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African medical schools see profound culture change

African medical education is evolving quickly as academic institutions harness new technologies and teaching tools, strengthen the breadth and depth of available curricula and ramp up training in rural sites. Many of these changes are being spurred by the Medical Education Partnership Initiative (MEPI), funded by the President's Emergency Plan for AIDS Relief (PEPFAR) and NIH, and co-administered by Fogarty and the Health Resources and Services Administration. MEPI participants gathered recently in Uganda to share lessons learned and review progress.

"Your commitment and effort have created a sea change in your programs and in the partnerships and collaborations that have provided such a significant catalyst for innovation and collective effort," observed Ambassador Eric Goosby, U.S. Global AIDS Coordinator, who heads PEPFAR. The result, he added, is that the whole is greater than the sum of its parts.

MEPI institutions have reached out to form partnerships

Photo by Dr. Roger I. Glass/Fogarty



Dr. Nelson Sewankambo, head of Makerere University College of Health Sciences, opened the annual Medical Education Partnership Initiative meeting in Uganda.

with other medical schools in their own countries, as well as with other MEPI grantees, creating a network that now includes some 40 members, a quarter of

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Fogarty awards \$22M through new HIV program

A new NIH program supporting HIV-related research training will provide \$22 million over five years for activities in 15 low- and middle-income countries. Fogarty's HIV Research Training Program is issuing 22 awards, which are intended to strengthen the ability of the grantee institutions to combat the HIV/AIDS epidemic, while building expertise in a particular scientific or critical research infrastructure area. Successful applicants proposed a broad range of focus topics including nutrition, mental health, co-infections and various aspects of implementation science, among others.

"These awards will help scientists and clinicians in devel-

oping countries build much-needed research infrastructure," said Fogarty Director Dr. Roger I. Glass. "The resulting advances will benefit all, providing trainees the opportunity to collaborate with NIH researchers on U.S. government-funded HIV/AIDS initiatives."

The program consolidates two long-standing Fogarty initiatives, the AIDS International Training and Research Program (AITRP) and the International Implementation, Clinical, Operational and Health Services Research Training Award for AIDS and tuberculosis (IICOHRTA-AIDS/TB) program. The awards are supported in part by the National Institute of Mental Health, National Cancer Institute and National Institute on Drug Abuse.

FOCUS



The Human Microbiome Project

- NIH initiative has catalyzed a promising new field
- Global microbiome diversity may hold clues for health
- Study of nutrition and disease could identify interventions

Read more on pages 8 - 9

Disease mapping is critical planning tool

Scientists can more productively study how to combat an infectious disease—including with the use of vaccines—if they know its location, prevalence and tendencies, but all too often such information is based on poor-quality or dated estimates. This prompted a team of researchers at Oxford University to seek a way to more accurately assess disease prevalence in specific locations around the world.

Describing the team’s innovation to a seminar hosted recently by the Trans-NIH Global Health Working Group, Dr. Andrew Farlow of Oxford said the initial model to map dengue fever could be applied to many of the 350 infectious diseases currently registered by the Global Infectious Disease and Epidemiology Network. Only about seven have been fairly well mapped by other methods, he noted in his talk, “Disease Mapping and the Economics of Vaccines: Opportunities and Challenges.”

One of the NIH working group’s areas of interest is exploring innovations and translational research to improve health in low- and middle-income countries. The quality of epidemiological data is often minimal in these locations, undermining the ability of authorities to efficiently support national health care needs.

“How can we intercept a normal risk for routine public health if we don’t have maps?” Farlow asked. Once researchers employ tools to track disease locations and intensities, they will be better positioned to assess the potential use of new vaccines, and develop incentive structures for vaccine financing in low-resource settings. “We can think of occurrence mapping as predicting the niche of a disease, much like when you predict a niche for a species,” Farlow said.

The mapping model compiles input factors, which vary depending on the disease. For the dengue model, the Oxford team included population density and movement,

Malaria vaccine is safe, effective

A malaria vaccine candidate has passed a key milestone in an NIH-sponsored clinical trial, showing it is safe and, at high enough doses, can protect adults against disease.

The small-scale trial, held at NIH’s Clinical Center and led by NIH’s National Institute of Allergy and Infectious Diseases, tested the PfSPZ Vaccine developed by Sanaria Inc. based on live but weakened versions of the *Plasmodium falciparum* parasite. All participants receiving the maximum



Photo by Cathy Kristiansen/Fogarty

Dr. Andrew Farlow of Oxford University advocated for disease mapping to improve research efficiency at a recent NIH address organized by Fogarty.

vegetation and urbanization because the main vector mosquito thrives in heavily populated environments. The model also includes precipitation data collected by satellite and temperature records, and incorporates the life cycle of the dengue parasite. Poverty plays a role, too.

“By putting all these things together, we can create a map that predicts the probability of occurrence of an infectious disease,” he said. “Based on the results, we can target more effective surveillance strategies.”

Their first model identified dengue’s presence in 128 countries, including 36 previously classified as dengue-free by the WHO. The preliminary estimate for the global population at risk put it as high as 3.97 billion. Producing the map for dengue was expensive, requiring five years of work, 15 staffers and 22,000 parasite rate surveys, but with each mapping exercise the cost declines.

“We’re creating a framework for lots of diseases,” Farlow said, adding the group’s second project, on malaria from *Plasmodium vivax*, has 10 staff and about 10,000 parasite rate surveys. “As the capacity builds up and we use these data banks much more efficiently, the cost of modeling malaria might be one-tenth what it was.”

RESOURCE

Article: <http://bit.ly/denguemap>

vaccine coverage were protected, but infection arose among participants with lesser dosages.

Everyone infected was promptly treated and cured. Results were published online in *Science*. Researchers are planning additional studies.



RESOURCE

News release: <http://bit.ly/malariavax2>



NIH CLINICAL CENTER

60 YEARS

DISCOVERING TOMORROW'S CURES

NIH Clinical Center celebrates 60 years

From developing the first successful chemotherapy for tumors to administering the initial treatment for AIDS, there are countless reasons to celebrate the NIH Clinical Center's groundbreaking research, said its director, Dr. John I. Gallin, in recent comments hailing the Center's 60-year anniversary.

From the outset, the Center encouraged clinical and bench scientists to share ideas and conduct crosscutting research—collaboration that was once uncommon. Since 1953, nearly half a million study participants have been partners in medical discovery, including many with under-researched, rare medical conditions.

Initially, scientists at the Center directed efforts at fighting cancer, heart disease and other major killers in the U.S., recording achievements such as the first successful chemotherapy treatment for a solid tumor (1957) and producing evidence to support new national guidelines on preventing and treating heart disease (1973). The focus then expanded to include a wide range of diseases and cutting-edge technologies. Among more recent breakthroughs are use of magnetic resonance imaging technology to diagnose coronary artery disease (1984) and development of gene therapy (1990).

Clinical Center collaborations have played a key role in HIV/AIDS research. Early on, its scientists launched a study of immunoregulatory defects seen in the new disease. They subsequently helped produce the first HIV/AIDS treatment, zidovudine (AZT). Researchers have also worked on ways to detect HIV and hepatitis viruses in blood, improving the safety of blood supplies around the world.

In recent years, the Center has embraced the task of researching rare diseases, which are seldom studied anywhere else. By working on these neglected conditions, scientists enhance understanding of more common diseases as well. Currently there are about 1,500 clinical studies in progress at the Center involving patients from across the U.S. and around the world.

Key to the Center's success is its philosophy of giving its in-house basic scientists and clinical researchers the leeway to follow their interests. It is also primed to change direction depending on medical needs. As Dr.

David Henderson, deputy director for clinical care, commented in a brochure, "The great thing about the Clinical Center is that it can turn on a dime. You could say, 'This is a national public health problem, deal with it,' and we could figure out how to restructure our resources and get started the next day."

The Center also offers cutting edge training opportunities, both on the NIH campus and globally. It partners with Fogarty to offer bioethics resources, a unique tool especially useful for scientists in developing countries.

Gallin said the Center is set to continue along its path of "leading the nation and the world in making groundbreaking scientific discoveries that improve the lives of patients and their families, training our next generation of physician-scientists, and working together and sharing what we have learned with colleagues across the country and around the world."

Photo courtesy of the Clinical Center/NIH



The NIH's Clinical Center is celebrating 60 years of scientific progress.

Mouse virus may cause breast cancer

One promising NIH project is studying whether a virus that causes breast cancer in mice does the same in humans. The research was highlighted during the recent symposium commemorating the NIH Clinical Center's 60-year anniversary.

NIH-funded scientists are investigating the human mammary tumor virus (HMTV), which has been identified in more than a third of human breast tumor samples. Leading the effort is NIH grantee Dr. James F. Holland, of Mount Sinai Hospital, who worked at the Center when it opened in 1953. He and his team found HMTV in 71 percent of mammary tissue from U.S. patients with inflammatory breast cancer.

Holland also described his recent finding that virus-susceptible mice, *Mus musculus domesticus*, live in areas of Europe where human breast cancer rates are high, whereas another mouse strain that is not susceptible commonly inhabits Eastern Europe, where human breast cancer is much less common. "We haven't proved that HMTV causes breast cancer yet," Holland said, "but we are following that lead."

African medical schools see profound culture change . . . continued from p. 1

sub-Saharan Africa's medical schools. Deans, faculty and other policymakers travel frequently among sites to learn about successful programs they might also adopt and to relay their own experiences. Through these collaborations, they are leveraging resources and expertise so all can benefit from the lessons learned.

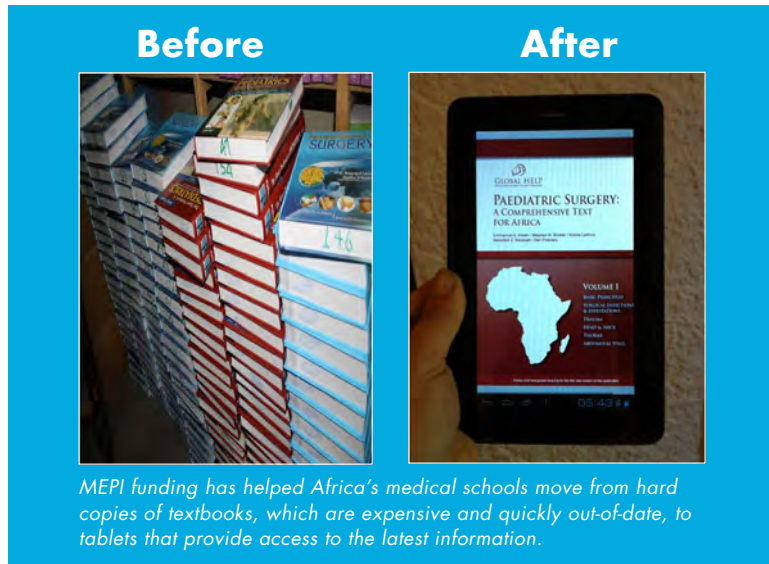
“There has been a profound culture change” in how African countries are networking with and helping each other in pursuing the common goal of improving health everywhere, said Dr. Joseph Kolars of the University of Michigan, who's collaborating with the MEPI effort in Ghana. “We're seeing an emphasis on and celebration of those academic community partnerships.”

Another dramatic shift in MEPI institutions has been the adoption of information communication technologies (ICT) to enhance teaching methods and greatly expand students' access to electronic education materials and current journal articles. Some MEPI sites are supplying students and faculty with personal tablet computers loaded with medical books, national health guidelines and other valuable resources. “The tablets have helped address the shortage of text books, improve access to electronic resources and extend the lecture beyond the classroom,” said Dr. Miliard Derbew, of the MEPI project in Ethiopia.

MEPI partners are also deploying ICT to bring videotaped lectures, interactive procedure demonstrations and other e-learning materials to rural training sites. Because the need for health care workers is greatest outside urban areas, MEPI schools are posting faculty and students at these remote locations to give them experience in community-based health care and to offer local trainees quality mentorship. Many countries are shoring up living and working conditions at these sites, providing improved housing and Internet connectivity.

“We're delighted to see that MEPI is fundamentally changing the way African institutions are approaching medical education,” said Fogarty Director Dr. Roger I. Glass. “Through decentralization, they are training health care workers in the places where they're needed most, engaging local physicians and increasing enthusiasm for rural practice and research.”

Another MEPI goal is to expand the subject matter included in curricula beyond infectious disease topics to include emergency medicine, mental health, surgery, cardiology, cancer, and maternal and child health. Developing expertise in these areas is critical to addressing current health challenges as well as the rising tide of chronic illness sweeping the continent.



MEPI funding has helped Africa's medical schools move from hard copies of textbooks, which are expensive and quickly out-of-date, to tablets that provide access to the latest information.

Brain drain still takes a devastating toll on Africa's medical workforce, so MEPI funds are supporting research grants for faculty as both an enticement for them to remain in-country and also to ensure health care quality continues to improve as science evolves. That investment is already paying dividends. MEPI institutions currently receive support from about 150 NIH grants, double the level three years ago, reflecting their growing

research capacity and ability to handle ethical review, manage financial programs and compete in grant writing. “As the MEPI sites mature, their ability to support and compete for additional funding will be key to long-term development efforts,” Glass noted.

Another essential MEPI aim is to nurture the cooperation of national governments and ensure goals are aligned with country priorities, since financial and policy support are critical for maintaining momentum. Many African governments have already boosted their health care funding significantly. “We have started a fire,” Kolars said, “but it is going to need to be fueled by more financing, more support.” The framework of institutions and collection of teaching tools have been assembled and are ripe for scale up through additional investment, MEPI partners suggested.

The challenge now is how to package this rich experience so it can be shared further within the MEPI network and beyond, said Dr. Francis G. Omaswa, a principal investigator for the MEPI Coordinating Center. “We want to move to a stage when our own African governments are putting our own money into making sure that what has been set in motion by MEPI does not stop when the MEPI program stops.”

RESOURCES

Fogarty MEPI website: <http://bit.ly/MEPIin>
 MEPI network website: www.mepinetwork.org

Fogarty supports infectious disease research training

Fogarty has awarded six grants totaling \$5.6 million to support new and ongoing infectious disease research training in five low- and middle-income countries. Funding from Fogarty's Global Infectious Disease Research Training program will enhance the efforts of grantees to build human capacity and conduct research on diseases that are endemic in their home countries. The five-year awards will fund new and ongoing projects in Bangladesh, China, Ethiopia, Kenya and Pakistan.

"Malaria, tuberculosis, rotavirus and other dangerous pathogens still pose a serious threat to populations in developing countries, particularly to their poorest citizens" said Fogarty Director Dr. Roger I. Glass. "This funding will help clinicians and health workers combat these diseases, while building a critical mass of researchers and support staff at grantee institutions."

The University of North Carolina at Chapel Hill will use its award to establish a research training center in China focused on a wide range of sexually transmitted diseases. Emory University's grant will help launch a training initiative designed to improve the research, treatment and control of tuberculosis in Ethiopia, where the disease is considered a public health emergency.

A grant going to the University of New Mexico Health Sciences Center will support ongoing training in Kenya that addresses severe anemia caused by malaria. An existing project that is administered by Johns Hopkins University

Researchers study human dynamics to track bird flu

Human social networks may hold the key to identifying how bird flu spreads. A team of Fogarty-funded researchers is studying the dynamics among people who spend time on farms and in poultry markets to see if they can find a way to determine how to target treatment when the next pandemic strain emerges.

Most models of contagion assume people in a group, like a town or a live-bird market, mix equally, but that's not usually the case. People tend to interact only with a small group that they know. Some people, however, serve as bridges connecting otherwise separate subgroups. These bridges may be the best targets for medical interventions like vaccinations or antiviral treatment.

"Flu is a highly changeable virus. It behooves us to understand the evolution of these viruses and how they



Photo courtesy of Aga Khan University

Fogarty's Global Infectious Disease Research Training program supports studies of childhood illnesses at Aga Khan University in Pakistan.

and targets infectious diseases affecting mothers and children in Bangladesh will also receive a renewal award. Grantees from Yale University carrying out biomedical research training in Kenya concerning human African trypanosomiasis—also known as sleeping sickness—will receive renewed funding. Finally, support will continue for training related to childhood diseases such as polio, rotavirus, pneumonia and measles through a renewal grant to Aga Khan University in Pakistan.

The awards are partly supported by NIH funding partner, the National Institute of Allergy and Infectious Diseases.

RESOURCE

Website: <http://bit.ly/infdiseseagrants>

move into people," observed Dr. Stephen Luby of Stanford's Center for Innovation in Global Health. Understanding how flu spreads in hot zones, among people who have frequent contact with birds, which are a regular source of new flu strains, could provide critical information about whom to target for treatment when the next pandemic strain emerges.

With a one-year seed grant from Fogarty, the scientists have begun studying these interactions among people who work in poultry farms or markets in Bangladesh. The team hopes to expand the study to other countries where the highly pathogenic strain of avian flu circulates. Researchers from University of California, Los Angeles, University of Oklahoma, International Centre for Diarrhoeal Disease Research in Bangladesh and the nonprofit organization EcoHealth Alliance also are collaborating on this project.

PROFILE

Fogarty Fellow studies Rwanda's surgical capacity

By Arthur Allen

Not long after arriving in Rwanda for her Fogarty research fellowship, Dr. Robin Petroze got ready to email a survey of surgical capacity to each of the country's hospitals. Not a good idea, her Rwandan colleagues said—she'd never get good data that way. So, Petroze decided to use old-fashioned rubber-tire epidemiology. She rented a car and got a friend, a Congolese salsa dancer, to drive her to each of the 44 hospitals.

Luckily, Rwanda is a small country and her driver had a lead foot. Starting at 5 a.m. and usually returning the same day, she covered the entire country in a month. At a cost of less than \$5,000, she completed the first comprehensive assessment ever of a nation's surgical system. "It was an adventure and amazingly educational, and it helped me integrate into the surgical staff, because my colleagues were more respectful after seeing me taking the time to see their country and its system," she said.

Fogarty's Global Health Program for Fellows and Scholars provides one-year, mentored clinical research experiences overseas for postdoctoral Fellows and pre-doctoral Scholars. Petroze joined a growing number of participants with interests outside the traditional infectious disease realm.

Rwanda's surgical community found Petroze's study—coauthored with three Rwandan colleagues including her local mentor, Dr. Georges Ntakirayuta—to be enormously helpful. So did surgeon Dr. Atul Gawande, who wrote in the *British Journal of Surgery* that the survey marked "a major leap forward" in efforts to strengthen surgery in underserved countries.

Poorer countries have barely a fraction of the surgical services of more developed lands. The study found just 124 operating rooms, 45 full-time surgeons and 12 anesthetists in Rwanda, a nation of 10 million. That's about one-fortieth the number of surgeons recommended by research studies. The study provides a baseline that indicates how Rwanda's surgical care needs to expand.



Robin Petroze, M.D.

Fogarty Fellow:	2010-2011
Fellowship at:	University of Rwanda
U.S. organization:	University of Virginia
Research focus:	Rwanda's surgical system
Website:	http://surgeryinrwanda.wordpress.com

After spending 2010-2011 in Rwanda on the Fogarty fellowship, Petroze decided to remain another year, supported by the University of Virginia, where she is now completing her residency. This allowed her to continue helping build a surgical research infrastructure, with the development of a trauma registry that tracks all patients entering emergency rooms at the country's two university teaching hospitals. In 2011, she helped organize a meeting to harmonize the country's surgical agenda with regional and international partners.

A native of northern Kentucky, Petroze had always been interested in global health. During her medical studies she volunteered with a mission organization performing surgeries in the Dominican Republic and a project providing health care to remote Tanzanian communities. Her research agenda in Rwanda, Petroze said, evolved from a list of priorities developed by the Rwandan Health Ministry and surgeons from the National University of Rwanda.

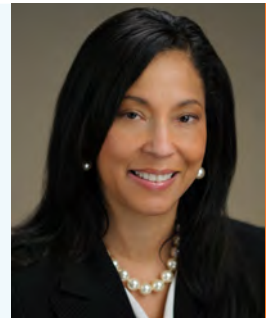
"The biggest benefit of the Fellowship is building relationships," she said, and learning to navigate among the various government, civil and international groups in a landscape where research faces severe challenges—cultural and language barriers, poverty and simple road access.

The experience deepened Petroze's belief that building local capacity is key to improving health outcomes. "If you treat someone for HIV for 20 years and they are in a car accident and no one is available to repair their broken leg, are you really servicing the community's needs?" she asked.

"Before doing this fellowship I knew I wanted to do international health, but now I know that it is my focus," said Petroze. "The field of global surgery really is just developing, and I definitely want to have this international, collaborative educational focus as I move on."

JANINE A. CLAYTON, M.D.

Dr. Janine A. Clayton is Director of NIH's Office of Research on Women's Health (ORWH), which she joined in 2008, and is also Associate Director for NIH Research on Women's Health. Previously, Clayton was deputy clinical director of NIH's National Eye Institute (NEI). Her research focus includes autoimmune ocular diseases and the role of sex and gender in health and disease, and she discovered a novel form of eye disease associated with premature ovarian insufficiency. She earned her medical degree at Howard University and completed her ophthalmology residency at the Medical College of Virginia and her fellowship training at the Johns Hopkins Hospital's Wilmer Eye Institute and NEI.



Why do we still need research on women's health?

The ORWH was first set up in 1990 to ensure that women were included in NIH-funded clinical research studies. Nearly a quarter-century later, and having come a long way in clinical research inclusion for women and minorities, we are doing a lot more. Today, the ORWH is reaching "beyond inclusion," to more fully investigate the role of sex influences in cell and animal experiments, not only in research studies that include humans. We really need to know more about the role of sex—arguably the most basic biological variable—in biochemical and physiological pathways both related and unrelated to reproduction. Deepening this knowledge base should help us understand what drives sex differences in the health of women, and it will undoubtedly help us ask and answer smarter questions in clinical studies.

How does gender factor in global health research?

Globally, women have significant impacts on others—you could say that women are the glue that holds together families and communities. Worldwide, women are most often caregivers, meaning they influence the health of children, men and elders. For decades, women have had a longer life expectancy than men, nationally and internationally, but the extra years are not always good ones. The global epidemic of noncommunicable diseases casts a pall on the well-being of women everywhere, with ischemic heart disease and depression among the leading causes of disability globally among females, with smoking, high blood pressure, and high body mass index as top risk factors for death.

How does ORWH support global health research?

Through scientific leadership, funding, and co-funding, ORWH contributes to the agency's strategic investment in global health. Some examples include the Tobacco Control Network among Brazilian women; exploratory studies of gall bladder cancer in Chilean women; studies of the impact of indoor air pollution in developing countries; and human papilloma virus vaccine cancer prevention trials in Costa Rica. Long-term sustainability is really important in global health investments. We are very excited about work that is

being done to capitalize on infrastructure that has been established by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). Through the Medical Education Partnership Initiative (MEPI), Fogarty, ORWH and colleagues are supporting research in sub-Saharan African countries with PEPFAR support to develop or expand and enhance models of medical education for women and men, toward capacity building for the future. The MEPI network joins regional partners, country health and education ministries, and several U.S. and foreign collaborators.

How do partnerships play a role in this research?

Partnerships and collaboration are central to everything we do. Because the ORWH mission is multifaceted—and because my job also includes helping to set the NIH research agenda related to the influences of sex and gender in biomedical research—I am always looking for ways to work together with colleagues in and out of NIH, as well as here and abroad. One example of a productive collaboration is the White House Working Group on Gender-Based Violence. This cross-agency effort, led by the U.S. State Department, aims to develop prevention and response strategies to gender-based violence internationally through increased coordination among U.S. government agencies, with other governments, international organizations, the private sector and civil society organizations, foundations, community-based and faith-based organizations, and labor unions. The group released a report in August 2012, which outlines its plans for generating toolkits, mobilizing resources and other actions.

How do Fogarty Fellows and Scholars further these goals?

I believe strongly that people are the lifeblood of medical progress, and so our investments in human capital in biomedicine are extremely important—for the health of the nation and the world. The Global Health Fogarty Fellows and Scholars program is a great example of how NIH shares knowledge and collaborates to build capacity in other nations—developing countries in particular. ORWH co-funds this important effort, which provides mentorship, research opportunities and a collaborative research environment for early-stage investigators from the United States and low- and middle-income countries.

The Human Microbiome Project: Research shows promise, may result in treatments

By Arthur Allen

NIH-funded studies of the human microbiome—the collective genomes of all microorganisms present in or on the body—are revealing surprises that may result in actionable discoveries. These could someday lead to new approaches to treat malnutrition, asthma, obesity, diabetes and other conditions but the research is still in its early stages.

Scientists met recently to review progress made under NIH's Human Microbiome Project and consider future directions for "this very exciting area of science, which is just bursting with opportunity and potential for understanding aspects of human health that had been outside our reach until recently," said Dr. Francis S. Collins, NIH director.

NIH began exploring this emerging area of science in 2006 with a five-year, \$115 million Common Fund initiative involving a handful of institutes and centers (I/Cs). The effort now has broad NIH interest and support—with about

The NIH Human Microbiome Project has revealed global differences that may have health implications.

\$180 million awarded in extramural funds in FY 2012—and includes international partners in Canada, Korea, Australia and the European Union.

"We've just begun to scratch the surface," Collins observed. NIH would like to move the field forward, he added, "to better understand how disruptions in that superorganism result in disease and what we can do about it."

Since the discoveries are relevant across the I/Cs, NIH would like to develop a more cohesive approach, identify opportunities for resource sharing and develop collaborations across the agency and with other U.S. government partners.

In 2012, the National Human Genome Research Institute (NHGRI) launched a three-year program to survey the human microbiome and its genetics by sequencing the contents of the gut, skin, mouth, nose and reproductive tract of 300 men and women. The project has already generated the largest mass of biological data ever gathered, showing that some 10,000 microbial species with 8 million unique genes colonize American adults, according to NHGRI director Dr. Eric Green. Other studies have compared the microbiomes of Westerners with those in cities and rural areas of the developing world.

"These efforts truly have catalyzed the field of microbiome research in a very productive way," Green said.

The balance of different microbe species in and on human bodies changes throughout life and particularly in different phases of pregnancy. Examinations of microbes in the stool of women in their third trimester of pregnancy show increased levels of certain inflammatory substances that trigger hormonal changes, weight gain and higher blood glucose—processes that help women support their fetuses.



Photo by K. M. Asad/PhotoShare

Many of these organisms are then passed along to babies during childbirth. Dr. Maria Gloria Dominguez-Bello, a Venezuelan-born microbiologist currently at New York University, spoke with concern about the growing number of C-sections. Her research shows that passage through the vaginal canal colonizes babies with particular bacterial families, and she speculated that lack of exposure might explain why C-section babies are at greater risk of developing Type 1 diabetes, celiac disease, asthma or obesity.

“We tend to blame environmental contamination or diet on problems like asthma,” Dominguez-Bello said. “Now we’re recognizing that there’s an interaction with microbes and the environment and microbes and us. When we disrupt the microbiome it may have consequences that, while not life-threatening, affect our health.”

Dr. Martin Blaser, an infectious disease specialist at New York University, noted that food companies routinely fatten livestock by feeding them antibiotics on a nontherapeutic basis. Studies in mice show that the antibiotics shift the microbial balance in the animals’ guts, stimulating inflammatory processes that lead to faster weight gain. Blaser asked whether excessive antibiotic use against childhood infections might be contributing to human obesity through the same mechanisms.

Some of the research discussed pointed to possible dietary interventions to improve health. Dr. Wendy Garrett, an immunologist at the Harvard School of Public Health, described how dietary compounds called short-chain fatty acids—the best-known of which is acetic acid, the main component of vinegar—stimulate certain microbes in the gut that in turn stimulate production of immune cells, called regulatory T-cells, that suppress inflammation.

A similar role for microbes and regulatory T-cells was noted by Dr. Susan Erdman, a veterinarian at the Massachusetts Institute of Technology. When she fed mice on probiotic bacteria called *Lactobacillus reuteri*, or a yogurt made with the bacteria, they remained healthy while eating the same junk food diet as their fatter cousins. The males had greater testicular growth, while the females had shinier coats and were more affectionate toward their offspring, Erdman said. The promising data on the benefits of lactic acid bacteria made her pose the question, “Is there some kind of intervention using these well-characterized strains that might be of enormous benefit for an immediate public health remedy for some types of conditions?”

But Dr. Jesse Goodman, chief scientist at the Food and Drug Administration, injected a note of caution, noting that masses of data can lead to hasty conclusions. “Systems biology gives you the ability to propose biological plausibility for almost anything,” he said. “Manipulating the microbiome must be based on the best science, with a healthy respect for the complexity of nature.”

While many presentations made microbial diversity sound like an unmitigated good, that could be a misapprehension. People in Malawi, Burkina Faso and the Amazon all have greater microbial diversity in their guts than Westerners, but also suffer more intestinal infections and die younger.

To illustrate this point, Dr. Kathryn Dewey of the University of California, Davis, noted that gut microbiota in rural populations of Burkina Faso were more diverse than those of Europeans and richer in microbes that feed off of starches, fibers and plant polysaccharides. Such organisms are thought to ward off inflammatory microbes.

“But I don’t want to give the impression that this is a better diet in any way,” Dewey said. “In this particular situation we could not argue that Burkinabe children were protected against these microbes, because diarrheal diseases are very, very common there.”

Dewey has conducted much of her research among severely malnourished children in Malawi. She and other scientists are interested in examining the extent to which malnutrition may result not just from inadequate food, but a breakdown in microbial communities that process different parts of the diet.

The relationship between malnutrition and microbial communities is complex, Dewey said. Her research will evaluate the relationship among breast- and formula-feeding, first foods and the development of intestinal microbes and the immune system in various countries of Africa, South Asia and South America. Her goal is to assess the impact of lipid-based nutrient supplements on microorganisms and infant health.

The microbiome studies have already revealed “surprising” things, Collins said. “There’s a lot of complexity here but it’s beginning to look as if the fog is lifting and we’re able to see some of the principles and some of the conclusions that might even become, before long, actionable.”

Photo by Dominic Sansoni \World Bank



NIH-funded researchers are studying the link between nutrition and the microbiome in the hopes of discovering interventions that could improve health.

RESOURCES

Website: <http://bit.ly/HMPnih>

Publications: <http://bit.ly/HMPpubs>

Videos: <http://bit.ly/HMPvideos>

OPINION

By Dr. Roger I. Glass, Director, Fogarty International Center

Evaluating Fogarty's impact

Fogarty invests heavily in training for research and I'm often asked the question, "How do you evaluate your success?" We regularly conduct program evaluations and I receive a report from an independent team that documents the number of researchers trained, their countries, topics studied and quantity of publications produced. When I finish reading the review, I put it down to reflect on the people themselves and the ways in which this training has really affected their lives and their success as researchers, teachers and leaders. I also think back on the classic quote attributed to Albert Einstein, "Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted."

This discord, this dissociation between the numbers of things counted and the assessment of what really counts has become more apparent as I've been visiting African sites where Fogarty has many alumni. At the site of our Medical Education Partnership Initiative (MEPI) in Ghana, our group was greeted on campus by the Vice Chancellor of Kwame Nkrumah University of Science and Technology, a biochemist. As Dr. William Otoo Ellis addressed us, he mentioned that he was himself a Fogarty Fellow at the University of Alabama, working on aflatoxins—fungal toxins that grow in moist corn and peanuts and are potent carcinogens in Ghana.

His early training as a Fogarty Fellow launched him in a successful career as a researcher and now Vice Chancellor. Even though we'd never met before, he welcomed me as an old friend and colleague whose fellowship had played such an important role in his personal development. I was charmed even though the kudos should have gone to my predecessors and project officers at Fogarty.

Then, at our MEPI meeting in Uganda, I visited the dean of Makerere University Medical School, Dr. Harriet Mayanja-Kizza. She, too, was delighted to welcome me warmly and tell me that she launched her career after her Fogarty Fellowship at Case Western University, where she received her master's in immunology. She now has a robust laboratory in Kampala with many doctoral and postdoctoral students and international collaborations, all of which stem from her Fogarty links.

And as our conference closed, Uganda's Deputy Minister of State for Health the Honorable Elioda Tumwesigye,



Dr. Harriet Mayanja-Kizza (right), dean of Makerere University's Medical School, told me her Fogarty Fellowship helped her earn her master's in immunology.

a physician who has worked on HIV, addressed the attendees. He went off script to tell of his extraordinary career, which reached a new level after he studied epidemiology as a Fogarty Fellow at Case Western in 1998. Before then, he'd never touched a computer, seen snow or thought of himself as a researcher. He waxed eloquently about what this experience meant for his own career and the unique value that this training provides.

“Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted.”

— ALBERT EINSTEIN

These cases are not unique. One of the joys of being Fogarty director is that wherever I travel, people find me, introduce themselves as if we were old friends, and tell me these secrets of their past training through a Fogarty program. By the numbers that we count, these people represent little more than a cold statistic in a bland report. But by their influence as research and policy leaders whose training has been career-changing and whose vision has been shaped early on by contact with their mentors in the U.S., they are perhaps our most effective ambassadors of science and research and represent our best long-term investments in research and collaboration.

The impact of this training to advance the research agenda, create agents of change and develop leaders has been immense. We must evaluate the programs, not in terms of the short-term counts but rather in terms of the long-term careers developed and sustained through these Fogarty collaborations. Investing in the right people through the right programs is a strategy for global health that works!



Fogarty trainee to head Brazil's AIDS program

Dr. Fábio C. Mesquita was named director of Brazil's National HIV/AIDS program. Mesquita participated in Fogarty's AIDS International Training and Research Program and most recently worked as senior advisor on HIV in the WHO's Vietnam Country Office.



Fogarty grantee Garcia recognized for productivity

Long-time Fogarty grantee, Dr. Patricia Garcia, has received an award from Universidad Peruana Cayetano Heredia in recognition for being the institution's "Most Productive Researcher." Garcia received training early in her career with Fogarty support.



Fogarty trainee Reddy earns AIDS award

Fogarty trainee Dr. Kavidha Reddy of the University of KwaZulu-Natal has received the Young Investigator Award from the International AIDS Society and the French Agency for Research on HIV/AIDS and viral hepatitis. She was chosen for showing innovation, originality and quality research, based on her studies on a new arm of the innate immune system.



Fogarty investigator Herzallah deemed influential

Fogarty investigator Dr. Mohammad M. Herzallah has been named one of the "500 Most Powerful Arabs in the World," by *Arabian Business* magazine. He is pursuing a doctoral degree at Rutgers University, Newark, and directs the Palestinian Neuroscience Initiative at Al-Quds University in the West Bank.



Fogarty trainee wins honor for leadership

Former Fogarty trainee Dr. Damalie Nakanjako Kyabayinze has received the 2013 Merle A. Sande Health Leadership Award for improving health in her community. An internist focusing on HIV/AIDS, she lectures at Uganda's Makerere University and is a Wellcome Trust postdoctoral research fellow.



Fogarty trainee receives award for dissertation

Former Fogarty trainee Dr. Olaniyi Taiwo was honored by the University of Liverpool for writing the Dissertation of the Year, on consent forms for dental care clinical trials in Nigeria. Before his Ph.D. studies, Taiwo participated in a Fogarty-supported program at the Johns Hopkins Berman Institute of Bioethics.



Fogarty welcomes Said to its staff

Dr. Maria Said recently joined the Fogarty staff as a program officer. Said will manage the Center's tobacco research program and assist with the Medical Education Partnership Initiative. She is a Public Health Service Commissioned Officer, a licensed physician and is board-certified in internal medicine and infectious diseases.

Reports assess health in six world areas

The leading causes of premature mortality and disability in the world are shifting, dramatically in many cases, according to six regional reports from the World Bank Group and the Institute for Health Metrics and Evaluation. The reports also describe each region's policy efforts to improve health. Reports: <http://bit.ly/IHMEreg>

mHealth toolkit addresses privacy issues

A new report on mHealth and privacy offers a legal framework that can be tailored to different cultures, environments and scenarios. Produced by the mHealth Alliance and partners, the resource provides guidance on how to protect health data collected and transmitted over mobile devices. Full report: <http://bit.ly/GEV96GE>

Geneticists push for global data plan

Privacy concerns are hampering the sharing of genomic and related clinical data. To change this, more than 70 leading health care, advocacy and research organizations, including NIH, have pledged to develop technical and regulatory standards for ethical and safe data exchange. Article: <http://bit.ly/LGxSLG4>

AAMC creates network for med students

A global health network has been established to provide final-year medical students in the U.S. and abroad with international opportunities to pursue clinical, research or other public health activities. The Association of American Medical Colleges recently launched the Global Health Learning Opportunities Collaborative to spur research innovation and global understanding. Website: www.aamc.org/ghlo

Peace Corps recruits medical educators

The U.S. Peace Corps, collaborating with the President's Emergency Plan for AIDS Relief and the nonprofit group Seed Global Health, has sent its first 30 volunteer doctor and nurse educators to Tanzania, Malawi and Uganda for a year to help build health care capacity. Website: <http://bit.ly/PeaceC>

Africa's health challenges examined

A recent World Bank report suggests African health authorities should explore how best to leverage existing resources to deal with the growing numbers of citizens suffering from noncommunicable diseases or road traffic injuries. Full report: <http://bit.ly/9Road66>

Funding Opportunities

Funding Opportunity Announcement	Details	Deadline
Research on the Role of Epigenetics in Social, Behavioral, Environmental and Biological Relationships (R21)	http://1.usa.gov/19eJ9er	Nov 13, 2013
International Cooperative Biodiversity Groups (U19)	http://bit.ly/55bio55	Dec 11, 2013
Ecology and Evolution of Infectious Diseases Initiative	http://1.usa.gov/13JYUrB	Nov 20, 2013
International Research Scientist Development Award (K01)	http://1.usa.gov/V9wRRF	Mar 4, 2014
Global Health Research and Research Training eCapacity Initiative (R25)	http://1.usa.gov/190BF4c	May 15, 2014
International Research Ethics Education and Curriculum Development Award (R25)	http://1.usa.gov/15jRbAB	May 28, 2014

For more information, visit www.fic.nih.gov/funding

Info on resumption of NIH activities following appropriations lapse: <http://bit.ly/NIHGuidance>

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Fogarty marks namesake's 100-year milestone

Photo by Jeff Gray/Fogarty



Congressman John E. Fogarty was remembered on the centenary of his birth as his daughter, Mary Fogarty McAndrew, visited the Center to help its director, Dr. Roger I. Glass, mark the occasion.

To commemorate the birth 100 years ago of Congressman John E. Fogarty, after whom the Fogarty International Center is named, his daughter Mary Fogarty McAndrew recently paid a visit to present a series of panels on the history of her father's work.

The display was unveiled earlier this year at a celebration of the late congressman, held in his home state of Rhode Island. After Fogarty's sudden death in 1967, Congress established the John E. Fogarty International Center in memory of his tireless efforts on behalf of NIH and health needs. He helped steer a rise in the NIH budget from \$37 million in 1949 to \$1.24 billion in 1967.

Fogarty Director Dr. Roger I. Glass welcomed McAndrew's attendance at the Center's board meeting and noted the poster panels were welcome additions and provide a useful historical record.

McAndrew is board chair of the John E. Fogarty Foundation for Persons with Intellectual and Developmental Disabilities, a nonprofit group that reflects her father's vision of improving the health and well-being of all.

RESOURCE Foundation website: <http://bit.ly/Fog100>