2015-2016 VIDO-INTERVAC ANNUAL REPORT

VIDO

THE HUMAN AND ANIMAL HEALTH INTERFACE

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VISION

PROTECTING CANADA AND THE WORLD
FROM INFECTIOUS DISEASES

MISSION

TO CONDUCT RESEARCH AND DEVELOP VACCINES AND RELATED PRODUCTS, WITH KEY NATIONAL AND INTERNATIONAL PARTNERS, FOR THE PREVENTION AND CONTROL OF HUMAN AND ANIMAL DISEASE

SCIENTISTS FROM 25+ NATIONS WORKING TOGETHER TO ADVANCE INFECTIOUS DISEASE RESEARCH

VIDO-INTERVAC TEAM

VIDO-INTERVAC

2015-2016 BOARD OF DIRECTORS

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COMMITMENT TO LEADERSHIP AND INNOVATION

LEN EDWARDS
Board Chair

The University of Saskatchewan in Saskatoon is home to VIDO-InterVac, one of Canada's leading research institutions active in the fields of human and animal health. As a reflection of its origins and its primary sources of funding, VIDO-InterVac works to serve national, provincial and local communities, and engages both public and private sector clients. As a growing presence internationally, the organization promotes Canada's innovation credentials and interests through both public and private partnerships—emerging diseases know no borders.

Following our 40th Anniversary celebrations in September 2015, VIDO-InterVac's team of scientists, researchers, technicians and administrators look forward to further decades of innovation and leadership in vaccine and vaccine delivery research. That leadership will focus on finding vaccine solutions relevant to both human and animal health. Given the evidence that animal pathogens are the source of most of today's emerging infectious diseases in humans, the organization will explore this critical interface more than ever.

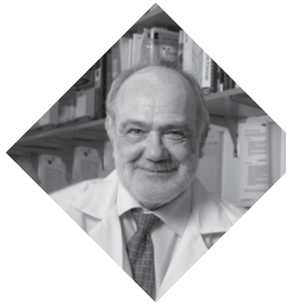
The organization's work in this respect will be greatly facilitated by its large-animal containment facility, critical for dealing with animal diseases and providing modeling for human disease research. This facility is unique to Canada and features internationally recognized state-of-the-art containment for level 3 pathogens.

I urge readers to explore this annual report to learn more about the important health, social and economic benefits that VIDO-InterVac's research will have in dealing with threats to both animal and human health in the years ahead.

It has been an honour to be the chair of the Board of Directors for 2015–16 and to bring this message from my colleagues on the board.

As the board carries out its responsibilities, we are committed to working with the Director and CEO of VIDO-InterVac, Dr. Andrew Potter, and the women and men at VIDO-InterVac to ensure this remarkable institution continues to enjoy pre-eminence in the vaccine field and provide Saskatchewan, Canada and the world with leading solutions for the protection of both animal and human health. ◆

THE CHANGING NATURE OF INFECTIOUS DISEASES



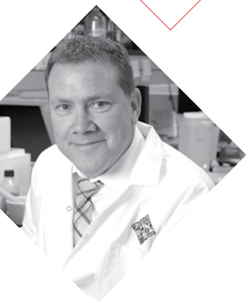
ANDREW POTTER
Director and CEO

The past year was the 40th anniversary of VIDO-InterVac. Looking back, it has been interesting to reflect on the changing nature of infectious disease and the evolution of the organization. Infectious diseases continue to be a significant burden on both human and animal health and more than ever, these diseases and our response to them are in the public eye.

We continue to see the emergence of new pathogens and the re-emergence of others. More often than not, outbreaks are zoonotic, involving transmission from animals to humans. Globalization has played a key role in the rapid spread of disease, and the merging of rural and urban communities has resulted in many new threats. Current travel and trade practices mean pathogens can be transmitted to any global destination in less than a day. Many of these pathogens have always been present, but the mixing of rural and urban populations has resulted in greater risks to both animals and humans. As such, international trade has become a driving force in infectious disease research. One need only look at the effect a small number of cases of prion-related disease have had on Canadian cattle producers to see the enormity of the impact.

Historically, we have reacted to the emergence of new diseases rather than proactively developing mitigation strategies. Therefore, VIDO-InterVac research includes projects involving pathogens that have not yet entered Canada but are a potential threat. These have included collaborative projects on African swine fever, Congo Crimean hemorrhagic fever, and Middle East respiratory syndrome, to name but a few. This research is enabled by the VIDO-InterVac containment level 3 facility. Over its initial two year operational period, the containment level 3 facility has hosted over 23 research groups and 43 individuals, including both public and private sector researchers focused on the development of tools for the prevention and control of Porcine epidemic diarrhea virus. After the virus entered Canada in January 2014, Dr. Gerdts and a team of our researchers developed a vaccine in less than 18 months and the vaccine has since been licensed to a private-sector manufacturer. This is exactly what the InterVac facility was envisioned to accomplish.

Last year, we completed an external review of our research activities, a process we carry out every five years. The external review confirmed the overall scientific excellence of our organization and provided useful perspectives that will influence future activities as the organization continues to mature. We look forward to the challenges of the future and the role that VIDO-InterVac will play in protecting the health and economic livelihood of humans and animals. ◆



MEETING CHALLENGES AT THE HUMAN-ANIMAL INTERFACE

VOLKER GERDTS

Associate Director of Research

Our 2015–2016 fiscal year was an exciting year for VIDO-InterVac. Over the last 18 months, the organization developed and commercialized a novel vaccine against the Porcine epidemic diarrhea (PED) virus, an emerging swine disease responsible for the deaths of over eight million pigs in the last two years. This vaccine was licensed to a European-headquartered pharmaceutical company. Thousands of doses were produced in-house and made available to veterinarians coping with outbreaks in southern Manitoba. The speed with which the vaccine was developed attests VIDO-InterVac's ability to rapidly respond to emerging diseases.

Most emerging diseases originate at the human-animal interface. It is estimated that three diseases emerge every year and every three years one of them will lead to a larger epidemic. Avian influenza, Ebola virus, Middle East respiratory syndrome coronavirus (MERS-CoV) and Zika virus are prominent examples of recent disease events. Globalization, habitat fragmentation and a closer human-animal interface suggest that the frequency of outbreaks will increase. Canada needs to be prepared and ready to respond quickly to these infectious-disease threats. VIDO-InterVac's containment level 3 facility, the largest in Canada, was built for this purpose, and, two new scientists joined our team over the last 15 months to strengthen our capacity to respond to emerging threats.

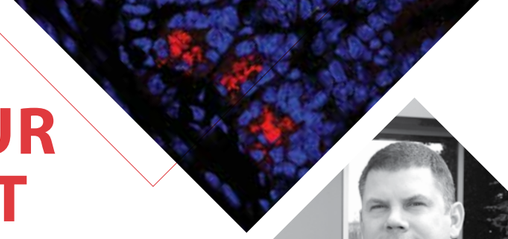
Dr. Darryl Falzarano is developing novel vaccine technologies for coronaviruses, an important family of viruses that includes the Severe Acute Respiratory Syndrome (SARS) virus, MERS-CoV, and PED virus, to name a few. Over the last twelve months, VIDO-InterVac helped establish a novel animal model for MERS-CoV, and, in collaboration with researchers in the Middle East, is currently developing novel vaccines against the disease.

Another prominent example of a recent emerging disease is the Zika virus. Two weeks before the World Health Organization declared a global public health emergency, VIDO-InterVac launched a project to develop a novel animal model for the disease and to establish if there is a link between fetal infection and microcephaly. The project is led by Dr. Uladzimir Karniychuk, the newest member of our scientific team, in collaboration with the National Microbiology Lab in Winnipeg. In less than five months, we established a novel animal model in pigs, which is being used to study disease transmission and prevention.

Influenza is another disease originating in the human-animal interface. Outbreaks around the world and the regular emergence of new types of flu viruses make this disease of special importance. For example, most avian influenza viruses are not dangerous to people. However, highly pathogenic viruses that emerge through recombination and reassortment in pigs or ducks have the potential to cause severe pandemics in humans. With financial support from the Public Health Agency of Canada, Dr. Yan Zhou and her group are working on novel vaccine technologies that could be used against a wide range of influenza viruses. Work with these highly pathogenic viruses is restricted to VIDO-InterVac's containment level 3 facility.

Understanding disease pathogenesis and transmission is key to developing mitigation strategies and has been a research focus for over 40 years. Using large animals and their natural diseases allows us to develop novel vaccine technologies using animal models. For example, we recently received a multi-million dollar grant from Genome Canada to develop vaccines for Mycobacterial diseases in cattle, including bovine tuberculosis and Johne's disease. Both diseases pose significant problems for the livestock industry, threaten Canada's ability to trade with international partners and are linked to human health challenges. Often, effective vaccines are not available or fail to distinguish infected from vaccinated animals. In partnership with several laboratories, Dr. Andrew Potter and his team are using reverse vaccinology to develop novel vaccines against bovine tuberculosis and Johne's disease. Studying tuberculosis in cattle may reveal insights into human tuberculosis, which could aid in the development of novel vaccines. Similarly, VIDO-InterVac is establishing a pig model for human tuberculosis, which can be used to study the underlying transmission mechanisms of this important disease. Dr. Jeff Chen, who was hired in 2014 to establish a tuberculosis program at VIDO-InterVac, leads this project.

Like other international research organizations, VIDO-InterVac constantly monitors the relevance and competitiveness of its research activities through internal and external scientific reviews. In 2015, a panel of international experts representing the private and public health sectors conducted an external scientific review of the organization. We are very pleased to see that the panel confirmed the organization continues to operate on the forefront of international vaccine research. ◆



ENHANCING OUR GLOBAL IMPACT

PAUL HODGSON

Associate Director of Business Development

Since its inception over 40 years ago, VIDO-InterVac has played a key role in mitigating the impact of infectious diseases on human and animal health. However, many infectious diseases still present a significant threat. The microbes that infect both humans and animals (termed zoonotic) are responsible for the majority of emerging diseases. As a result, the interface of human and animal health is a global priority. Vision and leadership has ensured VIDO-InterVac has the facilities as well as the research and development capacity to address emerging infections and has positioned our organization to play a key role at this interface.

During the past year, we increased our number of strategic partners to expand the impact of our research. While focussing on developing solutions for high-risk emerging pathogens, industrial and government partnerships were extended nationally and internationally, with an emphasis on developing solutions for high risk emerging pathogens. We've developed partnerships in Asia and Africa to create animal vaccines for some of the most important animal pathogens.

New collaborations in Europe and the Middle East are developing vaccines against tuberculosis and Middle East respiratory syndrome coronavirus. In addition, we've forged a formal partnership for the commercial development of a vaccine developed at VIDO-InterVac against Porcine epidemic diarrhea virus, a swine specific-virus that emerged in the United States in 2013 and spread to Canada in 2014. Infectious diseases are a global issue and these collaborations ensure our research has a broad reach.

The renewed federal emphasis on science, and vaccines in particular, highlights the national importance of this sector and VIDO-InterVac is positioned to play a key role. To further define our role in meeting the challenges of infectious diseases at the human and animal interface, we have initiated a review of our strategic plan. We are developing a new framework to ensure we maximize our global impact and meet the needs of our stakeholders, a key measurement of our success.

We are re-certifying our management system under the new international standard (ISO 9001:2015). This external certification demonstrates to our partners our dedication to quality. We will be one of the first organizations recertified under this new standard.

In the coming years, we will continue to build on our successes and strive to protect human and animal health globally. ◆

Partners from SCUVI, GIRD, GDD, Dalton, VIDO-InterVac and the Canadian Embassy in China for RSV progress meeting.

VIDO-INTERVAC TRAINING THE WORLD

CANADA	EGYPT	GHANA	KENYA	NETHERLANDS	SCOTLAND	TAIWAN
CHILE	ETHIOPIA	HUNGARY	KOREA	NIGERIA	SERBIA	USA
CHINA	FRANCE	INDIA	KYRGYZSTAN	RUSSIA	SHRI LANKA	
COLUMBIA	GERMANY	JAMAICA	MALAYSIA	SAUDI ARABIA	SPAIN	

CONNECTING PEOPLE TO COMBAT EMERGING DISEASES

JOYCE SANDER

Associate Director of Human Resources

Emerging infectious diseases, especially those that infect both humans and animals, are a serious global challenge. Although new infectious diseases cannot be predicted, our organization is driven to prevent disease and understand the socio-economic challenges these diseases present. We continue to recruit top talent to support our strategic focus on emerging zoonotic infections. VIDO-InterVac's team is strengthened by interdisciplinary collaboration that ensures innovative ideas and approaches push the boundaries of vaccine development.

Our research teams continue to identify the main pathways of pathogen transmission, understand the impact of disease on society, and bridge research knowledge and industry to achieve outcomes that lead to disease prevention and control. We promote discussion and interaction that connect science to government policy. It is through these policies and funded research that we meet the needs of our expanding human populations.

VIDO-InterVac focuses on training that meets national and international standards. We realize that talent is precious and dynamic. One of our fundamental deliverables as an organization is to prepare the next generation of scientists to help combat infectious disease outbreaks. We continually find new ways to strengthen collaboration and participate in forums for knowledge transfer. VIDO-InterVac provides worldwide opportunities for training that exposes our staff to global health issues. We communicate risk to the public, which is a critical component to preventing the spread and responding to an infectious disease outbreak. These are the ways our scientists and trainees network and understand global health issues as we interface with industry and other collaborators on the development of vaccines and related technologies.

VIDO-InterVac connects people at every intersect to combat emerging infectious diseases. Our passion for science allows us to pursue excellence. Achieving excellence in science requires talented staff, effective communication, good governance, high standards and freedom to conduct strong, independent and collaborative research. ◆

ENABLING INFRASTRUCTURE

CAM EWART

Associate Director of Operations and Maintenance

VIDO-InterVac is one of the largest, most advanced containment infrastructures in the world. This specialized facility enables our scientists and partners to meet the research goals of our organization and fill an international need to quickly respond to new infectious disease threats.

Due to the complex nature of containment facilities, fine tuning in the building and addressing issues and inefficiencies are key aspects of streamlined operations. We have developed preventive maintenance solutions to ensure that the scientific environment is neither interrupted nor compromised, and that compliance with regulatory authorities is met or exceeded.

This past year, our containment level 3 facility, InterVac, operated in a very stable and predictable fashion. As we move toward our forty-second year of operations, we will undertake numerous energy efficiency projects to make operations more cost effective and reduce our overall environmental impact.

Among our priorities this year were making access easier for staff and enhancing the safety and security of VIDO-InterVac. To accomplish this, we expanded electronic access control and closed circuit television systems across our facilities. These improvements create operational efficiencies and assure compliance with the security aspects of the Human Pathogens and Toxins Act. They also provide instant tracking of all employees within the facility in case of an emergency.

The operations team remains extremely dedicated to the organization and is proud of the contributions we have made to support VIDO-InterVac in achieving its goals. ◆

FUNDING SUPPORTS RESEARCH OBJECTIVES

LORNE VANIN
Associate Director of Finance

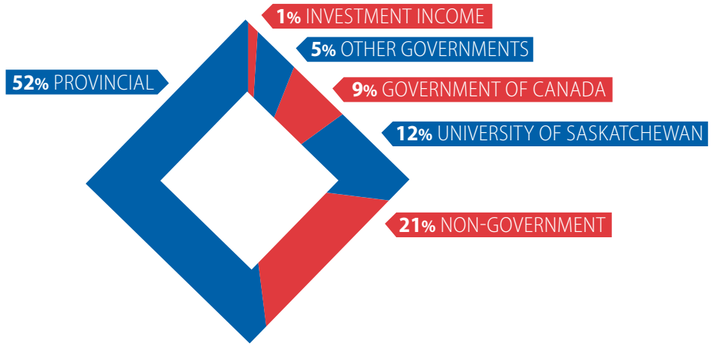
Last year, VIDO-InterVac's position as a global leader in vaccine development was supported by revenue of $13.7 million. This funding came from a variety of partners, including the Government of Canada, Government of Saskatchewan, livestock councils and agencies, foundations, and human and animal health companies (*see details on the back cover*). Their confidence in our organization manifests in their continued financial support. As such, we are driven to provide results that improve human and animal health.

Our revenue increased in 2015–2016, as outlined in the attached financial statements. Highlights include a five-year funding agreement with Innovation Saskatchewan that will provide operational support to help our organization focus on strategic growth. At the same time, we were invited to submit a full proposal for operational funding from the Canada Foundation for Innovation under their Major Science Initiatives program. A decision on this funding is expected in the second quarter of 2016. VIDO-InterVac was also awarded multiple competitive research grants that have enabled our organization to pursue projects focused on infectious diseases at the human and animal health interface. Included in this is research that targets tuberculosis, funded by Genome Canada through Genome Prairie and Genome British Columbia, and highly pathogenic influenza research, supported by the Public Health Agency of Canada.

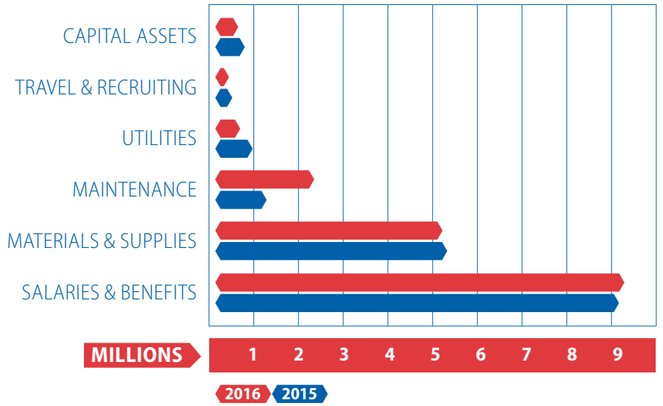
Expenses also increased moderately over the previous year. Funds were dedicated to core research priorities, including Zika virus and Middle East respiratory syndrome. Preliminary data from core projects such as these is used to strengthen external funding applications with a goal of increasing research revenue.

We appreciate the continued financial support from our partners, which helps ensure rapid response to global infectious disease challenges and the success of our organization. ◆

SOURCES OF REVENUE



ANNUAL EXPENSE COMPARISON



UNIVERSITY OF SASKATCHEWAN
VACCINE AND INFECTIOUS DISEASE ORGANIZATION-INTERNATIONAL VACCINE CENTRE

STATEMENT OF FINANCIAL POSITION

AS AT APRIL 30, 2016

	2016	2015
ASSETS		
CURRENT ASSETS		
Funds held – University of Saskatchewan	$ 11,811,301	$ 15,388,396
Accounts Receivable	3,523,027	3,695,478
Inventories	283,210	128,677
	15,617,538	19,212,551
LONG TERM ASSETS		
Long Term Accounts Receivable	813,722	342,374
Investments	12,362,941	12,549,993
	$ 28,794,201	$ 32,104,918
LIABILITIES		
CURRENT LIABILITIES		
Accounts Payable & Accrued Liabilities	$ 249,940	$ 96,514
	249,940	96,514
Long Term Liabilities	–	–
	249,940	96,514
EQUITY		
EXTERNALLY RESTRICTED FUNDS	$ 11,151,836	$ 9,480,957
INTERNALLY RESTRICTED FUNDS	17,392,424	22,527,447
	28,544,261	32,008,403
	$ 28,794,201	$ 32,104,918

Unaudited

STATEMENT OF OPERATIONS & CHANGES TO FUND BALANCE

FOR THE YEAR ENDED APRIL 30, 2016

	2016	2015
INCOME		
Government of Canada	$ 1,231,640	$ 2,547,393
Provincial	6,992,012	3,469,318
Other Governments	595,617	620,740
Non-Government	2,837,942	2,326,421
Investment Income	73,936	452,511
University of Saskatchewan	1,605,882	1,649,075
Miscellaneous Income	368,777	303,843
	13,705,806	11,369,300
EXPENDITURE		
Salaries and Benefits	9,209,685	9,048,632
Materials and Supplies	5,151,417	5,306,086
Maintenance	2,336,974	1,266,742
Utilities	714,201	931,379
Travel and Recruiting	323,197	334,124
Bad Debt Expense	–	5,310
Capital Assets	665,121	754,545
Internal Cost Recoveries and Transfers	(1,230,646)	(1,436,333)
	17,169,949	16,210,484
EXCESS OF INCOME OVER EXPENDITURE	(3,464,143)	(4,841,184)
FUND BALANCES, BEGINNING OF YEAR	32,008,403	36,849,587
FUND BALANCES, END OF YEAR	$ 28,544,260	$ 32,008,403
EXTERNALLY RESTRICTED FUNDS	$ 17,392,424	$ 22,527,447
INTERNALLY RESTRICTED FUNDS	11,151,836	9,480,957
	$ 28,544,260	$ 32,008,403

Unaudited

REVIEW STATEMENT

AUGUST 24, 2016

The University of Saskatchewan's Financial Reporting Department has examined the Financial Statements as prepared by VIDO and have found that the figures presented therein reconcile to the University's financial records. In addition, Financial Reporting has reviewed the adjusting transactions and have concluded that the adjustments are reasonable and accurate. Therefore, the University of Saskatchewan can confirm that the statements as presented by VIDO are accurate in accordance with the University's financial policies.

Financial statement users are cautioned that these statements have not been audited or reviewed for purposes other than those described above. ◆

COMMUNITY LIAISON COMMITTEE REPORT

SUSAN LAMB

Community Liaison Committee Chair

The VIDO-InterVac Community Liaison Committee is an example of best practices for biocontainment facilities worldwide. Made up of community leaders, the role of the committee is to provide information to the public regarding safety and security at the University of Saskatchewan InterVac research laboratory. The committee helps to create and maintain an atmosphere of trust, confidence and transparency between InterVac and the public.

While the committee has no authority over operations at InterVac, they have been given a mandate from the University of Saskatchewan to remain informed of InterVac activities that might be of public interest and to report them as appropriate.

The committee meets regularly to be briefed on InterVac's work. There were no significant issues, such as a leak or spill of biological materials this past year, but, in the interest of sustained transparency, three minor incidents were brought to the Community Liaison Committee's attention.

The committee is committed to remaining educated on issues relating to infectious diseases, particularly as they apply to VIDO-InterVac. In addition to sharing articles this past year on infectious diseases, vaccine development and biocontainment, the committee sought out experts to present information on Porcine epidemic diarrhea virus, tuberculosis, Middle East respiratory syndrome coronavirus and Ebola virus.

The VIDO-InterVac Community Liaison Committee held its annual public meeting in September and enjoyed their best attendance to date. Dr. Lorne Babiuk, past director of VIDO-InterVac, and Dr. Andrew Potter, the current director and CEO, talked about ongoing research at VIDO-InterVac and answered questions.

Members of the public can contact the committee at (306) 270-1729. ◆

2015/2016 CLC MEMBERS

FROM LEFT TO RIGHT: Dr. Brian Gibbs, Patricia Roe, Susan Lamb (chair), Dick Batten, Noreen Jeffrey (vice chair)

MISSING: Dr. Andrew Potter, Dr. Michael Schwandt, Morgan Hackl

VIDO-INTERVAC CONTRIBUTORS

Alberta Cattle Feeders
Alberta Egg Producers
Alberta Livestock and Meat Agency
Alberta Research Chemicals
AnGes MG
Aquila Diagnostic Systems Inc.
Beef Farmers of Ontario
Bovicor Pharmatech Inc
Canadian Institutes of Health Research (CIHR)
Canadian Poultry Research Council
Canadian Swine Health Board
Chicken Farmers of Saskatchewan
Egg Farmers of Canada
Elanco Animal Health
Genome Alberta
Genome Prairie
Canada Foundation for Innovation
International Development Research Centre
Public Health Agency of Canada
Government of Saskatchewan through Agriculture Development Fund
Government of Saskatchewan through Innovation Saskatchewan
Grand Challenges Canada
Intervet Canada Corp.
Jarislowsky Chair in Biotechnology
Kamloops Stockmen's Association
Kazah Scientific Centre for Quarantine & Zoonotic Diseases
Krembil Foundation
Lumen Associates Inc
Meadow Ridge Enterprises
Merck Animal Health
Merial
National Pork Board
Natural Sciences and Engineering Research Council (NSERC)
Novartis Animal Health Canada Inc.
Novartis Animal Health
Ohio State University
Ontario Pork
Ontario Sheep Marketing Agency
Pan-Provincial Vaccine Enterprise Inc. (PREVENT)
Prosetta Biosciences
Qatar University
Saskatchewan Health Research Foundation (SHRF)
Saskatchewan Pork Development Board
SterileCare Inc
Texas A & M University
The Banting Research Foundation
University of Alberta
University of Calgary
University of Saskatchewan
University of Toronto
Zoetis LLC

VACCINE AND INFECTIOUS DISEASE ORGANIZATION – INTERNATIONAL VACCINE CENTRE
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