

# **ISGlobal** **Annual** **Report** **2015**

**Total number of employees**

**252**

**Sex**

**70%**

Women

**30%**

Men

**Nationality**

**80%**

Spanish

**20%**

International

**Funding sources**

**51%**

Private

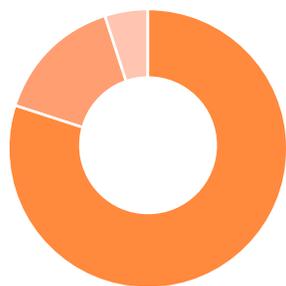
**49%**

Public

**Average age**

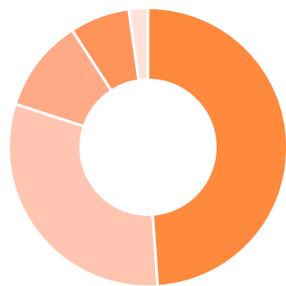
**37.7**

**Staff by department**



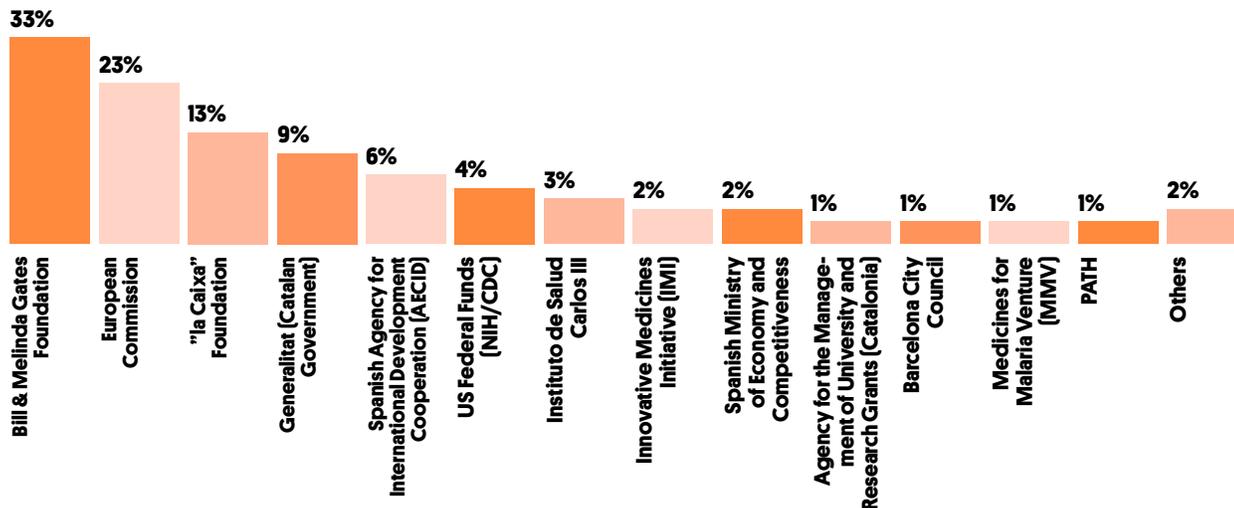
- 5% Knowledge translation
- 15% Administrative
- 80% Research

**Budget breakdown by area**



- 49% Research
- 31% Initiatives
- 11% Administration and infrastructure
- 7% Policy and global development
- 2% Training

**Main funders**



**Total budget 2015**

**€23,014,339**

**Ongoing projects in 2015**

**123**

**New projects in 2015**

**46**

## Malaria Elimination Initiative

## Chagas Initiative

## Maternal, Child and Reproductive Health Initiative

## Antibiotic Resistance Initiative

### Research

- Enabling technologies for malaria research
- Parasite biology
- Pathophysiology
- Malaria immunology
- Diagnostics
- Evaluation of preventive and therapeutic tools
- Epidemiology and clinical presentation of *Plasmodium falciparum* and *Plasmodium vivax*
- Vector biology and control
- Novel approaches and strategies for malaria elimination

- Epidemiology of Chagas disease in non-endemic areas
- Biomarkers of therapeutic efficacy and for early diagnosis of cardiac damage in patients with Chagas disease
- Clinical trials of new drugs to treat Chagas disease
- Studies on the pharmacokinetics of benznidazole

- Malaria in pregnancy
- Operational research on the acceptability and viability of introducing human papillomavirus (HPV) vaccination programmes for pre-adolescent African girls
- Pharmacovigilance studies on antiretroviral and antimalarial drugs in pregnant women
- Determination of causes of death in low-income countries
- Effects of the HIV/AIDS epidemic on maternal and child health
- Cervical cancer

- Molecular basis of antimicrobial resistance
- Relationship between virulence and antimicrobial resistance
- Discovery and assessment of new antibacterial drugs
- Search for diagnostic and prognostic biomarkers of bacterial and viral infections
- Pathogenesis and antimicrobial resistance of microorganisms that cause neonatal sepsis
- Epidemiology and clinical presentation of viral and bacterial infections

### Training

- 4th edition of the course “Science of Eradication: Malaria”

- 11th Workshop on Chagas Disease

- First workshop on “Safe Mothers and Newborns”
- HPV training in Mozambique

### Policy and Global Development

- Secretariat of the Malaria Eradication Scientific Alliance (MESA)
- Mozambican Alliance Towards Elimination of Malaria (MALTEM)

- Coordination of the Global Chagas Disease Coalition
- Spread the Word project

- Advocacy work and participation in decision-making forums
- Joint study on inequality in maternal and reproductive health in sub-Saharan Africa with the World Bank

- Educational materials for secondary school students

## Letter from the Director

**Antoni Plasència**  
General Director



The year 2015 was a significant one for global health: it was the moment to assess the results of the Millennium Development Goal (MDG) targets for health and to launch the new Sustainable Development Goals (SDGs), which are much more ambitious than the MDGs and include all countries. It was also the year global health was clearly recognised by the Nobel Prize for Medicine when the Committee awarded the prize to three scientists who had discovered treatments for parasitic diseases that affect hundreds of millions of people every year: onchocerciasis, filariasis and malaria.

It was also an important year for ISGlobal. We celebrated our fifth anniversary with an increase in scientific output, a very positive assessment from our Scientific Advisory Council, and a stable financial situation. The European Commission awarded the institute HRS4R accreditation, recognising ISGlobal as a centre of excellence in human resources strategy for researchers. It was also the year in which CRESIB finally became an integral part of ISGlobal, and significant progress was made on the integration of CREAL with ISGlobal. CREAL celebrated its tenth anniversary and will bring to our institute the “other face” of the global health research agenda: non-communicable chronic diseases and environmental health. The appointment of Dr Josep M. Antó as Scientific Director of ISGlobal has strengthened the link between the two organisations in terms of management, scientific activities, knowledge transfer and training, as well as in other areas, such as human resources and funding. In 2015, we also celebrated another milestone—the 20th anniversary of the foundation of the Manhica Health Research Centre (CISM), an excellent example of cooperation between Spain and Mozambique. The Foundation is supported by the effective commitment of ISGlobal, which is a member of its Board of Trustees.

During the year, we published important new findings relevant to malaria elimination strategies and the Mozambican Alliance Towards the Elimination of Malaria (MALTEM) project was launched in southern Mozambique with the support of the “la Caixa” Banking Foundation and the Bill & Melinda Gates Foundation. We consolidated our work on the causes of infant mortality, which has led to the creation of the Child Health and Mortality Prevention Surveillance (CHAMPS) global surveillance network. Our work on the elimination of yaws in Papua New Guinea has become the cornerstone of the World Health Organisation’s strategy for eradicating this disease worldwide. In a year marked by fear over the possible introduction of emerging diseases, we participated in the Scientific Advisory Committee on Ebola virus disease in Catalonia and strengthened our collaboration with Barcelona’s Hospital Clínic in the area of international health, in addition to other actions involving scientific and technical support and training.

The consolidation of our training and knowledge translation departments is reflected in activities such as the first Safe Mothers and Newborns workshop, a seminar on equity and the new SDGs, and the publication of a policy document analysing the role of Spanish cooperation after 2015. Our new Innovation Department started to work on strengthening our capacities in the development of technological innovations important to global health and developing new lines of work related to social innovation and responsible research and innovation (RRI). Finally, as a result of our communications activities, ISGlobal has the largest presence of any of the CERCA research institutions in the media and on social networks.

One of our goals in the new phase we are now entering is to roll out new projects and initiatives that will link research with knowledge translation and training, in line with the central tenet of our model of excellence. Completing the merger between CREAL and ISGlobal will be a key element in this new phase because it will increase our area of competence and strengthen the synergies between the research on maternal and child health as well as infectious and chronic diseases and the study of how health and disease are affected by our environment. One of the challenges we now face is to establish joint projects with the private sector and civil society in the field of global health.

Thanks to the support of all the institutions, entities and people who have continued to demonstrate their confidence in us, ISGlobal is becoming an internationally recognised institution for scientific research and knowledge translation. I would also like to thank all the professionals who work in ISGlobal and make special mention of their sustained and successful efforts to shape a world in which everyone can enjoy good health. A world in which the postal code, the place where a person is born and lives—and their genetic code—become less and less important in determining life expectancy.

In 2015, ISGlobal celebrated its fifth anniversary

## The ISGlobal Alliance: Working together for excellence

**ISGlobal** **Barcelona Institute for Global Health**

And its allied research centres



Moreover, 2015 was certainly a year of confluences and synergies. The first example of that was the completion of the merger between ISGlobal and the Barcelona Centre for International Health Research (CRESIB), which, after a nine-year period of excellence in research has opened a new phase in its trajectory. In fact, the creation of CRESIB in 2006 was itself the result of a desire to continue and expand the lines of work in tropical medicine and international health originally initiated by the Hospital Clínic and the University of Barcelona. As a result of the same evolution and spirit of a constant desire to excel, ISGlobal was created in 2010, at which time CRESIB became the research centre associated with the new institute.

On the 30 June 2015, after working together for five years, CRESIB and a fully consolidated ISGlobal finally completed their merger in the framework of SUMA, a programme that supports the merger of research centres belonging to the Catalan Government’s CERCA network. Once the merger was complete, ISGlobal received accreditation from the Catalan Government as a CERCA research centre, a position previously held by CRESIB.

## Board of Trustees

*The Barcelona Institute for Global Health is the result of a collaboration between institutions from the public and private sectors. At the end of 2015, the membership of the ISGlobal Board of Trustees was as follows:*

**H.R.H. The Infanta Cristina de Borbón**  
Chair  
Director of the International Programme at the "la Caixa" Foundation

**Mr Javier Solana Madariaga**  
Vice-Chair  
President of ESADE and member of the Board of Trustees of the "la Caixa" Foundation

**Ms Marta Casals Virosque**  
Secretary  
Director of the Legal Department at the "la Caixa" Foundation

**Dr Enric Banda Tarradellas**

**Member pending appointment**  
Ministry of Health, Social Services and Equality

**Mr Jesús Manuel Gracia Aldaz**  
Secretary of State for International Cooperation and Ibero-America  
Ministry of Foreign Affairs and Cooperation  
Government of Spain

**Dr Boi Ruiz**  
Minister of Health,  
Generalitat de Catalunya  
(Autonomous Government of Catalonia)

**Mr Dídac Ramírez Sarrió**  
Rector of the University of Barcelona

**Mr Santiago Vila Vicente**  
Minister of Internal Affairs and Sustainability

**ISGlobal will become one of the largest global health institutes in Europe and an international centre of excellence**

## CREAL-ISGlobal Merger

The year 2015 will also go down in history because of another important event: the formal decision by the Centre for Research in Environmental Epidemiology (CREAL) and ISGlobal to approve the merger of the two organisations. In November, after two years of joint work and also in the framework of the SUMA programme, both institutions committed to taking their alliance one step further and the ISGlobal Board of Trustees confirmed the addition of two new Board members: the Universitat Pompeu Fabra and the Parc de Salut Mar. Both of these institutions were formally trustees of CREAL. As part of this process, Dr Josep M. Antó, Director of CREAL, was appointed as Scientific Director of ISGlobal.

The two research institutions will complete the merger in 2016, giving rise to an ISGlobal with increased competitive capacity that will be one of the largest global health institutes in Europe and an international centre of excellence.

## International Global Health Partnership Board

*The International Global Health Partnership Board is made up of individuals and institutions of recognised international prestige in the field of health and international cooperation. One of its functions is to advise the Board of Trustees and provide a global vision of the organisation's executive strategy.*

**Aga Khan Foundation**

**Bill & Melinda Gates Foundation**

**Carlos Slim Foundation**

**FDC (Fundação para o Desenvolvimento da Comunidade)**

**Fred Newton Binka**

**Jaime Sepúlveda**

**Manhiça Foundation**

**Marcel Tanner**

**Nelson Mandela Children's Fund**

**Pedro Alonso**

**Silvia Gold**

**Virander S. Chauhan**

Generalitat de Catalunya  
(Autonomous Government of Catalonia)

**Mr Jaume Casals Pons**  
Rector of Pompeu Fabra University

**Mr Jaume Giró Ribas**  
CEO of "la Caixa" Foundation

**Mr Jaime Lanaspa Gatnau**  
Member of the Board of Trustees of "la Caixa" Foundation

**Mr Roberto Constantino Tapia Conyer**  
General Director of the Carlos Slim Health Institute

**Mr Josep María Piqué i Badia**  
General Director of the Hospital Clínic de Barcelona

**Mr José Maria Leal Villalba**  
CEO of Caja Burgos

**Mr Jordi Portabella Calvete**  
Director of the Department of Research and Knowledge at the "la Caixa" Foundation

**Mr Andreu Mas-Colell**  
Minister for Economic Affairs  
Generalitat de Catalunya  
(Autonomous Government of Catalonia)

**Mr Raimundo Pérez-Hernández**  
Director of the Ramón Areces Foundation

**Ms Laia Ortiz Castellví**  
Second Deputy Mayor, Barcelona Town Council

**Ms Esther Planas Herrera**  
Director of Finance and Resources at "la Caixa" Foundation

## How We Work

ISGlobal's mission is to improve global health and promote health equity through excellence in research and the translation and application of knowledge. Our vision is to be a world class global health research and knowledge translation centre working towards a world in which all people can enjoy health.

### Work Model

The aim of our work model is to make the most of the positive impact science can have as an instrument of change and to create a virtuous circle involving knowledge, action and impact on health.

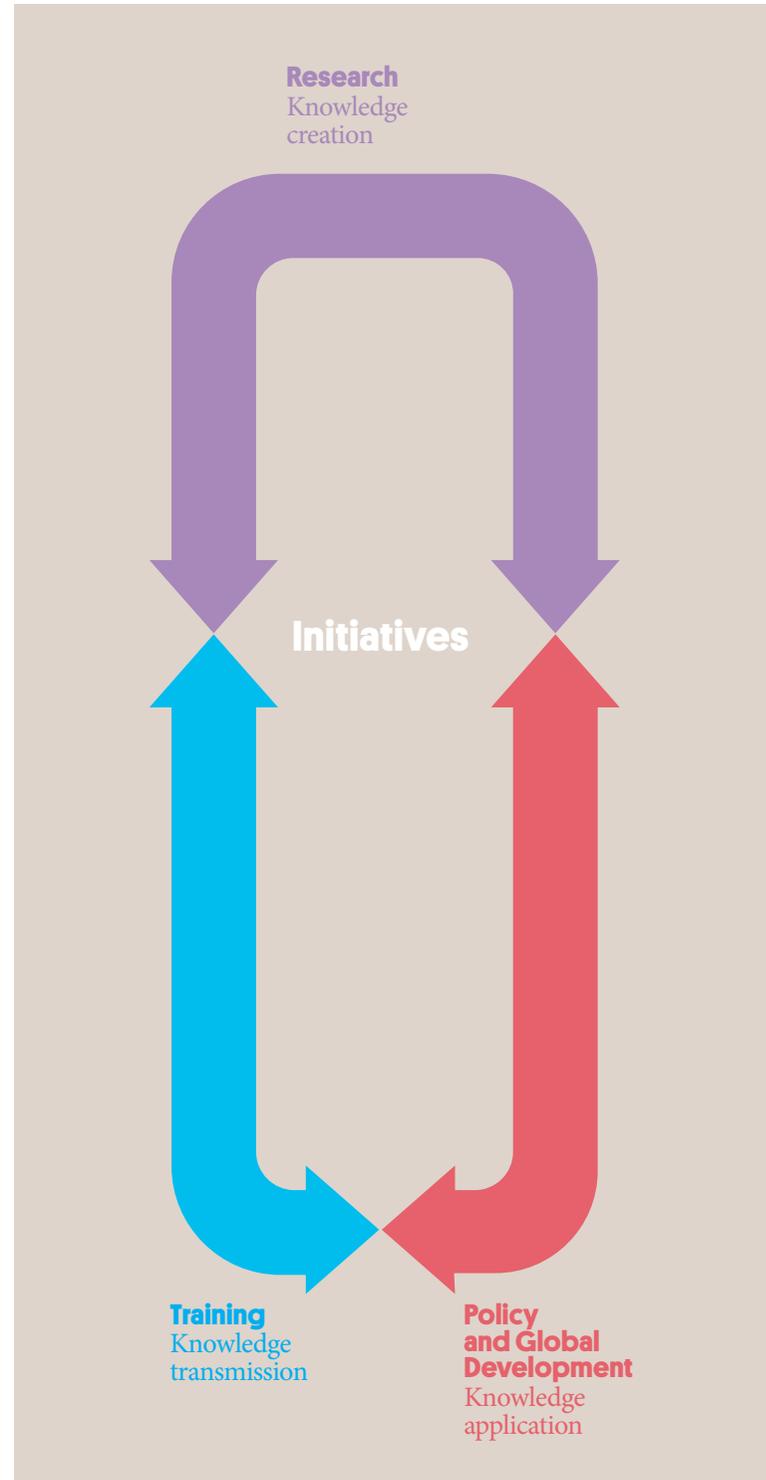
In ISGlobal and in our allied centre CREAL we are committed to generating new scientific knowledge focused on chronic, infectious and non-communicable diseases and their social and environmental determinants. The task of our Training and Policy & Global Development departments is to transfer this knowledge to society.

### ISGlobal Initiatives

Knowledge transfer is particularly important in the field of global health.

Consequently, ISGlobal has four initiatives specifically tasked with the responsibility of increasing the impact of the knowledge generated by research beyond the realm of science. These four initiatives focus on areas in which ISGlobal is at the forefront of international research efforts and they explore ways in which scientific knowledge can be applied and have an effective impact on global health.

- **Malaria Elimination Initiative**
- **Chagas Initiative**
- **Maternal, Child and Reproductive Health Initiative**
- **Antibiotic Resistance Initiative**



# Facts & Figures

## Number of articles

# 214

## In first decile

# 31%

3 papers in the *NEJM*,  
2 of them as leading authors



Within the top 6% of the Spanish health research centres in normalised impact factor (Scimago Institutions Ranking, 2015)

# 6%

## 134 Research staff

Research Professors (ICREA)	7	
Associate Research Professors (ICREA)	8	
Assistant Research Professors	12	
Associated Researchers	10	
Postdoctoral Fellows	17	
Medical Research Fellows	11	
Predoctoral Fellows	43	
Staff Scientist	1	
Research Assistants	5	
Statisticians	5	
Lab Technicians	15	



WHO Collaborating Centre  
for Malaria Control, Elimination  
and Eradication



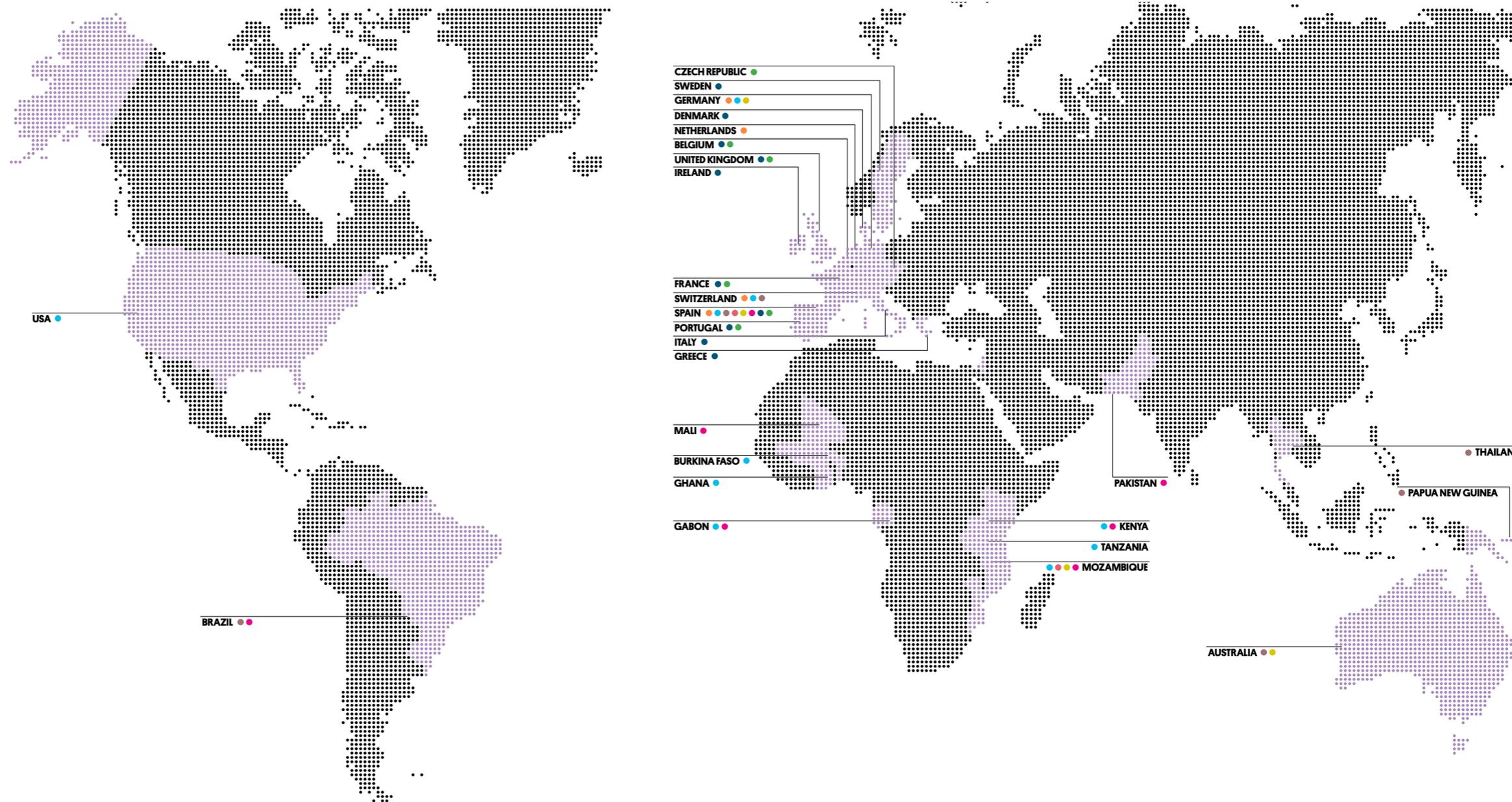
In 2015, we once again saw the growth and expansion of our research and translation capacities. For the first time ever, our researchers published more than 200 articles and reviews, one third of which appeared in top-decile journals.

*The Lancet* published the final results of a phase III clinical trial of the malaria vaccine candidate RTS,S, which involved the participation of researchers from ISGlobal and the Manhica Health Research Centre (CISM). RTS,S became the first vaccine against malaria to receive a positive opinion from the European Medicines Agency (EMA) and a recommendation from the World Health Organisation (WHO). ISGlobal's leadership in the development of the minimally invasive autopsy (MIA) as a tool for determining cause of death in low-income countries was strengthened by the approval of the follow-on CaDMIA-plus project, which will make it possible to continue the validation of MIA in children and to create a centre of excellence for research and training in cause of death.

ISGlobal has earned accreditation of excellence in human resources policy in the form of the official European Commission HR Excellence in Research Award.

In the area of knowledge translation, ISGlobal led teams that produced consensus statements on the diagnosis and treatment of imported malaria and Chagas disease at the primary care level and also submitted three new patent applications.

# 8 multisite research projects coordinated by ISGlobal



## MALARIA

### ● SYSMALVAC

#### Identifying Correlates of Protection to Accelerate Vaccine Trials.

Goal: to apply an analytical method of mapping the human immune response to malaria vaccines that allows a predictive artificial intelligence model to identify the main physiological processes leading to protection upon immunisation with the candidate vaccine RTS,S or with sporozoites (CPS). Generalisable immune correlates of protection will be validated in an experimental CPS animal model. Combinatorial biomarkers correlating with protection against malaria will be bundled into a final vaccine product.

—  
PI and coordinator: Carlota Dobaño  
Funding institution: Seventh Framework Programme (FP7), European Union  
Funding: €2.8 million  
Calendar: 2013–2015

### ● RTS,S IMMUNOLOGY

#### Malaria Vaccine-Induced Protection Through Integrated Analysis of Antibody, B Cell and T Cell Immune Responses.

Goal: to identify antibody and cellular immunological signatures associated with protection elicited by RTS,S with innovative technical and analytical approaches that would allow a deeper and more powerful assessment of vaccine-induced immunity.

—  
PI and coordinator: Carlota Dobaño  
Funding institution: NIH  
Funding: \$3 million  
Calendar: 2012–2017

### ● TRANSEPI

#### The Comparative Epidemiology of *P. falciparum* and *P. vivax* Transmission in Brazil, Thailand and Papua New Guinea.

Goal: to contribute towards improved control and eventual elimination of malaria in the Asia-Pacific and Americas through gaining an in-depth understanding of transmission patterns of *P. falciparum* and *P. vivax*.

—  
PI and coordinator: Ivo Mueller  
Funding institution: Bill & Melinda Gates Foundation  
Funding: \$3.5 million  
Calendar: 2012–2015

### ● MALTEM

#### Mozambican Alliance Towards the Elimination of Malaria.

Goal: to support the Mozambican National Malaria Control Program (NMCP) with the overall goal to eliminate malaria in the southernmost areas of Mozambique by 2020 and to make significant progress towards elimination in Gaza and Inhambane provinces. In the long term, the adopted strategy seeks to expand malaria elimination efforts to the rest of the country, through the development of a national elimination strategy.

—  
PI: Antoni Plasència  
Funding institutions: Bill & Melinda Gates Foundation, "la Caixa" Foundation  
Funding: €16 million  
Calendar: 2015–2020

## HIV/AIDS

### ● GAMA

#### Development of Novel Gastrointestinal Biomarkers for Use in HIV Incidence Determination in a Sub-Saharan African Setting.

Goal: to develop a set of biomarkers which can discriminate individuals recently infected with HIV (6-12 months prior) from chronically infected individuals.

—  
PI and coordinator: Denise Nanche  
Funding institution: Bill & Melinda Gates Foundation  
Funding: \$1 million  
Calendar: 2012–2016

## MATERNAL, CHILD AND REPRODUCTIVE HEALTH

### ● CaDMIA

#### Validation of the Minimally Invasive Autopsy (MIA) Tool for Cause of Death Investigation in Developing Countries.

Goal: to design and assess Minimally Invasive Autopsies (MIA) tools for investigation of infectious causes of death, and to evaluate the acceptability and feasibility of using such tools in different cultural, religious and geographical backgrounds.

—  
PI and coordinators: Quique Bassat, Clara Menéndez and Jaume Ordi  
Funding institution: Bill & Melinda Gates Foundation  
Funding: \$1.4 million  
Calendar: 2013–2015

## VIRAL AND BACTERIAL INFECTIONS

### ● NOMORFILM

#### Novel Marine Biomolecules Against Biofilm. Application to Medical Devices.

Goal: to find new biomolecules derived from microalgae that can inhibit the formation of bacterial and fungal biofilms for use in the manufacture of prostheses and catheters to prevent some of the complications associated with the use of such devices.

—  
PI and coordinator: Sara Soto  
Funding institution: Horizon 2020, European Union  
Funding: €7.7 million  
Calendar: 2015–2019

## OTHER

### ● EUROLEISH

#### From the Laboratory to the Patient and the Community.

Goal: to train 15 PhD students in topics related to leishmaniasis research under the supervision of specialised researchers from nine European centres of excellence.

—  
PI and coordinator: Albert Picado  
Funding institution: Marie Skłodowska-Curie – Innovative Training Network (ITN, Horizon 2020), European Union.  
Funding: €3.8 million  
Calendar: 2015–2018

# Innovation and Knowledge Translation

## Research

### Creation of the Innovation Department

The Innovation Department was created in 2015 to provide cross-cutting support throughout the whole organisation. The objectives are to strengthen ISGlobal's capacities in the development of technological innovations and to promote new lines of work in the field of social innovation. We want innovation to permeate all levels of the institution and an innovative spirit to be an integral part of our organisational culture. The new department will help to develop innovations that address local needs and respect the inherent characteristics of the local environment and culture, while maintaining a global outlook.

### Responsible Research and Innovation Working Group

In line with the concept of responsible research and innovation (RRI) promoted by the European Commission, our objective is to ensure that ISGlobal's research and innovation is inclusive and forward-looking and that it addresses the needs of our society, which is currently facing a series of challenges that threaten the sustainability of our health systems and our environment. This new working group was created to promote research that empowers civil society, guarantees gender balance, applies and promotes ethical criteria of high standards, promotes scientific professions, and produces open and accessible publications and data.

## Patents

- **Cyclic peptides against the outer membrane protein A (OmpA) for the treatment of infections caused by gram negative pathogens**

**Inventors:** Younes Smani, Jeronimo Pachón, Ernest Giralt, Meritxell Teixidó, Jordi Vila Estapé, Xavier Vila Farrès  
**Institutions:** Hospital Virgen del Rocío, ISGlobal, Hospital Clínic de Barcelona, Institut de Recerca Biomèdica  
**Reference number:** PCT/EP2015/072166

- **Dichloroacetate compounds for use in a method for treating a disease caused by a glycolytic parasite**

**Inventors:** Alberola, J., Rodríguez, A., Martínez, A. Izquierdo, L.  
**Institutions:** ISGlobal and Universitat Autònoma de Barcelona  
**Reference number:** PCT/EP2015/054931

- **Exosomes and their use as vaccines**

**Inventors:** Sergio Montaner-Tarbes, Francesc E. Borrás, Maria Montoya, Lorenzo Fraile, Hernando A. del Portillo  
**Institutions:** ICREA, ISGlobal, IGTP, Universitat de Lleida, INNOVEX Therapeutics SL.  
**Reference number:** P201530775

One of ISGlobal's objectives is to translate the results of basic research into practices and strategies that have an impact on health



## Knowledge Translation

One of ISGlobal's objectives is to translate the results of basic research into practices and strategies that have an impact on health. As a WHO Collaborating Centre for Malaria Control, Elimination and Eradication, ISGlobal participated in the development of a technical brief on the control and elimination of *Plasmodium vivax* malaria. Because of the biological characteristics of *P. vivax*—the most common malaria-causing species outside of Africa—specific strategies are needed to combat the parasite. These strategies are outlined in the WHO technical brief.<sup>1</sup>

As a member of the Malaria in Pregnancy Working Group, ISGlobal participated in the development of two new recommendations published by Roll Back Malaria. The first of these proposes the continuous distribution of insecticide-treated nets through antenatal care services and vaccination clinics.<sup>2</sup> The second statement provides guidelines on the use of folic acid supplementation during pregnancy.<sup>3</sup>

During the year, ISGlobal also played a leading role in the development of two clinical practice guideline documents: one on the diagnosis and treatment of imported malaria in Spain and the other on managing Chagas disease at the primary care level.<sup>4,5</sup>

<sup>1</sup> Control and elimination of *Plasmodium vivax* malaria. A technical brief. WHO 2015.

<sup>2</sup> Continuous Distribution of Long-Lasting Insecticidal Nets in Africa through Antenatal and Immunization Services: A Joint Statement by the Roll Back Malaria Working Groups on Malaria in Pregnancy and Vector Control and the Alliance for Malaria Prevention, Feb 2015.

<sup>3</sup> Roll Back Malaria Partnership Malaria in Pregnancy Working Group: Consensus Statement on Folic Acid Supplementation During Pregnancy, Feb 2015.

<sup>4</sup> Muñoz J, Rojo-Marcos G, Ramírez-Olivencia G, Salas-Coronas J, Treviño B, Perez Arellano JL, et al. Diagnosis and treatment of imported malaria in Spain: Recommendations from the Malaria Working Group of the Spanish Society of Tropical Medicine and International Health (SEM-TSI). *Enferm Infecc Microbiol Clin* 2015;33:e1-e13.

<sup>5</sup> Roca Saumell C, Soriano-Arandes A, Solsona Díaz L, Gascón Brustenga J, Grupo de consenso Chagas-APS. Consensus document for the detection and management of Chagas disease in primary health care in a non-endemic areas. *Aten Primaria* 2015;47:308-17.

# Malaria

*In the past 15 years, 57 countries have succeeded in reducing the number of malaria cases by 75%, and 2015 was the first year in history in which no indigenous malaria cases were recorded in Europe. Despite these unprecedented achievements, around 14 million people become infected with malaria every year and 438,000 of them die. Most of these deaths occur in sub-Saharan Africa in two of the most vulnerable groups: children and pregnant women. Much work remains to be done, but the achievements of recent years have allowed us to set our sights on a more ambitious goal: moving from controlling malaria to eliminating the disease completely. The appearance of artemisinin resistance in Southeast Asia and the increase in insecticide-resistant “Anopheles” mosquitoes underscore the importance of accelerating malaria elimination efforts. At ISGlobal, we are convinced that the only sustainable long-term solution is the complete elimination of the parasite in a given territory and our Malaria Elimination Initiative focuses all its efforts on achieving this goal.*

## Main Lines of Research

- Enabling technologies for malaria research
- Parasite biology
- Pathophysiology
- Malaria immunology
- Diagnostics
- Evaluation of preventive and therapeutic tools
- Epidemiology and clinical presentation of *Plasmodium falciparum* and *P. vivax*
- Vector biology and control
- Novel approaches and strategies for malaria elimination

## Main Results in 2015\*

### ● Adaptive capacity of the malaria parasite.

A study deciphered the mechanisms that govern the mutually exclusive expression of a group of genes in the malaria parasite *P. falciparum*.<sup>6</sup> Under strong selective pressure, some parasites were found to express more than one copy of the *clag3* gene, which can increase their ability to adapt to the presence of antimalarial drugs. These results contribute to our understanding of the dynamics of the malaria parasite's adaptation to environmental change.

### ● New delivery methods for antimalarial drugs.

A joint unit formed by ISGlobal and the Institute for Bioengineering of Catalonia (IBEC) to develop nanoparticle-based diagnostic and therapeutic tools described a new delivery method that increases the efficacy of antimalarial drugs.<sup>7</sup> The drugs are encapsulated in lipid vesicles coated with red blood cell antibodies. These vesicles, known as immunoliposomes, selectively release the drug inside red blood cells. This delivery method is much more efficient than free drug at eliminating the malaria parasite *in vivo*.

\* Studies related to malaria in pregnancy are included in the section on Maternal, Child and Reproductive Health research.

<sup>6</sup> Rovira-Graells N, Crowley VM, Bancells C, Mira-Martínez S, Ribas de Pouplana L, Cortés A. Deciphering the principles that govern mutually exclusive expression of *Plasmodium falciparum* *clag3* genes. *Nucleic Acids Res* 2015;43:8243–57.

<sup>7</sup> Moles E, Urbán P, Jiménez-Díaz MB, Viera-Morilla S, Angulo-Barturen I, Busquets MA, et al. Immunoliposome-mediated drug delivery to *Plasmodium*-infected and non-infected red blood cells as a dual therapeutic/prophylactic antimalarial strategy. *J Control Release* 2015;210:217–29.

### ● A tool to accelerate the development of drugs and vaccines against malaria.

A study established an experimental model of controlled human malaria infection with the infectious form of the malaria parasite (sporozoites).<sup>8</sup> The authors identified the optimal dose of sporozoites that results in a reproducible infection, comparable to that acquired through mosquito bites. This technique will facilitate the standardisation of controlled human malaria infection and accelerate the development of new antimalarial tools.

● **Vivax malaria.** A multisite study coordinated by ISGlobal found that malaria caused by *P. vivax* parasites can be severe, particularly in pregnant women and patients with other infections.<sup>9</sup> For the first time, researchers characterised the clinical complications of *P. vivax* infection at two referral hospitals (in Brazil and in India) using a common protocol and sufficiently sensitive molecular diagnostic methods.

A study in the Solomon Islands showed that *P. vivax* remains endemic in the archipelago and that the prevalence of asymptomatic, sub-microscopic infections is high.<sup>10</sup> These silent infections produce gametocytes—the infectious phase of the parasite—and can therefore contribute significantly to sustaining malaria transmission. In contrast, *P. falciparum* has practically disappeared from the area and the few cases detected in this study were probably reintroduced by travellers. These results indicate that silent infections caused by *P. vivax* must be detected and treated in order to eliminate malaria.

Another study found that most malaria infections in Papua New Guinean children were caused by *P. vivax* via the reactivation of dormant stages of the parasite in the liver.<sup>11</sup> The study, which has significant implications for public health, suggests that mass drug administration (MDA) could be more cost-effective and kill parasites more effectively if drugs against the dormant stage of the parasite were included.

<sup>8</sup> Mordmüller B, Supan C, Sim KL, Gómez-Pérez GP, Ospina Salazar CL, Held J, et al. Direct venous inoculation of *Plasmodium falciparum* sporozoites for controlled human malaria infection: a dose-finding trial in two centres. *Malar J* 2015;14:117.

<sup>9</sup> Siqueira AM, Lacerda MVG, Magalhães BML, Mourão MPG, Melo GC, Alexandre MAA, et al. Characterization of *Plasmodium vivax*-associated admissions to reference hospitals in Brazil and India. *BMC Med* 2015;13:57.

<sup>10</sup> Waltmann A, Darcy AW, Harris I, Koepfli C, Lodo J, Vahi V, et al. High Rates of Asymptomatic, Sub-microscopic *Plasmodium vivax* Infection and Disappearing *Plasmodium falciparum* Malaria in an Area of Low Transmission in Solomon Islands. *PLoS Negl Trop Dis* 2015;9:e0003758.

<sup>11</sup> Robinson LJ, Wampfler R, Betuela I, Karl S, White MT, Li Wai Suen CSN, et al. Strategies for understanding and reducing the *Plasmodium vivax* and *Plasmodium ovale* hypnozoite reservoir in Papua New Guinean children: a randomised placebo-controlled trial and mathematical model. *PLoS Med* 2015;12:e1001891.



In July, the malaria vaccine candidate RTS,S (Mosquirix) received a positive opinion from the European Medicines Agency



● **Recommendations on the RTS,S vaccine.**

In July, the malaria vaccine candidate RTS,S (Mosquirix)—which ISGlobal and CISM helped develop—received a positive opinion from the EMA. Shortly thereafter, the WHO recommended that RTS,S be used in large-scale studies before eventually being widely introduced. The vaccine provides partial protection to small children, reducing the total number of malaria cases by 36% in children aged 5 to 17 months. Four doses are needed in order to maintain an adequate level of immunity.<sup>12</sup>

Specifically, the WHO recommended that pilot tests of RTS,S be carried out in three to five regions of sub-Saharan Africa prior to the widespread introduction of the vaccine. The efficacy of the vaccine likely depends on multiple factors. One international study involving ISGlobal identified genetic variations in a protein of the parasite that determine, at least in part, the level of protection provided by the vaccine.<sup>13</sup>

● **Vector control.** In the field of malaria vector control, a study showed that the *Anopheles funestus* population in southern Mozambique is highly resistant to the pyrethroid insecticides used to treat mosquito nets and for indoor spraying.<sup>14</sup> The results suggest that vector-control programmes need to include multiple strategies in order to eliminate malaria from a given region.

The use of ivermectin, an antiparasitic drug that is toxic to mosquitoes, could open up new possibilities for vector control. In an animal model, the slow release of ivermectin in blood was found to be safe, effective and useful in helping to control insecticide-resistant mosquitoes.<sup>15</sup>

<sup>12</sup> RTS,S Clinical Trials Partnership. Efficacy and safety of RTS,S/AS01 malaria vaccine with or without a booster dose in infants and children in Africa: final results of a phase 3, individually randomised, controlled trial. *Lancet* 2015;386:31–45.

<sup>13</sup> Neafsey DE, Juraska M, Bedford T, Benkeser D, Valim C, Griggs A, et al. Genetic Diversity and Protective Efficacy of the RTS,S/AS01 Malaria Vaccine. *N Engl J Med* 2015;373:2025–37.

<sup>14</sup> Glunt KD, Abilio AP, Bassat Q, Buló H, Gilbert AE, Huijben S, et al. Long-lasting insecticidal nets no longer effectively kill the highly resistant *Anopheles funestus* of southern Mozambique. *Malar J* 2015;14:298.

<sup>15</sup> Chaccour C, Barrio A, Gil Royo AG, Martínez Urbistondo D, Slater H, Hammann F, et al. Screening for an ivermectin slow-release formulation suitable for malaria vector control. *Malar J* 2015;14:102.

## Maternal, Child and Reproductive Health

*In 2015, an estimated 300,000 women died as a result of pregnancy, child-birth or postpartum complications. Although mortality rates in children under the age of five years have decreased considerably, the likelihood of death in the first days of life remains extremely high (5.9 million children under five years of age died in 2015 and 45% of these deaths occurred in the first month of life). Most of these maternal and child deaths occur in developing countries and are preventable; they represent the greatest health inequity in the world today. Improving maternal health is the most neglected of the MDGs, which were supposed to be met by December 2015.*

*ISGlobal has conducted research to i) identify the main causes of maternal and child mortality in low-income countries, where a lack of reliable data hampers the design of adequate health strategies; ii) improve and scale up strategies for the prevention and control of malaria during pregnancy (a factor associated with a high risk of death from malaria); iii) study the impact of HIV coinfection; iv) assess the efficacy of maternal immunisation against vaccine-preventable infections; and v) determine the effectiveness of a human papillomavirus (HPV) immunisation programme that targeted adolescent girls with the aim of preventing cervical cancer, a disease that causes an estimated 275,000 deaths a year, primarily in developing countries.*

### Main Lines of Research

- Malaria in pregnancy
- Determination of causes of death in low-income countries
- Pharmacovigilance studies of antiretroviral and antimalarial drugs in pregnant women
- Operational research on the acceptability and viability of introducing the HPV vaccine in pre-adolescent African girls
- Effects of the HIV/AIDS epidemic on maternal and child health
- Cervical cancer
- Maternal immunisation

### Main Results in 2015

● **Malaria in pregnancy.** Malaria infection during pregnancy is a serious public health problem because it poses considerable risks to the mother and to the child before and after birth.

The consequences of malaria infection during pregnancy are even more serious when efforts are being made to eliminate the disease from a region. A study in Mozambique showed that a reduction in the prevalence of the parasite led to a decrease in pregnant women's immunity to malaria, which in turn led to adverse clinical outcomes in pregnant women who became infected and in their babies.<sup>16</sup> The results of that study underscore the importance of sustained efforts to control and eliminate malaria.

Most maternal and child deaths occur in developing countries and are preventable

<sup>16</sup> Mayor A, Bardaji A, Macete E, Nhampossa T, Fonseca AM, González R, et al. Changing Trends in *P. falciparum* Burden, Immunity, and Disease in Pregnancy. *N Engl J Med* 2015;373:1607–17.

## Chagas and Other Imported Diseases

Malaria-HIV coinfection during pregnancy is associated with reduced transfer of antimalarial antibodies from mother to foetus.<sup>17</sup> Although this does not appear to increase the child's susceptibility to malaria, it can limit the efficacy of child immunisation strategies based on the vaccination of pregnant women.

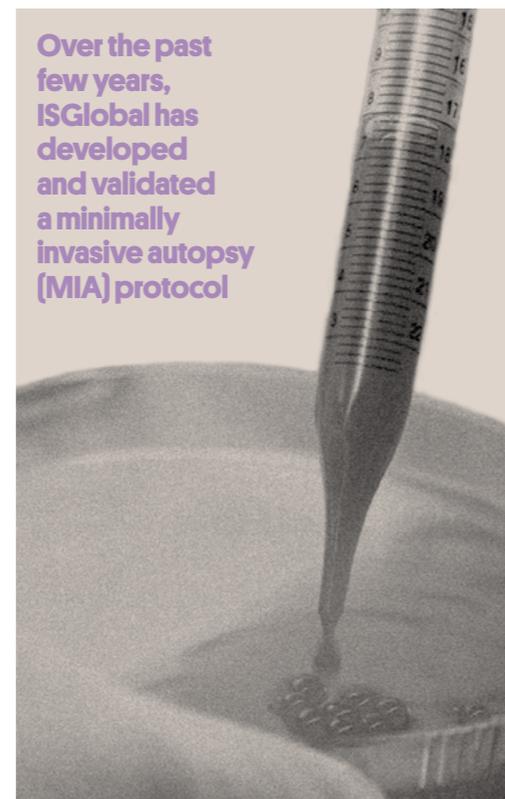
A study comparing the immune systems of pregnant women living in endemic and malaria-free areas suggested that immune system activation during pregnancy provides protection against malaria and other endemic infectious diseases and that an increase in interleukin 10 (an anti-inflammatory mediator) helps to control excessive inflammatory responses that could harm the foetus.<sup>18</sup>

● **Cervical cancer.** A prospective study showed that the tumour suppressor protein p16 is not a good marker of progression in epithelial lesions of the cervix.<sup>19</sup> Another study showed that cases of cervical cancer not caused by HPV infection, although rare, are associated with increased risk of progression and mortality.<sup>20</sup>

● **Determination of cause of death in children.** Over the past few years, ISGlobal has developed and validated a minimally invasive autopsy (MIA) protocol in which small samples of organs and fluids are collected to determine the causes of death.<sup>21</sup> The accuracy of this method is comparable to that of a complete autopsy. The MIA technique can be used in rural areas of developing countries by specially trained technical staff and is therefore a key step towards facilitating access to cause-of-death diagnosis in such areas.

The project is now entering a second phase, CaD-MIA-plus, funded by the Bill & Melinda Gates Foundation. The validation of the MIA (especially for determining causes of death in children) will continue and a research and training centre will be created to support initiatives in this field. ISGlobal is also collaborating with Child Health and Mortality Prevention Surveillance (CHAMPS), the world's largest surveillance network for child health. With funding from the Bill & Melinda Gates Foundation, CHAMPS will use the MIA technique to gain a better understanding of how, where and why children get sick and die in the world's poorest countries.

● **Immunisation.** In the area of maternal immunisation, a descriptive study examined the feasibility of conducting a clinical trial of a vaccine to prevent group B streptococcus infection in pregnant women and subsequent neonatal sepsis.<sup>22</sup>



<sup>17</sup> Moro L, Bardaji A, Nhampossa T, Mandomando I, Serra-Casas E, Sigauque B, et al. Malaria and HIV infection in Mozambican pregnant women are associated with reduced transfer of antimalarial antibodies to their newborns. *J Infect Dis* 2015;211:1004–14.

<sup>18</sup> Requena P, Barrios D, Robinson LJ, Samol P, Umbers AJ, Wangnapi R, et al. Proinflammatory responses and higher IL-10 production by T cells correlate with protection against malaria during pregnancy and delivery outcomes. *The Journal of Immunology* 2015;194:3275–85.

<sup>19</sup> Sagasta A, Castillo P, Saco A, Torné A, Esteve R, Marimon L, et al. p16 staining has limited value in predicting the outcome of histological low-grade squamous intraepithelial lesions of the cervix. *Mod Pathol* 2016;29:51–9.

<sup>20</sup> Rodríguez-Carunchio L, Soveral I, Steenberg RDM, Torné A, Martínez S, Fusté P, et al. HPV-negative carcinoma of the uterine cervix: a distinct type of cervical cancer with poor prognosis. *BJOG* 2015;122:119–27.

<sup>21</sup> Castillo P, Ussene E, Ismail MR, Jordao D, Lovane L, Carrilho C, et al. Pathological Methods Applied to the Investigation of Causes of Death in Developing Countries: Minimally Invasive Autopsy Approach. *PLoS ONE* 2015;10:e0132057.

<sup>22</sup> Belard S, Toepfner N, Capan-Melser M, Mombongo G, Zoleko-Manego R, et al. Streptococcus agalactiae Serotype Distribution and Antimicrobial Susceptibility in Pregnant Women in Gabon, Central Africa. *Sci Rep* 2015;5:17281.

*It is currently estimated that more than 6 million people are infected with “Trypanosoma cruzi”—the majority in Latin America—and that a further 25 million people are at risk of infection. Despite these figures, Chagas is a neglected disease and less than 1% of infected people receive treatment. The impact of Chagas disease is no longer confined to the rural areas of Latin America where vector-borne transmission occurs. As a result of migratory flows, the disease has spread to non-endemic countries such as Spain, where transmission can occur from mother to child or through blood transfusions or the transplantation of infected organs.*

*ISGlobal is taking action on three fronts: i) in Bolivia, the endemic country most affected by Chagas disease, in partnership with the Foundation for Applied Science and Studies for Health and Environmental Development (CEADES) and in collaboration with the National Chagas Programme, the Departmental Health Services, Juan Misael Saracho Autonomous University in Tarija and the University of San Simón in San José de Cochabamba, we have established a platform for the comprehensive care of Chagas disease to improve prevention efforts and the diagnosis and treatment of patients with chronic disease; ii)*

Less than 1% of people infected with Chagas disease receive treatment

*work is ongoing on the development of new drugs and biomarkers to assess treatment response; and iii) we have generated scientific evidence to strengthen European legislation on the detection and control of Chagas disease.*

*As a result of intercontinental travel, imported infectious diseases continue to pose a challenge. There is also a risk that some diseases could be reintroduced as a result of the introduction and/or presence of certain vectors. ISGlobal undertakes epidemiologic surveillance and works to improve tools for the diagnosis and treatment of these diseases.*

### Main Lines of Research

- Epidemiology of Chagas disease in non-endemic areas
- Biomarkers for therapeutic efficacy and for early diagnosis of cardiac damage in patients with Chagas disease
- Clinical trials for new drugs to treat Chagas disease
- Studies on the pharmacokinetics of benznidazole
- Helminth infections
- Travel medicine
- Factors determining health in migrant populations
- Leishmaniasis: vector control, diagnosis and treatment

# Viral and Bacterial Infections

## Main Results in 2015

● **New challenges caused by the globalisation of Chagas disease.** A review article analysed the new epidemiologic scenario of Chagas disease and ways of dealing with it. Climate change and migratory flows have contributed to the globalisation of Chagas disease and led to new challenges for its prevention and treatment.<sup>23</sup>

Another study found that around 4% of Latin Americans living in Europe have chronic Chagas disease—a higher rate than previous estimates—and highlighted the importance of establishing a clear, harmonised European health policy on the prevention and control of the disease.<sup>24</sup>

A case study illustrated the risk of transmitting Chagas disease through organ donation in non-endemic countries.<sup>25</sup> The article describes the case of a patient who received a *T. cruzi*-infected liver and did not receive preventive treatment against the infection.

A pharmacokinetic study showed that it is possible to treat adult patients with chronic Chagas disease with lower doses of benznidazole (2.5 mg/kg/24 h) than those used in the standard treatment.<sup>26</sup> If confirmed by the clinical trials currently underway, these results could have a major impact on the management of chronic Chagas disease, leading to a decrease in both the adverse effects of benznidazole and the cost of treatment.

● **Helminth infections.** Infections caused by *Strongyloides* helminths acquired during visits to tropical and subtropical countries can have serious consequences and the efficacy of the treatments used needs to be evaluated.<sup>27</sup> Serologic testing can be more useful than faecal-based methods in the follow-up of patients with strongyloidiasis, especially in non-endemic areas.

<sup>23</sup> Pinazo M-J, Gascon J. The importance of the multidisciplinary approach to deal with the new epidemiological scenario of Chagas disease (global health). *Acta Trop* 2015;151:16–20.

<sup>24</sup> Requena-Méndez A, Aldasoro E, de Lazzari E, Sicuri E, Brown M, Moore DAJ, et al. Prevalence of Chagas disease in Latin-American migrants living in Europe: a systematic review and meta-analysis. *PLoS Negl Trop Dis* 2015;9:e0003540.

<sup>25</sup> Rodríguez-Guardado A, González ML, Rodríguez M, Flores-Chavez M, Boga JA, Gascon J. Trypanosoma cruzi infection in a Spanish liver transplant recipient. *Clin Microbiol Infect* 2015;21:687.e1–3.

<sup>26</sup> Soy D, Aldasoro E, Guerrero L, Posada E, Serret N, Mejía T, Urbina JA, Gascón J. Population pharmacokinetics of benznidazole in adult patients with Chagas disease. *Antimicrob Agents Chemother* 2015;59:3342–9.

<sup>27</sup> Buonfrate D, Sequi M, Mejia R, Cimino RO, Krolewski AJ, Albonico M, Degani M, Tais S, Angheben A, Requena-Mendez A, Muñoz J, Nutman TB, Bisoffi Z. Accuracy of five serologic tests for the follow up of *Strongyloides stercoralis* infection. *PLoS Negl Trop Dis* 2015;9:e0003491.



*Although the mortality rate associated with infectious disease has decreased worldwide, viral and bacterial infections continue to disproportionately affect the world's poorest populations, in particular children: pneumonia and diarrhoea are the main causes of child death in low-income countries. In addition, hundreds of millions of patients worldwide are affected by hospital-acquired infections, especially in developed countries. A large percentage of these infections are caused by multidrug-resistant bacteria, which, alarmingly, have become much more common as a result of the inappropriate use and abuse of antibiotics in health care and the livestock industry. Multidrug-resistant bacteria spread easily and are present in all regions of the world; as a result, they are considered one of the most serious threats to global health.*

*At ISGlobal, we have deployed our expertise in this area in an effort to improve the diagnosis and treatment of infectious diseases, understand the causes of antibiotic resistance and find new treatments against infectious diseases.*

## Main Lines of Research

- Design of new rapid tools to diagnose infectious diseases
- Molecular basis of antimicrobial resistance
- Relationship between virulence and antimicrobial resistance
- Discovery and assessment of new antibacterial drugs
- Surveillance, phylogeny and clinical impact of the influenza virus and emergent viruses
- Search for diagnostic and prognostic biomarkers of viral and bacterial infection
- Pathogenesis and antimicrobial resistance of microorganisms that cause neonatal sepsis
- Epidemiology and clinical presentation of viral and bacterial infections
- Treatment of yaws in Papua New Guinea

## Main Results in 2015

● **Acquisition of drug resistance.** An analysis of the *in vivo* evolution of drug resistance in *Pseudomonas aeruginosa* isolated from patients in intensive care units showed that the stepwise acquisition of different resistance mechanisms is necessary for the appearance of multidrug-resistant strains.<sup>28</sup> The study also identified the antibiotics most frequently associated with resistance.

The results of studies on *Acinetobacter nosocomialis* and *Salmonella* Typhi showed that the acquisition of antimicrobial resistance is associated with a loss of virulence in both bacteria.<sup>29,30</sup>

<sup>28</sup> Solé M, Fàbrega A, Cobos-Trigueros N, Zamorano L, Ferrer-Navarro M, Ballesté-Delpierre C, et al. In vivo evolution of resistance of *Pseudomonas aeruginosa* strains isolated from patients admitted to an intensive care unit: mechanisms of resistance and antimicrobial exposure. *J Antimicrob Chemother* 2015;70:3004–13.

<sup>29</sup> Vila-Farrés X, Ferrer-Navarro M, Callarisa AE, Martí S, Espinal P, Gupta S, et al. Loss of LPS is involved in the virulence and resistance to colistin of colistin-resistant *Acinetobacter nosocomialis* mutants selected in vitro. *J Antimicrob Chemother* 2015;70:2981–6.

<sup>30</sup> Ballesté-Delpierre C, Fàbrega A, Ferrer-Navarro M, Mathur R, Ghosh S, Vila J. Attenuation of in vitro host-pathogen interactions in quinolone-resistant *Salmonella* Typhi mutants. *J Antimicrob Chemother* 2016;71:111–22.

# HIV/AIDS and Tuberculosis

## ● Automated classification of clinical isolates.

A simple, fast, automated mass spectrometry approach known as MALDI-TOF makes it possible to discriminate the major lineages of methicillin-resistant *Staphylococcus aureus* (MRSA).<sup>31</sup> This technique, which can be implemented in routine laboratories, could facilitate the implementation of control measures to limit MRSA transmission and make it possible to study MRSA population dynamics.

● **New medicines and combinations.** In a study designed to identify new compounds with activity against multidrug-resistant bacteria, ozenoxacin (a new-generation non-fluorinated quinolone) was found to be a good option for the treatment of MRSA because the emergence of ozenoxacin-resistant strains is very rare.<sup>32</sup> Another study found that the combination of a beta-lactamase inhibitor (avibactam) with ceftazidime is effective against bacteria that are resistant to broad-spectrum antibiotics.<sup>33</sup>

● **Debate on the global threat posed by antimicrobial resistance.** The conclusions of the B-Debate, which focused on the global threat posed by antimicrobial resistance, underscored the urgent need to relaunch the research and development of novel antimicrobial agents and come up with innovative strategies that reconcile the interests of the pharmaceutical industry with public health needs.<sup>34</sup>

● **Identifying the causes of respiratory diseases.** A biomarker signature that classifies pneumonias according to their bacterial, viral or malarial origin was identified.<sup>35</sup> The technique could contribute to a faster and more accurate diagnosis of pneumonia in children, thereby reducing morbidity and the unnecessary use of antibiotics.

Another study showed that two respiratory viruses—respiratory syncytial virus (RSV) and human metapneumovirus (hMPV)—are frequent causes of severe pneumonia in Moroccan children.<sup>36</sup> The real contribution of these viruses to severe pneumonia, as defined by the WHO, in different regions has not been determined.

In Mozambican children under five years of age, pneumonia caused by the opportunistic fungus *Pneumocystis jirovecii* is potentially fatal, especially in HIV-infected children. The study highlighted the urgent need to develop new diagnostic tools for the at-risk population and to improve the prevention of mother-to-child HIV transmission.<sup>37</sup>

● **Invasive *Salmonella* infections in children.** According to a study based on data collected over 14 years of microbiological surveillance in Mozambique, the incidence of invasive *Salmonella* infections in small children has declined but the mortality rates associated with these infections remain high, particularly in children with severe malnutrition or anaemia.<sup>38</sup>

● **Yaws can be eradicated using single-dose treatment with oral azithromycin.** In a study conducted in Papua New Guinea, a single round of mass treatment with single-dose oral azithromycin for the entire population reduced the transmission and prevalence of yaws, a neglected tropical disease.<sup>39</sup> The results of this study support the WHO's strategy for the worldwide eradication of yaws by 2020.

<sup>31</sup> Camoez M, Sierra JM, Dominguez MA, Ferrer-Navarro M, Vila J, Roca I. Automated categorization of methicillin-resistant *Staphylococcus aureus* clinical isolates into different clonal complexes by MALDI-TOF mass spectrometry. *Clin Microbiol Infect* 2016;22:161.e1–7.

<sup>32</sup> López Y, Tato M, Espinal P, García-Alonso F, Gargallo-Viola D, Cantón R, et al. In vitro selection of mutants resistant to ozenoxacin compared with levofloxacin and ciprofloxacin in Gram-positive cocci. *J Antimicrob Chemother* 2015;70:57–61.

<sup>33</sup> Pitart C, Marco F, Keating TA, Nichols WW, Vila J. Activity of ceftazidime-avibactam against fluoroquinolone-resistant Enterobacteriaceae and *Pseudomonas aeruginosa*. *Antimicrob Agents Chemother* 2015;59:3059–65.

<sup>34</sup> Roca I, Akova M, Baquero F, Carlet J, Cavalieri M, Coenen S, et al. The global threat of antimicrobial resistance: science for intervention. *New Microbes New Infect* 2015;6:22–9.

<sup>35</sup> Valim C, Ahmad R, Lanaspá M, Tan Y, Acácio S, Gillette MA, et al. Responses to Bacteria, Virus, and Malaria Distinguish the Etiology of Pediatric Clinical Pneumonia. *Am J Respir Crit Care Med* 2016;193:448–59.

<sup>36</sup> Jroundi I, Mahraoui C, Benmessaoud R, Moraleda C, Tligui H, Seffar M, et al. A comparison of human metapneumovirus and respiratory syncytial virus WHO-defined severe pneumonia in Moroccan children. *Epidemiol Infect* 2016;144:516–26.

<sup>37</sup> Lanaspá M, O'Callaghan-Gordo C, Machevo S, Madrid L, Nhampossa T, Acácio S, et al. High prevalence of *Pneumocystis jirovecii* pneumonia among Mozambican children. *Clin Microbiol Infect* 2015;21:1018.e9–1018.e15.

<sup>38</sup> Mandomando I, Bassat Q, Sigatique B, Massora S, Quintó L, Acácio S, et al. Invasive *Salmonella* Infections Among Children From Rural Mozambique, 2001–2014. *Clin Infect Dis* 2015;61 Suppl 4:S339–45.

<sup>39</sup> Mitjà O, Houineï W, Moses P, Kapa A, Paru R, Hays R, et al. Mass treatment with single-dose azithromycin for yaws. *N Engl J Med* 2015;372:703–10.

*In late 2014, 37 million people worldwide were infected with HIV, and tuberculosis (TB) was responsible for nearly one third of the estimated 1.2 million HIV-related deaths that year. TB alone caused an additional 1 million deaths in 2014 and is, together with HIV, one of the leading causes of death in the world.*

*Thanks to better joint HIV/TB interventions, the number of people who die as a result of TB associated with HIV has decreased by 22% since 2000. However, low antiretroviral treatment coverage, resistance to antiretroviral drugs, and limited access to diagnosis of both infections remains a problem in sub-Saharan Africa, which is home to more than 70% of all HIV-positive people and has the world's highest TB burden. Access to antiretroviral drugs is a priority in the fight against both diseases. By 2020, the UNAIDS 90-90-90 initiative aims to diagnose 90% of HIV cases, provide treatment to 90% of all people diagnosed with HIV, and achieve viral suppression in 90% of all patients treated. If these targets are reached, it could be possible to eliminate HIV-AIDS by 2030.*

*Our research on HIV/AIDS and TB is focused on specific problems related to the epidemic in sub-Saharan Africa, where the incidence of HIV and TB is extremely high in children as well as adults.*

## Main Lines of Research

- HIV and maternal and child health
- Pathogenesis of acute and early HIV infection
- Community-based epidemiologic and operational studies to improve access to antiretroviral treatment
- Epidemiologic studies to determine the TB burden in the community
- Evaluation of new tools for the diagnosis, treatment and prevention of TB

## Main Results in 2015

● **Resistance to antiretroviral therapy.** In Mozambique, where HIV rates are among the highest in the world, antiretroviral therapy (ART) fails in one quarter of the patients who receive it. A study showed that most of these failures were caused by HIV drug resistance.<sup>40</sup> This result underscores the need to increase access to virological monitoring so that ART failure can be detected early and alternative treatments can be offered, thereby preventing drug resistance from spreading to the rest of the population.

● **High prevalence and geographical clustering of HIV.** Designing community interventions to improve access to ART requires more data than just national and regional rates of prevalence and incidence. A study carried out in a rural area of southern Mozambique used spatial geolocation systems and sero-survey data to demonstrate the existence of micro clusters of high HIV prevalence in one district.<sup>41</sup> These results are important for the design of effective strategies for preventing the disease and improving treatment access at the community level.

<sup>40</sup> Rupérez M, Pou C, Maculube S, Cedeño S, Luis L, Rodríguez J, et al. Determinants of virological failure and antiretroviral drug resistance in Mozambique. *J Antimicrob Chemother* 2015;70:2639–47.

<sup>41</sup> González R, Augusto OJ, Munguambe K, Pierrat C, Pedro EN, Sacoor C, et al. HIV Incidence and Spatial Clustering in a Rural Area of Southern Mozambique. *PLoS One*. 2015 10:e0132053.

● **TB incidence in HIV-infected adults.** Mozambique is one of the few high-TB-burden countries where the incidence of the disease has not declined in recent years. An epidemiologic study carried out at CISM showed that the incidence of TB in HIV-infected adults is extremely high (860 and 1,800 cases per 100,000 people per year for women and men, respectively).<sup>42</sup> Given that not all cases are diagnosed, these figures indicate that the TB burden in HIV-infected people is extremely high and that public health interventions are needed to control this epidemic.

● **Childhood tuberculosis.** According to a prospective study, the burden of childhood TB in southern Mozambique is high (470 new cases per 100,000 people per year).<sup>43</sup> This figure—twice as high as previous estimates reported by the Ministry of Health—shows that, under normal conditions, as in other regions of Africa, a large percentage of childhood TB cases are never diagnosed and/or reported.

Non-tuberculous mycobacteria (NTM) can hamper diagnosis of TB in children because the infections caused by these bacteria are clinically indistinguishable from TB. A first review of NTM in children summarised current knowledge of these bacteria and described the implications for public health, especially in developing countries with high rates of childhood TB.<sup>44</sup>

<sup>42</sup> García-Basteiro AL, López-Varela E, Respeito D, González R, Nanche D, Manhiça I, et al. High tuberculosis burden among people living with HIV in southern Mozambique. *Eur Respir J* 2015;45:547–9.

<sup>43</sup> López-Varela E, Joaquim Augusto O, Gondo K, García-Basteiro AL, Fraile O, Ira T, Ribó Aristizabal JL, Bulo H, Muñoz Gutierrez J, Aponte J, Macete E, Sacarlal J, Alonso P. Incidence of tuberculosis among young children in rural Mozambique. *Pediatr Infect Dis J*. 2015 Jul;34(7):686-92.

<sup>44</sup> López-Varela E, García-Basteiro AL, Santiago B, Wagner D, van Ingen J, Kampmann B. Non-tuberculous mycobacteria in children: muddying the waters of tuberculosis diagnosis. *Lancet Respir Med* 2015;3:244–56.



The number of people who die as a result of TB associated with HIV has decreased by 22% since 2000

# Facts & Figures

Training programmes

25

Capacity-building seminars

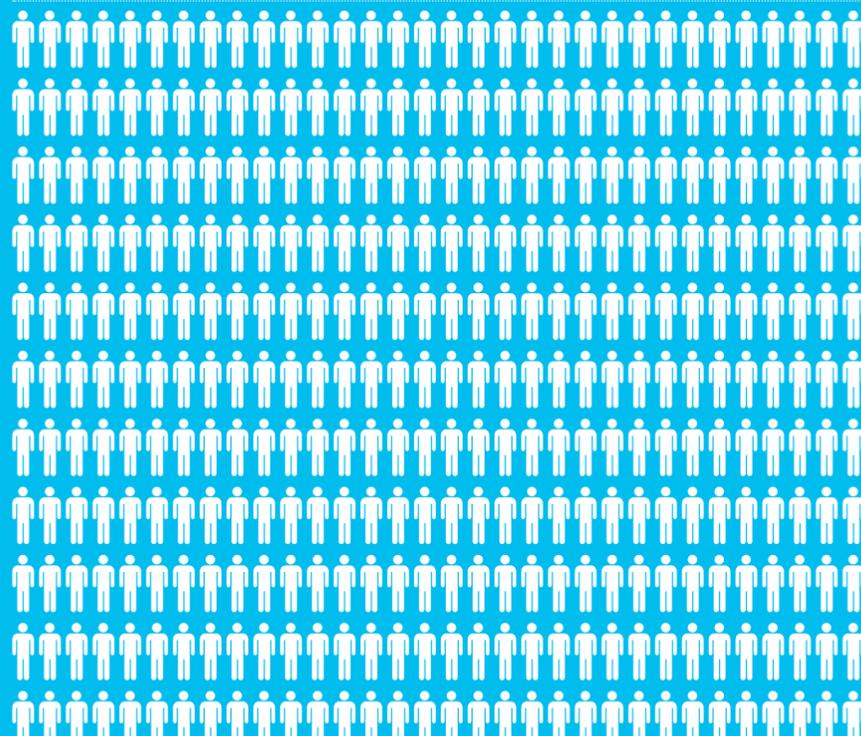
29

Doctoral theses defended

10

Number of students 478

Short courses 367



Doctorate 67



Master or diploma 31



Rotations 13



Núria Casamitjana  
Training and Education  
Director

Knowledge translation plays a fundamental role in building a world where all people can enjoy good health. In 2015, we consolidated our graduate programme and increased the number and diversity of our specialised short courses and workshops for researchers and professionals working in global health.

ISGlobal offers 25 graduate programmes and short courses to students from all over the world with a variety of different educational backgrounds in a diverse range of disciplines.

Over the course of 2015, as part of the ongoing merger between the Centre for Research in Environmental Epidemiology (CREAL) and ISGlobal, the doctoral programmes at the two institutions were consolidated. With more than 70 students from Catalan universities currently pursuing the doctorate and an average of 15 doctoral theses defended each year, our programme has consolidated its position as southern Europe's only doctoral programme in global health.

In parallel, as part of our activities in Mozambique, Bolivia and Morocco, we provided researchers and health professionals with training that will enable them to help build and strengthen the individual and institutional capacities that are essential to improving the health of vulnerable populations in countries with limited resources.

## Training and Education

### Graduate Courses

- Doctorate in Medicine and Translational Research (International Health track), UB
- Trans Global Health: joint doctorate in the framework of the Erasmus Mundus programme in collaboration with academic institutions in Belgium, France and the Netherlands
- ISGlobal-UB Master of Global Health
- ISGlobal-UB Master of Clinical Research (International Health and Clinical Microbiology tracks)
- Master in Internationalisation. Global Health course, Faculty of Economics, UB
- Master in Public Health, Global Health course, UPF-UAB
- ISGlobal-UB Diploma of Global Health Fundamentals

### Courses, Workshops and Rotations

- International Governance & Politics of Global Health
- Nutrition and Food Security
- 11th Workshop on Imported Chagas Disease
- Maternal and Reproductive Health
- Humanitarian Crises and Global Health
- Global Environmental Health
- Development and Application of Vaccines in Global Health
- Safe Mothers and Newborns: a leadership workshop
- Barcelona Global Health Summer School
- The Science of Eradication: Malaria. Organised jointly with Harvard University and the Swiss Tropical and Public Health Institute
- Fundamentals of Qualitative Health Research
- Determinants of Global Health
- Introduction to Epidemiology I
- Fundamentals of Biostatistics in Global Health
- Imported Diseases: An Intensive Course for Physicians in Clinical Practice
- Global Health Systems and Policies
- Rotations of resident physicians and graduate doctors at the Manhica Health Research Centre (Mozambique)
- Rotations of resident physicians and graduate doctors at the Chronic Diseases Clinic of Ifakara (Tanzania)
- Student internships at the Manhica Health Research Centre (Mozambique)

### Doctoral Theses Defended

*Los flebotomos de las islas de Mallorca y Menorca y su papel focalizador en la distribución de las leishmaniosis,*  
**Maria Magdalena Alcover Mengual**  
8 January 2015, UB  
Supervisor: Dr Montserrat Gállego

*Contribución de la anemia y de la exposición al virus de la inmunodeficiencia humana a la morbi-mortalidad infantil en África,*  
**Cinta Moraleda Redecilla**  
15 April 2015, UB  
Supervisors: Dr Clara Menéndez, Dr Ruth Aguilar

*Distribution of multiple chronic conditions and their impact on the Spanish population,*  
**Noe Garin Escria**  
17 April 2015, UB  
Supervisors: Dr Antoni Trilla, Dr J.M. Haro

*Burden, impact and control of malaria and HIV in women of reproductive age from southern Mozambique,*  
**Raquel González**  
12 June 2015, UB  
Supervisor: Dr Clara Menéndez

*Epidemiology and aetiology of severe respiratory infections among children under five, admitted to the children's hospital of Rabat, Morocco,*  
**Imane Jroundi**  
21 October 2015, UB  
Supervisor: Dr Quique Bassat

*Responsiveness to hepatitis A and hepatitis B vaccination in HIV-infected patients: a naturalistic study,*  
**Guillermo Mena**  
30 October 2015, UB  
Supervisor: Dr José María Bayas Rodríguez

*Quinolone resistance acquisition and impact on virulence in Salmonella enterica: a cost-benefit matter,*  
**Clara Ballesté**  
13 November 2015, UB  
Supervisors: Dr Jordi Vila, Dr Anna Fàbrega

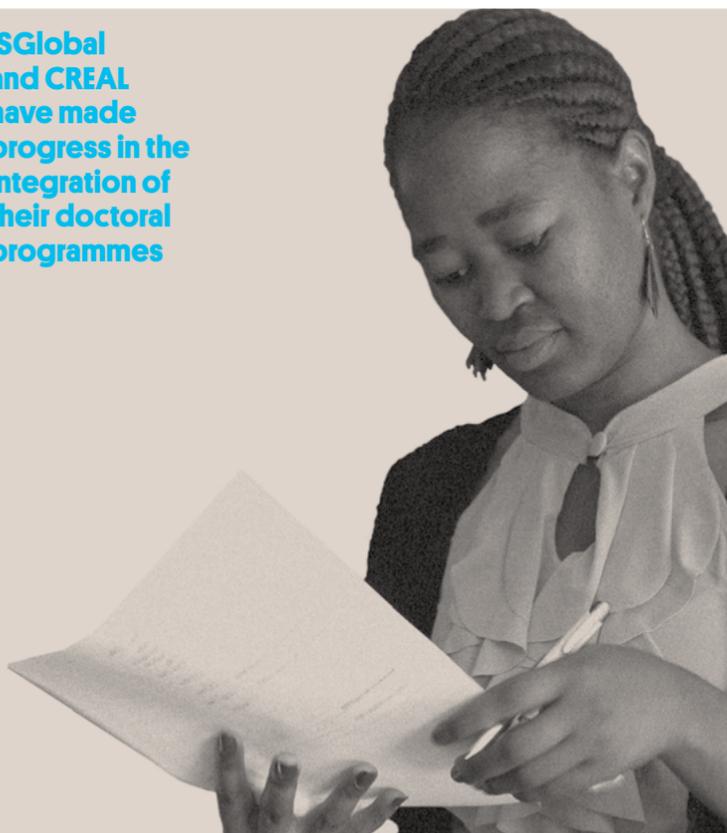
**We trained researchers and health professionals in Mozambique, Bolivia and Morocco**

*Development of polyvalent erythrocyte- and parasitized erythrocyte-targeted nanovectors as novel site-specific drug delivery approaches for Plasmodium falciparum malaria chemotherapy,*  
**Ernest Moles**  
9 December 2015, UB  
Supervisor: Dr Xavier Fernández-Busquets

*Promoció de la vacunació antigripal en els professionals sanitaris,*  
**Anna Llupià**  
14 December 2015, UB  
Supervisors: Dr Antoni Trilla, Dr José María Bayas Rodríguez

*Exploration of sulfated polysaccharides as antimalarials and as targeting molecules for nanovector-mediated drug delivery to Plasmodium-infected cells,*  
**Maria Joana Azevedo Silva Marques**  
14 December 2015, UB  
Supervisor: Dr Xavier Fernández-Busquets

**ISGlobal and CREAL have made progress in the integration of their doctoral programmes**



### More Exchange Students in ISGlobal's Programmes

The number of exchange students in our master's and doctoral programmes increased significantly in 2015. These university students participate in research teams or specialised courses at ISGlobal in order to gain a deeper understanding of their research subjects or the issues they wish to address as professionals. The exchange students in our master's programmes belong to the tropEd network, of which ISGlobal, like other major international academic institutions, is a member. TropEd students who choose ISGlobal as their home institution must also complete coursework at other international institutions.

### 2nd Barcelona Global Health Summer School

Sixty participants from all over the world attended the second edition of the Barcelona Global Health Summer School, organised by the Health Science Students' Association of Catalonia and the International Federation of Medical Students' Associations in collaboration with ISGlobal. The focus of the programme was the relationship between climate change and health. As confirmed by experts in Spain and elsewhere, climate change clearly exists and is most likely caused by human activity. However, we still do not have conclusive evidence about the impact that climate change will have on human health. The Barcelona Global Health Summer School is a 30-hour intensive course that includes interactive classes, visits to environmental health research centres in Barcelona (such as CREAL and IC3), a guided tour of the CosmoCaixa Barcelona science museum and various other activities.

### 2nd ISGlobal-CREAL Joint Doctoral Symposium

The second Joint Doctoral Symposium organised by ISGlobal and CREAL was held on 4 November at the University of Barcelona. This one-day seminar represented a step on the way towards the strategic integration of CREAL and ISGlobal. The aim was to train doctoral students on how to present and defend their work and to introduce students from both centres to the work of their colleagues with a view to increasing synergistic interaction between the researchers and promoting scientific collaborations. The programme included two sessions of oral presentations and two poster sessions in which researchers from ISGlobal and CREAL presented their work on a broad range of topics. Awards for the best posters were presented at the symposium.

### Higher Education for Mozambican Women

In collaboration with the Mozambique-based Foundation for Community Development (FDC) and with support from the "la Caixa" Foundation, ISGlobal set up a scholarship programme that helps Mozambican women pursue a university education in various disciplines. The programme enables women to focus on their studies so that they can participate in solving Mozambique's problems and play a leadership role in the country's development process. Nineteen women have received scholarships between 2009 and 2015.

The number of exchange students in our master's and doctoral programmes increased significantly in 2015



## Malaria Elimination Initiative

### The Science of Eradication: Malaria

In 2015, the fourth edition of the leadership development course "The Science of Eradication: Malaria" was held at Harvard Business School in Boston, in collaboration with ISGlobal and the Swiss Tropical and Public Health Institute. Fifty-seven participants from various malaria-related fields acquired a multidisciplinary perspective on malaria eradication. Thanks to the knowledge and basic skills imparted by this course, including the effective use of evidence and real-life data, the participants were able to improve their analytical and problem-solving skills for the design and implementation of appropriate intervention strategies. The participants acquired the knowledge and leadership skills they need to develop programmes for controlling, eliminating and eradicating malaria and gained an understanding of a wide range of related key issues.

## Chagas Initiative

### 11th Workshop on Chagas Disease

Organised by ISGlobal in collaboration with the Mundo Sano Foundation, this workshop brought together 150 experts from all over the world at Casa del Mar (Barcelona). The aim of the workshop was to present the latest research on the prevention and treatment of Chagas disease. In addition to the usual innovative and highly anticipated scientific sessions, this edition of the workshop featured a parallel work session organised by the Ibero-American network NHEPACHA to discuss protocols for future multicentre clinical trials and the barriers that hinder access to the diagnosis and treatment of Chagas disease. The aim of the network, which comprises 13 research groups from nine countries and is funded by the Drugs for Neglected Diseases initiative (DNDi), is to develop new tools and biomarkers for the diagnosis, treatment and management of Chagas disease.

The 11th Workshop on Chagas Disease brought together more than 150 experts in Barcelona

## Maternal, Child and Reproductive Health Initiative

### Safe Mothers and Newborns Workshop

ISGlobal, the Harvard T.H. Chan School of Public Health and Aga Khan University (AKU)—three institutions with considerable experience in maternal, neonatal and child health—joined forces to create this new academic collaboration to speed up the reduction of maternal and neonatal mortality. The first edition of the workshop, held in Barcelona from 20 June to 3 July, focused on the health of mothers and newborn infants. More than 50 leaders and experts in maternal, child and reproductive health from countries with high maternal and neonatal mortality rates came together to acquire new knowledge and skills that they can apply in their home countries.

### Training Programme to Fight Cervical Cancer in Mozambique

In collaboration with the Manhica Health Research Centre (CISM) and the Mozambican Ministry of Health, ISGlobal finished a training programme—launched the previous year—that imparts the necessary skills and knowledge for the introduction of the human papillomavirus (HPV) vaccine, which prevents cervical cancer, in Mozambique. The programme, which is being financed by the "la Caixa" Foundation, trained 217 health professionals attached to the Ministry of Health in Maputo as well as staff in other districts, including Manhica, in the south; Mocimboa da Praia, in the north; and Manica, in western central Mozambique. Three training courses were held during the pilot phase and educational materials were created for the Ministry of Health to use and develop.

ISGlobal, the Harvard T.H. Chan School of Public Health and Aga Khan University joined forces in 2015 to create the Safe Mothers and Newborns Workshop



# Facts & Figures

Publications

5

News items and posts published

195

Equity analysis of the

17

Sustainable Development Goals

**EQUITY** KNOWLEDGE TRANSLATION  
MATERNAL-CHILD  
ADVOCACY **ACCESS** **R&D**  
COOPERATION CHAGAS DISEASE  
LATIN AMERICA  
**SDG** ANTIBIOTIC RESISTANCE  
**EBOLA**  
INEQUALITY PHILANTHROPY  
**MALARIA** **YAWS**  
DEVELOPMENT  
**INNOVATION** POLICY **HIV**

**Rafael Vilasanjuan**  
Director, Policy and Global Development

The global development agenda turned the page in 2015, a year of endings and new beginnings, all of which have had an influence on the work and the focus of the Policy and Global Development department throughout the year.

On the one hand, we have observed that considerable progress was made in the indicators for the MDGs, even though not all the targets set were reached. On the other, the international community defined a radically new agenda, which we are now starting to implement. With the SDGs, the proposal for the new global health agenda is to continue working on and improving the advances made in the treatment of infectious diseases, such as malaria. However, it also sets new targets, including reductions in the mortality and morbidity associated with non-communicable diseases and, as its most ambitious objective, achieving universal health coverage.

During the process that has led to the SDGs, ISGlobal's focus has been on prioritising equity and opening up the policy analysis to new areas that come under the heading of environmental epidemiology, which are now being incorporated into our organisation. The Global Development department has worked on defining our role in Latin America, with an agenda focused primarily on Chagas disease and malaria. In another direction, work has started on gaining a broader and deeper understanding of the main challenges affecting health in North Africa to complete the work currently underway in sub-Saharan Africa through our collaboration with the Manhiça Health Research Centre (CISM).

Finally, in what was an electoral year in Spain, ISGlobal worked on concrete proposals with all the country's political parties. The aim of this advocacy work was to shape a public policy for development cooperation that would include and prioritise global health objectives pursued through the exchange of knowledge and seeking to maximise impact.

## Policy

### Policy and Global Development

While monitoring the process of defining the SDGs, ISGlobal's Policy Department worked on a number of different proposals. Together with the Overseas Development Institute (ODI) in London and Save the Children-UK, we organised an international seminar in Barcelona to establish priorities.

ISGlobal's work in this area continues, following three lines of action:

- Developing a proposal for a new model of pharmaceutical innovation and access that would respond to the needs of public health and focus on optimising the use of scientific knowledge
- Working to propose ways to implement the health-related SDGs in Latin America, Africa and Europe with a particular focus on equity
- Promoting the need to change the parameters of official development assistance (ODA) in order to give more importance to the criteria of impact, equity, and knowledge translation

As part of this work, we participated in the It's Not Healthy campaign, an initiative that advocates for a more just and equitable model for pharmaceutical R&D.

## Global Development

The year 2015 was the first complete year of operation for the new Global Development department. As such, it was a year of expansion and a time to look for partners and alliances that would help to further the organisation's strategy of establishing a position in the international arena on the basis of its initiatives.

To achieve this goal, we worked on the following priorities:

- Broadening ISGlobal's strategic agenda in Latin America, which had been focused primarily on Chagas disease, and establishing new relationships with the main regional and multilateral organisations
- Starting to interact with European development institutions to promote the concept of knowledge as a strategy for development cooperation
- Helping to create a knowledge platform in Morocco that would eventually become a regional Health Observatory

On another topic, during the Ebola epidemic, an event of worldwide impact, we worked on a knowledge translation initiative that led to a laboratory project in Liberia and a regional workshop in Latin America.

## Advocacy

As 2015 was an electoral year in Spain, our priority in this area was to exercise a direct influence on the electoral programmes and proposals of the various political parties. Our goal was to achieve a substantial increase in ODA, targeting a level of 0.4% of the gross domestic product during the next legislature, and to underscore the need to reform Spanish cooperation in order to improve its impact and prevent dispersion.

Another focus in 2015 was developing philanthropy. The first step in this direction was the creation of a preliminary workgroup entitled "Ideas and Philanthropy".

Closer to home, ISGlobal has started to develop closer relationships with European Union (EU) institutions and other organisations with political influence, seeking support for an agenda that would prioritise the generation of new evidence and the value of knowledge in EU development projects.

### Publications

- *The Feasibility of a Shared Data System in the Kenyan Medical Insurance Sector as a Means to Reduce Fraud.* Nina Wine, February 2015.
- *Strategies to Increase Access to Hepatitis C Treatment: A Question of Price or Public Health?* Anna Cusi, March 2015.
- *The Three Crises of Ebola.* Gonzalo Fanjul et al., March 2015.
- *20 años del Centro de Investigación en Salud de Manhica.* Olivia Blanchard, July 2015.
- *La Cooperación Española más allá de 2015: razones éticas y prácticas para el cambio.* September 2015.
- *Mind the Gap: Health Inequities and the Sustainable Development Goals.* November 2015.

## Malaria Elimination Initiative

### Mozambican Alliance Towards the Elimination of Malaria

In its first year of operation, MALTEM deployed all the interventions available to interrupt the transmission of malaria in the district of Magude in southern Mozambique. This project, currently led by the Mozambican Ministry of Health and coordinated by ISGlobal, is being implemented through the Manhica Health Research Centre (CISM) and supported by numerous actors. The first step was to undertake epidemiological and entomological studies in the region. This was followed by various interventions in the field, including a full census of the district, indoor insecticide spraying of all the houses in the area, and the administration of a first round of treatment to the whole population in the month of December.

### Secretariat of the Malaria Eradication Scientific Alliance

The objective of the Malaria Eradication Scientific Alliance (MESA) is to advance the science of malaria eradication through research and development. ISGlobal has hosted the secretariat of this body since it was first established. In June 2015, MESA launched maIERA Refresh, a consultative process undertaken to update the malaria eradication research agenda involving more than 150 experts in malaria. During the year, the MESA Track database completed its first year of operation with in excess of 800 registered research projects. In collaboration with the WHO, MESA presented an analysis of all the ongoing projects using mass administration of antimalarials in endemic areas.

The Mozambican Alliance Towards the Elimination of Malaria (MALTEM) deployed all the interventions available to interrupt the transmission of malaria in the Magude district in southern Mozambique

## Chagas Initiative

### Global Chagas Disease Coalition

ISGlobal has been coordinating the Global Chagas Disease Coalition since January 2015. During this period, the activities of the Coalition have been successfully relaunched. The partners agreed that the focus should be on increasing access to the diagnosis and treatment of Chagas disease by way of an advocacy and communications campaign. During the year, the Coalition's online channels were created (web page, newsletter and social networking accounts), coordination meetings were held, the Coalition participated in various events and conferences in order to raise awareness about the current situation of Chagas disease, and work was undertaken to identify the principal obstacles to access to diagnosis and treatment and to identify potential strategies for scaling up such access. By the end of the year, the number of Coalition members participating in working groups had increased and the working group had defined the fundamental lines of the campaign to be launched in 2016.

### Spread the Word!

At the end of 2015, ISGlobal launched the Spread the Word programme with the support of the Global Chagas Disease Coalition. The primary objective of this programme is to increase the number of people accessing diagnosis and treatment for Chagas disease by raising awareness about the disease in the affected population and among health professionals. The strategy is to carry out a pilot project in the city of Barcelona combining information, education and communication activities, which is designed to improve access to health services specialised in the diagnosis and treatment of Chagas disease. Later, this experience will be analysed in a study of the demand for health care by migrant families with the disease. The aim is to publicise the results of the intervention among the members of the Global Chagas Disease Coalition and encourage others to implement similar projects.

## Maternal, Child and Reproductive Health Initiative

### Advocacy and Participation in Decision-Making Forums

Throughout 2015, we participated in various Maternal, Child and Reproductive Health forums. Since April, we have attended meetings of the Board of Trustees of the Partnership for Maternal, Newborn & Child Health. In the context of our continued collaboration with the Roll Back Malaria Partnership's Malaria in Pregnancy Working Group, we contributed to a call-to-action document promoting increased coverage for intermittent preventive treatment (IPT) against malaria in pregnancy.

In July, we took part in the annual meeting of Roll Back Malaria's Working Group on Malaria in Pregnancy in Geneva, in which participants evaluated the progress made in the countries in the adoption and implementation of policies for IPT during pregnancy and how to influence the decision to increase coverage of antimalarial treatment during pregnancy in the framework of the post-2015 agenda.

In October we participated in the biannual meeting of the Maternal Health Task Force in Mexico and in December we attended a conference organised by the European Commission entitled "Together for the Next Generation: Research and Innovation for Maternal & Newborn Health".

### Joint Study with the World Bank

In 2015, in collaboration with the World Bank's Poverty and Equity Global Practice department, we started to study inequality in maternal and reproductive health in sub-Saharan Africa. The provisional title of this work is *Inequalities in maternal and reproductive health opportunities for African women*.

**The Global Chagas Disease Coalition has been coordinated by ISGlobal since January 2015**

## Antibiotic Resistance Initiative

### Educational Materials for Secondary School Students

In 2015, we signed an agreement with the "la Caixa" Foundation to develop a series of educational materials explaining the problems associated with antibiotic resistance to secondary school students. The aim is twofold: first, to put the scientific knowledge into classrooms; and, second, to raise awareness among young people of the need to use antibiotics responsibly. The materials will be published in the eduCaixa web portal.

**Educational materials on antibiotic resistance are being developed under an agreement with "la Caixa" Foundation**

## Communication and Outreach

*One of the reasons ISGlobal was set up was a desire to translate the knowledge generated through research for the good of society. A key activity needed to achieve that goal is communication, which is one of our cross-cutting departments. Much of the work of the Communications Department is carried out on the Web, where throughout the year we published almost 200 news items and blog posts.*

### New Line of Action: Online Reports

In 2015, we introduced a new line of action consistent with modern methods: the publication of online reports. These combine a critical and rigorous view of global health issues with the publication of graphic material and interactive data visualisations. In close collaboration with the Policy Department, during the first three months of the year we continuously updated an online report entitled The Three Crises of Ebola that closely monitored and reviewed the international health crisis provoked by the outbreak of the Ebola epidemic in West Africa.

### Manuel Castillo Prize for the Series #ObjectHealth

In June 2015, the series of 15 videos on the subject of global health created for the ObjectHealth campaign received the Manuel Castillo award for journalistic reporting. This award, given by the South-North Board of Trustees of the University of Valencia, recognises and disseminates the results deemed most interesting for Spanish society on the topic of international cooperation, peace and its contribution to human and sustainable development of the peoples of the world.

### ISGlobal Alliance: Moving Towards Integrated Communication

As a consequence of the process leading to the merger of ISGlobal and its allied research centre CRESIB, the CRESIB website was taken offline in 2015 and the content was integrated into the ISGlobal domain. The second phase of this process will be the merger of CREAL and ISGlobal and a start was made during 2015 on preparing the integration of the communication channels and tools of the two centres.

### Promotion of Scientific Vocations

In ISGlobal we are increasingly involved in the task of stimulating an interest in science and bringing science closer to civil society. In May 2015, the researcher Alfred Cortés gave a talk in the *Ciencia abierta al barrio* (Science for People) cycle of lectures. As in previous years, in July we welcomed two secondary school students who had received the Catalan Government's *Premi Extraordinari de Batxillerat*, a prize awarded to students who obtain particularly high results in their final school exams. November saw the first Science for Kids event, in which two workshops and a visit to the laboratories were organised to bring science into the world of young school-children. The year closed with a talk given by the researcher Oriol Mitjà as part of the *Trobades amb compromís* (Meetings with Commitment) series.

In ISGlobal we are increasingly involved in the task of stimulating an interest in science and bringing science closer to civil society



## Facts & Figures

Joint research projects  
in Mozambique

18

Mozambican researchers  
in the Training Fellowship  
Programme

5

New patients treated  
by the Chagas Platform  
in Bolivia

5,465

Health system staff  
trained by the Chagas  
Platform in Bolivia

146

Junior researchers trained  
in Morocco

42

**Our work in science and knowledge translation is strongly rooted in the realities of low- and medium-income countries. Throughout our history, we have developed long-term strategic alliances and partnerships in sub-Saharan Africa, Latin America and the Maghreb. In 2015, we provided support for our partners in Mozambique, Bolivia and Morocco, combining important research with efforts to promote and consolidate local human capacities as well as technical resources and infrastructure.**

## Bolivia

### Strategic Alliances

*Building on our work on Chagas disease in Spain, in 2009 we created the Platform for the Comprehensive Care of Patients With Chagas Disease in Bolivia, the country most affected by this disease. The Platform has implemented a new health care model that combines research, training for health professionals, and direct patient interventions aimed at improving the prevention, diagnosis and treatment of Chagas disease.*

### Application of the Care Model in National Health Service Clinics

The care of patients in Bolivia improved greatly in 2015 when the Bolivian Ministry of Health decided to implement the comprehensive care model developed by the Platform for the Comprehensive Care of Patients With Chagas Disease in Bolivia in collaboration with the CEADES Foundation in the National Health Service's primary, secondary and tertiary facilities. As part of this process, the Platform has adapted the care protocols and provided training for National Health Service staff on the management of Chagas disease using the model.

### Expansion of Research Objectives

The main change in our scientific activity in 2015 was the decision to expand our research agenda to include projects related not only to Chagas disease but also to other prevalent neglected diseases such as leishmaniasis and geohelminthiasis. In another project, we participated in a clinical trial of fexinidazole, a new drug for the treatment of Chagas disease, organised by the Drugs for Neglected Diseases initiative (DNDi). At the same time we also continued to work alongside the Bolivian health and education authorities to identify the priority lines of health research.

### Agreement with the Spanish Agency for International Development Cooperation (AECID) Renewed

One of the greatest challenges now facing the Platform for the Comprehensive Care of Patients With Chagas Disease is to guarantee the continuity of its comprehensive care model. Thanks to a new four-year agreement with the Spanish Agency for International Development Cooperation (AECID), the Platform will receive the support it needs to consolidate the model and to work with local authorities to enable the National Health Service to take over its health care activities in the medium term. The support provided by the AECID under the new agreement will also strengthen the health research infrastructure.

## Morocco

*In 2015, ISGlobal adopted a new formula for strengthening links between Moroccan stakeholders and ISGlobal: the Mediterranean Health Observatory. Based in Morocco, the Observatory will provide an efficient and coordinated way to bring together the various researchers in the region who are associated with ISGlobal. It will also serve as a platform for the translation of biomedical and epidemiologic research into health policies.*

### Workshop on Antimicrobial Resistance

As part of the FP7-MNSIRSES project—now two years into its four-year term—a workshop on antimicrobial resistance was held in Rabat in October 2015. The workshop brought together experts in the field from ISGlobal (Dr Jordi Vila and Dr Sara Soto) with Moroccan professionals from the microbiology departments at various university hospitals, the Ministry of Health, the National School of Public Health and the National Hygiene Institute. The aim of the workshop was to allow participants to share their experiences, to generate interest and, most importantly, to lay the groundwork for a future surveillance network in Morocco.

**The creation of kangaroo care units is an excellent example of the synergy between the worlds of cooperation and research**

### Kangaroo Care Units

The creation of kangaroo care units is an excellent example of the synergy between the worlds of cooperation and research. The project, which was launched in 2015 and is currently in the development stage, came into being as a result of the Morocco Platform's contacts with Moroccan researchers and with the AECID, the funding body. ISGlobal's experience in data management plays an important role in this project because the institute will be involved in strengthening the information systems needed to evaluate the project results and in setting up the research projects.

### Training of Health Care Professionals

Three training programmes were carried out within the framework of the FP7-MNSIRSES project in 2015. In Rabat, 12 paediatric residents received training in Good Clinical Practice (GCP) in a two-day blended-learning course (face-to-face training followed by an online exam for accreditation). In Fez, 10 resident physicians with different specialties studied scientific writing in a three-day course organised jointly with the epidemiology department at Sidi Mohamed Ben Abdellah University. Finally, in Marrakesh, 20 residents in different specialties learned how to write research protocols in a week-long training course organised jointly with the epidemiology laboratory at Cadi Ayyad University.

# Mozambique

*The Manhiça Health Research Centre (CISM) is one of Africa's leading health research centres. ISGlobal's long-term strategic alliance with CISM guarantees knowledge transfer and capacity building and supports a research portfolio focused on some of the main threats to health in Mozambique. In addition, 2015 was a year for celebration, as CISM marked the 20th anniversary of its creation.*

**The Manhiça Health Research Centre (CISM) celebrated its 20th anniversary in 2015**

## CISM Celebrates 20th Anniversary

A conference in Maputo in March 2015 featuring Jean-Marie Okwo-Bele, Director of the Department of Immunisation, Vaccines and Biologicals at the WHO, kicked off CISM's 20th anniversary celebrations. In Spain, the anniversary was celebrated with the publication of a book on CISM's history, which was presented in Madrid at a conference attended by Nazira Abdula, Mozambique's Minister of Health, and other public figures.

## RTS,S Vaccine Receives Green Light

CISM was one of the centres that participated in the clinical trials of the malaria vaccine candidate RTS,S. The final results of the phase III study, published in April 2015, confirmed the moderate efficacy of the vaccine. In July, the EMA issued a positive opinion of the vaccine, and in September the WHO's Strategic Advisory Group of Experts on Immunisation and Malaria Policy Advisory Committee issued a recommendation, effectively greenlighting the first vaccine against malaria.

## Mozambican Alliance Towards the Elimination of Malaria

MALTEM is one of ISGlobal's largest joint projects with CISM. Led by the Mozambican Ministry of Health, MALTEM has various partners and receives crucial support from the "la Caixa" Foundation and the Bill & Melinda Gates Foundation. MALTEM launched its first activities on the ground in Magude, a district in southern Mozambique. The first objective of the alliance is to interrupt the transmission of malaria in Magude. MALTEM's ultimate goal is to develop a scientific method that can be used to eliminate malaria in regions where the disease is highly endemic.

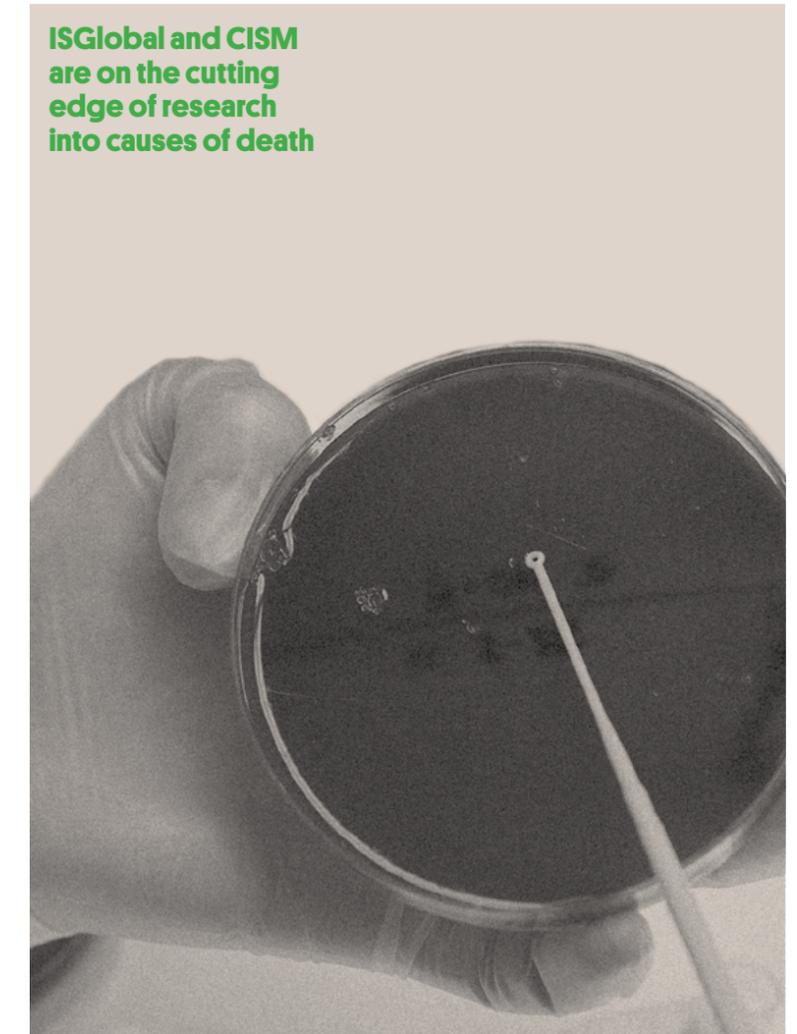
## Determining Causes of Death: CHAMPS and CaDMIA-plus

In March 2015, the Bill & Melinda Gates Foundation announced the creation of the Child Health and Mortality Prevention Surveillance (CHAMPS) network to increase understanding of how, where and why children in the world's poorest countries become sick and die. CHAMPS uses a post-mortem sampling method based on the minimally invasive autopsy techniques developed in the CaDMIA project by ISGlobal and CISM (one of the centres in the CHAMPS network). In 2015, CaDMIA received funding to launch a second phase of the project, known as CaDMIA-plus. Thanks to these activities, ISGlobal and CISM are on the cutting edge of research into causes of death.

## Agreement with AECID Renewed

AECID played a major role in the creation of CISM in 1995, and today the centre is one of the Spanish cooperation agency's greatest success stories. Two decades later, AECID has decided to continue its support for CISM by renewing the centre's funding agreement for a further four years.

**ISGlobal and CISM are on the cutting edge of research into causes of death**



# 3 Ways to Stay Up to Date

## 1. Follow us on the social networks

[www.facebook.com/isglobal](http://www.facebook.com/isglobal)

[@ISGLOBALorg](https://twitter.com/ISGLOBALorg)

## 2. Subscribe to our blog on global health issues

[www.isglobal.org/healthisglobal](http://www.isglobal.org/healthisglobal)

## 3. Subscribe to our monthly newsletter

**You will receive all the news in an email**





# With the support of

AECID	EACEA - Education, Audiovisual and Culture Executive Agency	Instituto de Salud Carlos III	PATH Malaria Vaccine Initiative
Agencia Andaluza de Cooperación Internacional para el Desarrollo	European & Developing Countries Clinical Trial Partnership	Institut Investigacions Biomèdiques de Barcelona (IIBB-CSIC)	Roche Diagnostics, S.L.U
Agència Catalana de Cooperació al Desenvolupament	European Society of Clinical Microbiology and Infectious Diseases	ISDIN	SEIMC - Sociedad Española de Enfermedades Infecciosas y Microbiología Clínica
Agència de Gestió d'Ajuts Universitaris i Recerca	Ferrer Internacional, S.A.	Izasa	SEMTSI - Sociedad Española de Medicina Tropical y Salud Internacional
Ajuntament de Barcelona	Fundación Alfonso Martín Escudero	Johns Hopkins University	Servicio Andaluz de Salud
Asociación Española de Pediatría	Fundació IrsiCaixa – Hospital Germans Trias i Pujol	London School of Higiene & Tropical Medicine	Sociedad Española de Medicina Tropical y Salud Internacional
AstraZeneca	Fundación Manhiça	Medicines for Malaria Venture	SPOO - Stichting Pathologie, Onderzoek en Ontwikkeling
Beckman	Fundación Mundo Sano	Merck Sharp & Dohme de España	Swiss Federal Institute of Technology
Bill & Melinda Gates Foundation	Fundación Ramón Areces	Ministerio de Economía y Competitividad	Swiss Tropical & Public Health Institute
Biokit	Generalitat de Catalunya	Ministerio de Educación, Cultura y Deporte	Swiss Federal Institute of Technology (Branco Swiss)
Centers for Disease Control and Prevention	Genesis Laboratories	Ministerio de Sanidad, Servicios Sociales e Igualdad	The Institute of Tropical Medicine
CEPHEID	GlaxoSmithKline Biologicals	Nanomedpharma	Thrasher Research Fund
CIBER - Epidemiología y Salud Pública	Hospital Clínic de Barcelona	National Institute of Health	USAID
Comisión Europea (FP7, H2020)	IMS Health	Novartis	Universitat de Barcelona
Drugs for Neglected Disease initiative	Innovative Medicines Initiative	Obra Social "la Caixa"	University of Oxford
	Instituto de Medicina Molecular	Organización Mundial de la Salud	Wellcome Trust
		Pfizer	

A partnership of:



# Highlights 2015

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## January

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Launch of Euroleish.net, a project coordinated by ISGlobal that trains young researchers in topics related to leishmaniasis

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## February

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Results of a study in Papua New Guinea support the WHO strategy for the eradication of yaws

Funding awarded by Horizon 2020 to an ISGlobal-led project seeking new marine-derived biomolecules with antibacterial activity

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## March

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New data on the prevalence of Chagas disease in Europe

11th Workshop on Chagas disease in Barcelona

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## April

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Final results of Phase III clinical trial of the RTS,S malaria vaccine candidate

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## May

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CRESIB becomes an integral part of ISGlobal

A minimally invasive autopsy (MLA) protocol developed by ISGlobal inspires the creation of the world's largest global child health network (CHAMPS)

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## June

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New findings indicate that virologic monitoring and access to alternative treatments are essential for the control of HIV in Africa

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## July

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First Safe Mothers and Newborns workshop held in Barcelona

Ceremony held in Madrid to celebrate the 20th anniversary of CISM

Second global health summer school on climate change and its implications for health

ISGlobal receives the HR Excellence in Research badge

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## August

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## September

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Start of the fourth edition of the Master of Global Health

Presentation of the report *La cooperación española más allá de 2015: razones éticas y prácticas para el cambio* (Spanish Cooperation post-2015: Ethical and Practical Reasons for Change)

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## October

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WHO publishes recommendations on RTS,S malaria vaccine candidate

Seminar on SDG challenges and global health inequities

Evidence shows that an upturn in malaria can have serious consequences for pregnant women in areas where efforts are being made to eliminate the disease

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## November

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First Science for Kids session at ISGlobal

Second ISGlobal and CREAL Joint Doctoral Symposium

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## December

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ISGlobal celebrates its fifth anniversary

CREAL celebrates its tenth anniversary

First online publication: report on the Ebola crisis