BIO International Convention
The Global Event for Biotechnology

June 19-22, 2017
One Health Recap
San Diego, CA

Show Daily Articles:

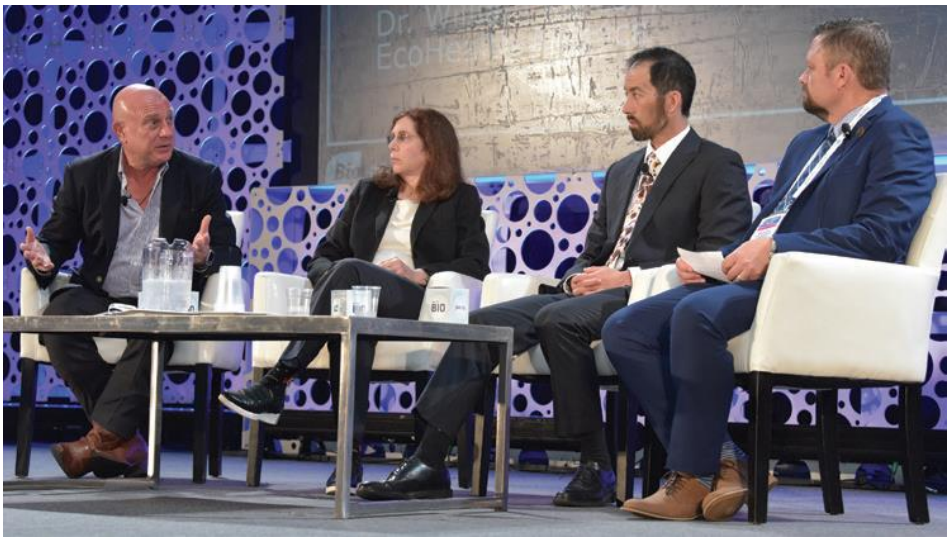
The Beginning of the End of the Pandemic Era

By Show Daily News Staff; Tuesday, June 20, 2017

During yesterday's speaker presentations and panel discussions attendees heard stories about how modern technologies are enabling us to solve global challenges through a collaborative One Health-focused approach.

"Biotechnology is inherently interdisciplinary," said Adrianne Massey, BIO's Managing Director for Science and Regulatory Affairs, "and BIO is a logical home for exploring the One Health concept and addressing the connectivity between animal health & human health."

"One Health impacts economic health," explains William Karesh, Executive Vice President for Health and Policy at Eco-Health Alliance. "The costs associated with a disease outbreak aren't just healthcare costs, but also the costs associated with loss of trade and social disruption."



From left: Dr. William Karesh, Executive Vice President for Health and Policy, EcoHealth Alliance; Dr. Laura Kahn, Research Scholar, Woodrow Wilson School of Public and International Affairs, Princeton University and Co-Founder, One Health Initiative; Dr. Nikos Gurfield, County Veterinarian, San Diego County Vector Control Program, Department of Environmental Health; Dr. Eddie Sullivan, CEO, SAB Biotherapeutics & Chair, BIO Food and Agriculture Section Chair

ONE HEALTH PART 1:
Understanding the Biological Underpinnings of Health, Disease and Linkages

By Renee Morad; Tuesday, June 20, 2017

This is the first part of a three-story series that looks at the ways in which the One Health movement drives biotechnology research and product development. Today, we discuss how gaining a deeper understanding of zoonotic diseases spread between humans and animals is helping to bring forth new therapeutics and vaccines.

One Health is rooted in the idea that the health of humans, animals and the environment are inextricably linked – where product development and research is driven by the appreciation of the oneness of living organisms at a molecular level. It has changed the way researchers address health challenges: from preventing emerging zoonotic diseases spread between animals and people, to mass-producing antibodies in the event of an outbreak or combatting, say, autoimmune diseases or inflammation.

The concept helps scientists better understand the biological underpinnings of health, disease and the linkages among organisms, all of which can be instrumental in creating new therapeutics and vaccines. As scientists work on understanding diseases and how they impact animals, they can better understand how they also affect humans and the environment.

"Whether companion animals, farm animals or wildlife, we often learn first about diseases in animals and then apply what we understand about them to humans," says Eddie Sullivan, President and CEO of SAB Biotherapeutics, based in Sioux Falls, S.D. Here, scientists have genetically engineered cattle to develop the first large animal platform to create human, polyclonal antibodies, also known as immunoglobulins, without using human donors.

The company develops therapeutics to treat disease by boosting animals' natural immunity with antibodies that target cancer, autoimmune disorders, inflammation and infectious diseases. These genetically engineered animals produce human antibodies after being vaccinated against a disease organism, cell, protein or toxin. Since their "internal software" resets to recognize human antibodies to be part of themselves, there are no adverse reactions. Scientists then take and purify these human antibodies out of the plasma of animals to treat humans.

Since successful disease diagnosis requires the ability to respond swiftly with new therapeutics and vaccines, SAB Biotherapeutics creates a herd of human antibody-producing cattle to be readily available in the event of an outbreak, such as Zika, MERS, Ebola or influenza. "We're focused on unlocking nature's complex codes to develop life-saving therapeutics," Sullivan says.

Global animal health company Zoetis, headquartered in Parsippany, N.J., sees strategic advantage in research collaborations between animal health and human pharma companies hinging on the fact that the health of animals and people is interconnected. "Research and development in veterinary medicine can help inform and perhaps even accelerate innovation in human medicine at the species translation stage," says Scott Brown, Vice President of External Innovation, Veterinary Medicine R&D at Zoetis. "Likewise, insights generated in human medicine can inform innovation in animal health," he says.

Since more than 60 percent of infectious diseases that can impact humans are zoonotic, Zoetis scientists are developing ways to control disease in animals, especially livestock. They use diagnostic options to detect avian flu in poultry and provide a vaccine, or evaluate the risk of a horse's exposure to infectious bacterial disease leptospirosis and offer a vaccine for horses and dogs. Zoetis scientists recognize that technologies designed to control infectious diseases or support the prediction of feed efficiency in livestock is highly valuable to the animal health industry.

Biomedical research company Exemplar Genetics, based in Sioux Center, Iowa, is also paving the way for progress within the One Health realm. They've developed specialized miniature swine models that are genetically engineered to exhibit a variety of human disease states to provide a platform that more accurately replicates the human pathology than more traditional research models when testing the efficacy of new medications and devices. Miniature swine models provide a platform to test drug therapy approaches such as those for sickle cell disease and cystic fibrosis.

Considering advancements like these, now is the time for biotechnology and One Health to work in unison. Yesterday, during the 2017 BIO International Convention's One Health Day, keynote speakers featured the One Health concept through stories illustrating what it is and why it's important. They spoke of barriers standing in the way of progress, including socioeconomic and socio-political challenges, as well as the need for more inter-disciplinary research.

Although scientists in general tend to view their specific area of work through a laser-focused lens, taking a step back to consider how their work can relate to the larger context of One Health can bring us all closer to discovering new ways to prevent and treat disease.

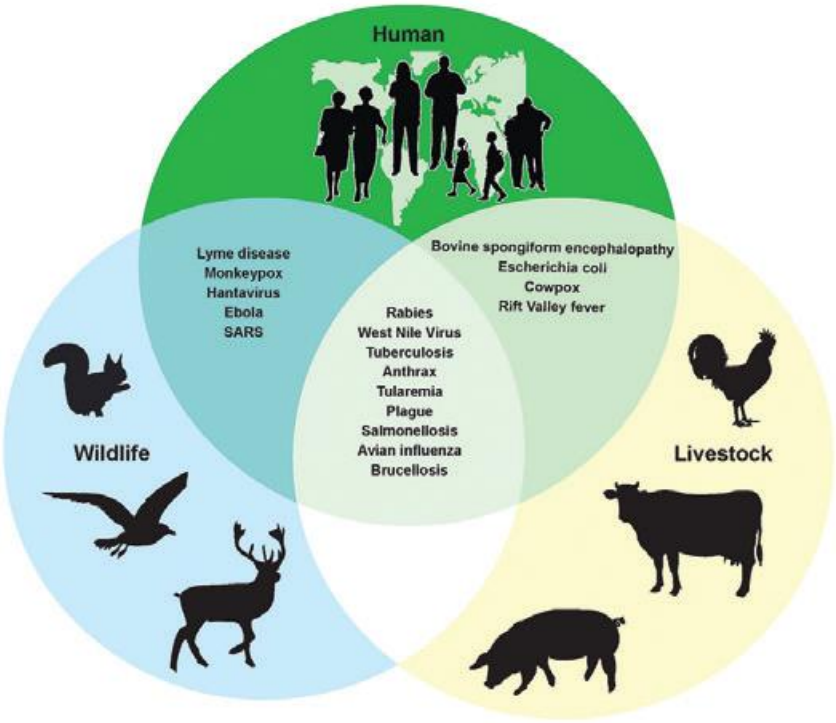
Sullivan explains, "This approach will help us focus on what really matters, from protecting our environment and stopping the spread of emerging infectious diseases to ultimately ending suffering for humans and animals. More and more, we recognize that human health, animal health and the environment are all related. There are components of this that affect all of us."

How Vulnerable Are We to Zoonotic Diseases?

By Renee Morad; Tuesday, June 20, 2017

Tens of thousands of Americans each year get sick from diseases spread between humans and animals, known as zoonoses, with modern-day examples such as Ebola and avian influenza. These types of diseases are the root of some of the world's most harmful pandemics in the past. The bubonic plague, for example, originated in rats and was usually transmitted to humans through an infected flea bite. The HIV/AIDS pandemic started as a virus in Old World monkeys in Africa.

Today, an estimated six out of every ten known infectious diseases in people are spread from animals, and three out of every four new or emerging infectious diseases in humans are spread from animals, according to the CDC. Over the past decade, the number of infectious diseases surfacing each year has nearly quadrupled, while the number of outbreaks each year has tripled.



And it's the nature of zoonotic diseases, which can emerge and re-appear anywhere and at any time without warning, that keeps researchers on their toes. In the U.S. alone, more than a dozen new infectious diseases have appeared over the past 25 years, ranging from a fatal tick-borne virus to a new hemorrhagic fever. With animals and humans more frequently sharing pathogens, some infectious diseases cause more of an alarm than others.

One growing concern today is human infection with the Powassan virus, a disease transmitted by the deer tick that can cause inflammation in the brain, which can lead to death or permanent disability. In the report, "Powassan Virus: An Emerging Arbovirus of Public Health Concern in North America," coauthors Meghan Hermance and Saravanan Thangamani, of University of Texas Medical Branch, say the Powassan virus is sharply on the rise. "We are highly vulnerable to tick-borne illness—more than ever before," Thangamani says.

Between 2006 to 2015, there have been 75 confirmed cases of the Powassan virus, which can be transmitted from a tick in as little as 15 minutes, according to the CDC. Last year, there were 10 confirmed cases, Thangamani says. But in a recent study conducted by the Maine Medical Research Center, up to 7 percent of ticks and 10 percent of ticks in the nymph stage carried the Powassan virus.

Ticks carrying the Powassan virus certainly aren't the only cause for concern. The longstanding threat of rabies kills some 60,000 people a year from animal bites, says the CDC. Meanwhile, bird flu outbreaks continue to surface in the U.S., among other zoonotic diseases.

Vaccine Development is the Key

Researchers studying the intersection of disease and ecology are homing in on the question of whether altered ecosystems make pathogens more virulent. Through deforestation and animal farming, for example, humans manipulating the environment could be behind the rise in infectious diseases. And because of rising temperatures, milder winters are not killing off as many pests as previous years.

Urbanization, particularly in poorer communities that lack effective public health monitoring and preventions systems, could also be contributing to the rise—since viruses could spread much faster without traveling as far. A rise in global travel also poses a greater risk for the spread of zoonotic diseases, Thangamani says.

To better prevent against infectious diseases, Thangamani urges that vaccine development is key. Response efforts are also helpful. In the U.S., many efforts to fight infectious disease fall under the authority of the CDC's National Center for Emerging and Zoonotic Infectious Diseases, or NCEZID. To reduce illness and deaths from infectious diseases and to remain proactive in protecting against the spread of these diseases, NCEZID implements measures from releasing pre-pandemic planning guidelines to monitoring for foodborne illness.

Internationally, the World Health Organization (WHO) maintains best practices for the naming of new human infectious diseases, as well as social innovation efforts, data collection and more. And the U.S. Agency for International Development (USAID) is working on new genomic tools that allow public health officials to predict outbreaks and respond in a proactive manner. They launched the Emerging Pandemic Threats (EPT-2) Program in 2014, to heavily concentrate on places and practices that enable new microbial threats to spread.

Biotech companies are also making headway by assisting in emerging infectious disease surveillance and rapid diagnosis, and helping to treat, control and prevent diseases. GeneThera, based in Westminster, Colo., has an animal molecular testing platform that aims to improve food safety by eradicating zoonotic diseases such as Johne's Disease, Mad Cow Disease,
Chronic Wasting Disease and E. coli. The company also develops therapeutics and vaccines to control emerging diseases in animals and humans.

Gaithersburg, Maryland-based Novavax, a clinical-stage biotechnology company, uses proprietary recombinant nanoparticle vaccine technology to respond to known and emerging diseases, such as Ebola, the Zika virus and seasonal influenza.

While the looming threat of zoonotic infectious diseases continues to remain, scientists are working hurriedly behind the scenes to better protect humanity.

ONE HEALTH PART 2:
Understanding the Biological Underpinnings of Health, Disease and Linkages

By Renee Morad; Wednesday, June 21, 2017

This is the second part of a three-story series that looks at the ways in which the One Health movement drives biotechnology research and product development. In this story, we touch on how a multidisciplinary approach to plant science could help overcome pressing environmental challenges.

One Health speaks to the interconnectedness of humans, animals and the environment. Plant health scientists too, are increasingly advocating One Health to better understand the environment's impact on human and animal health.

Environmental challenges as they relate to human and animal health run far and wide, from securing food supply to improving food safety and water quality. Applying the concept of One Health not only helps scientists grasp the importance of plant health in the interconnectedness of all living things, but fosters collaboration and communication across scientific disciplines, calling on public health officials, epidemiologists, ecologists and toxicologists.

As the world's population continues to increase, the amount of available arable land remains limited, so researchers at Bayer's Crop Science division are working to safeguard food supply by using cutting-edge genetic analyses, high-tech cameras and biochemical expertise to achieve maximum performance from crops such as wheat and soybeans. The researchers are on a mission to achieve crop efficiency as scientists discover new ways to systematically optimize the yield potential of crops, allowing them to better cope with pests, fungi and environmental conditions, like drought.

Scientists are also growing increasingly aware of the idea that plant health should not be underestimated. A study published in in Veterinaria Italiana, "Healthy Plants: necessary for a balanced 'One Health' concept" highlights how plant pathology, veterinary science and food safety are interconnected. It notes that "all life forms depend ultimately upon sunlight to create the energy 'currency' required for the functions of living." However, there are risks involved: plants, like humans and animals, can be attacked by pathogens that can lead to reduced yields, lower quality products and lessened nutritional value.

"Plants, although generally relegated by humans to the bottom of the priority list, are absolutely essential to our survival," the study states. "Without plants, the transformers of solar energy, humans and animals would lack food and oxygen and, without the sun, the earth would be cold and all life would cease."

This interdisciplinary approach to studying the ecosystem or certain aspects of plant health is paramount. In response to concerns about microbial contamination of food plants and foodborne illness for example, the scientific communities of plant pathology and food safety repeatedly come together to study plant diseases and disease management strategies. In another study published in Phytopathology, "Human Pathogens on Plants: Designing a Multidisciplinary Strategy for Research," researchers conveyed that a multidisciplinary approach of food microbiology and the study of plant-microbe interactions before and after harvest have become increasingly relevant in understanding plant health and how it impacts humans and animals.

Aquaculture is a significant sector where biotechnology innovation is positively impacting the environment. The Maynard, Massachusetts based AquaBounty, with a hatchery and lab in Fortune Bay, Prince Edward Island, for example, is focused on climate-smart, land-based salmon farming, which reduces the cost and carbon footprint of salmon distribution and reduces the U.S. seafood deficit. "By raising our innovative salmon on land, closer to consumers, AquaBounty will radically reduce the transportation miles and carbon emissions associated with traditional salmon farming," says Dave Conley, AquaBounty's Director of Communications.

While biotechnology continues to spur innovative ways to bolster plant health, humans and animals also stand to benefit; after all, human health and animal health are not only interconnected, but they're exceedingly vulnerable to the health of the ecosystem in which they exist.

ONE HEALTH PART 3:
What One Health Can Teach Us About Antimicrobial Resistance

By Renee Morad; Thursday, June 22, 2017

This is the second part of a three-story series that looks at the ways in which the One Health movement drives biotechnology research and product development. This story provides insight about how a One Health approach could be the missing piece of the AMR puzzle.

While antibiotics is the foundation of modern medicine, agriculture is the foundation of civilization, says Laura Kahn, author of the book, "One Health and the Politics of Antimicrobial Resistance" (John Hopkins University Press). Now, considering that agriculture is as dependent on antibiotics as modern medicine, the global rise in resistance to antibiotics could not only threaten the foundation of modern medicine, but food supply and civilization as a whole.

In a 2016 report commissioned by then-British Prime Minister David Cameron called "Review on Antimicrobial Resistance," it was estimated that by 2050, 10 million lives would be lost globally each year to antimicrobial-resistant infections. Kahn says this points to the urgency of understanding antimicrobial resistance (AMR) under the One Health framework, which takes into account how human and animal health and the environment are all inextricably linked. "When each of these three areas isn't explored, we can't see the entire picture," she says.

In Europe in the late 1980s, there was a rise in a particular antibiotic resistant bacteria called vancomycin-resistant Enterococcus faecium (VRE), which afflicted humans and animals. Since vancomycin was chemically related to avoparcin, an antibiotic used to promote animal growth, researchers were led to believe that avoparcin was behind the rise in VRE. In 1995, the antibiotic avoparcin—which was relied on for food production in pigs—was banned in Denmark. Later, AMR surveillance data showed that VRE in pigs and poultry dropped by 90 percent in the twelve years that followed the ban. However, VRE in hospitalized patients remained high during this same timeframe.

In the U.S. the picture was very different, since the country never approved the use of avoparcin in livestock because of concerns about potential carcinogenicity. Thus VRE in pigs and poultry were zero, yet VRE in hospitals was a major issue. In 2008, when the entire genome of VRE was sequenced, it became clear that there are two distinct groups of VRE: one on farms and another in hospitals, and they are not related to each other.

"Up until now, AMR surveillance was conducted as if you'd group all people with red hair and say they were related to each other," Kahn says. "You can't determine how people are related to each other based on their hair color, and while bacteria might share the same resistance gene, it doesn't mean they're the same."

So what caused the VRE spike in hospitals? Researchers in Denmark discovered that the precursor to VRE in hospitals appeared to have come from dogs. Since "dogs share our homes, eat our food and share our beds, there are plenty of opportunities for the exchange of microbes," Kahn says. The findings showed that just like humans, pets too can be reservoirs of antibiotic resistance.

This particular case suggests that AMR surveillance systems should track entire genomes, not just resistance genes, and that companion animals should be tracked the same way that humans are. While this is just one example of why One Health needs to be part of the AMR dialogue, it's a stark reminder that when solving conundrums like these, the environment, humans and animals should all be part of the equation.

Pennies to Prevent Pandemics

The Global Virome Project as a Grand Challenge for Global Health

By William B. Karesh, D.V.M.; Thursday, June 22, 2017

William B. Karesh,
Executive Vice President for Health and Policy,
EcoHealth Alliance

What would you say if you were asked to spend a four or five cents a year to possibly prevent hundreds or thousands of deaths, reduce terrifying disease outbreaks and save billions of dollars in economic losses due to infectious diseases? Being asked this exact question recently became a distinct possibility. According to findings from a large international team (myself included) previously published in the scientific journal mBio, the universe of viruses lurking in the wild that could someday infect humans is far smaller and much more approachable than previously thought.

More analyses since the original work suggest that there are a half-million unknown viruses that could potentially infect people. Of course, like any scientific finding, it's based on a few assumptions that ultimately could make the total higher or lower. For example, rather than including all manner of animals, we limited the original calculation just to mammals (4,486 different species) because they share the most viruses with humans. But birds also carry a few others for which we are now including.

The work was not just theoretical and it was a massive multi-year undertaking, requiring the safe capture, sampling and release of thousands of very wild animals in very wild places, combined with sophisticated

laboratory diagnostics and high-end bioinformatics as just the beginning. Much of that work was being undertaken as part of a USAID global health program called PREDICT, so we knew what was feasible and what the efforts cost. Then, we recognized a grand opportunity: Rather than just waiting for the next outbreak or pandemic, could we take our experience, match it to what is known about biodiversity and determine the possibility and practicality of identifying every virus that could threaten human and animal health?

Without being so explicit, the work lays the groundwork for an achievable but grand challenge for both national and global health, worthy of investments from governments, foundations or private enterprise. Like the human genome project that has found the roots of thousands of genetic disorders and also the new human brain initiative that will unlock both imaginable and unimaginable mysteries, a Global Virome Project initiative will be big, bold, and immensely beneficial to humankind.

Every species carries dozens and dozens of different viruses, and in many ways they represent vast libraries of genetic material -- the code of life. Not having read all the books in the Library of Congress is understandable, but what if we had not yet even catalogued them? Biodiversity loss is the living world's equivalent of burning down the Library of Congress and its database before we've read the books.

The good news is that with advances in computational technology and the dramatic reduction in costs being seen in gene sequencing, we could actually reverse that trend and protect ourselves in the process.

So how much will all this cost? If we try to find every virus of every mammal, the estimate is $7 billion spread over 10 years. Of course, a cheaper approach might be possible. That's because doing a perfect job takes longer and costs more than just doing a great job which, when starting from near zero, would be hugely important.

If we forget about the rarest of the rare for now and focus on the viruses most likely to affect humans, it might be possible to capture 99% of these $3.4 billion spread over 10 years, or $340 million a year. That works out to just about four cents per person on the planet per year. I added another penny in my opening question just in case someone wants to include other animals, or delve into the sea to truly catalog all the possible viruses. To put this in perspective, the wildlife virus that became SARS in humans caught everyone off guard and resulted in $10-30 billion in economic losses around the world in less than a year – $3.00 per person on the planet – or roughly 100 times the annual cost of this grand challenge.

For more information on this initiative, go to: www.GlobalViromeProject.org

How Vulnerable are we to Mosquito-Borne Illness?

By Renee Morad; Thursday, June 22, 2017

Over the past year, there have been more than 5,000 Zika cases in the U.S., and the virus has been detected in more than 50 countries and territories, according to the CDC. Zika—transmitted by Aedes aegypti mosquitoes—has been linked to birth defects including microcephaly, a rare neurological condition in which babies are born with small heads and brain damage, as well as Guillain-Barré syndrome, which causes temporary paralysis in adults.
Zika certainly isn't the first mosquitoborne illness transmitted by Aedes aegypti mosquitoes that have created widespread risk and panic. Chikungunya, first described during an outbreak in southern Tanzania in 1952, and dengue, first recognized in epidemics in the 1950s in the Philippines and Thailand, are also looming threats. Some Aedes aegypti mosquitoes also carry West Nile, malaria and yellow fever. These types of viruses have had scientists working diligently over the years to deeply understand how these mosquito-borne illnesses spread and develop precautions and treatments to limit those infected.

"Mosquito-borne diseases present a very high threat," says Saravanan Thangamani, assistant professor of pathology at University of Texas Medical Branch. "The risk is much higher than, say, ticks, where you have to go into a wooded area to become infected. Since mosquitoes fly, there's an added layer of vulnerability, with pathogens being transmitted by Aedes aegypti mosquitoes carrying diseases like chikungunya, Zika or dengue."

Humans' vulnerability to Zika stems from several different factors, such as warm climates, poor areas where people are living without proper window screens and no air-conditioning and areas where pools of water are accumulating and creating breeding grounds for the mosquitoes. Other factors, such as the ease of global travel to high-risk regions and the fact that Zika can be sexually transmitted present additional risk.

Some progress has been made to gain a firmer understanding of the virus and its path to reach its status as a global health emergency. Researchers from three independent research group recently sequenced more than 100 Zika genomes taken from mosquitos and patients to trace the virus's journey from Brazil in late 2013 or early 2014 to neighboring countries over to the Caribbean and the U.S.

The genetic history of the virus, published in three papers in the journal Nature, could help developers find a cure and can help contain the virus. They plan to apply their findings to help develop a genetics-based global surveillance system that would aid in controlling the next outbreak, whether Zika-related or another type of threat.

Then there's British-based biotech company Oxitec, which is using an ecofriendly solution to tweak the genes of Aedes aegypti mosquitoes. They're genetically engineering male mosquitoes to pass on a self-limiting gene, which kills their offspring before they reach adulthood.

In March, WHO recommended that officials in Zika-prone areas consider pilot programs involving Oxitec OX513A mosquitoes, which have reduced populations of the insect by up to 90 percent in various trials in Brazil, Malaysia and the Cayman Islands. By reducing the population of these mosquitoes, they're also limiting the risk of other diseases that they transmit.

Despite public concern about genetically modified insects, some 78% of respondents in a Purdue University survey said they would support the introduction of genetically modified mosquitoes in the U.S. to curtail the risk of Zika. Furthermore, in an environmental assessment of engineered mosquitoes conducted by the FDA, the agency found that the mosquitoes will have no significant impact on the environment.

This type of technology fares better than more traditional interventions, such as insecticide spraying, which has proven to reduce Aedes aegypti populations by 30 to 50 percent. While combatting mosquitoborne diseases poses great challenge, scientists have made progress so far in reducing the reach of Zika—and will continue to work to uncover new ways to face this threat head-on.

BiotechNOW blogs:

To Improve Human, Animal and Environmental Health, Agency Coordination is Key
By Karen Batra, July 21, 2017

Looking closely at the concept of "One Health," it's logical to see the interconnectedness of human, animal and environmental health. By addressing the potential for infectious disease in animals and the environment, we can help prevent the transmission of infectious diseases among humans and enhance the health of the global population.

This concept was explored in detail at BIO's 2017 International Convention on June 19, which brought together experts from industry, government and academia for the Convention's "One Health Day" sessions.

BIO is especially interested in and supportive of One Health because the tools of biotechnology provide unprecedented opportunities for understanding, solving and preventing the web of interrelated problems threatening the health of people, animals and the environment.

"Seventy-five percent of emerging diseases such as Ebola or Zika come from animals," said Sen. Al Franken (D-Minn.) via video message at the top BIO's One Health Day program. "The biotechnology industry has an important role to play here, and your convention is a great example of One Health in action."

The increasing incidence of transboundary animal and zoonotic disease outbreaks, with emergence and re-emergence of new animal diseases, can often be traced to changes in climate, food security and agricultural practices. Recent outbreaks of diseases such as SARS, Ebola, Middle East Respiratory Syndrome, avian influenza, Bovine Spongiform Encephalopathy and Nipah, have caused major human suffering and enormous economic costs.

Governments must be ready. Encouraging a multidisciplinary and multisector public health policy approach is one way for the United States to improve its readiness.

Sen. Franken has been pushing legislation aimed at breaking down silos between human and animal health programs, and has introduced language in the Senate Appropriations Bill specifically aimed at enhancing the collaboration between government agencies to better prevent zoonotic disease outbreaks:

> "The Committee believes that complex problems affecting the health of humans, animals, and the environment are best solved through important communication, cooperation, and collaboration across disciplines, sectors, between agencies, and between other appropriate domestic and international actors.
>
> "The Committee requests a report detailing existing collaborative efforts between FDA, USDA, and other agencies to prevent and respond to zoonotic disease outbreaks in animals and humans; a proposed framework to improve these efforts; and specific activities requested to achieve the proposed framework."

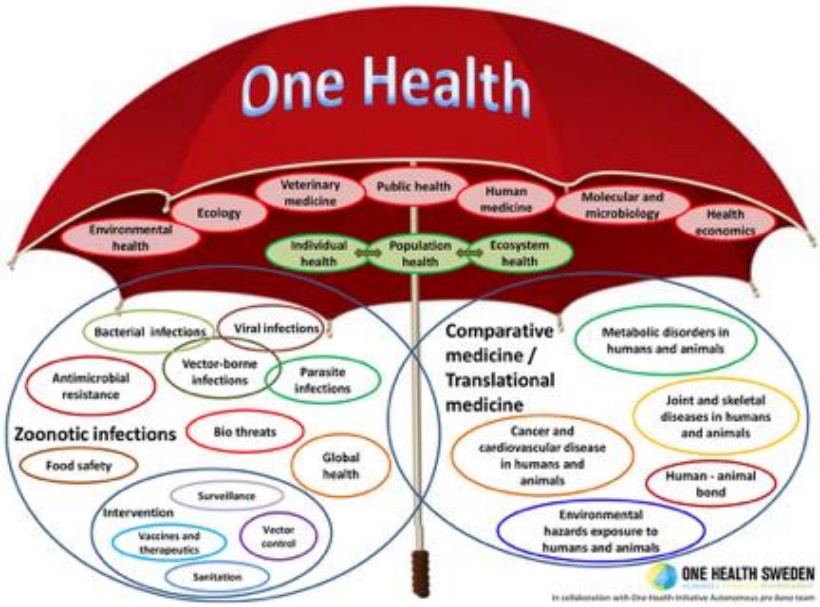
BIO supports efforts, both legislative and programmatic, to encourage cooperation and collaboration on One Health priorities. Doing so is a national public health priority.

One Health Holds the Key to Preventing the Next Pandemic
By Karen Batra, June 20, 2017

Can we combat disease threats before they even emerge? In the fight against infectious diseases, understanding where outbreaks are most likely to happen and under which circumstances can help us develop tools to address risk to potentially prevent the next pandemic.

This theme was explored at BIO's International Convention on Monday, June 19, during its "One Health Day" programming, which brought together different parts of the BIO family with sessions focused on issues linking human, animal and environmental health.

The One Health concept examines the connectivity between infectious diseases, the health of plants and animals, the health and safety of the environment and food security issues. All of these play a role in contributing to or controlling and preventing the threat of disease outbreaks. To be effective, prevention mechanisms need to address all of these areas and be put in place cooperatively by government, industry and academia on a global scale.



"Seventy-five percent of emerging diseases such as Ebola or Zika come from animals," said Senator Al Franken (D-Minn.) via video message. Franken is a sponsor of legislation aimed at breaking down silos between human and animal health programs. "The biotechnology industry has an important role to play here. And your convention is a great example of One Health in action."

In addition to Senator Franken, session speakers included:

- Dr. William Karesh, Executive Vice President for Health and Policy at EcoHealth Alliance
- Dr. Carsten Brunn, Bayer's Head of Pharmaceuticals, Americas Region
- Frank Terhorst, Bayer's Global Head of Seeds
- Dr. Eddie Sullivan, President, CEO and Co-Founder, SAB Biotherapeutics Inc., and Chairman, BIO Food & Ag Section Governing Board (moderator)
- Dr. Laura Kahn, Research Scholar, Woodrow Wilson School of Public and International Affairs, Princeton University and Co-Founder, One Health Initiative
- Dr. Nikos Gurfield, Adjunct Professor of Pathology, UC San Diego and County Veterinarian, San Diego County Vector Disease and Diagnostic Laboratory
- Adrianne Massey, Managing Director for Science and Regulatory Affairs, Food & Agriculture, BIO
- Phyllis Arthur, Managing Director, Infectious Diseases and Diagnostics Policy, BIO
- Joanne Duncan, President, Membership and Business Operations Division, BIO

Dr. Carsten Brunn, Phyllis Arthur, Dr. Adrianne Massey, Dr. William Karesh and Frank Terhorst.

"One Heath action requires the efforts of more than just policymakers, academics and practitioners. It is dependent on engagement, and often leadership, from civil society and the private sector," said Dr. Karesh, who pointed to international efforts such as The Global Virome Project, a global cooperative scientific initiative aimed at massively lowering the risk of harm from future viral outbreaks over 10 years.

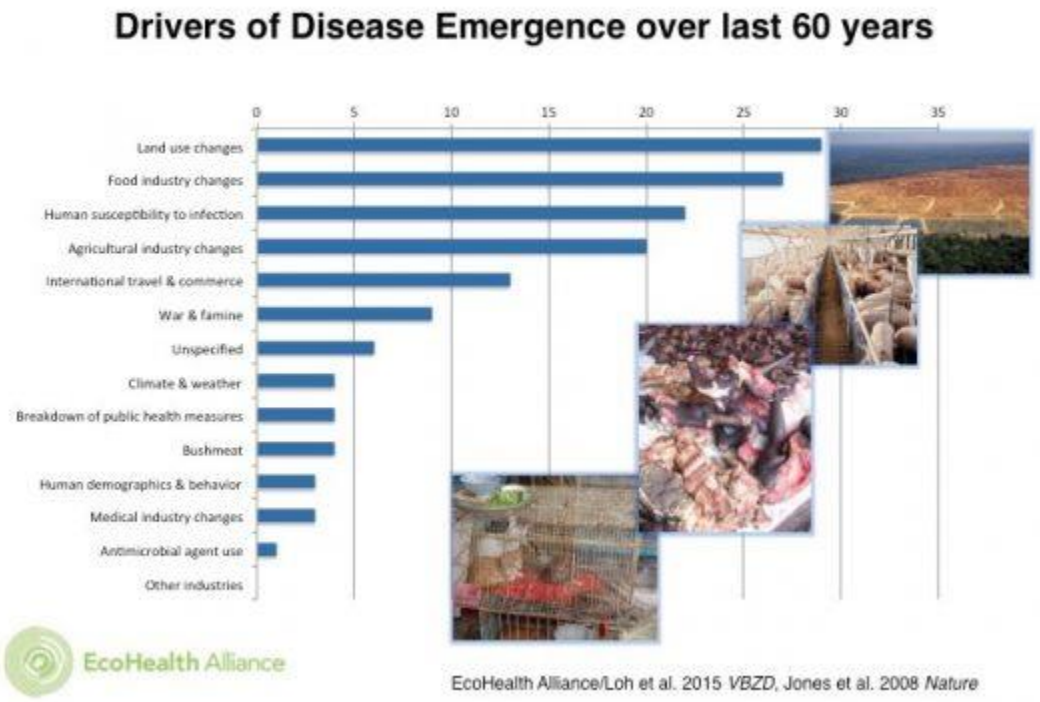
"One Health impacts economic health," explained Karesh. "The costs associated with a disease outbreak aren't just healthcare costs, but also the costs associated with loss of trade and social disruption." At BIO, we're working to breakdown the silos between plant, animal and human health to leverage the potential of One Health.

"Biotechnology is inherently interdisciplinary," said BIO's Adrianne Massey, "and BIO is a logical home for exploring the One Health concept and addressing the connectivity between animal health and human health."

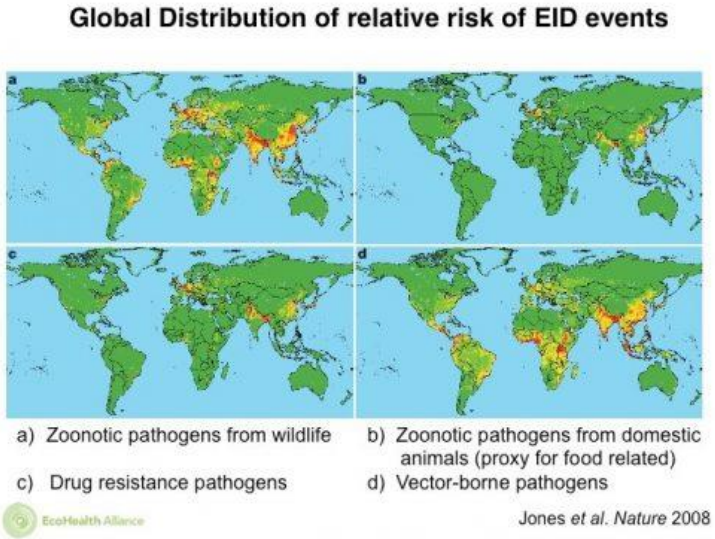
One Health for the 21st Century
By William B. Karesh, D.V.M., May 19, 2017

In remarkable ways, the embracing of the One Health concept over the last decade has resulted in a dramatic shift in the discussions, practices, polices and partnerships that link the health of people, animals and our shared environments. In part, One Health has benefited from many innovative, collaborative efforts well underway and years in the making. In other ways, the efforts have been focused on improving on 20th Century approaches and meeting 20thCentury goals rather than boldly leading us into the 21st Century. While the movement has had positive effects, the challenge remains to expand stakeholder engagement in One Health and think more broadly about where opportunities for impact may lie.

One Health is not only about infectious diseases; non-transmissible diseases, the health of plants and animals, the quality of our water and air, and the safety of the environment in which we live, share, and depend all fit within the rubric. But since infections shared among animals and people account for nearly two-thirds of human infectious diseases, and the majority of these are from wildlife, "low-hanging fruit" for collaborative benefits can be found at the human/animal/environment interface of infectious diseases and even pandemics. The environment and how we interact with it is key because we know that the leading drivers of disease emergence in humans result from activities such as land use change, food production systems, and trade and travel. This reality reveals the need to embrace a wider range of civil society and private sector partners and indicates the valuable role that the biotechnology sector can play.



We now have the ability to predict where outbreaks are most likely to happen and under which circumstances, thus we can take action to reduce risk and mitigate adverse outcomes. As with earthquakes, we can identify areas of higher risk, and we can engineer solutions to mitigate impact.



One Heath action requires the efforts of more than just policy makers, academics and practitioners. It is dependent on engagement, and often leadership, from civil society and the private sector. Fire safety serves as good analogy. Fire fighters don't just put out fires, they engage the community in fire prevention. School children are taught safety, buildings and products are designed and manufactured to be fire safe. Companies sell smoke detectors and fire extinguishers to private citizens. Data crunchers map out tax delinquencies as a predictor of arson. Health in the 21st Century requires this same whole of society effort and requires the creation of opportunities for the inclusion and engagement of a wide range of actors to participate. In essence, this is the heart of the One Health concept.

Dr. Karesh is scheduled to speak at BIO's 2017 International Convention in San Diego on Monday, June 19, as part of BIO's "One Health Day" programming. This unique half-day session provides an opportunity for attendees to engage in discussions around the promises of One Health innovations to help us better heal, fuel and feed the world.

Convention Programming to Feature "One Health" Concept

By Karen Batra, May 12, 2017

Bio-based Technologies Address Human, Animal, Plant and Environmental Health

At its heart, the concept of One Health is rooted in the notion that the health of humans, animals, and the environment are all interconnected. At BIO's 2017 International Convention (June 19-22 in San Diego), programming will feature the One Health concept through stories that show how science and technology are making tomorrow's breakthroughs possible.

On Monday, June 19, BIO will host "One Health Day," bringing together different parts of the BIO family with sessions focused on issues linking human, animal and environmental health. Scheduled speakers include:

Keynote: One Health for the 21st Century

- Dr. William Karesh, Executive Vice President for Health and Policy at EcoHealth Alliance

"The very concept of 'One Health' is ancient," says Dr. William Karesh, Executive Vice President for Health and Policy at EcoHealth Alliance. "But our world has changed dramatically, and what's really exciting is that with 21st Century innovation we have the opportunity to begin to end the pandemic era."

Human, Animal and Plant Health Connectedness – Industry's Role:

- Dr. Carsten Brunn, Bayer's Head of Pharmaceuticals, Americas Region
- Frank Terhorst, Bayer's Global Head of Seeds

"With emerging issues like a rapidly aging population and new and increasingly complex medical needs, our industry is at the forefront of advancements in science and technology that will help cure and prevent some of the most difficult-to-treat conditions, and improve lives," said Dr. Carsten Brunn, Bayer's Head of Pharmaceuticals, Americas Region. "With Bayer's focus across the life science ecosystem, we are actively working to discover and develop innovations that impact the health of people, animals, and plants."

"As the world's population is projected to increase by more than three billion people in the next thirty years, we will require an adequate supply of healthy food as well as improved medical care," stated Frank Terhorst, global head of seeds at Bayer CropScience. "Our research and development activities, fundamental to the well-being of society, are therefore linked by the concept of 'One Health,' with the goal of finding solutions to some of the major challenges of our time."

Panel Discussion: How to Move "One Health" Forward

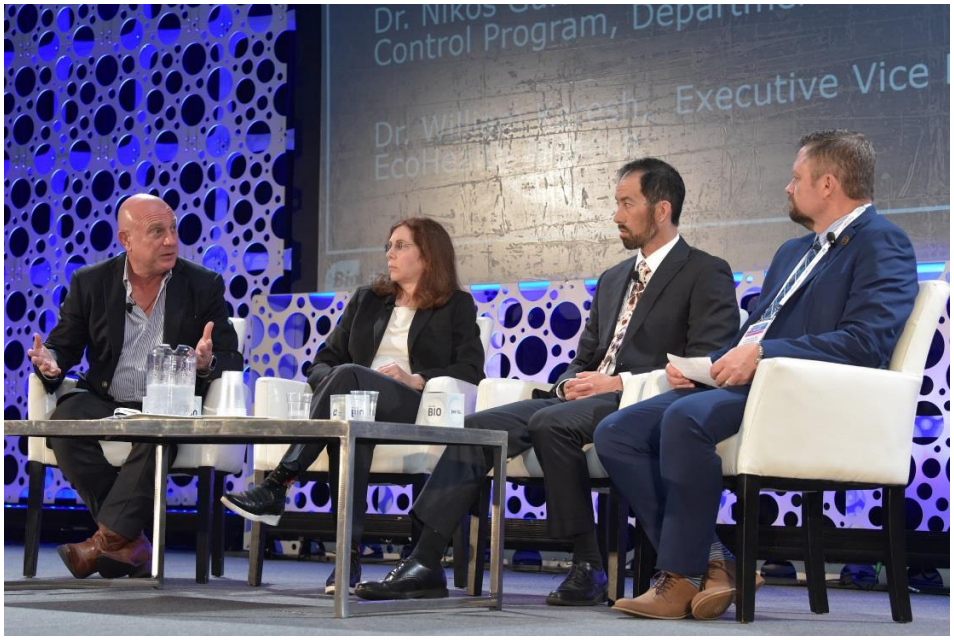
- Dr. Eddie Sullivan, CEO, SAB Biotherapeutics and Chairman, BIO Food & Ag Section Governing Board (moderator)
- Dr. Laura Kahn, Research Scholar, Woodrow Wilson School of Public and International Affairs, Princeton University and Co-Founder, One Health Initiative
- Dr. Nikos Gurfield, Adjunct Professor of Pathology, UC San Diego and County Veterinarian, San Diego County Vector Disease and Diagnostic Laboratory
- Dr. William Karesh, Executive Vice President for Health and Policy at EcoHealth Alliance
-

"Science and technology hold the promise of securing a healthier world for humans, animals and the environment," says Dr. Eddie Sullivan, CEO, SAB Biotherapeutics and Chairman, BIO Food & Ag Section Governing Board. "To make these breakthroughs a reality, we'll need a collaborative approach for addressing existing political and economic obstacles and opportunities."

In our speaker presentations and panel discussions, attendees will hear stories that illustrate the concept of "One Health" and how modern technologies are enabling us to solve global challenges through a collaborative One Health-focused approach. Panelists will also explore the barriers to success and what industry and others can do to solve the problems One Health is poised to address.

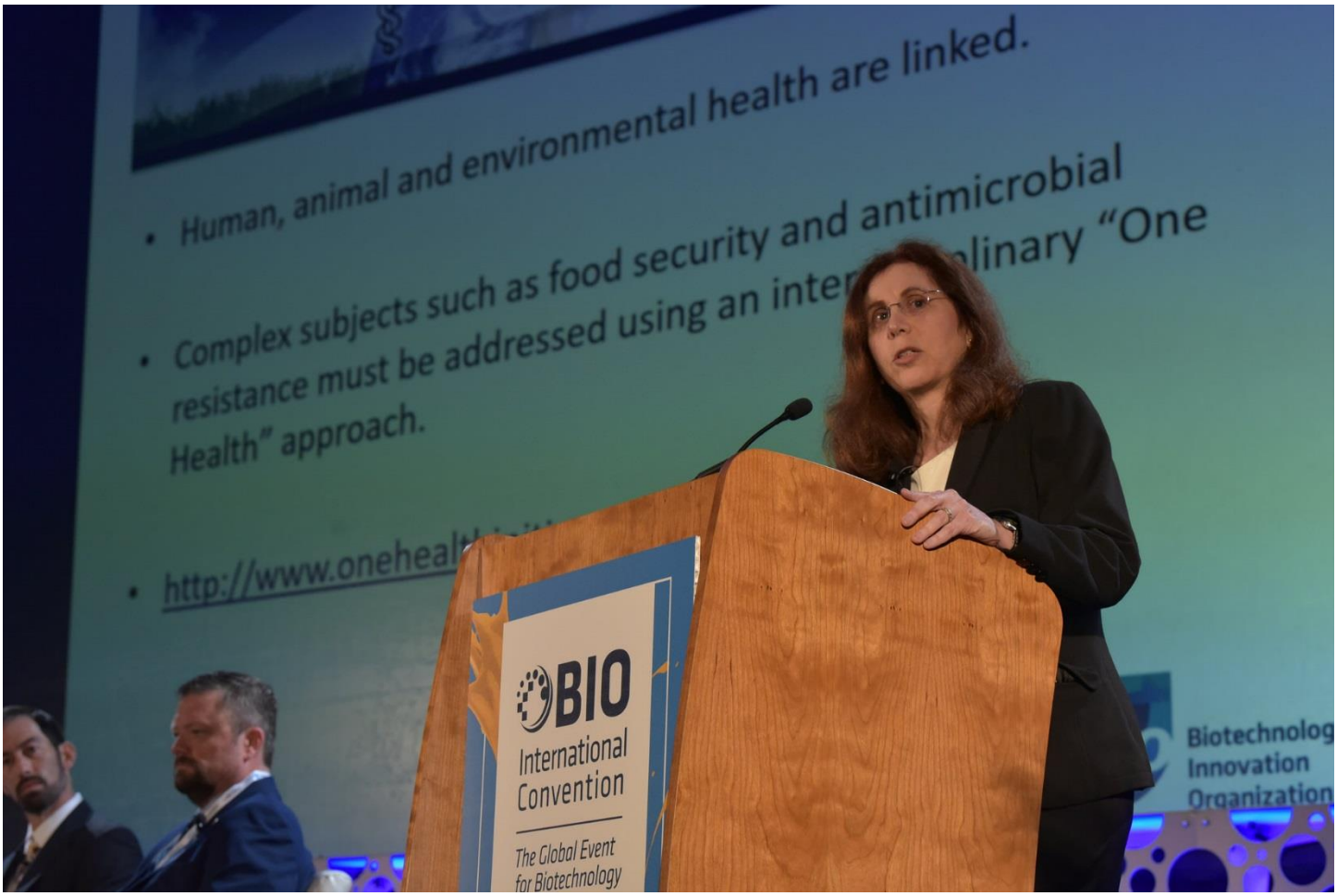
BIO 2017 International Convention (BIO 2017) is in San Diego June 19-22 and registration is now open! Check out the complete BIO 2017 programincluding Keynotes, Super Sessions, Educational Tracks and Fireside Chats with scientific experts, government leaders and leading biotech CEOs. And stay tuned for more updates as we approach BIO 2017!

Photos:




Global Distribution of relative risk of EID events
a) Zoonotic pathogens from wildlife
b) Zoonotic pathogens from domestic animals
c) Drug resistance pathogens
d) Vector-borne pathogens
Jones et al. Nature 2008
#BIO2017
EcoHealth Alliance
BIO
International Convention
The Global Event for Biotechnology


One Health
Environmental health
Ecology
Veterinary medicine
Public health
Human medicine
Molecular and microbiology
Health economics
Individual health
Population health
Ecosystem health
Viral infections
Vector-borne infections
Parasite infections
Bio threats
Global health
Vector control
Sanitation
Comparative medicine / Translational medicine
Metabolic disorders in humans and animals
Joint and skeletal diseases in humans and animals
Cancer and cardiovascular disease in humans and animals
Human - animal bond
Environmental hazards exposure to humans and animals


• Human, animal and environmental health are linked.
• Complex subjects such as food security and antimicrobial resistance must be addressed using an inter linary "One Health" approach.
• http://www.onehealth
BIO
International Convention
The Global Event for Biotechnology
Biotechnolog
Innovation
Organization


BREAKTHROUGH AT BIO 2017!
EDDIE SULLIVAN
SAB BIOTHERAPEUTICS
CONVENTION ACCESS


One Health Day