



The issue of
VACCINES

GRAND ROUNDS



Saint Louis University School of Medicine

FALL 2019

NOTHING EXEMPLIFIES THE MISSION OF SAINT LOUIS UNIVERSITY—THE PURSUIT OF TRUTH FOR THE GREATER GLORY OF GOD AND FOR THE SERVICE OF HUMANITY—QUITE LIKE THE CENTER FOR VACCINE DEVELOPMENT.

According to the World Health Organization, the only factor that is more important than vaccines toward fighting infectious disease is clean water, which is considered a basic human right. “Most of the population does not have adequate or any access to healthcare. If you can provide vaccines to people, you can prevent a lot of disease,” says Sharon Frey, M.D., Clinical Director, Center for Vaccine Development.

Vaccinations worldwide reduce or eliminate disease, improve primary care, and lower childhood mortality. They empower

women, who are then able to better plan their families, which has a ripple effect on public health—creating long-term social and economic benefits. Vaccination leads to increased life expectancy and longer, healthier lives are recognized as a prerequisite for an improved standard of living, which in turn promotes healthier living. “Vaccines are the only medical interventions that have resulted in the eradication of a disease from the human population,” adds Daniel Hoft, M.D., PhD, Director, Center for Vaccine Development.

VACCINATIONS ARE LIFE CHANGING.

TOGETHER, WE ARE EXPLORING THE NEW FRONTIER OF VACCINE DEVELOPMENT.



SAINT LOUIS
UNIVERSITY
— EST. 1818 —



9 RSV Vaccine
Trial Collaboration
for the Smallest Patients



10 Percentage
of Population
Vaccinated



12 30 Years of Influenza
Vaccine Leadership



16 INFLUENCING
VACCINE UPTAKE



ALUMNI IMPACT



19 / Dr. Charles Spencer



20 / Dr. John Pottage



21 / Dr. Martin Lagging



22 / Dr. Nicole Sullivan

24 WHY I GIVE



INSIDE
BACK
COVER

LEAVING A LEGACY
THE 1818 SOCIETY
LEROY FINK, M.D.

—1818—
SOCIETY
SAINT LOUIS UNIVERSITY.

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WELCOME DEAN WILMOTT

Saint Louis University President Fred P. Pestello, PhD is pleased to announce the appointment of Robert Wilmott, M.D., as Vice President for Medical Affairs and Dean of the Saint Louis University School of Medicine. Dr. Wilmott has been serving as Acting Dean and Vice President for Medical Affairs since January 2019.

Under Dr. Wilmott's leadership, the priorities of the SLU School of Medicine will include redeveloping the clinical and basic research programs, continuing to build on SLU's legacy of excellence in medical education, and developing an integrated healthcare network with SSM Health. He has prepared a three-year strategic plan for the School of Medicine and SLUCare, which is in alignment with SLU's fulfillment of its mission of teaching, research, healthcare, and service to the community.

Dr. Wilmott attended medical school at the University of London. He has served in leadership positions at SLU since 2001, including 17 years as Chair of the Saint Louis University School of Medicine Department of Pediatrics. Dr. Wilmott also served as Chief of Pediatrics at SSM Health Cardinal Glennon Children's Hospital. He specialized in treating children with pulmonary diseases, including cystic fibrosis and asthma, and his research interests include clinical and basic scientific aspects of cystic fibrosis.



“ THIS IS A WONDERFUL OPPORTUNITY TO MAKE A SIGNIFICANT CONTRIBUTION TO THE FUTURE OF THE MEDICAL SCHOOL AND SLUCARE. I AM VERY OPTIMISTIC ABOUT OUR FUTURE.

—ROBERT WILMOTT, M.D.

The background of the entire page is a dark blue field filled with a repeating pattern of colorful, stylized virus particles. These particles are spherical with various surface textures, including spikes, dots, and concentric circles, in shades of red, orange, yellow, green, and teal.

THE CENTER FOR VACCINE DEVELOPMENT

FOR OVER THREE DECADES, THE SAINT LOUIS UNIVERSITY CENTER FOR VACCINE DEVELOPMENT HAS BEEN ON THE FOREFRONT OF VACCINE RESEARCH AND DEVELOPMENT FOR INFECTIOUS DISEASES THAT THREATEN HUMAN HEALTH.



SHARON FREY, M.D.
*Clinical Director,
Center for Vaccine Development*

“/” WE’RE ALL PHYSICIANS, NURSES, OR OTHER PROFESSIONALS WHO ENTER VARIOUS FIELDS RELATED TO HEALTHCARE TO HELP PEOPLE. SOME PEOPLE FOCUS ON INDIVIDUALS, BUT IN OUR SITUATION WE FOCUS ON COMMUNITY.

—SHARON FREY, M.D.

THE CENTER IS ONE OF ONLY NINE RESEARCH CENTERS IN THE U.S. RECOGNIZED BY THE NATIONAL INSTITUTES OF HEALTH AS A VACCINE AND TREATMENT EVALUATION UNIT (VTEU), WHICH STUDIES INFECTIOUS DISEASES AND DRUGS, DEVELOPS NEW OR IMPROVED VACCINES, AND PROVIDES RAPID-RESPONSE CAPABILITY IN THE EVENT OF A PUBLIC HEALTH CRISIS.



The Center’s team is part of an elite national group of infectious disease specialists who are on the vanguard of worldwide vaccine development. Their expertise encompasses biodefense, emerging infectious diseases such as Ebola and Zika viruses, seasonal and pandemic influenza, and other viral, bacterial and parasitic infections. Work at the Center spans the full spectrum of the vaccine development process—from basic immunology research to clinical testing of candidate vaccines.

The multidisciplinary Center for Vaccine Development has conducted more than 100 studies with approximately 7,000 volunteers over the last 30 years. SLU’s Center for Vaccine Development’s contributions to the study of infectious diseases and vaccines are immeasurable. They have included the clinical development of the intranasal FluMist vaccine

(the live attenuated influenza vaccine), the development of safe and effective vaccines for smallpox and other potential bioweapons, and testing of new vaccines designed to protect against pandemic influenza, tuberculosis, herpes simplex virus (HSV), hepatitis C, dengue, and other diseases.

FUELED BY COMMUNITY



Part of what makes the Center so remarkable is its ability to enroll large numbers of volunteers rapidly into clinical trials, and vaccinate them in a safe, effective, and quick way. This ability to respond rapidly to the needs of vaccine testing is designed to counteract emerging public health concerns. “We’re all physicians, nurses, or other professionals who enter various fields related to healthcare to help people. Some people focus on individuals, but in our situation we focus on community,” explains Sharon Frey, M.D., Clinical Director, Center for Vaccine Development.

Former Saint Louis University President, Fr. Lawrence Biondi, was an early leader in supporting the Center for Vaccine Development. In approximately 1993, he very publicly volunteered for the AIDS vaccine trial, which was critical for the infectious diseases team to demonstrate that the vaccine was not going to cause AIDS, but was instead going to prevent infection.

Support from the St. Louis community has been invaluable to the development of life-saving vaccines—as people from around the region volunteer to participate in research studies such as influenza studies at the Extended Stay Research Unit.





“/” **WORKING WITH INFECTIOUS DISEASES IS A UNIQUE CHALLENGE. YOU DON'T KNOW WHAT'S GOING TO HAPPEN NEXT YEAR. HOW CAN YOU PLAN FOR THE UNKNOWN? BUT FORTUNATELY WE NOW HAVE THE TECHNOLOGY DEVELOP VACCINES MORE RAPIDLY.**

—DANIEL HOFT, M.D.

CENTER LEADERSHIP



The Center for Vaccine Development is led by Daniel Hoft, M.D., PhD, who has built his career around the study of pathogens which lead to infectious diseases. Dr. Hoft began his career with the Peace Corps as a senior malaria technician in Borneo, and realized just how much impact infectious diseases have on global health. After completing his M.D., clinical training in internal medicine and infectious diseases, and PhD in microbiology and immunology, he came to Saint Louis University School of Medicine where he worked with Dr. Robert Belshe, the renowned infectious diseases specialist who started the Center at Saint Louis University School of Medicine in 1989.

Dr. Hoft's work has advanced the understanding of the parasite *Trypanosoma cruzi* (also known as the “kissing bug”), the infection that causes Chagas disease, a leading cause of infectious heart disease in Latin America for which no licensed vaccines currently exist. If untreated, infection is lifelong and can be life threatening. Dr. Hoft has developed new Chagas vaccines that have proven effective in pre-clinical animal models, with the potential to be translated into new vaccines to protect humans.

In addition to Chagas disease, Dr. Hoft has advanced the fields of tuberculosis and universal influenza vaccine development. His team at the Center has also identified a potential new target for vaccines that activate a part of the immune system not previously known to be protective against tuberculosis and AIDS, as well as other diseases. Dr. Hoft's research has examined whether mucosal vaccinations and booster vaccinations can enhance immunity induced by conventional vaccination.

Tuberculosis is one of the top 10 causes of death worldwide, and is a leading killer of people who are HIV-positive.

Although tuberculosis is a treatable disease, cures require long-term treatments with multiple potentially toxic drugs and drug-resistant infections are increasing worldwide, which makes the Center's work critical for global health.

DEFENDING THE NATION



A critical part of the Center's work is biodefense—or national preparedness. The creation of the vaccine that eradicated smallpox is considered one of the greatest medical achievements in history. In 1980, following a global campaign committed to ridding the world of smallpox, the World Health Assembly declared smallpox eradicated—thanks almost entirely to the development of the vaccine. In response to concern that smallpox virus could be used as a bioterrorist weapon against the United States, SLU was early to begin exploring the best way to use existing supplies of Dryvax smallpox vaccine to protect U.S. populations.

Before 9/11, Dr. Frey, was conducting trials to see whether the smallpox vaccine could be diluted, in an effort to make additional vaccine stockpiles. Approximately 15 million doses of Dryvax smallpox vaccine have been stored since production stopped in 1983. However, it was estimated that controlling an outbreak of smallpox disease in the United States would require 40 million doses of vaccine. Working together with the other VTEUs, clinical trials showed the existing U.S. supply of smallpox vaccine could successfully be diluted up to 10 times and retain its potency, effectively expanding the number of individuals it could protect to 150 million.

In addition to smallpox vaccine leadership, the Center's work in bio-defense encompasses anthrax vaccines, plague vaccines, and others.





DANIEL HOFT, M.D.
*Director, Division of Infectious Diseases,
Allergy and Immunology
Professor, Department of Internal Medicine*

LOOKING AHEAD



No matter how much progress is made, the journey is long when it comes to vaccine development.

“Working with infectious diseases is a unique challenge,” says Dr. Hoft. “You don’t know what’s going to happen next year. How can you plan for the unknown? But fortunately we now have the technology available to more rapidly develop vaccines.”

Infectious diseases often impact the most impoverished groups around the world. Research from the World Health Organization has concluded that tuberculosis, malaria, and HIV/AIDS together account for nearly 18% of the disease burden in the poorest countries. Today, three-quarters

of the world’s children are vaccinated against infectious diseases, including millions in low-income countries, saving upwards of three million lives a year and preventing long term illness and disability in millions more. None of it would be possible without the work of researchers and physicians at organizations like the Saint Louis University Center for Vaccine Development.

Drs. Hoft and Frey not only stand behind the mission of the Center, they embody it every day. “We’re here to serve people,” Dr. Frey says. With the innovative research and development conducted at the Center for Vaccine Development, it’s only a matter of time until the next discovery, the next vaccine, or the next breakthrough that could potentially save the lives of millions.



THE CENTER HAS CONDUCTED
MORE THAN **100 STUDIES**
WITH APPROXIMATELY
7,000 VOLUNTEERS
OVER THE **LAST 30 YEARS.**

The clinical development of the intranasal FluMist vaccine is one of many contributions that SLU’s Center for Vaccine Development has made to the study of infectious diseases and vaccines.



RSV VACCINE TRIAL COLLABORATION FOR THE SMALLEST PATIENTS

Heidi Sallee, M.D., associate professor, and Mary Susan Heaney, M.D., professor in the Department of Pediatrics, Division of General Academic Pediatrics at Saint Louis University School of Medicine, are collaborating with Dr. Frey at the Center for Vaccine Development on a clinical trial to test the safety of a respiratory syncytial (RSV) vaccine.

While RSV is common and can cause mild cold-like symptoms, the respiratory virus can also be serious—especially for infants and small children with underlying respiratory conditions. The development of a vaccine would be significant because RSV is the most common cause of bronchiolitis and pneumonia in children younger than one. Of note, almost all children will be infected with RSV by the time they are two.

Drs. Sallee, Heaney and the SLUCare Physician Group at Cardinal Glennon Children's Hospital as part of a multicenter trial, are working to recruit a total of

160 patients across all sites to test three mucosal vaccines, as well as one placebo—40 participants in each arm of the trial. SLUCare Physician Group at Cardinal Glennon Children's Hospital is one of the sites selected to be part of the RSV clinical trial due to its significant patient volume, and commitment to leading edge patient care and health literacy.

Finding qualified trial candidates can be a challenge. Patients must be between 6 and 24 months old and must be in good health. Additionally, patients must not have been exposed to RSV in the past and cannot not spend time with other children under 6 months of age for one month after exposure to the vaccine.

Drs. Sallee and Heaney, together with the team at the Center for Vaccine Development, are an integral part of the team of researchers and healthcare providers who are working to ensure the safety, efficacy, and creation of the next generation of vaccines.

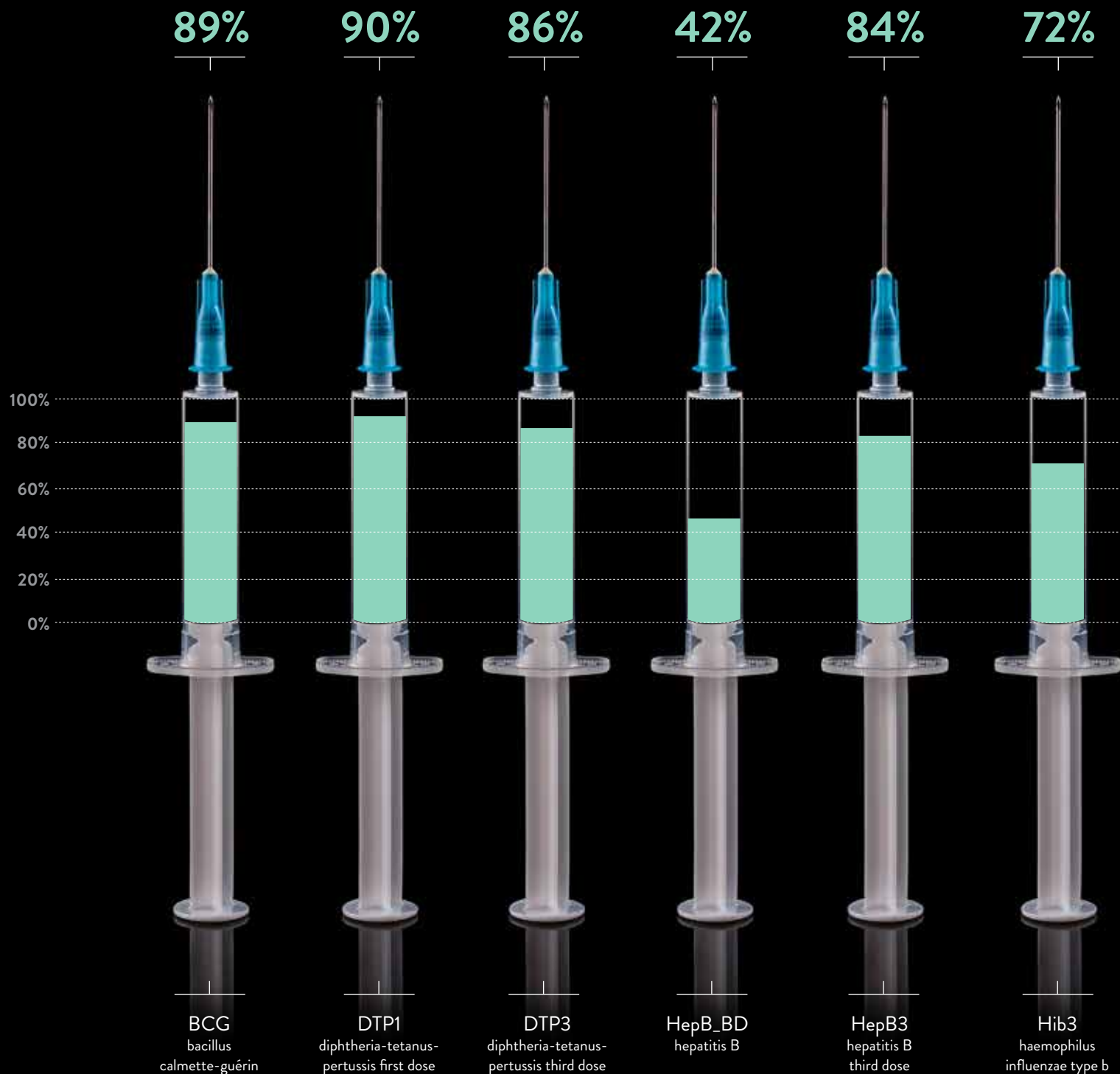


HEIDI SALLEE, M.D.
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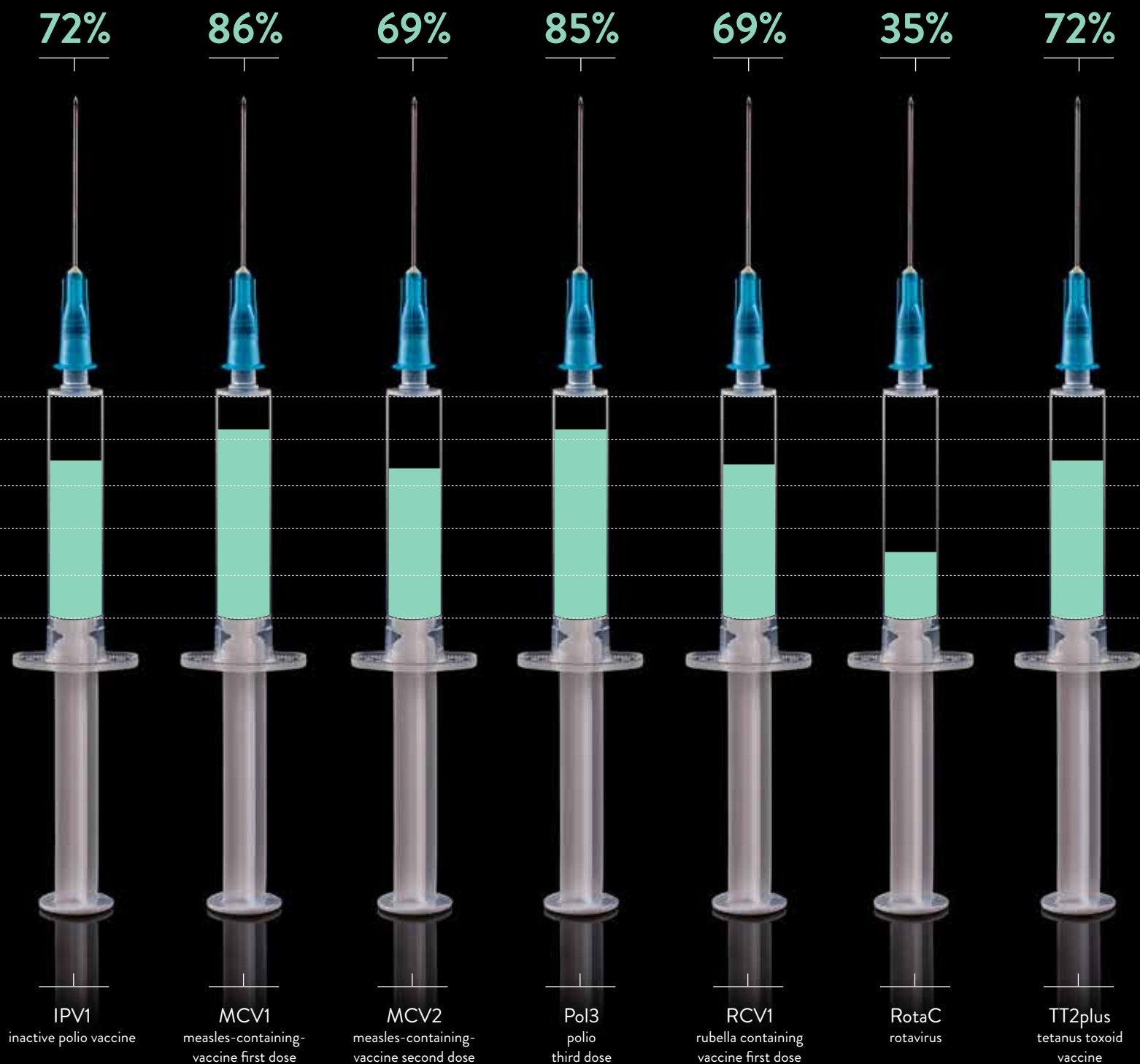


**MARY SUSAN
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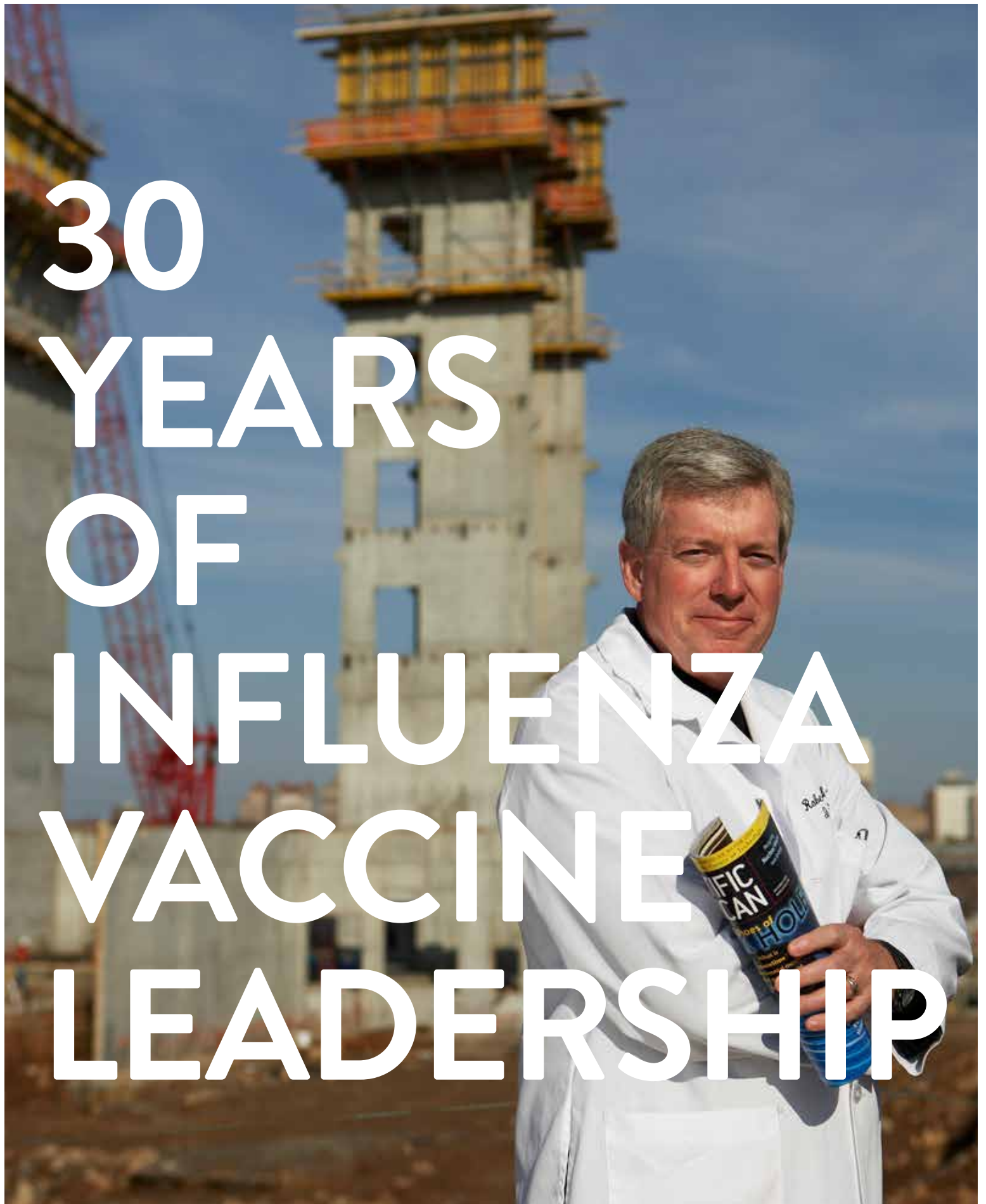
PERCENTAGE OF POPULATION VACCINATED BY ANTIGEN AND DOSE



PERCENTAGE OF GLOBAL POPULATION VACCINATED BY ANTIGEN BASED ON WHO-UNICEF ESTIMATES.



SOURCE: World Health Organization, www.who.int/immunization/monitoring_surveillance/data/en/



VACCINES ARE THE SINGLE MOST EFFECTIVE WAY TO PREVENT INFECTIOUS DISEASES, WHICH IS WHY SO MUCH TIME, ENERGY, AND MONEY ARE INVESTED INTO THE RESEARCH AND DEVELOPMENT OF VACCINES, ESPECIALLY FOR THOSE THAT PROTECT AGAINST THE FLU.

During the 2017-18 flu season, an estimated 48.8 million people in the United States became ill with influenza, there were almost 1 million hospitalizations and 79,400 deaths—the worst since the 2009 flu pandemic. While there are many ways to fight the flu—the most effective is getting a seasonal flu vaccine.

As one of only nine research centers in the U.S. recognized by the National Institutes of Health (NIH) as a Vaccine and Treatment Evaluation Unit (VTEU), the Saint Louis University School of Medicine's Center for Vaccine Development has been tasked by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, with developing a number of flu vaccines for the past 30 years, including the universal flu vaccine, which is expected to provide broad, durable protection from the flu.

Center Founder, Dr. Robert Belshe, Professor Emeritus, Division of Infectious Diseases, Allergy and Immunology, is on the forefront of the innovative field of influenza study. Dr. Belshe not only founded the Center but served as the Principal Investigator for nearly 25 years.

INFLUENZA VACCINES FOR OLDER PEOPLE

After his work on the attenuated vaccine for children, Dr. Belshe's team participated in clinical trials demonstrating an increased dose of flu vaccine in people over 65 elicits a better immune response (i.e. higher antibody levels). "Most people over the age of 65 receive a high dose influenza vaccine...we know they get a better immune response, and a better immune response means better protection," explains Dr. Belshe. This research led to the high-dose flu vaccine for adults 65 and over.

LESS IS MORE: INTRADERMAL FLU VACCINE SUCCESS

The Center for Vaccine Development has worked closely with the NIH to find ways to reduce the quantity of vaccines needed. Because it can be difficult to make enough of the influenza vaccine, one solution is to use a lower dose of the vaccine. One of the lower doses that was approved is an intradermal vaccine for younger people, which is injected between the layers of the skin—this requires significantly less antigen to elicit the same immune response.

PREVENTION OF CROUP

Dr. Belshe, jointly with the NIH, holds the intellectual property on a live attenuated parainfluenza vaccine that was developed by his laboratory at SLU. This vaccine is administered through the nose and is designed to protect against the virus that causes croup and pneumonia in children.



Completed in 2007, the Edward A. Doisy Research Center cost \$82 million to complete, is 10 stories tall, and totals over 206,000 sq. ft. of research space.

Dr. Robert Belshe poses in front of the Doisy Research Center construction in 2005.

“**VACCINE DEVELOPMENT IS SOMETHING THAT OCCURS NOT IN JUST A YEAR OR TWO, BUT OVER MANY, MANY YEARS OF RESEARCH AND CAREFUL CLINICAL TRIALS. I’LL PUT IT THIS WAY—ALL THE EASY VACCINES HAVE BEEN MADE.**”

—ROBERT BELSHE, M.D.

RECOGNIZED FOR VACCINE LEADERSHIP

Over the past 30 years, the relationship between the Center for Vaccine Development and Saint Louis University has remained steadfast. “The deans and presidents during my time here have been very supportive of our research,” says Dr. Belshe. The Center’s work has been recognized by the broader medical community as well. The Center for Vaccine Development has received commendations from the NIH for its work on smallpox vaccines after 9/11, and for its work on preventing the bird flu. The Secretary of Health and Human Services has visited the Center.

In the words of Dr. Belshe, “SLU is making a real contribution to our future by helping develop these vaccines. An important corollary to that idea is that it takes years. Vaccine development is something that occurs not in just a year or two, but over many, many years of research and careful clinical trials.”

“I’ll put it this way—all the easy vaccines have been made.”



Sarah George, M.D., is studying a vaccine candidate for yellow fever, which can be deadly and is sweeping Angola.

LOOKING AHEAD: UNIVERSAL FLU VACCINE AND THE FUTURE OF INFLUENZA

While many think of the flu as a yearly nuisance, the effects of influenza can be deadly—leading to 79,400 deaths in the U.S. alone in the 2017-18 flu season. The 2017-18 season was especially severe—with more than 22.7 million medical visits and more than 959,000 hospitalizations, and affecting all ages of the population.

The Center for Vaccine Development at Saint Louis University School of Medicine is currently researching ways to broaden the immune response so that people would not have to receive a vaccination every year to protect against the flu, but instead would receive a universal flu vaccine. A universal flu vaccine would protect against multiple subtypes of the influenza virus and may need to be administered only every 10 years or so—similar to tetanus—eliminating the need to update and administer the seasonal flu vaccine each year.

T CELL RESPONSE TARGETS

The current Director of the Center for Vaccine Development, Dr. Daniel Hoft, and his colleagues are developing novel vaccines that target the T cell response which are designed to protect against all influenza strains, past and future. So far, they have developed vaccines that work against multiple influenza types (both H3N2 and H1N1 viruses) in humanized mouse models. These new vaccines induce immune responses against parts of influenza A that are present in all pandemic streams throughout history, as well as in current concerning threats like the H5 and H7 bird flu viruses.



A room in SLU's Extended Stay Research Unit.



Ryan Michalesko / St. Louis Post-Dispatch / Polaris



Tammy Grant, business manager for the Center for Vaccine Development, displays the appropriate protective-wear that workers use at the Extended Stay Research Unit at Saint Louis University's Salus Center.

VOLUNTEERS MAKE THE DIFFERENCE

New research being conducted at the Center involves trials with volunteers at the Extended Stay Research Unit, which was created to provide a facility for testing the protective effects of novel vaccines in human volunteers against diverse influenza viruses. Located on the 5th floor of the Salus Center at Saint Louis University, this unit functions like a hotel and can accommodate up to 23 individuals at a time. The standard testing protocol first involves vaccination of participants with novel vaccines or placebo at its Vaccine Center Clinic in the Doisy Research Center. Then, after vaccine immune responses develop these subjects are quarantined within the Extended Stay Research Unit, challenged with influenza virus and monitored carefully for an average of 8 days to determine whether the novel vaccine protects against influenza infection. This work can greatly accelerate vaccine development by identifying the most promising candidates very early in the pipeline.

In addition to testing flu vaccines, Dr. Hoft is currently working on developing the Extended Stay Research Unit for use in testing novel vaccines for other illnesses, such as RSV (respiratory syncytial virus), and for drug development. Researchers will be able to challenge a volunteer with either influenza or RSV, then see if an investigational drug works as a therapy.

PANDEMIC PREPAREDNESS

Another major area of research at the Center for Vaccine Development is pandemic influenza, which is caused by a flu virus that has undergone an antigenic shift, resulting in a virus that is easily spread from person-to-person. When this happens, most people have little to no immunity to the new pandemic flu virus, which can lead to global outbreaks associated with massive mortality and morbidity. Both the T cell targeting vaccines being developed at SLU and the influenza challenge studies conducted at the Extended Stay Research Unit have the potential to revolutionize our ability to protect against future influenza pandemics. The research and development around pandemic influenza is funded by the National Institutes of Health and the Department of Defense—because of the potential for the virus to be used in biowarfare.

ANOTHER MAJOR AREA OF RESEARCH AT THE CENTER FOR VACCINE DEVELOPMENT IS PANDEMIC INFLUENZA, WHICH IS CAUSED BY A FLU VIRUS THAT HAS UNDERGONE AN ANTIGENIC SHIFT, RESULTING IN A VIRUS THAT IS EASILY SPREAD FROM PERSON-TO-PERSON.

INFLUENCING VACCINE



HOW CAN PHYSICIANS INFLUENCE VACCINE UPTAKE?

According to Terri Rebmann, PhD, RN, CIC, FAPIC, Professor, Epidemiology and Biostatistics, College for Public Health and Social Justice, and Director, Institute for Biosecurity at Saint Louis University College for Public Health and Social Justice, healthcare providers at many points along the lifecycle continuum are uniquely positioned to positively impact vaccine uptake.

Centers for Disease Control and Prevention (CDC) research shows that many adults are not aware of all the vaccines they need. As a result, U.S. vaccination rates for adults are extremely low. For example, in 2016 only:

- 26.6%** | of adults 19 years or older have received Tdap vaccination.
- 24.0%** | of high-risk adults 19 to 64-years-old received the pneumococcal vaccination.
- 43.5%** | of adults 18 years or older received the flu vaccination during the 2015-16 flu season.



OB/GYNS AND VACCINE UPTAKE

Pregnant women and their babies are at an increased risk for influenza-related complications, including premature labor and preterm birth. Pertussis outbreaks also continue to occur with infants at highest risk of hospitalization and death, and a high number of OB/GYNs recommended parents receive the pertussis vaccine.

However, low immunization rates persist among pregnant women in the U.S. During the 2017-18 influenza season:

- 49.1%** | of pregnant women received influenza vaccination before or during pregnancy.
- 54.4%** | of women with a live birth received Tdap during pregnancy.
- 32.8%** | received both recommended vaccines.

UPTAKE



HOW GERIATRICIANS AND PRIMARY CARE PROVIDERS CAN HELP

The CDC identifies adults over age 65 as higher-risk for vaccine preventable diseases and recommends vaccines for influenza, tetanus, pneumonia, and shingles. Each year, about 18,000 adults 65 years or older die and 400,000 end up in the hospital because of pneumonia caused by pneumococcal bacteria. Another 1 million Americans get shingles, which can cause severe post-herpetic neuralgia or other painful complications for years afterwards. Yet, vaccine coverage among adults age 65 and older remained low in 2016:

33% | did not report pneumococcal or Td vaccination.

80% | did not report Tdap vaccination.

66% | did not report a shingles vaccination.

HOW ONCOLOGISTS CAN DRIVE VACCINATIONS FORWARD

The vaccine conversation is critical for oncologists because “individuals who are immunocompromised, such as those receiving chemotherapy for cancer are at higher risk of getting influenza and other vaccine preventable diseases,” according to Dr. Rebmann. So if oncology patients can be vaccinated, they should be. Family and household members should also be vaccinated to protect the immunocompromised individual.



HAVE THE TALK

Dr. Rebmann believes that if primary care providers would start looking more holistically at all individuals’ risk for influenza and asking about occupational exposure or risk, it would add to the overall vaccine conversation, and more individuals within a family may become vaccinated.

“Primary care providers should ask about occupational risk. For instance, if the patient is a child care employee or they work in any healthcare setting, including long term care facilities, they work with a really vulnerable population—children, the immunocompromised, and the elderly. Vaccinating these individuals can reduce their risk of illness as well as protecting their vulnerable patients or clients,” she explained.

Most adults believe vaccines are important and research has found that individuals are much more likely to receive them if recommended by their healthcare professionals. This high level of patient trust places physicians and other medical professionals firmly at the forefront in the fight against vaccine-preventable diseases.

ALUMNI IMPACT



GRAND ROUNDS TALKS TO FOUR ALUMNI WHO ARE MAKING GREAT STRIDES IN THE AREA OF IMMUNOLOGY AND VACCINES.



CHARLES SPENCER, PhD

(PhD '08)

TELL US ABOUT YOUR CURRENT ROLE.

Following the receipt of a PhD in Molecular Microbiology and Immunology in May 2008, I obtained a postdoctoral fellowship at Vanderbilt University School of Medicine under the mentorship of Dr. Sebastian Joyce. Here, we were studying the persistence and success of the smallpox vaccine using human donors who had been previously vaccinated against smallpox. The goal of this research was to understand why the smallpox vaccine was so successful in order to apply those principles to the development of new vaccines. Subsequently, I obtained a faculty position at The University of Texas at El Paso (UTEP) under the leadership of Dr. Diana Natalicio, (another SLU grad) where my laboratory seeks to understand the immune response to bacterial infections and develop immunotherapies and vaccines to prevent bacterial disease. I was awarded tenure last year and now hold the position of Associate Professor with Tenure. In addition, I have become the Associate Chair of the Department of Biological Sciences, College of Science.

WHAT IS YOUR BEST MEMORY OF SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE?

The best thing about SLU was the people. The faculty, staff and students in the Department of Molecular Microbiology and Immunology were amazing. You can get a PhD at many places but it takes special people to not only make the rigorous work enjoyable, but to also understand why you're doing it.

HOW HAS THE SLU MISSION INFORMED YOUR WORK?

The mission of SLU really became ingrained in my ethics as I sought to work to better the health of humanity through understanding how the immune system protects us from harm, and develop new therapies and vaccines to cure disease. I was fortunate to find a faculty position at another major research university, UTEP, with a similar mission. UTEP's mission of access and excellence to those less fortunate but just as worthy in our region mirrors that of SLU's mission to serve humanity, even the least of these. In all things, I have sought to pursue truth in service to humanity.

IF YOU COULD GO BACK IN TIME, WHAT ADVICE WOULD YOU GIVE YOURSELF AS A DOCTORAL STUDENT?

Don't worry and follow where you're led. I've had a lot of unexpected deviations in my career that were in no way planned. But, with God's help, it worked anyway.

FROM YOUR PERSPECTIVE, WHAT CHALLENGES ARE ON THE HORIZON FOR THE FUTURE OF INFECTIOUS DISEASE? HOW ARE YOU PREPARED TO MEET THOSE CHALLENGES?

One of the courses that I have developed and teach focuses on the interaction between infectious diseases and their human hosts; herein, we talk about these challenges. While diseases of the person, e.g., cancer, diabetes, etc., are in the range of being cured, infectious diseases will continue to baffle and confound researchers and doctors. With the continued growth of the human population and expansion of our range of influence, the future of infectious diseases is a looming cloud of uncertainty. As humans venture into parts of the globe previously uninhabited or unexplored, we risk coming into contact with previously unknown infectious diseases. Diseases that circulate and have become adapted to their animal host are now thrown into contact with humans. The expansion of their host range is typically met with very severe outcomes for the new host, in this case us, e.g., HIV, Ebola, SARS, etc. The number of new infectious diseases continues to rise and the challenge is finding a way to deal with them. We are positioned at the cusp of these diseases. While we are not out in the field identifying new infections and combating the disease that they cause, our research on zoonotic diseases, those coming from animal reservoirs, places us center stage to deal with these diseases. In addition, the presence and utility of our high containment laboratory allow us to safely work with microbes that cause more severe diseases.



JOHN POTTAGE, PhD

(M.D. '78)

TELL US ABOUT YOUR CURRENT ROLE.

I am the Chief Scientific and Medical Officer and one of the founders of ViiV Healthcare, a company that is focused on the discovery, development and commercialization of medicines for the treatment of HIV Disease. The company is a joint venture between GlaxoSmithKline, Pfizer and Shionogi. I am accountable for the scientific and clinical strategy for developing new medicines for the treatment of HIV. Much of the work now relates to the development of long-acting injectable medicines and treatments for the long-term remission and cure. I also oversee the safety, pharmacovigilance, regulatory, and medical affairs activities of the company.

WHAT IS YOUR BEST MEMORY OF SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE?

My best memories relate to the third-year rotations at St. Louis City Hospital in Internal Medicine and OB/GYN. This was a 'typical' municipal hospital where, although the services were quite limited, I really learned how to take care of patients and see how all members of the healthcare team work together. This experience taught me what a great privilege it is to take care of patients and be part of their lives during both tough and good times.

HOW HAS THE SLU MISSION INFORMED YOUR WORK?

Doing what's best for the patient has always informed my career both in academic medicine and in the Biotech/Pharma industry. There were so many great clinicians who taught at SLU and all taught it is the patient who is at the center of our work. Doing well for patients is the core mission.

WHAT HAS BEEN THE MOST SURPRISING THING ABOUT YOUR CAREER JOURNEY?

The most surprising aspect of my career journey is that most of my career has been related to HIV, a disease that was not described when I was in medical school.

HIV/AIDS was first described in June, 1981, 2 weeks before I started my ID Fellowship. I spent 20 years in academic medicine taking care of patients and then the last 20 years in industry. Amazingly, I have helped lead an IPO for a small biotech company and over the last 10 years I have helped to found and grow a company producing important new medicines for the treatment of HIV. To top this off, last April I rang the Opening Bell at the NYSE to celebrate the company's 10th year. I would never have imagined that back in medical school.

FROM YOUR PERSPECTIVE, WHAT CHALLENGES ARE ON THE HORIZON FOR THE FUTURE OF INFECTIOUS DISEASE? HOW ARE YOU PREPARED TO MEET THOSE CHALLENGES?

The greatest challenges in infectious disease are twofold: 1) The emergence of resistance of microorganisms outpacing the availability of new anti-infectives. There is a misperception that most infectious diseases have been solved and have great therapies. 2) The emergence of new diseases or reemergence of old infections that have caught us by surprise. In my career in Infectious Diseases, a short (and incomplete) list includes toxic shock syndrome caused by Staph, HIV, multi-drug resistant bacterial infections, Ebola and Zika virus. The only way to prepare for these challenges is to maintain constant vigilance and continue providing resources for public education, and research and development of new treatments. Complacency is the greatest enemy we have.

WHAT IS THE BEST BOOK YOU'VE READ IN THE LAST YEAR?

"The Gene: An Intimate History" by Siddhartha Mukherjee. This is an extremely well-written book about the history of molecular biology starting with the work of Gregor Mendel. With the future and rapid advances of medical therapeutics centering on cell and gene therapy, Mukherjee provides a basis for understanding these exciting new therapies as well as the potential pitfalls of where we are headed.



MARTIN LAGGING, PhD

(RESIDENCY '95)

TELL US ABOUT YOUR CURRENT ROLE.

I am a professor in Virology at the University of Gothenburg in Gothenburg, Sweden.

WHAT IS YOUR BEST MEMORY OF SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE?

All the wonderful, generous, and considerate friends, colleagues, mentors, and patients in St. Louis.

HOW HAS THE SLU MISSION INFORMED YOUR WORK?

The SLU mission to pursue truth is a major part of my daily work and how I wish to live.

WHAT HAS BEEN THE MOST SURPRISING THING ABOUT YOUR CAREER JOURNEY?

To have been given the opportunity to be a fellow in Infectious Diseases at SLU. That changed everything for me and my family, and opened our eyes to a new world.

IF YOU COULD GO BACK IN TIME, WHAT ADVICE WOULD YOU GIVE YOURSELF AS A MEDICAL STUDENT?

I would not change anything. I have always believed that it is important to enjoy life and to be happy. By so doing, it is easier to help others who find themselves in difficult and challenging situations.

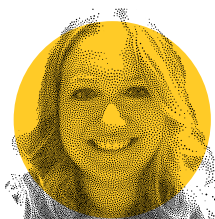
FROM YOUR PERSPECTIVE, WHAT CHALLENGES ARE ON THE HORIZON FOR THE FUTURE OF INFECTIOUS DISEASE? HOW ARE YOU PREPARED TO MEET THOSE CHALLENGES?

I believe there are two major challenges for the future of infectious disease: 1) To establish new financial incentives so that the pharmaceutical industry once again develops new antibiotics as resistance is becoming an increasing challenge globally.

2) To continue to develop new anti-viral therapies and vaccines to combat new as well as old threats, e.g. Ebola, Dengue, West Nile, Tick-borne encephalitis, RSV, etc. Even viral infections for which efficacious vaccines are currently available, e.g. measles, are reemerging, highlighting the need for anti-viral medications in addition to vaccines.

WHAT IS THE BEST BOOK YOU'VE READ IN THE LAST YEAR?

"A Little Life" by Hanya Yanagihara.



NICOLE SULLIVAN, PhD

(PhD '12)

TELL US ABOUT YOUR CURRENT ROLE.

I am a senior scientist in Infectious Diseases and Vaccines at Merck in West Point, Pa. I'm a B cell and T cell immunologist who studies immune responses to different viruses and viral vaccines, and correlates of vaccine durability. Being at Merck has shown me that what we do at the laboratory bench can have a meaningful impact in helping human health worldwide. Working with the people at Merck, whether it be the scientists I interact with daily all the way to the CEO of our company, has inspired me to be more thoughtful and innovative.

WHAT IS YOUR BEST MEMORY OF SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE?

My fondest memory was getting to interact with my PhD mentor, Dr. Daniel Hoft. He taught me how to be a good scientist but more importantly, how you can treat people kindly and with respect. Additionally, working with all the wonderful people in the departments of Molecular Microbiology and Immunology and Internal Medicine—Division of Infectious Diseases, Allergy and Immunology. Everyone was always willing to talk about my research, whether it be troubleshooting an experiment or understanding the big picture. I very much enjoyed my time as a graduate student at SLU.

HOW HAS THE SLU MISSION INFORMED YOUR WORK?

Part of the mission at SLU is to seek excellence in service to the community. Working on infectious diseases and new vaccines to potentially help society, whether it be locally or internationally, has always been important to me.

WHAT HAS BEEN THE MOST SURPRISING THING ABOUT YOUR CAREER JOURNEY?

I have been interested in infectious diseases since I was in high school. I had planned to go to medical school, but once I started doing laboratory research, I knew that is where I belong. I love being in the lab asking questions and trying to figure out the answers to both small and large questions/problems.

IF YOU COULD GO BACK IN TIME, WHAT ADVICE WOULD YOU GIVE YOURSELF AS A GRADUATE STUDENT?

To learn to think more outside the box. As a graduate student learning immunology, it can be easy to just repeat what has been done before but in a slightly different way. Stepping outside the box and being innovative can be more challenging, but it is ultimately where many of the scientific breakthroughs come from.

FROM YOUR PERSPECTIVE, WHAT CHALLENGES ARE ON THE HORIZON FOR THE FUTURE OF INFECTIOUS DISEASE? HOW ARE YOU PREPARED TO MEET THOSE CHALLENGES?

One challenge in developing new vaccines for infectious diseases is understanding the mechanisms/correlates of immune-mediated protection. For example, shingles is caused by reactivation of varicella zoster virus as one ages. The number of VZV-specific T cells decreases with age and is associated with an increase in shingles incidence. Thus, the primary correlate of protection is the number of VZV-specific T cells. However, not all infectious disease agents have a clear mechanism of protection. Another herpes virus, herpes simplex virus 2 (HSV-2), is a major health burden worldwide, yet we still don't quite understand what results in protection. Thus, understanding mechanisms of protection against infectious diseases is important for rational vaccine design and is something I currently work on for several pathogens.

WHAT IS THE BEST BOOK YOU'VE READ IN THE LAST YEAR?

"Vaccinated: One Man's Quest to Defeat the World's Deadliest Diseases" by Paul Offit. During Maurice Hilleman's 30 years at Merck, he developed eight vaccines: measles, mumps, rubella, hepatitis A, hepatitis B, meningitis, pneumonia and *Haemophilus influenzae*. One could argue Dr. Hilleman has helped to save more lives than any other scientist in the 20th century. As I am in the same department that Dr. Hilleman used to chair, it is a great inspiration and legacy to aspire to. Dr. Hilleman would have been 100 this year!

GET ENGAGED WITH THE SLU SCHOOL OF MEDICINE

KNOW YOUR VACCINE FACTS

Make sure you're ready to guide your patients when it comes to vaccinations. The CDC offers healthcare providers resources in various formats—flyers, fact sheets, posters, videos, web buttons—and includes links to other useful websites. CDC materials can be downloaded, copied, and distributed to patients, and some items can be ordered through an online ordering system.

JOIN US

We hope to see you soon at an upcoming event—please visit [SLU.edu/medicine](https://slu.edu/medicine) for the latest SLU School of Medicine event calendar.

GIVE

Your gift helps define the future of Infectious Diseases at SLU. For more information on making a gift, please email MedAlumni@SLU.edu or contact a member of the development staff.

STAY IN TOUCH

We are always interested in our graduates' news and accomplishments, both personal and professional. If you have news to share or wish to update your address, please fill out the form at Alumni.SLU.edu/StayConnected. We encourage you to send your contact information so we may keep you informed about reunions, events in your area, and news from the School of Medicine, as well as invite you to submit class notes for publication online.

VISIT THE SLU SCHOOL OF MEDICINE ONLINE

There's a lot more to learn about your School of Medicine online, including:

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How can we better serve you? Let us know with your comments and recommendations at MedAlumni@SLU.edu.



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WWW.SLU.EDU/MEDICINE/GRAND-ROUNDS

WHY I GIVE

“/” MY GIFTS TO SLU ARE IN APPRECIATION FOR THE OPPORTUNITY OF A MEDICAL EDUCATION AS WELL AS A MENTOR WHO CONNECTED ME TO A 33-YEAR MEDICAL ONCOLOGY CAREER AT THE SPRINGFIELD, ILL. CLINIC. I MET MY LATE HUSBAND AT SLU MEDICAL SCHOOL. OUR OLDEST SON IS A GRADUATE OF SLU LAW. NONE OF THIS WOULD HAVE BEEN POSSIBLE WITHOUT SLU GIVING ME A CHANCE BACK IN 1976. THANK YOU!



— DR. KAREN HOELZER (M.D. '80)



Duane Moore, a SLUCare physician, (M.D. '02, MPH '14) and Katrina Moore, Associate Professor in the History Department of the College of Arts & Sciences, created the John Berry Meachum Scholarship to provide tuition funds for medical school students who are from an educationally or economically disadvantaged background. The decision to support SLU derives from a family of SLU graduates. Duane's mother, Caroline Moore, is a graduate of the School of Nursing ('74) and his sister, Laura Hughes, is a graduate of the School of Law ('14).

The Missouri State Medical Association (MSMA)'s physician members understand the challenges—mental, physical and financial—medical students face. Through the MSMA Foundation, members have made scholarship funding a priority, and are honored to provide \$40,000 in MSMA Scholarships to SLU School of Medicine students each year.



< *Elissa Arnold, center, a third-year student at Saint Louis University School of Medicine, received one of 10 MSMA Scholarships awarded to SLU medical students in 2019. Elissa is a student member of MSMA and a graduate of Jefferson City High School. She is pictured with longtime MSMA member William Fogarty, M.D., a retired endocrinologist and SLU Med alumnus, and Mary Walley, coordinator of Student Financial Services at SLU.*

LEAVING A LEGACY

With Support for the School of Medicine



**SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE RECEIVED
A \$4.5 MILLION GIFT FROM THE ESTATE OF ALUMNUS LEROY FINK, M.D.
(MED '56), TO SUPPORT THE SAINT LOUIS UNIVERSITY CANCER CENTER.**

Dr. Fink was a lifelong supporter of the University and named the School of Medicine as a beneficiary of his estate, providing funds that will be used to support the Cancer Center, specifically for research and clinical care.

“We are incredibly grateful for Dr. Fink’s longtime support of the School of Medicine, and we are delighted to receive this gift,” said Robert Wilmott, M.D., dean of the School of Medicine. “I am proud to have alumni who care so much for the future of the University and its students. Dr. Fink touched many lives during his lifetime, and his legacy will touch countless more through the work we will be able to do in the Cancer Center.”

You can leave a legacy, by including a bequest to Saint Louis University School of Medicine in your will or living trust. It’s easier than you might think. By naming Saint Louis University School of Medicine a beneficiary, you will ensure that our research and educational mission continue even after your lifetime.

FOR MORE INFORMATION, CONTACT

Kent LeVan, *Executive Director of Planned Giving*
314-977-2357
email: plannedgiving@SLU.edu

The 1818 Society honors alumni and friends who have invested in Saint Louis University’s future through planned gifts. These gifts include bequest provisions in a will or trust, life income arrangements, gifts of life insurance, and beneficiary designations made with retirement assets or insurance policies.





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THE WHITE COAT SOCIETY

The School of Medicine is proudly and generously supported not only by our alumni, but also by many of our faculty members. They know that it takes ongoing support to continue providing an excellent learning environment for our medical students and residents, and to engage in meaningful research.

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The White Coat Society celebrates the partnerships between Saint Louis University School of Medicine and alumni, faculty, and friends who choose to make annual contributions of \$2,500 or more. Members of the White Coat Society are also included in the President's Circle Giving Society, which honors generous donors across the university.



Left to right: Christine Jacobs, M.D., Mary McLennan, M.D., Oscar Cruz, M.D., Robert Wilmott, M.D., Carole Vogler, M.D.

For more information, visit slu.edu/medicine/grand-rounds/white-coat-society.php or call 314-977-3287.