologists at GVN Centers of Excellence. These resources can be found at the **SARS-CoV-2 response page** at **gvn.org**.

# LONG COVID TASK FORCE

The COVID-19 pandemic is giving an unprecedented challenge and burden to public health. Clinical evidence is evolving on the long-term effects of COVID-19. In particular, long COVID-19 (Post-acute sequelae of SARS-CoV-2, PASC) is affecting the quality of individuals' life with lingering and debilitating symptoms. With ongoing pandemic, more people would experience PASC. Furthermore, spread of the Omicron is taking another turn in this pandemic. Its consequence on long-COVID-19 is currently uncertain. Currently, global collaborations from multi-disciplinary teams are crucial to understanding the causes, mechanisms, and risks to develop preventive measures. Our GVN is in an outstanding position to tackle this long COVID-19 with each center's experts and resources. Therefore, the GVN is initiating Long COVID-19 Task Force with leading virologists, clinical scientists, and epidemiologists.

# PUBLIC HEALTH AND HYGENE TASK FORCE

Infectious diseases have become important issues in global health with a huge economic impact. The GVN has organized collaborative meetings for leading global experts of public health, virology, epidemiology in the Centers of Excellence and its affiliates, and has provided scientific knowledge and strategies to protect the public from infectious diseases. The GVN has initiated the Global Health Task Force to (1) implement international efforts and promote cooperative activities in response to emerging and existing infectious diseases, including current COVID-19 pandemic, (2) translate research into practical applications to develop effective disinfectants and standard operating procedures, (3) facilitate collaborative efforts between industry partners and center scientists, and (4) provide a world-wide resource to assist public, cooperatives and organizations seeking intervention strategies to prevent infectious diseases.

### **DENGUE TASK FORCE**

GVN has established this task force with leading scientists of Dengue viruses. The scientists from around the world have committed to finding solutions to the challenges currently facing with Dengue virus. This group is aiming to provides (1) genomic surveillance of dengue viruses (2) development of innovative vaccines and therapeutics, and (3) technical support to low- and middle-income countries, (4) collaboration opportunities between the GVN academic centers and industrial partners.

#### **ZIKA TASK FORCE**

Announced on February 11, 2016 (Baltimore, MD), the GVN Zika Task Force's objective is to implement international efforts to catalyze cooperative activities that can make a difference in response to the emergency.

Activities include: (1) development of a FAQ sheet, an electronic survey on Zika and flavivirus research taking place at each institutions and at the GVN centers, as well as unique resources and expertise available, (2) coordination with Welcome Trust on Data sharing in public health emergencies, (3) co-organization with Emory University Bridging the Sciences (Zika Virus Meeting, May 1-3, 2016), (4) hosting a Webinar with Burson Masteller, and (5) Implementation of Zika Serum Bank.

#### GVN Zika Task Force map



#### **HTLV-1 TASK FORCE**

The mission of the HTLV Task Force is to speed the pathway to discovery of drugs that will stop virus transmission or progression from infection to disease and to educate the public about the nature of these viruses, the diseases they cause, and the preventive measures to mitigate their spread. This force has experts from 11 countries, led by Dr. Robert Gallo, GVN co- founder and international scientific advisor and director of the Institute of Human Virology (IHV) at the University of Maryland School of Medicine.



#### GVN HTLV-1 Task Force Map

Members of the GVN Task Force on HTLV published an opinion piece in the journal, Blood, on the need for better screening of transplantation donor organs in order to prevent new cases of HTLV-associated diseases. The commentary—screening transplant donors for HTLV-1 and -2 was published online on November 9, 2016 in Blood's First Edition section. Hardcopy publication in the journal and indexing PubMed will follow shortly.

In addition, members of the GVN Task Force on HTLV published a review article on November 11, 2016 in Antiviral Research entitled, "Reducing the global burden of HTLV-1 infection: An agenda for research and action.



# **CHIKUNGUNYA TASK FORCE**

The GVN Chikungunya Task Force is a group of leading scientists from around the world committed to finding solutions to the growing problem of Chikungunya (CHIK) virus. Activities of the CHIK TF include: (1) evaluation of the state of the science and potential research opportunities on animal models of infection and disease, candidate vaccine constructs, new anti-viral drugs, and seroepidemiology studies for previously unrecognized cases of CHIK, while including a focus on the Caribbean, (2) identification of Identify potential funding sources to support international collaborative research and address gaps in knowledge, (3) Training the next generation of researchers to study the interactions between viruses and mosquito vectors, and (4) Providing expertise and visibility as GVN speaks about this challenge to a variety of audiences.



#### Chikungunya Task Force Map

# **VIRUS WATCH GROUPS**

In 2019, the Global Virus Network (GVN) created international Virus Watch Groups (VWG), comprised of seven highly pathogenic virus categories: respiratory, retroviruses, oncogenic, arbovirology, hemorrhagic fever viruses, gastrointestinal and zoonotic. Group member selection was based upon region, gender-balance, and resource- limited representation. The Anticipation and Preparedness Task Force Leadership. Chairs and Co-Chairs lead the seven respective virus watch groups, with participation the group members.

The Leadership oversees Chairs and team members' activities, who are responsible for writing detailed summary reports on the state of each virus. These reports include new research findings, as well as current and novel surveillance techniques. Each group focuses on improving upon and filling in research gaps, learning lessons/ improving upon first research response, contributing ideas for new vaccines, therapeutics and diagnostic developments, and methods for the prediction of potential re-emerging or unknown viruses in various hot-zones of the world. VWG research reports will be made available to private/public health institutions (i.e. CEPI, WHO, USAID, CDC, Wellcome Trust) and, during epidemics, presented in the form of health alerts or advisories\_

#### **EMERGING PATHOGENS WATCH GROUPS**

This program aims to identify new pathogens and to build up research capacity by creating a network with low-and middle-income countries and by supporting their clinical and laboratory staff, instrumentation, and biorepository facilities. In each center, clinical samples and data will be collected and stored and processed for antigenic and molecular testing and genomic surveillance. Genomic analysis for collected raw data will be processed in the centralized core facilities, and then processed data and bioinformatics will be available through established database system. This program will be directed by Dr. Gene D. Morse (Director of University at Buffalo, SUNY GVN Center of Excellence) and Dr. Gavin Cloherty (Director of Infectious Diseases at Abbott Laboratories).

#### GVN ZIKA SERUM BANK TO SUPPORT DIAGNOSTIC AND VACCINE DEVELOPMENT

A major obstacle to understanding and controlling the Zika epidemic is affordable diagnostics that can be implemented in clinical settings without sophisticated laboratories. Several academic and commercial groups are working to develop better assays to detect the antibodies that are generated after Zika virus infection, but evaluating and optimizing these new diagnostics requires "gold standard" clinical samples of known antibody content. Unfortunately, patients seen in endemic locations or travelers seen here in the United States typically provide only a small quantity of blood that is consumed for their own diagnosis, leaving little or no extra sample for used to evaluate new tests. Another critical need for these clinical samples is to evaluate the immune response to Zika virus infection and compare this response to vaccines that are now beginning human clinical trials.

The Global Virus Network (GVN) has been responding to this need by acquiring blood samples from patients diagnosed in the United States who are willing to donate a relatively large volume a few weeks after their illness. But there are major logistical and scientific challenges, including: Identifying these patients; arranging for the blood donation; confirming that the samples contain Zika antibodies; and determining whether antibodies against related viruses such as dengue are present and likely to cross-react with Zika in diagnostic tests.

The GVN is meeting this critical need by expanding a nascent program to obtain, validate and make available to the research community these "gold standard" sera from a variety of patients. The effort is led by the GVN's Zika

Task Force Chair, Dr. Scott Weaver, at the University of Texas Medical Branch (UTMB) in Galveston, a GVN Center of Excellence, and the site of the World Reference Center for Emerging Viruses and Arboviruses.

The goal is to assemble a collection of at least 50 individual samples of patient sera, each in quantities sufficient to supply 25 or so investigators. Oversight by the GVN leadership and the GVN Zika Task Force members will ensure that these important samples are made available to interested investigators.

Funds for collecting, testing, shipping convalescent Zika blood samples are being provided by a grant from the Allergan Foundation, a U.S.-based, private charitable foundation.

### **GLOBAL VIRUS NETWORK SARS-COV-2 BIOBANK**

The COVID-19 pandemic has impacted global health and economies to unprecedented levels. The GVN has quickly organized collaborative meetings for leading global experts of virology and vaccinology in the Centers of Excellence and its affiliates, and has provided scientific knowledge and strategies to contain the pandemic. Some highlights include the creation of the SARS-COV-2 Task Force to (1) implement international efforts and promote cooperative activities in response to the current SARS-COV-2 pandemic, (2) translate research into practical applications to improve diagnostics and effective therapy and to develop vaccines, (3) facilitate clinical trials between industry partners and center scientists, and (4) serve as a world-wide resource to governments and international organizations seeking advice regarding the current COVID-19 outbreak. The GVN plays an important role as an information hub for the dissemination and sharing of COVID-19 updates for scientists and the general and assists the scientific community in seeking new insights into COVID-19.

In response to the COVID-19 pandemic emergency, the GVN has acknowledged the importance of global collaboration to assist with the development of diagnostics, therapeutics, and vaccines and a better understanding of the immune responses to SARS-CoV-2 infection. The goal of the GVN Biobank program is to further reinforce the GVN integrated global infectious disease research network by developing platforms based on common reagents, standard operating assay procedures, as well as customized bioinformatics data processing and analysis pipelines. This effort will lead to establish a database system of well-characterized COVID-19 clinical samples. The GVN centers in North America, Europe, Africa, Asia, and South America have already committed to participate in the establishment of our biobank and database of samples from COVID-19 patients. The database will contain the results of genome sequence and immunological analyses and clinical data (i.e., sample type, collection date and location, patient disease status, and prior exposure and treatment history). The GVN has confirmed the availability of clinical samples, types of samples, equipment, facilities, and staff with scientists in the participating centers. Furthermore, the GVN is coordinating research programs with directors and research members in the centers and industrial partners. Although the project is focused on urgent scientific questions in dealing with the COVID-19 emergency, the overall approach is designed to produce an integrated global research network that can be rapidly redirected to other infectious disease targets for future pandemic preparedness. This will enable us to provide rapid research response capabilities that are complementary to the role that the public health community plays in emerging infectious disease outbreak responses.

# SHORT COURSE FOR EMERGING LEADERS IN VIROLOGY

There is a critical need for highly-skilled, broadly-educated virologists worldwide. This course meets one of GVN's core goals: to ensure emerging leaders in virology receive top flight training and have opportunities to engage with partners globally. It supplements existing skills and provides new knowledge and avenues for broadening expertise and collaborations.

The initiative includes a one-week intensive course on basic, translational, and clinical aspects of viruses of great importance to human health. Lecturers leading virologists drawn from the ranks of GVN Centers of Excellence globally. All didactic courses on state-of-the-art aspects of research on specific viruses. Significant time for discussion and interaction with virology leaders are a hallmark as well as opportunities to meet with policymakers and program officials from funding agencies in Washington, DC.

Drs. Robert Gallo, Diane Griffin, Robert Redfield, Konstantin Chumakov, Yutaka Tagaya, Shyam Kottilil, Ken Olson, Scott Weaver, and Ab Osterhaus. To date, the GVN has trained 90 scientists from around the world.



6th GVN Course participants and speakers

# **HCV PROVIDER TRAINING IN INDIA**

Hepatitis C is a serious liver infection caused by the hepatitis C virus. It is spread person-to-person through contact with blood. Most people who are infected with it do not experience any symptoms for years. India has a high prevalence of Hepatitis C Virus (HCV), but public health knowledge of the disease is limited. India also is host to a large network of community-based practitioners with limited specialist training but extensive experience in the primary management of front-line patients.

The purpose of this collaborative project between India and the Institute of Human Virology at the University of Maryland School of Medicine (IHV/UMB) is to develop an HCV training model for medical providers in India that can be applied to other areas of South Asia. Generic medications are available and approved to use in India, but only a few providers have any experience in the management of HCV with interferon/ribavirin, and there are no infectious disease specialists in country with experience using new oral agents. Similar to when antiretroviral therapy was rolled out in the mid-2000s, India now has an acute need for providers to be trained in the management of HCV.

The collaboration with India utilizes a decentralized mentorship plan to build local capacity through high-level clinical mentoring to 50 physician and nurse mentors who will then be responsible for mentoring an average of 10 health care workers at each health facility, reaching more than 500 health care workers throughout

the country. The project focuses on building specific training for specialized populations (private patients versus community clinic patients) and on establishing settings (urban versus rural) in multiple sites in India.

IHV/UMB, a GVN Center of Excellence, serves as the primary clinical partner for clinical and operational research activities with Indian trainees. The project is managed by IHV/UMB professor, Shyam Kottilil, MBBS, PhD.

This collaborative effort is expected to have a major impact on the eradication of hepatitis C in India.

# HEPATITIS B: A PILOT STUDY TO DEVELOP AN INTEGRATED CLINICAL DATABASE TO SUPPORT CURRENT AND FUTURE COMMUNITY-BASED CLINICAL PROJECT

This is a pilot study to develop an integrated clinical database to support an ongoing project in Arunachal Pradesh, India. GVN assists in developing, maintaining and facilitating collection of data and assimilation and provides expertise in evaluating outcomes. Briefly, Dr. Abhijit Chowdhury, the principal investigator of the parent project will screen 30,000 marginalized populations for hepatitis B serologies:

- 1. Provide HBV vaccinations for those who are not exposed to HBV.
- 2. Develop a longitudinal cohort of patients with chronic HBV for linkage evaluation and care.

Investigators who are assisting with the study at the GVN are faculty within the Division of Clinical Care and Research at the Institute of Human Virology (IHV) at the University of Maryland School of Medicine. The program implementing this grant is unique in that it combines community-based clinical care and academic research. Since 1996, the IHV in Baltimore has had a long-standing history of pioneering research in human virology. The HCV Clinical Research Program has conducted several landmark clinical trials using novel therapeutics. The DC-PFAP is a partnership for community-based clinical care and research whose aim is to reduce the incidence and prevalence of HIVIAIDS and its comorbidities. Since its inception, this program has established itself as a global leader in novel therapeutics for HCV, HIV and HVB. The investigations within this program were the first in the world to utilize IFN-free HCV regimens, demonstrate efficacy of novel combination DAA therapy, and use IFN- and RBV-free regimens in a HIV/HCV co-infected population. This project is supported by the John C. Martin Foundation.

# **GVN ACADEMY**

Training and educating the next generation of the virologists are the long-lasting mission of GVN. GVN senior virologists are committed to sharing their invaluable expertise with junior virologists through mentorship and intensive training at the GVN to better prepare the next generation for future global viral threats. To advance this mission, GVN established the GVN Drs. Yang Liu & Pan Zheng Academy programs in 2021. GVN Academy facilitates supporting and training of early career virologists with well-coordinated and organized programs. GVN Drs. Yang Liu & Pan Zheng Academy includes the following individual programs:

- GVN Postdoctoral Fellowship Training Program: This program aims to train three postdoctoral researchers for a two-year term with the option to rotate two GVN Centers of Excellence. Participants of the program participate in GVN annual and regional meetings during their training, thus having opportunities to interact with wellestablished virology experts for cutting-edge research initiatives. Fellows can also have an opportunity to collaborate with GVN's growing list of industry partners.
- 2. GVN Rising Star Mentorship Program: This program is designed to mentor 15 bright, junior scientists over the course of two years and to connect each mentee with a GVN senior virologist to provide one-on-one research and career guidance. Participants of the program also participate in the elite GVN annual and regional meetings.
- 3. GVN Online Short Course: Emerging Leaders in Virology. Over the past 7 years, this in-person one-week short course has trained more than 90 scientists globally. By partner with the University of South Florida, we are creating the online version of the course. The course aims to benefit students who are interested in virology, immunology, epidemiology, public health, and biomedical research by allowing all participants the flexibility of anytime, anywhere online learning.
- 4. GVN Alumni Networking Series: GVN is dedicated to support the GVN Alumni by creating its Networking Series with a variety of programs and initiatives for enhancing the development of their carrier. These events provide various learning experiences and collaboration opportunities by connecting alumni and senior scientists from the GVN centers.

#### **GVN MEMBERSHIP PORTAL**

The objective of the GVN Membership Portal is to create an online site for GVN members to connect, which serves to centralize scientific information shared among members for collaboration on global health issues. Members of the GVN community will be able to share new publications, research interests and activities, resources available, courses and job postings for career development, and information related to research efforts and activities. Through this connection and collaboration, the GVN's ability to respond to emerging threats and contribute to the global community is greatly enhanced, and aids the scientific community.

## **ADVOCACY AND PUBLIC EDUCATION**

The GVN serves as a resource to government and international organizations seeking advice about viral disease threats, prevention or response strategies, advocates for research and training on virus infections and their many disease manifestations, and disseminates information to authorities and scientific communities throughout the world, including conducting workshops and webinars for journalists and the business community and providing Congressional testimony, opinion pieces, and journal articles.

- 1. To build and sustain broad based awareness and understanding of the efficacy and benefits of diagnostics, antivirals and vaccines in the identification, treatment and prevention of viral pandemic threats.
- 2. To engender and enhance adoption and utilization of diagnostics, antivirals and vaccines by the public-at-large to prevent and mitigate viral disease and the spread of pandemic viruses.
- 3. To monitor and measure acceptance and use of diagnostics, antivirals and vaccines by the public-at-large.
- 4. To utilize the GVN's foremost virologists in target markets internationally to build public trust, to serve as public advocates and to champion the benefits of diagnostics, antivirals and vaccines to mitigate viral disease and the spread of pandemic viruses.





 To develop and implement a methodology in select international target markets (Proof-Of-Concept Phase) that, if effectual, can be replicated in the most at-risk and vulnerable populations worldwide.

In 2021, GVN had 230,000 + pageviews of GVN website from around the world. Media content includes:

- 26 Press Releases
- 94 News Articles
- 13 TV Appearances
- 1 Radio Appearances
- 1 Press Conference
- 67 Newsletters
- 35 Scientific Reviews
- 13 Webinar Series
- 14 Blog Posts





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