



EDCTP

*The power of sharing science*

# EDCTP2 portfolio: Collaborative research and development 2014-2019



Supported by the  
European Union



## About EDCTP

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The European & Developing Countries Clinical Trials Partnership (EDCTP) is a public–public partnership between 14 European and 16 African countries, supported by the European Union.

EDCTP's vision is to reduce the individual, social and economic burden of poverty-related infectious diseases affecting sub-Saharan Africa.

EDCTP's mission is to accelerate the development of new or improved medicinal products for the identification, treatment and prevention of infectious diseases, including emerging and re-emerging diseases, through pre- and post-registration clinical studies, with emphasis on phase II and III clinical trials. Our approach integrates conduct of research with development of African clinical research capacity and networking.

The second EDCTP programme is implemented by the EDCTP Association supported under Horizon 2020, the European Union's Framework Programme for Research and Innovation.

# Contents

EDCTP2: International partnerships against infectious disease	4
EDCTP's investment in research & development	7
HIV & HIV-associated infections	9
Tuberculosis	25
Malaria	43
Neglected infectious diseases	55
Emerging diseases	69
Diarrhoeal diseases and lower respiratory tract infections	81

# EDCTP2: International partnerships against infectious disease

Dear EDCTP stakeholders,

The sixth year of implementation of the second programme of the European & Developing Countries Clinical Trials Partnership (EDCTP2) presents an opportune time to share with you the progress and achievements so far. This programme is advancing the development of diagnostics, drugs and vaccines against the most important infectious diseases affecting sub-Saharan Africa, particularly benefiting vulnerable groups such as infants, children, adolescents and pregnant women.

## The challenge

Infectious diseases remain a major cause of death and disability in sub-Saharan Africa. Despite much progress, diseases such as HIV/AIDS, malaria and tuberculosis (TB) still kill millions every year. As well as their effects on individuals, infectious diseases have a huge economic impact, in treatment costs and lost productivity.

Controlling infectious disease will therefore be core to achieving Sustainable Development Goal 3 – ensuring healthy lives and promoting wellbeing for all at all ages. Furthermore, ensuring healthy populations through effective infectious disease control will be central to achieving many other SDGs.



## EDCTP2 at a glance

**Duration:** 2014-2024

**Funding to date:** €607.9 M\*

**Membership and reach:** 16 sub-Saharan African countries are a member of EDCTP Association; 37 African countries and 198 African institutions are participating in EDCTP projects

**Studies:** Funded 211 clinical studies, including 123 clinical trials

**Capacity-building:** We are supporting 124 African researchers through fellowships; 31 ethics and regulatory projects involving 27 African countries

\*As of December 2019

Control of infectious diseases requires diagnostics to detect them, drugs to treat them and vaccines to prevent them. As pathogens inevitably develop resistance to drugs, the world relies on an ongoing supply of new treatments. However, new product development is costly and risky – failure rates are high – and it is often not commercially viable for companies to develop new products for infections mainly affecting low-income countries. Innovative partnerships are therefore required to advance new product development.

To determine their safety and efficacy, new products undergo extensive evaluation, in phase I, II and III trials of increasing size. However, the results of trials in high-income countries are only a partial guide to how well products perform in other settings. Genetic differences and past history of infections, for example, can influence how people respond to drugs and vaccines. Ideally, therefore, studies need to be conducted in sub-Saharan Africa to generate locally relevant evidence.

In addition, trials undertaken to secure regulatory approval often exclude certain populations, such

Advancing early clinical testing	Generating key data on safety, efficacy and performance	Adapting for target populations
> Innovative HIV, malaria and TB vaccines	> Typhoid conjugate vaccine	> Novel antiretroviral drugs for children, adolescents and pregnant women
> New drugs to shorten TB treatment	> Ebola vaccine use in children	> Antimalarial drugs for malaria prevention in pregnant woman
> Broadly neutralising antibodies to prevent HIV	> Novel drug combinations for malaria	> Extending use of drugs against neglected infectious diseases, inc. parasitic worm infetions
> Single-dose cures for malaria	> New TB diagnostics	> Adapting pre-exposure prophylaxis for adolescents
> Transmission-blocking vaccines for malaria	> Simplified treatment of cryptococcal meningitis in HIV patients	> Second-line antiretroviral therapy for children
> Preparations for testing of Lassa fever vaccine	> Optimising treatment of severe pneumonia in children	

as children, pregnant women or people with other infections. Further studies are needed to ensure that new products are safe, effective and can be delivered in suitable formulations to these special groups.

### The response

A partnership of equals between European and sub-Saharan Africa countries, and supported by the European Union, EDCTP2 invests in international research collaborations carrying out clinical trials of new interventions against poverty-related infectious diseases in sub-Saharan Africa. It aims to provide the evidence to guide informed decision-making on the introduction of new interventions, and also to build the capacity of African countries to plan, undertake and lead clinical studies of local priority infections.

### EDCTP2 targets

EDCTP2 focuses on the key poverty-related infectious diseases affecting sub-Saharan Africa – HIV/AIDS, TB, malaria, lower respiratory tract infections, diarrhoeal diseases and neglected tropical diseases. As infections are rarely experienced on their own, co-infections and co-existing health conditions (including interaction with non-communicable diseases) are a further important priority.

EDCTP2 also has a focus on infectious diseases of epidemic potential, including Ebola. It supports international consortia that are developing the capacity of countries to prepare for and respond promptly to infectious disease outbreaks, and to undertake clinical research in outbreak situations.

### The EDCTP2 niche

EDCTP2 occupies a distinct global niche. Concerted global efforts have seen much

progress made in early-stage drug discovery and intervention development. Increasingly, a bottleneck is the later-stage evaluation of interventions among target populations (phase II and III clinical trials) and post-licensing implementation studies (phase IV trials) to ensure smooth introduction of new interventions and to generate evidence on their performance in real-life settings – essential information for local policymakers.

EDCTP2 also has a strong emphasis on building the capacity for clinical research in sub-Saharan Africa, by supporting the development of up-and-coming researchers and scientific leaders, and by providing funds for laboratory equipment and other clinical research essentials. As well as being an integral part of clinical trial funding, support for capacity building is also provided through specific fellowships and capacity-building grants. EDCTP2 also aims to build an enabling environment for clinical research, by strengthening national regulatory and ethical review capabilities and promoting harmonisation of approaches across the region.

As well as partnerships between EU and sub-Saharan researchers and institutions, EDCTP2 also encourages global networking, with active involvement of teams from third countries such as the USA, other high-income countries and the global South. It also supports regional networks within Africa to promote the local dissemination of knowledge and expertise. EDCTP2 also works with an extensive range of global partners to coordinate efforts, align priorities and maximise impact.

We are very appreciative of the efforts of many of you who are associated with the EDCTP journey.

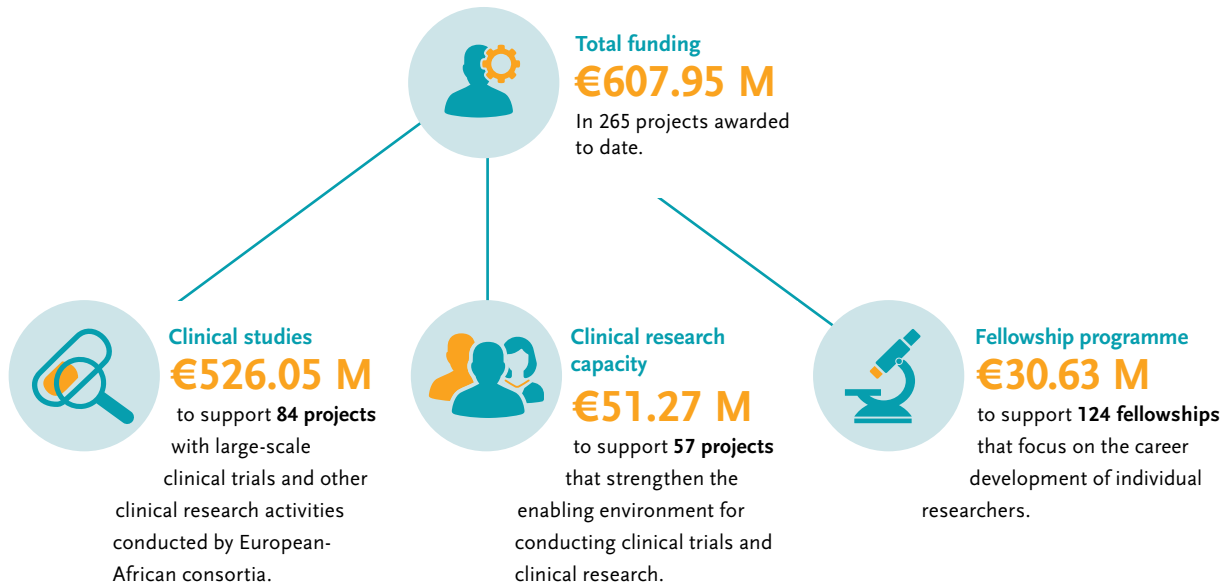
Kind regards,

**Dr Michael Makanga**  
Executive Director



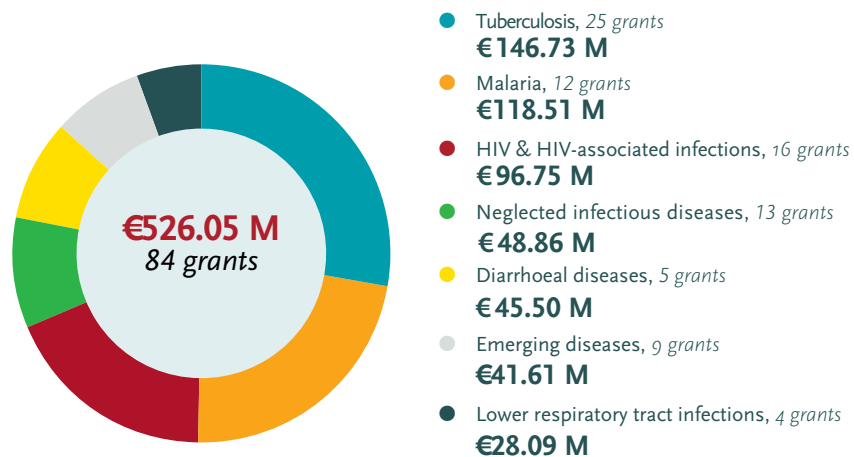
# EDCTP's investment in research & development

2014-2019



## Collaborative clinical trials and clinical studies

### By disease



### By intervention

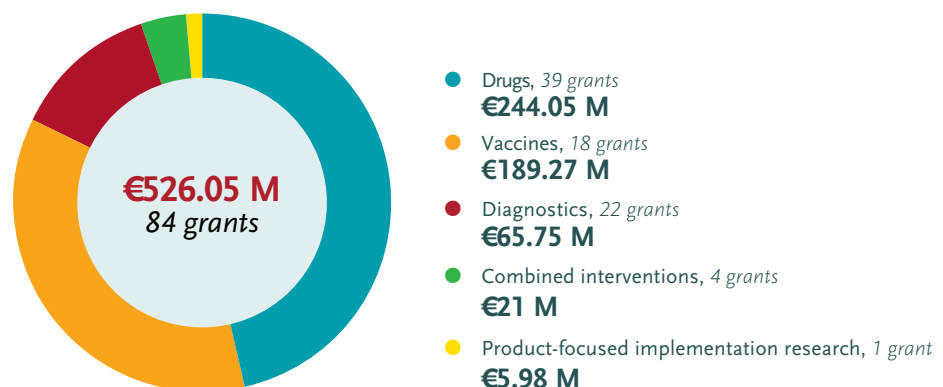




Photo:  
A resident of the Kangemi community in Kenya



# HIV & HIV-associated infections

2014-2019



16 grants  
**€96.75 M**



Drugs  
10 grants  
**€56.30 M**





























Vaccines  
4 grants  
**€35.60 M**













Diagnostics  
2 grants  
**€4.85 M**

## EDCTP portfolio: HIV & HIV-associated infections

Drugs	Vaccines	Diagnostics
<b>CAPRISA 018</b> South Africa  	<b>GREAT</b> Kenya, Uganda, Zambia  	<b>LIFE Study</b> Mozambique, Tanzania  
<b>CHAPAS-4</b> Uganda, Zambia, Zimbabwe  	<b>PrEPVacc</b> Mozambique, Tanzania, Uganda  	<b>DREAMM</b> Tanzania, Malawi, Cameroon  
<b>AMBITION-cm</b> Botswana, Malawi, South Africa, Uganda, Zimbabwe  	<b>Neo bnAb</b> Mozambique, Tanzania  	
<b>CHAPS</b> South Africa, Uganda  	<b>CAP012 SAMBA Trial</b> South Africa, Zambia  	
<b>PROMISE-EPI</b> Burkina Faso, Zimbabwe  		
<b>BREATHER Plus</b> Kenya, South Africa, Uganda, Zimbabwe  		
<b>PREGART</b> Ethiopia, Uganda  		

Caption	Study phase	Population
Project name	 Phase I	 Adults (18yr and above)
Site(s) in sub-Saharan Africa	 Phase II	 Adolescents (10yr-17yr)
	 Phase III	 Children (2yr-9yr)
	 Phase IV	 Infants (above 1mo-1yr)
	 Observational study	 Pregnant women and/or newborns (birth to 1mo)



## Better tools for HIV prevention in women

*The CAPRISA 018 study is developing an antiretroviral implant to protect women against HIV infection.*

### The challenge

Young women are twice as likely as young men to acquire HIV. Every year since 2010, they have accounted for two thirds of new infections among adolescents. In some parts of sub-Saharan Africa, women are up to eight times more vulnerable to HIV than young men.

Pre-emptive use of antiretroviral drugs – pre-exposure prophylaxis (PrEP) – can be a highly effective way to prevent HIV infection. However, results with women have been inconsistent, mainly because of a lack of adherence to the daily drug-taking that PrEP requires.

### The project

To provide women with an improved option for PrEP, the CAPRISA 018 study is evaluating an innovative sustained-release antiretroviral implant. A new implant is being developed incorporating tenofovir alafenamide (TAF), a highly potent antiretroviral with fewer unwanted side effects than earlier drugs.

The CAPRISA 018 team is evaluating an implant that would last six months. It will carry out preparatory studies to examine the safety, acceptability and pharmacokinetics of the TAF implant, and to gather initial data on its efficacy for HIV prevention. A randomised controlled trial will then be carried out on nearly 500 at-risk women.

### Impact

The CAPRISA 018 study will create a safe intervention that enables women to take control of HIV prevention. Positive results in the initial trial would pave the way to a large-scale phase III trial that would provide definitive evidence of the ability of a TAF implant to prevent HIV infection. As sub-dermal implants are already widely available through family planning service in several sub-Saharan African countries, implementation could be relatively straightforward.

### Project at a glance

**Project:** CAPRISA 018 study

**Project lead:** Professor Salim Abdool Karim, Centre for the AIDS Programme of Research in South Africa, South Africa

**Countries involved:** France, The Netherlands, South Africa

**Target population(s):** Women

**Year funded:** 2016

**EDCTP funding:** €9.8 M

**Total project funding:** €11.4 M plus donation of study drugs

**Project website:** <https://www.caprisa.org/Pages/EDCTP-funded%20studies>

**Clinical trial registration:** <https://pactr.samrc.ac.za/TrialDisplay.aspx?TrialID=3584>

# Back-up treatment for children with HIV

*The CHAPAS 4 study aims to identify a suitable second-line therapy for children with HIV who are not responding to first-line drugs.*

## The challenge

WHO now recommends that all children with HIV infections should be given antiretroviral drugs. A projected 2.3 million children are likely to be taking antiretroviral drugs by 2020.

Although antiretroviral therapy is highly effective in children, not all children respond as well as others. In addition, as more children take antiretroviral drugs for longer periods, drug-resistant infections will inevitably emerge. Documented levels of treatment failure vary widely in Africa, but can be as high as 50%. Treatment failure requires a shift to second-line antiretroviral therapy. However, current formulations for second-line treatments have significant drawbacks, being based on whole pills, mini-pill pellets, or unpleasant liquids, and limited data are available on their use in children.

## The project

For more than a decade, the CHAPAS Consortium has organised clinical trials to improve the treatment options available for children with HIV in sub-Saharan Africa. Data from EDCTP-funded CHAPAS 1 and CHAPAS 3 projects supported licensing applications for children-specific formulations and provided evidence in support of WHO recommendations on updated treatment options, opening the door to more extensive use of antiretroviral therapy in African children.

The CHAPAS 4 study is designed to identify an optimal second-line treatment for children with HIV infections. The study, being carried out in three sub-Saharan countries, will use an innovative trial design to compare a range of possible options. These include formulations incorporating dolutegravir, a relatively new drug with significant advantages over existing treatments; atazanavir/ritonavir (ATV/r), which is now available in a single pill suitable for children; and tenofovir–alafenamide (TAF), a tenofovir pro-drug that may be particularly suitable for use in children, co-formulated with

## Project at a glance

**Project:** CHAPAS-4 study

**Project lead:** Dr Mutsa Bwakura-Dangarembizi, University of Zimbabwe College of Health Sciences

**Countries involved:** the Netherlands, South Africa, Uganda, United Kingdom, Zambia, Zimbabwe

**Target population(s):** Children with HIV (3–15 years) failing first-line treatment

**Year funded:** 2017

**EDCTP funding:** €7.6 M

**Clinical trial registration:** [www.isrctn.com/ISRCTN22964075](http://www.isrctn.com/ISRCTN22964075)

emtricitabine. These agents will be tested in different combination regimens against the current standard of care for children.

The project will also explore interactions between antiretroviral drugs and anti-TB medications, and their impact on the effectiveness of treatment and toxicity. It will also examine the cost implications of the new treatments.

## Impact

CHAPAS 4 will generate key data on multiple second-line options for children in whom first-line antiretroviral therapy is failing – a vulnerable group that is destined to grow as use of antiretroviral drugs increases. In particular, the innovative trial design will enable comparisons to be made between multiple treatment options in a single clinical trial. The study will also provide important evidence on treatment options for children who are infected with TB as well as HIV.





# Improving treatment of HIV-associated meningitis

*The AMBITION-cm trial will confirm whether a simple treatment for a potentially lethal fungal infection is suitable for use in Africa.*

## The challenge

Early mortality from HIV is much higher in Africa than in high-income countries. Up to one in five HIV-related deaths in Africa are attributable to an opportunistic fungal infection, *Cryptococcus*, which can cause a lethal meningitis. Cryptococcal meningitis is responsible for around 500,000 deaths a year in sub-Saharan Africa.

The most widely used treatment in Africa, fluconazole, is of limited effectiveness – mortality is still higher than 50%. A superior alternative treatment, amphotericin B, is rarely used in African settings because it has to be given over two weeks and can trigger severe toxic reactions so patients require specialist monitoring.

## The project

The AMBITION-cm team has been evaluating an alternative formulation of amphotericin B, delivered in tiny lipid-based packages (liposomes), which would be more suitable for resource-poor settings. A phase II study showed that a single high dose of liposomal amphotericin B was safe and early antifungal responses were as good as those seen with the traditional two-week course.

Building on these promising findings, the phase III AMBITION-cm trial is comparing a one-week course of amphotericin B with single high-dose liposomal amphotericin B. The trial, taking place in five African countries, will determine whether single-dose liposomal amphotericin B is as good as the traditional two-week course at reducing mortality at 10 weeks.

## Impact

The AMBITION-cm trial is the largest HIV-associated cryptococcal meningitis treatment trial ever undertaken. If the encouraging phase II results are confirmed, a simple amphotericin B-based therapy could transform treatment

## Project at a glance

**Project:** AMBITION-cm trial

**Project lead:** Professor Joseph Jarvis, London School of Hygiene and Tropical Medicine, United Kingdom

**Countries involved:** Botswana, France, Malawi, South Africa, Uganda, the UK, Zimbabwe

**Target population(s):** Adults with HIV infection

**Sample size:** 850 (target)

**Year funded:** 2017

**EDCTP funding:** €10 M

of one of the most important causes of HIV-associated mortality in Africa.

## Key reference

Jarvis JN et al. Short course high-dose liposomal amphotericin B for HIV-associated cryptococcal meningitis: A phase-II randomized controlled trial. *Clin Infect Dis*. 2018. [Epub ahead of print]

Molloy SF et al. Cryptococcal meningitis: A neglected NTD? *PLoS Negl Trop Dis*. 2017;11(6):e0005575.

Rajasingham R et al. Global burden of disease of HIV-associated cryptococcal meningitis: an updated analysis. *Lancet Infect Dis*. 2017;17(8):873–881.

# Reducing HIV infections in adolescents

*The CHAPS study is evaluating novel approaches for preventing HIV infection, tailored to the needs of African adolescents.*

## The challenge

HIV/AIDS is the leading cause of death of young people aged 10–24 in Africa. Between 2000 and 2015, the number of adolescents dying from AIDS-related illness tripled – the only age group in which the number of deaths rose. Young people account for 37% of all new HIV infections, and in 2016 nearly three-quarters of all new HIV infections in adolescents occurred in Africa.

These figures suggest that prevention strategies that have proven effective in other populations are not working in this age group, and alternatives are required.

## The project

The CHAPS project is evaluating a range of strategies adapted to the characteristics of adolescents. These include a modified version of pre-exposure prophylaxis (PrEP) – pre-emptive use of antiretroviral drugs to prevent infection. Although daily PrEP has been clearly shown to reduce the risk of HIV infection, it is costly, has some side effects, and adherence is less good in adolescents.

The CHAPS project aims to overcome these challenges by evaluating the impact of an alternative, less toxic drug combination (tenofovir alafenamide and emtricitabine) as well as ‘on-demand’ PrEP – use of PrEP just around the time of sexual activity.

The project is consulting with adolescents to determine attitudes to on-demand PrEP and its likely acceptability. Laboratory-based studies are being used to optimise dose levels and dosing schedules for the novel antiretroviral drug combination. The CHAPS team is also undertaking laboratory studies to explore whether the drug combination could provide protection for longer periods after exposure to HIV, allowing more flexible use of post-exposure prophylaxis.

## Project at a glance

**Project:** CHAPS study

**Project lead:** Dr Julie Fox, King's College London, United Kingdom

**Countries involved:** South Africa, Sweden, Uganda, United Kingdom, Zimbabwe

**Target population(s):** Adolescents

**Year funded:** 2018

**EDCTP funding:** €3 M

**Project website:** <http://www.chaps.uct.ac.za/>

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03986970>

## Impact

The CHAPS study is the first to undertake research into attitudes to on-demand PrEP among adolescents in sub-Saharan Africa and the first multi-country study to investigate optimal dosing for on-demand PrEP. Its findings will play a key role in shaping the design of trials of on-demand PrEP in a group where more effective prevention is urgently required.





## Finding ‘hidden’ HIV-infected infants

*The PROMISE-EPI study is evaluating a novel strategy for identifying infants who, despite big drops in mother-to-child transmission, have still been infected with HIV.*

### The challenge

WHO now recommends that all pregnant and breastfeeding women with HIV should be offered antiretroviral therapy and all infants at risk of contracting HIV should be given antiretrovirals for 6 weeks. This so-called option B+ strategy has been implemented across most of sub-Saharan Africa. However, significant numbers of infants are falling through the net – in 2015, residual transmission rates were still about 14% at one year, well above the WHO target of 5%.

### The project

The PROMISE-EPI study is assessing whether a ‘rescue’ package can be integrated into routine immunisation services (generally known as the expanded programme on immunisation, EPI). Its goal is to identify and treat the hidden infant HIV cases, and to prevent transmission from previously undiagnosed HIV-infected mothers.

In countries such as Burkina Faso and Zambia, nearly all newborn babies receive vaccinations through the EPI at 4–6 weeks. The PROMISE-EPI study will assess whether it is possible to use the EPI platform to examine mothers’ experience of prevention services at birth; to detect missed HIV infections through point-of-care testing, so antiretroviral therapy can be started; and to measure virus levels in mothers, to identify infants at risk of infection, so mothers can be treated and preventive measures initiated.

### Impact

For more than a decade, the PROMISE consortium, set up with EDCTP funding, has developed a portfolio of studies addressing mother-to-child transmission of HIV in Africa. Having generated vital evidence on the importance of pre-emptively treating infants to prevent transmission of HIV, the latest study could identify a readily implementable strategy for reducing still further infant infection rates, and for identifying those who nonetheless have been infected.

### Project at a glance

**Project:** PROMISE-EPI study

**Project lead:** Professor Philippe van de Perre, Montpellier University, France

**Countries involved:** Burkina Faso, France, Norway, Zambia

**Target population(s):** Mothers, infants

**Sample size:** 2000 mothers and infants (target)

**Year funded:** 2018

**EDCTP funding:** €3 M

### Key reference

Nagot N et al. Extended pre-exposure prophylaxis with lopinavir-ritonavir versus lamivudine to prevent HIV-1 transmission through breastfeeding up to 50 weeks in infants in Africa (ANRS 12174): a randomised controlled trial. *Lancet*. 2016;387(10018):566–73.

# Improving the quality of life of adolescents living with HIV

*The BREATHER Plus study is evaluating whether simpler treatments maintain control of HIV but are easier for adolescents to manage.*

## The challenge

Adolescents who acquire HIV or were infected at birth are currently obliged to take antiretroviral drugs every day for the rest of their lives. This daily routine can be challenging for young people to stick to.

International trials have identified alternative approaches that simplify treatment schedules. These include a 'weekends off' approach, in which young people take a two-day break from treatment, and monthly use of a long-acting injectable antiretroviral.

## The project

The BREATHER Plus trial will compare these two new approaches – weekends off and a monthly injectable – with standard treatment in adolescents in four African countries. The oral regimens will be based on dolutegravir, an increasingly used antiretroviral. Importantly, the trial will take place in settings where viral load is monitored annually, as recommended by WHO, so any resurgence of HIV can be detected.

The trial will last 96 weeks and will assess control of HIV replication, the side effects of treatment, impacts on quality of life, and acceptability of the new approaches.

## Impact

The BREATHER Plus trial will generate evidence that could influence the treatment, and improve the quality of life, of more than 2 million adolescents living with HIV – most of whom are in sub-Saharan Africa.

## Project at a glance

**Project:** BREATHER Plus study

**Project lead:** Dr Adeodata Kekitiinwa-Rukyalekere, Baylor College of Medicine Children's Foundation, Uganda

**Countries involved:** Italy, Kenya, The Netherlands, South Africa, Uganda, United Kingdom, Zimbabwe

**Target population(s):** Adolescents

**Year funded:** 2018

**EDCTP funding:** €7.4 M





# Improving treatment of HIV in pregnant women

*The PREGART study is evaluating two new first-line antiretroviral treatment regimens in pregnant women living with HIV.*

## The challenge

New treatment regimens are typically first tested in clinical trials that exclude groups such as pregnant women. Without further trials, pregnant women may therefore not benefit from advances in treatment.

In 2016, almost 750,000 women of reproductive age became HIV-positive, most of them in sub-Saharan Africa. Effective treatment is important not just for the health of mothers but also to prevent mother-to-child transmission of HIV.

## The project

The PREGART trial is evaluating two possible enhancements to antiretroviral therapy in pregnant women. The first is use of dolutegravir, which has shown greater inhibition of viral replication than other first-line treatments and is less likely to be discontinued by patients. The second is a lowering of the dose of efavirenz, as standard-dose efavirenz may be associated with greater toxicity in pregnancy.

Lack of safety and efficacy data on the use of dolutegravir and low-dose efavirenz in pregnant and breastfeeding women has been identified as a priority evidence gap by WHO. Preliminary observational data from Botswana suggested that dolutegravir might be associated with an increased risk of neural tube defects if used during the first trimester of pregnancy. However, the numbers are small, and it is difficult to draw firm conclusions in advance of the final results. Nevertheless, WHO has updated its recommendation on the use of dolutegravir among pregnant women during the first trimester of pregnancy, and women in the first trimester of pregnancy will not be recruited into the trial.

## Project at a glance

**Project:** PREGART study

**Project lead:** Dr Birkneh Tadesse, Hawassa University, Ethiopia

**Countries involved:** Ethiopia, Italy, Sweden, Uganda

**Target population(s):** Pregnant women

**Year funded:** 2018

**EDCTP funding:** €3.9 M

The PREGART trial will compare triple therapy regimens containing dolutegravir and low-dose efavirenz with standard efavirenz-containing regimens, and with each other. It aims to enroll nearly 2,000 women in Ethiopia and Uganda.

The trial will also undertake pharmacokinetic and pharmacogenetic studies to see how genetic variation affecting the enzymes that metabolise dolutegravir and efavirenz influence the distribution of the drugs in the body. These studies will be important for determining the most appropriate dosing of dolutegravir in women in sub-Saharan Africa.

## Impact

The PREGART trial will provide key safety and efficacy data on two potentially superior antiretroviral drugs for pregnant and breastfeeding women, and on the appropriate dosing for women living in sub-Saharan Africa.



# Progressing a second-generation HIV vaccine

*The GREAT project will test an improved prototype HIV vaccine in high-risk and vulnerable African populations.*

## The challenge

An HIV vaccine is likely to be central to global efforts to eradicate the virus. However, developing an effective HIV vaccine has been highly challenging. One major issue is the extreme diversity of HIV – meaning that protection against one strain may not afford protection against another. In addition, the virus rapidly evolves within individual patients, generating variants that may evade vaccine-induced protection.

## The project

Over many years, a group led by Professor Tomáš Hanke has been developing an HIV vaccine capable of targeting a wide range of HIV variants. HIV control is likely to depend on different vaccines that elicit either T cell- or antibody-based protection, and his group's focus has been a vaccine that generates protective T cells. His team has been aiming to identify highly conserved HIV structures that are shared across different HIV variants and are thought to be critical to its ability to multiply and spread. These structural antigens are delivered via commonly used DNA-based vectors.

Recently, Professor Hanke's team has developed a second-generation vaccine, tHIVconsvX, that builds on this promising platform but adds new features. The new vaccine is a 'mosaic': as well as several widely shared antigens, it also includes multiple variants of antigens known to stimulate strong T-cell responses. In addition, it incorporates antigens that, in patients, are associated with relatively good control of HIV replication. This extensive combination of antigens in a single vaccine, partnered with a potent delivery system, has generated encouraging results in animal models and initial human studies.

The GREAT project will test the safety of tHIVconsvX, as well as its ability to generate HIV-specific immune responses. The project team will work with a range of marginalised communities,

## Project at a glance

**Project:** The Globally Relevant AIDS Vaccine Europe–Africa Trials (GREAT) Partnership

**Project lead:** Professor Tomáš Hanke, University of Oxford, UK

**Countries involved:** Kenya, the Netherlands, Uganda, the UK, the US, Zambia

**Target population(s):** HIV-negative adults

**Sample size:** 88

**Year funded:** 2017

**EDCTP funding:** €7.1 M

**Total project funding:** €16.8 M

including fishing communities around Lake Victoria, male and female sex workers, and men who have sex with men.

## Impact

The GREAT trial will generate evidence that will indicate whether tHIVconsvX is sufficiently potent to justify a phase III efficacy trial. Moreover, the consortium's capacity building and extensive community engagement will provide a platform for a pivotal phase III study, should one be merited.

## Key reference

Ondondo B et al. Novel conserved-region T-cell mosaic vaccine with high global HIV-1 coverage is recognized by protective responses in untreated Infection. *Mol Ther.* 2016;24(4):832–42.





# Combining drugs and vaccines to prevent HIV infection

*The PrEPVacc trial is the first to test whether a combination of pre-exposure prophylaxis and an experimental vaccine can prevent HIV infection.*

## The challenge

An effective HIV vaccine is likely to be key to controlling the HIV epidemic. Unfortunately, HIV is very difficult to target with vaccines and past trials have had limited success. However, the RV144 trial in Thailand did find that a DNA vaccine 'prime' followed by a protein vaccine 'boost' appeared to offer modest levels of protection.

Nevertheless, more innovative approaches may be needed. One possibility is pre-exposure prophylaxis (PrEP), in which high-risk populations receive antiretroviral drugs to prevent HIV infection.

## The project

The PrEPVacc trial is combining these two approaches to HIV prevention in a large-scale phase II trial. It will assess the impact of two experimental HIV vaccine regimens, already tested and shown to be safe in people, when used alongside antiretroviral-based PrEP. The vaccine regimens both combine DNA-based and protein-based elements, as used in the RV144 trial.

The trial will be carried out in high-risk populations in four sub-Saharan African countries. It also includes an innovative design feature: PrEPVacc will be an 'adaptive' trial, so that combinations can be halted mid-trial if they are turning out to be ineffective – the first time this approach has been adopted in an HIV vaccine trial.

## Project at a glance

**Project:** PrEPVacc

**Project lead:** Professor Jonathan Weber, Imperial College, UK

**Countries involved:** Germany, Mozambique, Netherlands, South Africa, Sweden, Switzerland, Tanzania, Uganda, United Kingdom, and the United States

**Target population(s):** High-risk, marginalised communities

**Sample size:** 1668 (target)

**Year funded:** 2017

**EDCTP funding:** €15 M

**Total project funding:** €22.2 M

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT04066881>

## Impact

PrEPVacc will generate the first evidence of the ability of vaccine plus PrEP combinations to prevent HIV infections – information that would have major public health importance. It will also provide key data on the ability of the experimental vaccines to stimulate protective immune responses, and the likely success of DNA plus protein prime–boost vaccine strategies. Data on the nature of the immune responses triggered by the vaccines may also reveal which are key to prevention of HIV infection.

# Using antibodies to prevent HIV transmission to babies

*The Neo bnAb study is evaluating whether emerging ‘broadly neutralising antibody’ approaches can protect newborns against HIV infection.*

## The challenge

Despite much progress in reducing mother-to-child transmission of HIV – more than 1.4 million infections have been averted since 2010 – 180,000 infants acquired HIV in 2017. With current approaches, global elimination goals are unlikely to be achieved.

Broadly neutralising antibodies are an exciting new option in HIV control. On very rare occasions, people generate antibodies to HIV that recognise multiple HIV strains. Mass production of these antibodies could provide a new weapon in the anti-HIV armoury.

## The project

Most studies on broadly neutralising antibodies to date have focused on adults. The Neo bnAb will explore their potential use in newborns to prevent mother-to-child transmission.

The study is focused on one specific broadly neutralising antibody known as VRC01. Minor modifications have created a slightly different version, VRC01LS, that survives longer in the bloodstream, so could potentially provide protection for longer periods and require less frequent administration. Initial studies have shown that VRC01LS is safe to give to newborns.

The Neo bnAb trial will compare standard approaches used to prevent mother-to-child transmission with an enhanced programme in which babies also receive four doses of VRC01LS – at birth and at 12, 24 and 36 weeks. A total of 2,000 babies will be studied in two countries. As well as gathering data on efficacy, the study will also analyse cases of infection to determine how HIV evaded antibody protection, to inform the design of preventive antibody strategies.

## Project at a glance

**Project:** Neo bnAb study

**Project lead:** Dr Arne Kroidl, Ludwig Maximilian University of Munich, Germany

**Countries involved:** Germany, Mozambique, Tanzania, UK

**Target population(s):** Newborns

**Year funded:** 2019

**EDCTP funding:** €4.2 M

**Total project funding:** €4.8 M

## Impact

The Neo bnAb study will provide proof-of-concept evidence on the safety and efficacy of broadly neutralising antibody use for HIV prevention in newborns. It will also examine the operational feasibility and affordability of the intervention in the African context. Evidence of the effectiveness of broadly neutralising antibody could offer a novel way to prevent mother-to-child transmission of HIV and achieve global elimination targets.





# A new approach to HIV prevention

*Passive immunisation with broadly neutralising antibodies could offer a novel way to block HIV infection.*

## The challenge

HIV is a highly diverse and rapidly evolving pathogen. Despite much effort, a vaccine that would protect against multiple HIV variants has yet to be developed, threatening global efforts to bring the HIV/AIDS epidemic under control by 2030.

However, a small number of individuals worldwide have been found to produce 'broadly neutralising antibodies' – antibodies that recognise structures common across many HIV strains. There are hopes that these antibodies could be mass produced and used in passive immunisation – given to people periodically to protect against infection.

## The project

The CAP012 SAMBA project builds on the discovery of a broadly neutralising antibody, known as CAP2456-VRC26.25, in a woman from KwaZulu Natal. Excitingly, this antibody, and two others, have been found to protect monkeys from infection with the monkey version of HIV.

The CAP012 SAMBA project is extending this work by analysing the safety of the antibodies in people, exploring their acceptability to potential recipients, and monitoring their metabolism in the body. On the basis of these studies, the most promising combinations of antibodies will be taken forward to a phase II trial to assess safety and efficacy at preventing HIV infection.

## Impact

The CAP012 SAMBA project could advance the development of a radically new approach to HIV prevention. It offers the prospect of HIV protection delivered through injections every four to six months. Notably, it is envisaged as an approach of particular benefit to women – the antibodies are being evaluated in groups of women, and the intervention is one that places HIV control in the hands of women, who are currently experiencing the brunt of the HIV epidemic in Africa.

## Project at a glance

**Project:** CAP012 SAMBA project

**Project lead:** Professor Salim Abdool Karim, Centre for the AIDS Programme of Research in South Africa, South Africa

**Countries involved:** France, the Netherlands, South Africa, Zambia

**Target population(s):** Women

**Year funded:** 2018

**EDCTP funding:** €9.3 M

**Total project funding:** €18.7 M

**Project website:** <https://www.caprisonline.org/Pages/EDCTP-funded%20studies>

**Clinical trial registration:** <https://pactr.samrc.ac.za/TrialDisplay.aspx?TrialID=3553>

# Improving management of meningitis in HIV-infected adults

*The DREAMM project aims to embed innovative meningitis diagnostic practices into routine health care.*

## The challenge

Infections of the central nervous system (CNS) are responsible for 25–30% of HIV-related deaths, with cryptococcal fungal infections alone accounting for up to 20% of such deaths. There is growing evidence, from EDCTP-funded and other trials, that early screening for cryptococcal infections and prompt treatment can save lives, but take-up of diagnostics has so far been limited, in part because of the practical difficulties of implementing new procedures in existing healthcare systems.

## The project

The DREAMM project is a product-based implementation study aiming to demonstrate how screening for CNS infections can be introduced into routine care of people with HIV, and the likely benefits this would deliver.

One key aim of the project is to generate data on an upgraded version of a dipstick diagnostic for cryptococcal infections, the CrAG LFA test, a diagnostic dipstick test that is heat-stable, inexpensive, requires minimal training and has been shown to be cost-effective in resource-limited settings. The test provides an indication of the severity of infection and the need for more intensive care.

In collaboration with healthcare staff, the DREAMM team will develop new clinical pathways and decision-making procedures that incorporate use of an upgraded CrAG LFA test and assessment of other possible causes of meningitis. This should facilitate more rapid use of lumbar punctures to confirm infection and faster initiation of treatment.

Once these new procedures have been finalised, staff will be given training in their use. The project will then evaluate whether they reduce the delays in assessment and treatment, and lead to improved survival.

## Project at a glance

**Project:** DREAMM

**Project lead:** Dr Angela Loyse, St George's University of London, UK

**Countries involved:** Cameroon, France, Malawi, Tanzania, the United Kingdom

**Target population(s):** Adults with HIV

**Sample size:** 450 (target)

**Year funded:** 2016

**EDCTP funding:** €1.9 M

## Impact

DREAMM has been designed to generate both evidence and resources directly relevant to health policymakers. It will provide a measure of the added value of the upgraded CrAG LFA test used in conjunction with specific patient management algorithms designed for low-resource settings. The study will also produce training and other materials to support implementation elsewhere, enabling the new procedures and diagnostics tools to be readily introduced in other settings.

More generally, the study illustrates how product-based implementation research can provide a stepping stone between clinical trials and routine clinical use, accelerating the introduction of new interventions.





## Speeding up HIV treatment in infants

*The LIFE study is assessing whether use of new rapid diagnostic tests for HIV leads to quicker and better treatment of infants with HIV.*

### The challenge

Less than half of infants exposed to HIV are tested for HIV, less than half of those tested receive early infant diagnostic test results, and less than half of those found to be infected receive antiretroviral therapy. The need to send samples away to central facilities for testing is a key barrier to timely diagnosis and initiation of therapy.

There are hopes that a new generation of easy-to-use rapid diagnostic tests could overcome these hurdles, so more infants receive an early diagnosis and start to receive antiretroviral therapy. Point-of-care testing has been recommended by WHO, but implementation presents practical challenges and is likely to have significant financial implications.

### The project

Members of the LIFE consortium carried out a pilot trial in Mozambique, evaluating point-of-care testing administered by nurses. Compared with usual practices, point-of-care testing led to nearly all infants receiving results within 60 days, compared to 12% in the control group, and 90% of HIV-infected babies were put on antiretroviral therapy within 60 days, compared to 13% in the control group.

Following up these encouraging results, the LIFE consortium has begun a larger trial spanning 24 sites in two countries. The trial will follow infants for 18 months to assess initial antiretroviral therapy initiation rates as well as longer-term impacts on child mortality and illness. The team will also measure virus levels in mothers at delivery, as a way of identifying infants at high risk of mother-to-child transmission.

### Impact

The LIFE study will fill important gaps in the evidence base. It will reveal whether use of rapid point-of-care HIV diagnostics at birth increases antiretroviral therapy coverage and benefits infant survival; whether measurement

### Project at a glance

**Project:** LIFE study

**Project lead:** Dr Ilesh Jani, Instituto Nacional de Saude, Mozambique

**Countries involved:** Germany, Mozambique, Portugal, Tanzania, the United States

**Target population(s):** Infants of mothers with HIV

**Sample size:** 5040 women and their HIV-exposed babies (144 HIV-infected infants)

**Year funded:** 2018

**EDCTP funding:** €3 M

**Project website:** <https://hivlifestudy.org>

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT04032522>

of virus levels in mothers at delivery leads to the adoption of special measures to prevent mother-to-child transmission; and what the financial and practical implications are of rapid diagnostic use. The study will therefore provide key data for decision makers on the cost-effectiveness and practicalities of implementing the new technology and new models of care.

### Key reference

Jani IV et al. Effect of point-of-care early infant diagnosis on antiretroviral therapy initiation and retention of patients. *AIDS*. 2018;32(11):1453–1463.

MICROBIOLOGY

EXIT





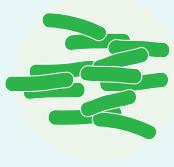
SINGLE USE ONLY

MTBVAC-202  
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Apr 1 2019  
10 (24hr)  
NORMAL USE



# Tuberculosis

2014-2019



25 grants

€146.73 M

Drugs  
9 grants

€68.82 M

Vaccines  
3 grants

€31.82 M

Diagnostics  
13 grants

€46.09 M

## EDCTP portfolio: Tuberculosis

Drugs	Vaccines	Diagnostics
<b>PanACEA</b> Ethiopia, Malawi, Mali, Mozambique, Nigeria, Rwanda South Africa, Senegal, Tanzania	<b>POR TB</b> South Africa, Tanzania	<b>Stop TB/HIV at one</b> Ethiopia, Nigeria
<b>VirTUAL</b> Uganda, South Africa	<b>MTBVAC-Newborns</b> South Africa	<b>Screen TB</b> Ethiopia, The Gambia, Namibia, South Africa, Uganda
<b>TREATS</b> South Africa, Zambia	<b>priMe</b> Gabon, Kenya, South Africa, Tanzania, Uganda	<b>DIAMA</b> Benin, Cameroon, DR Congo, Ethiopia, Guinea, Mali, Nigeria, Rwanda, Senegal
<b>Simplici-TB</b> Gabon, Malawi, Mozambique, South Africa, Tanzania, Uganda		<b>Predict TB</b> South Africa
<b>CLICK-TB</b> South Africa		<b>RaPaed</b> Malawi, South Africa, Tanzania
<b>StatinTB</b> South Africa		<b>CAP-TB</b> Tanzania, Mozambique
<b>INTENSE-TBM</b> Cote d'Ivoire, Madagascar, South Africa, Uganda		

### Caption

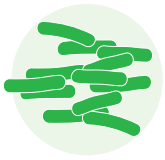
Project name  
Site(s) in sub-Saharan Africa

### Study phase

- Phase I
- Phase II
- Phase III
- Phase IV
- Observational study

### Population

- Adults (18yr and above)
- Adolescents (10yr-17yr)
- Children (2yr-9yr)
- Infants (above 1mo-1yr)
- Pregnant women and/or newborns (birth to 1mo)



# Advancing a suite of TB drug treatments

*Building on its past successes, the PanACEA2 Consortium is continuing its innovative programme of work on shorter, simpler and better treatments for TB.*

## The challenge

TB is one of the most difficult infections to treat, and presents major challenges to drug development. Current treatment regimes last six months and require patients to take multiple medications. Shorter and simpler regimens would improve adherence, reduce side effects and lower costs.

Unfortunately, evaluation of new TB drugs, and new combinations and doses of existing drugs, is highly challenging. In particular, methods for determining the impact of drugs on TB bacteria are imperfect, making it harder to determine whether drug treatments should be progressed. In addition, long and costly phase III trials are required, and several promising treatments have failed at this stage. As a result, there are many possible improvements to TB treatment, and a key challenge is to determine as efficiently as possible which are most likely to succeed so they can be rigorously evaluated in large-scale trials.

## The project

The PanACEA Consortium, funded in the first EDCTP programme, was set up not just to evaluate novel TB drugs and combinations, but also to build capacity for TB drug trials in Africa and, importantly, to advance clinical trial methodology to improve the efficiency of drug development and enhance the likelihood of success. It carried out landmark trials aiming to shorten TB treatment and introduced novel clinical trial designs never before used in infectious disease research.

PanACEA2 will build on this foundation. With higher doses of rifampicin showing promise in trials, it will carry out studies to identify the maximum tolerated dose that could be evaluated in future trials. In addition, it plans to assess the safety of promising new drugs entering the TB drug development pipeline, using a novel design that will allow determination of slow-acting effects and evaluation of multiple combinations in one study.

## Project at a glance

**Project:** PanACEA2 Consortium

**Project lead:** Professor Martin Boeree, Radboud University Nijmegen Medical Centre, The Netherlands

**Countries involved:** Germany, Gabon, Malawi, Mozambique, the Netherlands, South Africa, Switzerland, Tanzania, Uganda, the United Kingdom

**Target population(s):** Adults with TB

**Year funded:** 2018

**EDCTP funding:** €11.4 M

**Project website:** <http://panacea-tb.net>

In a third strand of work, multiple combinations will be assessed in an adaptive trial, allowing for discontinuation of poorly performing therapies. Long-term follow-up will be undertaken – addressing the issue that early responses to drugs do not necessarily provide an accurate indicator of long-term treatment success. This will provide a key step towards reducing the risk of failure in phase III trials.

## Impact

PanACEA2 will generate key data on TB drug treatments, pilot innovative methodologies for drug evaluation that could greatly accelerate drug development and reduce the risk of failure, and build capacity for trials of the highest international regulatory standard. Furthermore, by operating as an open partnership, it can carry out studies in partnership with multiple drug developers, and also coordinate activities with other international TB drug consortia, minimising duplication of efforts.

# Treating TB and HIV in neglected groups

*The VirTUAL study is combining modelling and clinical research to identify the optimal drug treatments for pregnant women, children and adolescents with HIV and TB.*

## The challenge

As more people gain access to antiretroviral therapy, new challenges are arising in the management of HIV, and more tailored approaches to treatment are required.

For example, every year around one in ten people being treated for HIV transfer to second-line antiretroviral therapy, because of drug resistance or other factors. Second-line therapy includes drugs known as boosted protease inhibitors, which interact with a key anti-TB drug, rifampicin. Determining the most appropriate dose of boosted protease inhibitors is therefore challenging, particularly in groups such as pregnant women, children and adolescents who are generally excluded from clinical trials.

## The project

The VirTUAL project is drawing on existing data, conducting new clinical studies and using modelling to determine and test the most appropriate dosing of boosted protease inhibitors in second-line treatment of HIV.

It will use an approach known as physiologically based pharmacokinetic modelling to explore how rifampicin affects the metabolism and excretion of boosted protease inhibitors and their distribution around the body. These analyses will reveal the drug doses likely to be necessary for antiretroviral concentrations to be high enough to effectively suppress HIV replication.

The results of the modelling will be tested in clinical pharmacokinetic studies, with gradually increasing levels of boosted protease inhibitors being given to patients receiving high-dose rifampicin. Pharmacokinetic modelling will also be used to determine appropriate antiretroviral doses for special populations, such as pregnant women, children and adolescents.

## Project at a glance

**Project:** VirTUAL study

**Project lead:** Dr Catriona Waitt, University of Liverpool, United Kingdom

**Countries involved:** Italy, South Africa, Uganda, United Kingdom

**Target population(s):** Pregnant women, children and adolescents

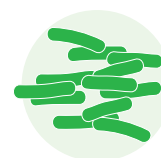
**Year funded:** 2018

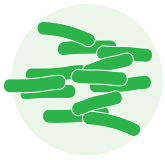
**EDCTP funding:** €2.1 M

**Project website:** <https://virtualconsortium.org>

## Impact

The VirTUAL project will provide much-needed data on complex but increasingly common clinical scenarios in HIV management, including antiretroviral use in vulnerable and neglected populations. In addition, it will build the capacity of African scientists in pharmacokinetic modelling, increasingly used to identify dosing strategies for evaluation in clinical trials.





# Tackling TB and HIV together

*The TREATS study will reveal whether combined HIV and TB interventions targeting entire populations have an impact on the prevalence of TB.*

## The challenge

TB is responsible for around 40% of the deaths of people living with HIV. Hence there is great interest in interventions that address both infections.

Control of HIV is increasingly moving towards 'test and treat' strategies, screening as many people as possible and starting antiretroviral therapy in all those found to be infected with HIV. Potentially, approaches to TB detection and prevention could be integrated into population-based initiatives to identify HIV infections.

## The project

The HPTN 071 (PopART) trial, the largest trial ever of combined HIV and TB prevention, involving around one million people, found that targeting entire populations cut the number of new HIV infections by 30%. The TREATS study is using the PopART trial infrastructure to determine whether population screening for active TB, piggybacking universal HIV testing and treatment, leads to a reduction in the community burden of TB.

The trial is taking place in 21 communities in South Africa and Zambia. A trial on the scale of PopART is unlikely ever to be repeated, so it provides a unique opportunity to collect data on population-based approaches for detecting TB.

TREATS will also use a range of methods for detecting TB infections and cases of active TB (most cases of TB are inactive, or latent; people with latent TB infections cannot spread the disease). These studies will provide a wealth of data on the best ways of measuring the number of new cases of TB each year and the prevalence of TB infection and disease.

## Project at a glance

**Project:** TREATS study

**Project lead:** Professor Helen Ayles, London School of Hygiene & Tropical Medicine, UK

**Countries involved:** France, Germany, the Netherlands, South Africa, United Kingdom, Zambia

**Target population(s):** All ages

**Year funded:** 2018

**EDCTP funding:** €12.9 M

**Total project funding:** €26.3 M

**Project website:** <https://treatsproject.org>

## Impact

The TREATS trial is a unique opportunity to gather information from large numbers of people on the impact of a combined HIV and TB control intervention on the TB disease burden. As countries move to more population-based HIV control strategies, its findings will help policymakers decide whether to combine large-scale TB and HIV screening.

# Facilitating implementation of TB testing

*The CAP-TB study will provide crucial information on the performance and impact of new TB diagnostics in real-life settings.*

## The challenge

Introduction of Xpert technology was a major step forward in the molecular diagnosis of TB as an alternative to culturing TB bacteria. However, although offering several significant advantages – notably, much faster results – its impact has been less than expected. This reflected some drawbacks in the Xpert technology, but also the fact that, in practice, clinicians do not rely solely on diagnostic test results when deciding on treatment.

As new generations of molecular diagnostic tests for TB become available, therefore, it will be important to consider not just their technical performance but also how they would contribute to clinical decision-making and working practices in existing healthcare systems.

## The project

The CAP-TB project is examining practical implementation issues for an updated version of Xpert, known as Cepheid Omni. The Omni platform enables high sensitivity testing for TB (Omni/Ultra) and detection of a greater range of drug resistance genes (Omni/XDR).

The CAP-TB team is evaluating the performance of these new tools at a range of sites in sub-Saharan Africa. One aim of the project is to gather data on health outcomes and HIV-related mortality when the new tools are used. But the study will also examine how Omni technology, including its internet connectivity, can improve care and logistical processes – from linking patients to care pathways to stock management.

It will also explore implications for staff training and practical matters such as stock management and maintenance, when the technology is used outside specialist laboratory facilities.

## Project at a glance

**Project:** CAP-TB study

**Project lead:** Dr Samuel Schumacher, Foundation for Innovative New Diagnostics, Switzerland

**Countries involved:** Ethiopia, Germany, Italy, Mozambique, Spain, South Africa, Switzerland, Tanzania

**Target population(s):** All age groups

**Year funded:** 2018

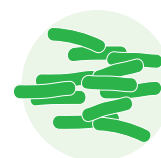
**EDCTP funding:** €6 M

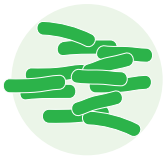
**Total project funding:** €10.6 M

**Project website:** [www.cap-tb.org](http://www.cap-tb.org)

## Impact

The CAP-TB study will provide insight into the clinical benefits the Omni platform might offer, based on its use in realistic contexts, and into the financial implications of its introduction. It will provide policymakers with much clearer evidence of the most impactful implementation strategies based on local patterns of disease and healthcare infrastructure, enabling them to make more informed decisions on introduction of the new technology.





## Shorter treatment for drug-resistant TB

*The Simplici-TB study is evaluating a new combination of drugs that could significantly shorten treatment times for both drug-sensitive and drug-resistant TB.*

### The challenge

TB kills more than 1.5 million people every year. Standard treatment involves six months' use of multiple antibiotics. In addition, multidrug-resistant TB is on the rise – nearly half a million cases were reported in 2016 – and requires even longer and more arduous treatment, with only a 50% chance of cure.

Shortening and simplifying TB drug treatments are major goals in TB research. Shorter regimens would cost less, be easier to implement and easier for patients to manage.

### The project

The development of highly effective new drugs – particularly bedaquiline and pretomanid – is raising hopes that shorter duration treatments are a realistic possibility.

A recent trial which showed that bedaquiline and pretomanid, combined with two potent currently used drugs (moxifloxacin and pyrazinamide), cleared TB bacteria from the lungs of patients with multidrug-resistant TB up to three times faster than the standard regimen cleared bacteria from patients with drug-sensitive TB – the fastest rate of clearance ever seen in a clinical trial. Following up these positive findings, the Simplici-TB trial is now comparing a four-month course of the new combination to treat drug-sensitive TB and a six-month course to treat multidrug-resistant TB.

The study is being run in partnership with the TB Alliance, a US-based not-for profit organisation, with the African studies forming part of a wider global trial evaluating the new combination.

### Project at a glance

**Project:** Simplici-TB study

**Project lead:** Professor Stephen Gillespie, University of St Andrews, UK

**Countries involved:** Gabon, Germany, Malawi, Mozambique, the Netherlands, South Africa, Switzerland, Tanzania, Uganda, United Kingdom, and the United States

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €12 M

**Total project funding:** €32.4 M

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03338621>

### Impact

The Simplici-TB will provide key data on a highly promising new combination treatment for TB. It could accelerate the introduction of a treatment that has a major impact on treatment of both drug-sensitive and drug-resistant TB in sub-Saharan Africa.

# Advancing new options for treatment of TB

*The CLICK-TB study is adopting a novel approach to identify the most likely promising new treatment options for TB.*

## The challenge

The rise of drug resistance is making treatment of TB even more difficult. Treatment of multidrug-resistant TB typically lasts at least a year, involves up to 10 drugs, and cures only around half of all patients. Hence new drugs are urgently required.

Phase III clinical trials of TB treatments are large, lengthy and expensive. It is therefore critical that resources are focused on drugs with the greatest likelihood of success.

## The project

The CLICK-TB study aims to identify the most promising combinations of TB drugs from a pool of early-stage candidates from new chemical classes. It is focusing on three novel compounds, two of which have already completed early-stage clinical trials: sanfetrinem cilexetil, a broad-spectrum antibiotic with potential for repurposing for TB; GSK3036656, an inhibitor of an enzyme pivotal to mycobacterial protein synthesis (LeuRS); and two inhibitors of DprE1, an enzyme involved in cell wall synthesis, which are in late pre-clinical development.

The CLICK-TB team will assess each of these drugs in combination with newly approved anti-TB drugs, delamanid or pretomanid and bedaquiline. Up to 10 combinations will be evaluated in rapid (two-week) assays examining early potency against TB bacteria. As well as bacterial culture results, the team will also collect radiological and immunological data, providing an additional readout of treatment responses.

The team will then develop a statistical model to compare results across the different combinations and to determine the relative contributions of each drug component. This model will be used to identify the likely most potent combinations, which will be evaluated in a four-week trial using the same response readouts alongside traditional phase IIb trial endpoints.

## Project at a glance

**Project:** CLICK-TB study

**Project lead:** Dr David Barros, GSK I+D, Spain

**Countries involved:** Germany, Spain, South Africa

**Target population(s):** All age groups

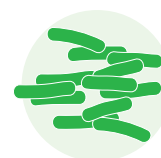
**Year funded:** 2018

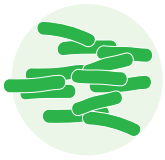
**EDCTP funding:** €6.9 M

**Total project funding:** €11 M

## Impact

The CLICK-TB study has adopted a novel trial methodology that will rapidly generate a wealth of data on a suite of candidate TB drugs, efficiently identifying the most promising combination for a definitive phase III trial.





## Statin use to boost anti-TB therapies

*The StatinTB proof-of-concept study is exploring whether statins can reduce lung damage and lower the risk of recurrence of TB.*

### The challenge

*Mycobacterium tuberculosis* (Mtb) causes 1.8 million deaths every year. Treatment is based on use of multiple antibiotics over six months, but disease recurs in 3–5% of patients after they have supposedly been cured. Patients may also continue to experience a deterioration in lung function due to persistent inflammation.

There is growing evidence that statins, drugs widely used to lower cholesterol levels, could be beneficial in treatment of TB. Mtb relies on host cholesterol for survival. As well as lowering cholesterol levels, statins also have anti-inflammatory properties, which may limit the damage caused to the lungs during TB infections. Notably, several studies have found that people who are taking statins have a decreased risk of active TB disease.

### The project

The StatinTB team is carrying out a rigorous proof-of-concept trial to determine whether use of statins, in addition to antibiotic therapy, reduces the risk of relapse and lessens damage to the lung.

HIV-infected and -uninfected adults will be given a statin, atorvastatin, for 12 weeks at the end of their antibiotic treatment. They will undergo PET/CT (positron emission tomography/computed tomography) scans, which will provide insight into whether active TB disease is still present and the extent of inflammatory damage to the lungs.

### Impact

If the StatinTB trial shows that statins have a beneficial impact on lung health as judged by PET/CT measures, it would open the door to large-scale trials to investigate their impact on TB relapse rates and long-term lung function.

### Project at a glance

**Project:** StatinTB study

**Project lead:** Dr Reto Guler, University of Cape Town, South Africa

**Countries involved:** Germany, Namibia, South Africa, and the United Kingdom

**Target population(s):** Adults, with and without HIV infection

**Year funded:** 2019

**EDCTP funding:** €4.9 M



# Improving treatments for TB-associated meningitis

*The INTENSE-TBM study will provide the first data on whether intensified treatment of tuberculous meningitis – TB infection of the brain – reduces mortality and long-term disability.*

## The challenge

Although the TB bacterium is mainly found in the lungs, it can also invade the central nervous system, causing a potentially lethal form of meningitis in the brain. Tuberculous meningitis is particularly common in young children, and has a high mortality rate (30%). Mortality is much higher in patients with HIV, particularly when they are infected with drug-resistant strains of TB. In addition, around half of survivors are affected by long-term disabilities.

Treatment of tuberculous meningitis is complicated as the blood–brain barrier restricts access of anti-TB drugs to infected tissues. In addition, despite its severity, there is relatively little evidence on the optimum treatment of tuberculous meningitis.

## The project

The INTENSE-TBM study is evaluating a revised, more intensive treatment of patients with tuberculous meningitis, including those with HIV infections. The first week's treatment will include high-dose intravenous rifampicin, which does not cross the blood–brain barrier well, and linezolid, an anti-TB drug that shows good uptake into the brain, plus other anti-TB drugs and corticosteroids. For the next two months, treatment switches to an oral regime, followed by a simplified antibiotic regime up to seven months. The trial will also test whether daily aspirin is beneficial, by reducing tissue-damaging inflammation.

For patients with HIV infections, triple antiretroviral therapy will begin four weeks after the start of treatment for tuberculous meningitis. Dexamethasone will also be given during the first four weeks of antiretroviral treatment, to reduce the risk of immune reconstitution inflammatory syndrome (IRIS) – when a recovering immune system launches a powerful response against TB infections.

## Project at a glance

**Project:** INTENSE-TBM study

**Project lead:** Professor Fabrice Bonnet, University of Bordeaux, France

**Countries involved:** Côte d'Ivoire, France, Madagascar, South Africa, Spain, Switzerland, Uganda

**Target population(s):** Adults and children >15 years old, including those with HIV infections

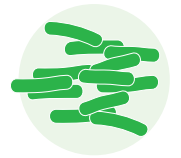
**Year funded:** 2018

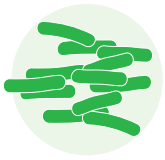
**EDCTP funding:** €9.3 M

The study will also examine how combined use of antiretroviral and anti-TB medicines affects their metabolism in the body.

## Impact

The INTENSE-TBM study will answer key questions in treatment of tuberculous meningitis, which has scarcely changed in decades. It will assess the impact of more intensive treatment on mortality and the likelihood of longer-term disability, and generate data on a tailored regimen specific for those infected with HIV.





## A new approach for TB vaccination

*The POR TB trial is evaluating a novel strategy for protecting against TB – preventing latent infections from springing back to life.*

### The challenge

Most TB vaccines aim to prevent new infections. However, an estimated 2 billion people are already infected with *Mycobacterium tuberculosis*. Although 1.5 million lives are lost to TB every year, not everyone with an *M. tuberculosis* infection develops clinical disease. Hence an alternative goal for vaccination is to promote immune responses that keep an existing infection in check – which is likely to require a different type of vaccine from one designed to prevent initial infection.

The POR TB team has developed a candidate vaccine, known as H56:IC31, that has been specifically designed to protect people already exposed to *M. tuberculosis*. It is based on a fusion protein (known as H56) containing antigens made by *M. tuberculosis* at different stages of its life cycle, combined with an adjuvant (IC31). Preliminary clinical trials have shown that H56:IC31 is safe and stimulates good immune responses of the kind thought likely to be protective.

### The project

The POR TB consortium is now carrying out a larger phase II trial, to assess the safety and efficacy of H56:IC31 using a 'prevention of recurrence' approach not previously applied to TB. Even after successful treatment of TB, up to 10% of patients experience a relapse – their TB returns, following reinfection or reawakening of dormant bacteria that survived initial treatments. Preventing recurrence would improve the success of treatments and reduce the spread of TB.

In the placebo-controlled POR TB trial, H56:IC31 will be given to TB patients who have successfully completed 6 months of standard TB treatment. Patients will be monitored for 2 years for recurrence of their TB.

### Project at a glance

**Project:** POR TB Consortium

**Project lead:** Professor Peter Andersen, Statens Serum Institute, Copenhagen, Denmark

**Countries involved:** Denmark, Italy, South Africa, Tanzania

**Target population(s):** Adults treated for TB

**Sample size:** 900 (target)

**Year funded:** 2018

**EDCTP funding:** €13.8 M

**Project website:** <https://www.porconsortium.org>

**Clinical Trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03512249?term=H56%3AIC31@rank=1>

### Impact

Complementing preventive vaccines such as BCG, H56:IC31 could enhance the long-term success rates of TB drug treatments. Potentially, by stimulating host responses to infection, it could also provide a route to shortened drug treatments.

The POR TB consortium is also piloting a novel clinical trial approach and measures of success that could be adopted for evaluation of similar products. Finally, the trial will also generate data on the elements of the immune response and features of *M. tuberculosis* that are associated with recurrence or the success of vaccination to prevent recurrence.

### Key reference

Luabeya AK et al. First-in-human trial of the post-exposure tuberculosis vaccine H56:IC31 in *Mycobacterium tuberculosis* infected and non-infected healthy adults. *Vaccine*. 2015;33(33):4130–40.

# Better TB protection for newborns

*The MTBVAC-Newborns study will determine whether a weakened form of the TB bacterium is suitable for large-scale trials – potentially offering a better alternative to BCG.*

## The challenge

BCG (Bacillus Calmette-Guérin) has been used to protect newborn infants against TB for nearly 100 years. It is a weakened (attenuated) form of the bacterium that causes TB in cattle, *Mycobacterium bovis*. It was developed by repeated culturing of *M. bovis* and selection for strains that stimulated anti-TB immune responses but did not cause disease.

Although BCG offers generally good protection to newborn infants, it has many drawbacks and is significantly less effective in older age groups. In part, this reflects the fact that attenuation led to the loss not just of genes that trigger disease but also of others that stimulate strong immune responses. Using this knowledge, the MTBVAC team has developed a new vaccine based on *M. tuberculosis* which has been precisely engineered to eliminate genes central to disease while maintaining those lost in BCG that provoke strong immune responses.

## The project

MTBVAC has been shown to be safe in healthy adult volunteers and in a small number of newborn infants in South Africa; it appears to stimulate an immune response as least as strong as BCG. In a new trial, the MTBVAC team is carrying out a larger trial in newborn infants in South Africa to evaluate the safety of increasing doses of MTBVAC and the strength of anti-TB immune responses, in comparison with BCG. In parallel, the consortium is building capacity for future large-scale trials in Senegal and Madagascar, which have a high burden of TB.

## Impact

In theory, MTBVAC should provide better protection in older age groups, but it is also important to determine whether it is a suitable alternative to BCG. Positive results would pave the way to a pivotal phase III trial that would

## Project at a glance

**Project:** MTBVAC-Newborns trial

**Project lead:** Ms Ingrid Murillo, Biofabri SL, Spain

**Countries involved:** Madagascar, the Netherlands, Senegal, South Africa, Spain

**Target population(s):** Newborns

**Sample size:** 99 (target)

**Year funded:** 2018

**EDCTP funding:** €5.5 M

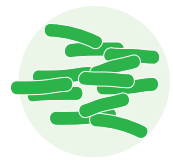
**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03536117>

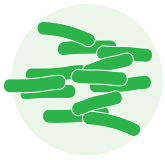
provide definitive evidence of MTBVAC's efficacy in newborn infants compared with BCG.

## Key reference

Spertini F et al. Safety of human immunisation with a live-attenuated *Mycobacterium tuberculosis* vaccine: a randomised, double-blind, controlled phase I trial. *Lancet Respir Med*. 2015;3(12):953–62.

Tamaris et al. Live-attenuated *Mycobacterium tuberculosis* vaccine MTBVAC versus BCG in adults and neonates: a randomised controlled, double-blind dose-escalation trial. *Lancet Respir Med*. 2019 Sep;7(9):757-770.





## Building a successor to BCG

*The priMe study will reveal whether a promising alternative to BCG is safe and effective for use in newborn infants.*

### The challenge

The BCG (Bacillus Calmette-Guérin) vaccine has been used to vaccinate against TB since the 1920s. It is reasonably effective at preventing serious disease, but many vaccinated infants still develop TB meningitis and it appears to have little impact on the spread of pulmonary TB. Modelling studies suggest that, despite BCG, around 7.5 million children were infected with *Mycobacterium tuberculosis* in 2010 and 650,000 developed TB disease.

BCG is a weakened or attenuated version of *Mycobacterium bovis*, a relative of *M. tuberculosis* that causes TB in cattle. Researchers have recently revisited *M. bovis* and introduced precise genetic changes that cause it to stimulate stronger immune responses and make it safer for use in individuals with HIV, who sometimes suffer reactions to conventional BCG.

### The project

The large-scale phase III priMe study will build on promising preliminary trials, in adults and children, of this updated version of BCG, known as VPM1002. Aiming to recruit around 7000 newborns, it will provide definitive evidence of the safety and efficacy of VPM1002 in both HIV-free and HIV-infected newborn infants.

### Impact

Positive findings would indicate that VPM1002 is a suitable alternative to BCG, widely recognised to be an imperfect vaccine but included in most countries' routine immunisation programmes; it would also provide a suitable vaccine for infants with HIV. Furthermore, production methods for VPM1002 are relatively simple and straightforward to scale up, so the vaccine could meet global demand and overcome some of the supply difficulties recently experienced with BCG. The priMe study will also generate important data on the immune responses associated with good protection against *M. tuberculosis*, to enhance the design of future vaccines.

### Project at a glance

**Project:** priMe trial

**Project lead:** Dr Leander Grode, Vakzine Projekt Management GmbH, Germany

**Countries involved:** Gabon, Germany, India, Kenya, the Netherlands, South Africa, Tanzania, Uganda

**Target population(s):** Newborn infants (HIV-free and HIV-infected)

**Sample size:** 6940

**Year funded:** 2018

**EDCTP funding:** €12.5 M

**Total project funding:** €25 M

### Key reference

Loxton AG et al. Safety and immunogenicity of the recombinant *Mycobacterium bovis* BCG vaccine VPM1002 in HIV-unexposed newborn infants in South Africa. *Clin Vaccine Immunol.* 2017;24(2). pii: e00439-16.

# Efficient diagnosis of HIV and TB

*The Stop TB/HIV at One study is assessing technologies to allow diagnosis of HIV and TB in a single visit.*

## The challenge

HIV infections greatly accelerate progression from latent TB to active TB disease. Globally, around 10% of new TB cases are among people living with HIV, and in 2016, 374,000 people with HIV and TB co-infections died – 86% of them in Africa. TB remains the leading cause of death of people with HIV.

Diagnosis of HIV is relatively straightforward, as simple and affordable point-of-care tests are available. Detection of TB is more challenging – national surveillance programmes are thought to miss a third of new cases. In particular, TB can be difficult to detect in people living with HIV, leading to delayed diagnosis and initiation of treatment.

## The project

The Stop TB/HIV at One study aims to develop new approaches for diagnosing HIV and TB rapidly and cost-effectively. Current approaches for TB detection are not suitable for rapid and large-scale screening. Smear microscopy is time-consuming and misses a significant number of cases, and is particularly poor at identifying TB in people with HIV, who may not be able to generate a sputum sample for analysis. Molecular tests and X rays require equipment that may not be available at clinics.

To overcome these shortcomings, new point-of-care diagnostic tools are being developed. The Stop TB/HIV at One study is evaluating a range of tools for diagnosing HIV and TB. Based on the performance of these tests, it will then develop new approaches for use of these tests, or diagnostic algorithms, to enable health care workers to detect TB and HIV in the shortest possible time and at the lowest possible cost.

The performance of these new diagnostic algorithms will then be evaluated in real-life settings in Nigeria and Ethiopia.

## Project at a glance

**Project:** Stop TB/HIV at One study

**Project lead:** Professor Luis Cuevas, Liverpool School of Tropical Medicine, UK

**Countries involved:** Ethiopia, Moldova, Nigeria, Spain, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2016

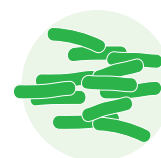
**EDCTP funding:** €1.4 M

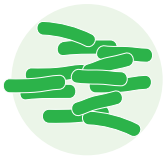
## Impact

Rapid detection of TB is essential to ensure rapid initiation of treatment, which improves patient outcomes and reduces the risk of disease transmission. Earlier identification of TB and prompt treatment could prevent most TB-related deaths in people with HIV infections. However, detection of TB is challenging, particularly in people with HIV. New tests, and careful design of testing strategies, could provide diagnostic algorithms that are practical for use in health centres with limited facilities and cost-effectively improve timely detection of both HIV and TB.

## Key reference

Santos VS et al. Acute phase proteins and IP-10 as triage tests for the diagnosis of tuberculosis: systematic review and meta-analysis. *Clin Microbiol Infect.* 2019;25(2):169–177.





## Developing a point-of-care test to detect active TB

*The ScreenTB study is developing a rapid, point-of-care test to identify active TB using just a fingerprint blood sample.*

### The challenge

Screening for active TB in remote populations is problematic. Sputum samples need to be transported to suitable facilities for analysis, leading to delays that may mean patients never start treatment.

This challenge could be overcome by point-of-care diagnostics suitable for use with minimal training. Implementation would also be easier if blood samples rather than sputum could be analysed.

### The project

In an earlier EDCTP-funded project, the ScreenTB team identified a set of six biomarkers in blood that were strongly associated with active TB. Building on this discovery, the team is now developing a simple-to-use 'dipstick' test (lateral flow assay) that would detect these biomarkers, allowing rapid initiation of anti-TB treatment.

The project is making use of novel nanoparticle-based detection methods, which are both highly sensitive and robust enough to be used in environmentally challenging settings. Using this technology, the team is developing a tool that can simultaneously detect all six biomarkers in a finger-prick blood sample. The performance of the test is being compared with that of gold-standard methods in 800 adults with suspected active TB.

### Impact

A rapid, reliable and user-friendly TB screening test could streamline diagnostic processes in resource-limited settings, reducing unnecessary referrals for molecular testing and ensuring more patients immediately start treatment.

### Project at a glance

**Project:** ScreenTB study

**Project lead:** Professor Gerhard Walzl, Stellenbosch University, South Africa

**Countries involved:** Ethiopia, The Gambia, Germany, Namibia, the Netherlands, South Africa, Uganda, and the United Kingdom

**Target population(s):** Adults

**Year funded:** 2016

**EDCTP funding:** €3 M

### Key reference

Chegou NN et al. Diagnostic performance of a seven-marker serum protein biosignature for the diagnosis of active TB disease in African primary healthcare clinic attendees with signs and symptoms suggestive of TB. *Thorax*. 2016;71(9):785–94.

Awoniyi DO et al. Evaluation of cytokine responses against novel Mtb antigens as diagnostic markers for TB disease. *J Infect*. 2016;73(3):219–30.

# Better detection of multidrug-resistant TB

*The DIAMA study is evaluating new diagnostics that could provide a faster and more complete picture of drug resistance in TB.*

## The challenge

Multidrug-resistant TB infections are becoming more common. A failure to identify drug resistance is bad for individual patients, and facilitates the wider spread of drug-resistant bacteria.

Culturing TB bacteria to assess resistance is technically difficult and can take up to four months. Molecular diagnostics are increasingly being used, but do not necessarily identify all resistance mutations.

## The project

The DIAMA study is evaluating new options that could provide more rapid results on drug resistance than culturing. It builds on previous EDCTP funding and an infrastructure that undertakes continuous monitoring of TB patients for resistance to rifampicin.

Benin and Rwanda have established reference laboratories that can use the 'Deeplex' assay, which generates sequence information on genes conferring resistance to 14 key anti-TB drugs. In the first phase of the study, sputum samples will be shipped to the reference labs for Deeplex analysis and results compared with those obtained by the traditional culturing method.

In the second phase of the study, all participating countries will begin using two lower-tech tools – Molbio Diagnostics' TrueNat test and the latest version of the Xpert molecular diagnostic platform – which do not require samples to be sent to a reference laboratory. Results will be compared with those obtained by Deeplex analysis. Newly developed software will be used to transmit results immediately to national TB programmes. Use of the new tools in patient management will be evaluated at two pilot sites. The project will also explore use of two faster alternatives to culture to monitor responses to treatment.

## Project at a glance

**Project:** DIAMA study

**Project lead:** Dr Dissou Affolabi, Centre National Hospitalier de Pneumo-Phtisiologie, Benin

**Countries involved:** Belgium, Benin, Cameroon, Democratic Republic of the Congo, Ethiopia, France, Guinea, Mali, Nigeria, Rwanda, Senegal, Switzerland, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2016

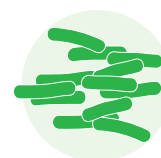
**EDCTP funding:** €3 M

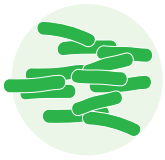
**Project website:** <https://www.diama-project.com/>

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03303963>

## Impact

Use of the new approaches could lead to more rapid identification of multidrug-resistant TB, and dramatically improve treatment in resource-poor settings, where treatment outcomes are typically much worse than in high-income countries.





# Identifying TB patients suitable for shortened treatment

*The PredictTB study is investigating whether a combination of biomarkers can identify TB patients who are responding well to antibiotics so their treatment can be halted early.*

## The challenge

Reducing treatment times from six to four months is a major goal in TB research. Shorter treatment times would reduce costs, increase compliance and reduce the risk of drug resistance.

In clinical trials, four-month regimens have generally not been as successful as standard six-month treatments. However, 80–85% of participants are cured at four months. If these patients could be identified reliably, their treatment could safely be stopped early.

## The project

The PredictTB team has identified a combination of markers, based on radiographic examination of lungs and detection of *Mycobacterium tuberculosis* by Xpert molecular diagnostic technology, that are good predictors of individuals who respond well to therapy and whose treatment could be stopped at four months.

To evaluate these markers, the team is running a phase IIb clinical trial on more than 600 patients with drug-sensitive pulmonary TB. All patients are receiving standard TB treatment for 16 weeks; at this point, radiographic and Xpert results are being used to distinguish 'poor responders', who will continue with the full six-month course, and 'good responders', who will be randomised to continued therapy or early completion. Cure rates will then be compared at 18 months.

The PredictTB project has received support from a range of funders, including the Bill & Melinda Gates Foundation, and is recruiting patients at multiple sites in China as well as South Africa.

The sophisticated radiographic tools used to identify good responders would not be suitable for routine use in low-resource settings. The project is therefore also investigating other

## Project at a glance

**Project:** PredictTB study

**Project lead:** Professor Gerhard Walzl, Stellenbosch University, South Africa

**Countries involved:** Germany, The Netherlands, South Africa, UK

**Target population(s):** All age groups

**Year funded:** 2017

**EDCTP funding:** €7.7 M

**Total project funding:** €24.7 M

**Project website:** <https://predict-tb.com>

possible biomarkers that are associated with good response to treatment, which could be used as alternatives to radiographic screening. This is informing the development of a more practical point-of-care test that could be used to identify patients suitable for early completion of therapy. The project is also developing a biobank of samples for future biomarker research.

## Impact

The PredictTB study could provide the tools to enable large numbers of TB patients to finish TB therapy early, even with currently used drugs. This would benefit patients, reducing their exposure to powerful drugs and a daily drug-taking routine, as well as health systems, by reducing costs of treatment.

## Key reference

Chen RY et al. Using biomarkers to predict TB treatment duration (Predict TB): a prospective, randomized, noninferiority, treatment shortening clinical trial. *Gates Open Res.* 2017;1:9.



# Improving TB diagnosis in children

*The RaPaed TB study is exploring a range of new tools for diagnosing TB in children – one of the biggest obstacles to control of TB disease.*

## The challenge

More than 200,000 children die from TB every year, and 1 million new cases are reported. However, TB in childhood can be treated effectively – mortality rates are just 1% – suggesting that many children are dying because their TB is never diagnosed.

Unfortunately, TB is hard to diagnose in children. Clinical symptoms are similar to those for other respiratory infections and young children may find it hard to generate a sputum sample for analysis. Furthermore, because of the way that the TB bacterium infects children, sputum samples may contain few bacteria. Reliable new diagnostics suitable for children are thus urgently needed.

## The project

The RaPaed TB project has brought together a consortium of experts from different fields to evaluate eight promising new diagnostic approaches for childhood TB. These include TAM-TB, a blood test that showed promise in the EDCTP-funded TB-CHILD project, as well as a version of the Xpert MTB/RIF molecular diagnostic adapted for stool samples. The RaPaed team will also evaluate two LAM-based tests, which detect a component of *Mycobacterium tuberculosis* in urine known as lipoarabinomannan (LAM); a LAM-based urine test is now recommended by WHO for detection of TB in HIV-infected adults.

## Impact

The RaPaed TB team anticipates that at least two of these innovative new approaches will prove sufficiently sensitive to attract WHO endorsement. The team's make-up and project partners are designed to ensure rapid capture of field-relevant results, encompassing experts in child TB clinical research, industry partners developing point-of-care tests, the Foundation for Innovative New Diagnostics (FIND), and national TB control programmes. FIND,

## Project at a glance

**Project:** RaPaed TB project

**Project lead:** Norbert Heinrich, Ludwig Maximilians Universität, Munich, Germany

**Countries involved:** Australia, Germany, Malawi, Mozambique, South Africa, Sweden, Switzerland, Tanzania

**Target population(s):** Children

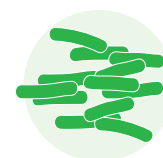
**Sample size:** 800 suspected TB cases (minimum 200 confirmed cases)

**Year funded:** 2018

**EDCTP funding:** €3 M

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03734172>

which has developed a portfolio of possible technologies, would be well-placed to take forward the WHO submission process for diagnostics achieving sensitive and specific detection of TB in children.





# Malaria

2014-2019



12 grants  
**€118.51 M**



Drugs  
 8 grants  
**€70.28 M**





























Vaccines  
 3 grants  
**€45.23 M**



Diagnostics  
 1 grant  
**€3 M**

## EDCTP portfolio: Malaria

Drugs		Vaccines	
<b>IMPROVE</b> Kenya, Malawi, Tanzania  	<b>WANECAM II</b> Burkina Faso, Gabon, Mali, Niger  	<b>MMVC</b> Burkina Faso, Sierra Leone, Tanzania  	
<b>MAMAH</b> Gabon, Mozambique  	<b>PAMAFRICA</b> Burkina Faso, Gabon, Mozambique, Uganda  	<b>PfTBV</b> Burkina Faso, Guinea, Liberia, Mali  	
<b>ASAAP</b> Benin, Burkina Faso, Ghana, Gabon, Mali  			
<b>PYRAPREG</b> Burkina Faso, Democratic Republic of Congo, The Gambia, Mali, Mozambique  			

Caption	Study phase	Population
<b>Project name</b>	 Phase I	 Adults (18yr and above)
<b>Site(s) in sub-Saharan Africa</b>	 Phase II	 Adolescents (10yr-17yr)
	 Phase III	 Children (2yr-9yr)
	 Phase IV	 Infants (above 1mo-1yr)
	 Observational study	 Pregnant women and/or newborns (birth to 1mo)



# Protecting pregnant women from malaria

*The IMPROVE trials should reveal whether a recently developed drug can protect pregnant women from malaria.*

## The challenge

Some 30 million pregnant women are at risk of malaria in Africa, and 10,000 die from malaria each year. In addition, malaria is responsible for the deaths of 100,000 infants, and 900,000 are born underweight because of malaria infections.

To prevent infections, pregnant women receive a series of preventive treatments with sulfadoxine-pyrimethamine (SP), as well as insecticide-treated bednets. However, resistance to SP is growing, and the hunt is on for safe and effective alternatives. Unfortunately, several possible options have been ruled out because, although they prevent malaria infections, many women experience side effects such as dizziness and vomiting.

## The project

The IMPROVE team has been exploring the use of a recently developed antimalarial drug, dihydroartemisinin–piperaquine (DP), to replace SP in areas where resistance to SP is high. Small-scale trials in Kenya and Uganda have shown that DP is better than SP at preventing malaria infections and is well-tolerated, but were not large enough to judge the effect of DP on pregnancy outcomes. Trial data were reported to WHO in 2015, which stated that supportive evidence from a large-scale trial was required before DP could be recommended in pregnancy.

In two new larger-scale trials in ten sites in three countries, involving more than 4500 women, the IMPROVE team is aiming to generate confirmatory evidence of DP's efficacy against malaria infection, as compared with SP, and new data on birth outcomes – such as fetal loss, premature birth and low birthweight. As well as comparing SP and DP, the phase III IMPROVE-1 study has a third arm, which includes the antibiotic azithromycin as well as DP. Azithromycin is used to prevent sexually transmitted and reproductive tract infections, which are common in East Africa and can also affect birth outcomes.

## Project at a glance

**Project:** IMPROVE-1 and IMPROVE-2 trials

**Project lead:** Professor Feiko ter Kuile, Liverpool School of Tropical Medicine, United Kingdom

**Countries involved:** Denmark, Finland, Kenya, Malawi, Norway, Tanzania, and the United Kingdom

**Target population(s):** Pregnant women (with and without HIV) and their newborn infants

**Sample size:** 4680 (IMPROVE-1); 1335 (IMPROVE-2)

**Year funded:** 2016

**EDCTP funding:** €10.6 M

**Total project funding:** €10.6 M

Furthermore, the team is running a complementary phase III trial (IMPROVE-2) in pregnant women with HIV, who cannot receive SP because of its interactions with cotrimoxazole, an antibiotic used prophylactically to prevent infection. A previous small-scale study suggested that DP is safe and well-tolerated, but this larger study will show whether it also protects against negative birth outcomes and whether azithromycin provides any further benefits to mother or offspring.

## Impact

The trials should provide definitive evidence on the suitability of DP as a preventive treatment against malaria in pregnancy. They will also reveal whether azithromycin provides any additional benefits.

## Key reference

Desai M et al. Intermittent screening and treatment or intermittent preventive treatment with dihydroartemisinin-piperaquine versus intermittent preventive treatment with sulfadoxine-pyrimethamine for the control of malaria during pregnancy in western Kenya: an open-label, three-group, randomised controlled superiority trial. *Lancet*. 2015;386(10012):2507–19.

# Preventing malaria in pregnant women with HIV

*The MAMAH study is evaluating a new drug combination for preventing malaria infections in pregnant women with HIV.*

## The challenge

In Africa, at least a million pregnant women are affected by both HIV and malaria infections. The two infections have mutually reinforcing effects, leading to higher parasite loads and greater viral replication. This is harmful to mothers, but also to the developing fetus, including an increased risk of mother-to-child transmission of HIV.

Because of the risks of malaria in pregnancy, WHO recommends that pregnant women receive preventive treatment with antimalarial drugs, generally sulphadoxine–pyrimethamine (SP). However, this is not recommended for women with HIV, because of the risk of side effects when women are also taking cotrimoxazole, an antibiotic used to prevent HIV-related infections.

## The project

A previous EDCTP-funded study found that an alternative to SP, mefloquine, used alongside insecticide-treated bednets and cotrimoxazole, offered good protection against malaria. However, it caused unpleasant symptoms in women, and was also associated with elevated viral replication and an increased risk of mother-to-child transmission of HIV.

The MAMAH study is assessing whether a different antimalarial drug, dihydroartemisinin–piperaquine (DP), may be a more suitable alternative. It has proven safe and effective in pregnant women without HIV infections, but there are limited data on its use in HIV-infected pregnant women.

Working in two African countries, the MAMAH team is running a placebo-controlled trial of DP for malaria prevention in HIV-infected pregnant women who are receiving antiretroviral therapy and cotrimoxazole. As well as impacts on malaria in mothers, the project will explore whether DP affects the pharmacokinetics of antiretroviral drugs and cotrimoxazole, and infants will be followed up to the age of one year to assess any impacts on mother-to-child transmission of HIV.

## Project at a glance

**Project:** MAMAH study

**Project lead:** Professor Clara Menendez, ISGlobal, Spain

**Countries involved:** Austria, Gabon, Germany, Mozambique, Spain

**Target population(s):** Pregnant women with HIV

**Year funded:** 2016

**EDCTP funding:** €3 M

## Impact

The MAMAH study will provide data on a possible approach to malaria prevention in a highly disadvantaged group – pregnant women with HIV. Effective malaria prevention in this group would benefit the health not only of mothers but also their offspring – improving maternal health, reducing infant mortality, and increasing birthweight, with long-term benefits for child health and development.





## A fallback therapy for malaria

*The ASAAP study is evaluating a novel triple combination to protect current antimalarial drugs and to provide an alternative if artemisinin resistance spreads to Africa.*

### The challenge

After several years of progress, malaria control has stalled. An estimated 435,000 deaths occurred in 2017, with Africa accounting for 93% of deaths.

Malaria control is undermined by the development of drug resistance in malaria parasites. Although resistance to the mainstay of malaria treatment, artemisinin-based combination therapies, has not yet been widely seen in Africa, there are concerns that it could be introduced from South-East Asia and threaten the use of highly effective antimalarial therapies.

### The project

The ASAAP project is evaluating the safety and efficacy of a novel triple therapy – combining artemether+lumefantrine (AL) and atovaquone–proguanil (AP, also known as Malarone). The AL combination is already widely used and is highly effective, but it is important that it is protected against the

development of resistance. Adding AP, another antimalarial with proven efficacy, will reduce the risk of resistance and have additional benefits. AP targets multiple stages of the malaria parasite life cycle, and may contribute to continuing protection after treatment and prevent the transmission of parasites to others.

The ASAAP project is organising primarily a pilot phase III study (in adults and adolescents) and a main phase III trial (in your children) in four African countries, comparing the AL–AP combination with AL on its own. The main trial will involve more than 1,500 children aged 6–59 months.

As well as cure rates at 42 days and safety, the trial will also look for any effects on re-infections, to assess post-treatment protection, and investigate the novel drug combination's ability to block transmission of malaria parasites from blood samples to mosquitoes.

### Project at a glance

**Project:** ASAAP study

**Project lead:** Dr Oumou Maïga-Ascofaré, Kwame Nkrumah University of Science and Technology, Ghana

**Countries involved:** Benin, Burkina Faso, France, Gabon, Ghana, Germany, Mali

**Target population(s):** Adults (pilot study), Young children (main trial)

**Year funded:** 2018

**EDCTP funding:** €7.6 M

### Impact

The ASAAP project will contribute to preparedness in Africa for the emergence of artemisinin-resistant malaria parasites. It will determine whether AL–AP is a suitable alternative in such a situation, and whether it provides additional benefits by reducing human-to-mosquito transmission of malaria parasites.

# Expanding the options for malaria control in pregnancy

*The PYRAPREG study is exploring whether pregnant women can benefit from a newly developed safe and effective antimalarial drug.*

## The challenge

Malaria in pregnancy can be harmful to both mother and child, causing maternal anaemia and low birth weight. In 2015, it was the third most common cause of death of women of reproductive age in Africa. Malaria in pregnancy is responsible for around 400,000 cases of maternal anaemia and 15% of maternal deaths globally.

Several artemisinin-based combination therapies are recommended for treatment of malaria in the second and third trimesters of pregnancy, but they vary in their efficacy, safety and tolerability. Pyronaridine–artesunate (PA) is a relatively new artemisinin-based combination therapy that could be a suitable alternative but it has yet to be evaluated in pregnancy.

## The project

The PYRAPREG study is carrying out a large-scale evaluation of PA use in pregnant women in five African countries. The safety and efficacy of PA will be compared with those of two other commonly used artemisinin-based combination therapies, dihydroartemisinin–piperaquine and artemether–lumefantrine.

The main aim of the trial is to determine if PA is as good as the comparator treatments, with acceptable safety and tolerability. The pharmacokinetics of PA are also being monitored, and any influence of antiretroviral medications examined in a subset of women with HIV infections.

## Impact

The PYRAPREG study will determine whether a relatively new drug with some attractive features – for example, it only needs to be taken once a day, does not need to be eaten with fatty food, and has a relatively long half-life – is suitable for use in pregnant women.

## Project at a glance

**Project:** PYRAPREG study

**Project lead:** Dr Kassoum Kayentao, Université des Sciences, des Techniques et des Technologies de Bamako, Mali

**Countries involved:** Burkina Faso, Democratic Republic of the Congo, The Gambia, Mozambique, Mali, the Netherlands, Spain, and the United Kingdom

**Target population(s):** Pregnant women, including HIV-positive women

**Year funded:** 2018

**EDCTP funding:** €7.1 M





## Advancing a new class of antimalarial drug

*The WANECAM II study is accelerating the development of a new class of antimalarial drug that may have significant advantages over existing treatments.*

### The challenge

Despite much progress, malaria control has stalled in recent years, with deaths still in excess of 400,000 a year in Africa, most of them young children.

In addition, the emergence in South-East Asia of resistance to the mainstay of malaria treatment, artemisinin combination therapy (ACT), is of grave concern and emphasises the need to identify possible alternative treatments.

### The project

With EDCTP funding, the WANECAM consortium played a key role in the evaluation of new antimalarial formulations suitable for use in children. With additional funding through the EDCTP2 programme, the WANECAM II is now a pivotal partner in a global collaboration advancing a novel antimalarial treatment that does not include artemisinin-based drugs. The collaboration includes the not-for-profit Medicines for Malaria Venture and the Novartis pharmaceutical company.

WANECAM II is focusing on a new antimalarial drug, KAF156 (ganaplacide), from an entirely novel chemical class. Its mode of action appears to be different to that of artemisinin-based drugs, and it is highly active against several stages of the malaria parasite and against *Plasmodium vivax* as well as *P. falciparum*. It is being teamed up with a new formulation of an existing antimalarial, lumefantrine, that is less affected by food intake and would allow the new combination to be given as a single dose.

The WANECAM II team is carrying out a phase IIb trial with groups of children from 12 years down to six months of age. A phase III trial will then be conducted in adults and infants of six months of age and older.

### Project at a glance

**Project:** WANECAM II study

**Project lead:** Professor Abdoulaye Djimdé, Université des Sciences, des Techniques et des Technologies de Bamako, Mali

**Countries involved:** Burkina Faso, France, Gabon, Germany, Mali, the Netherlands, Niger, Sweden, Switzerland, and the United Kingdom

**Target population(s):** All age groups, including children

**Year funded:** 2018

**EDCTP funding:** €10 M

### Impact

WANECAM II will provide key evidence on the safety and efficacy of KAF156–lumefantrine in Africans, including children, who are most at risk from malaria. Positive data would support submissions to regulatory authorities for approval of the new combination. KAF156–lumefantrine would be an alternative to artemisinin-based combination therapies, but would also have advantages, including the need for just a single dose and the possibility of blocking parasite transmission to mosquitoes, which would prevent the spread of the infection to others.

In addition, the project is further strengthening research capacity across the WANECAM network, including in Niger, which to date has not had a strong medical research base.



# Advancing a portfolio of malaria drugs

*The PAMAFRICA project is advancing the development of a suite of drugs to address unmet needs in malaria treatment.*

## The challenge

Between 2000 and 2015, malaria deaths were more than halved, mainly through use of artemisinin-based combination therapies (ACTs). However, progress has slowed markedly, and may even have gone into reverse. The rise of resistance to ACTs in South-East Asia is also greatly concerning. To achieve ambitious malaria control and elimination goals, new tools are urgently required to close treatment gaps and to provide new impetus.

## The project

Since its launch in 1999, the Medicines for Malaria Venture (MMV) and its partners have developed the most extensive portfolio of candidate malaria drugs ever seen. As many drugs do not make it through the development pipeline, a portfolio approach is essential. In addition, a portfolio approach is required so that treatments can be tailored to the needs of specific groups, including vulnerable populations such as young infants.

The PAMAFRICA project will draw on MMV resources – drug candidates and reformulations of licensed medicines – to address significant unmet needs in malaria treatment. One priority is a single-dose cure for malaria. The project is likely to focus on two promising compounds: M5717, which is active against all stages of the parasite life cycle; and SAR121, a potent and long-lasting agent that the malaria parasite is unable to develop resistance to. However, with additional clinical data due to be released shortly, other compounds in the MMV portfolio could be considered. A final decision will be made on the basis of all available clinical data.

PAMAFRICA will also undertake a specific study to develop and test a new formulation of artemether–lumefantrine for children less than 5 kg in weight. Drug metabolism changes significantly in the first two years of life, so current formulations may not be appropriate for newborns and young infants. Previous studies

## Project at a glance

**Project:** PAMAFRICA

**Project lead:** Dr Timothy Wells, Medicines for Malaria Venture, Switzerland

**Countries involved:** Burkina Faso, Gabon, Germany, Mozambique, Spain, Switzerland and Uganda

**Target population(s):** Adults and children

**Year funded:** 2019

**EDCTP funding:** €22 M

**Total project funding:** €41.9 M

have identified a suitable dose combination, which will be tested in a phase II trial.

A further strand of work will advance a new injectable formulation of cipargamin, a highly potent antimalarial being developed as a back-up treatment for severe malaria caused by ACT-resistant parasites. A phase I study is planned to determine a suitable dose of the new formulation for a phase II trial in patients.

MMV has previously partnered with EDCTP-funded consortia such as WANECAM on highly successful projects and will again work with African and international partners, helping to build African research capacity.

## Impact

The PAMAFRICA project will continue the successful relationship between EDCTP and MMV, which has already led to the licensing of new antimalarial treatments. It will be a joint funding venture, with MMV providing 50% of funding. The project will generate key data that will feed into licensing applications for treatments focused on some of the most urgent needs in malaria treatment – simple and effective treatments for deadly severe malaria and a treatment for the youngest and most vulnerable patients.





## A four-strike vaccine against malaria

*With encouraging progress in malaria vaccine development, the Multi-Stage Malaria Vaccine Consortium (MMVC) will test a novel vaccine combination targeting four stages of the malaria parasite life cycle.*

### The challenge

The malaria parasite has a complex life cycle, spanning mosquitoes and humans. When injected into the bloodstream following the bite of an infected mosquito, it first invades and multiplies within liver cells, before seeking refuge and multiplying again in red blood cells. When these burst, parasites circulating in the bloodstream can be taken up by a feeding mosquito.

Although only a single cell, the parasite is a master of disguise, adopting entirely different forms at different stages of its life cycle. Malaria vaccine developers typically focus on one specific stage of the life cycle. The only licensed malaria vaccine, RTS,S, targets the initial human stage, to prevent liver infection. However, a vaccine targeting the final bloodstream stage could block transmission to mosquitoes.

### The project

With exciting progress being made in vaccine development at all stages of the life cycle – pre-liver, liver, red blood cell and bloodstream stages – MMVC has ambitious plans to combine them in a single formulation, maximising the benefits of the individual vaccines.

The four-stage vaccine will include a next-generation version of RTS,S, known as R21; a liver-stage vaccine that has shown positive results in EDCTP-funded trials; a promising vaccine targeting a key protein involved in red blood cell invasion, PfRH5; and a vaccine targeting a key protein in the final bloodstream form, Pfs25.

Results from a series of controlled human infection studies – using new capacity in Africa – and pilot trials will inform the design of an appropriate vaccination strategy. This will be tested in a phase II trial in infants in sites of different levels of malaria transmission. The project will also build capacity to test

### Project at a glance

**Project:** Multi-Stage Malaria Vaccine Consortium

**Project lead:** Professor Adrian Hill, University of Oxford, United Kingdom

**Countries involved:** Burkina Faso, France, India, Kenya, the Netherlands, Sierra Leone, Sweden, Tanzania, and the United Kingdom

**Target population(s):** Adults, children and infants

**Sample size:** 1493 (estimated for four trials)

**Year funded:** 2018

**EDCTP funding:** €15 M

**Total project funding:** €20 M

**Project website:** <https://www.jenner.ac.uk/mmvc>

the vaccine in adults as a possible way of blocking transmission to mosquitoes in malaria elimination campaigns.

### Impact

The project will generate key evidence on the efficacy of the four-stage vaccine, with the aim of achieving the WHO Roadmap's target of 75% efficacy. Such a vaccine could make a major contribution to reducing the incidence of an infection that still kills more than 1000 children every day.

# Prevention of malaria transmission

*The PfTBV study is accelerating the development of vaccines that interfere with the transmission of malaria via mosquitoes.*

## The challenge

Blood-sucking mosquitoes are responsible for transmitting malaria parasites from an infected individual to a new host. Parasites are taken up by mosquitoes at a particular stage in their life cycle, the gametocyte, and develop further in the mosquito into a form that can re-infect people. Vaccination against gametocyte antigens could prevent parasites completing their life cycle in the mosquito.

Hence, although transmission-blocking vaccines would not protect an individual from being infected, they could prevent parasites being transmitted to others.

## The project

Some progress has been made in the development of transmission-blocking malaria vaccines. However, progress has been slow, in part because most studies investigate single vaccine options in a step-wise fashion. The PfTBV study aims to accelerate development by comparing multiple options, and multiple adjuvants, and focusing on those showing most promise.

It will focus on three gametocyte antigens: Pfs230D1M, a well-advanced candidate; R0.6C (a fusion of two antigens, GLURP and Pfs48/45), which has yet to be tested in humans; and Pfs230-6C, a novel fusion antigen combining Pfs230 and Pfs48/45. Initial studies will focus on how well these candidates elicit transmission-blocking antibodies, when used with a range of different adjuvants. The safety and efficacy of Pfs230D1M will also be assessed in children over the age of 5 years.

The project will also make use of 'controlled human malaria infection' facilities established in Africa, to determine whether vaccination reduces the ability of mosquitoes to transmit parasites. Following these preparatory studies, the most suitable candidate will be evaluated in a phase II field trial in adults.

## Project at a glance

**Project:** PfTBV study

**Project lead:** Dr Issaka Sagara, Université des Sciences, des Techniques et des Technologies de Bamako, Mali

**Countries involved:** Burkina Faso, Denmark, Guinea, Liberia, Mali, the Netherlands, and the United States

**Target population(s):** All age groups

**Year funded:** 2019

**EDCTP funding:** €18 M

**Total project funding:** €32.3 M

The PfTBV project also aims to identify features of immune responses associated with vaccine efficacy. In addition, it will build malaria vaccine research capacity in Africa and establish a biobank of African samples for future study.

## Impact

Transmission-blocking vaccines have the potential to break the cycle of malaria transmission. They could be used in combination with existing malaria vaccines, such as RTS,S/AS01 or its successors, which would provide protection against infection. In particular, by reducing the 'reservoir' of infective parasites, transmission-blocking vaccines have been identified as critical to malaria elimination and eradication.





1230	455	341	54 32
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783	292	401	
653	211	341	
542	220	327	





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DATA ENTRY POINT

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# Neglected infectious diseases

2014-2019



13 grants  
€48.86 M



Drugs  
8 grants  
€30.06 M

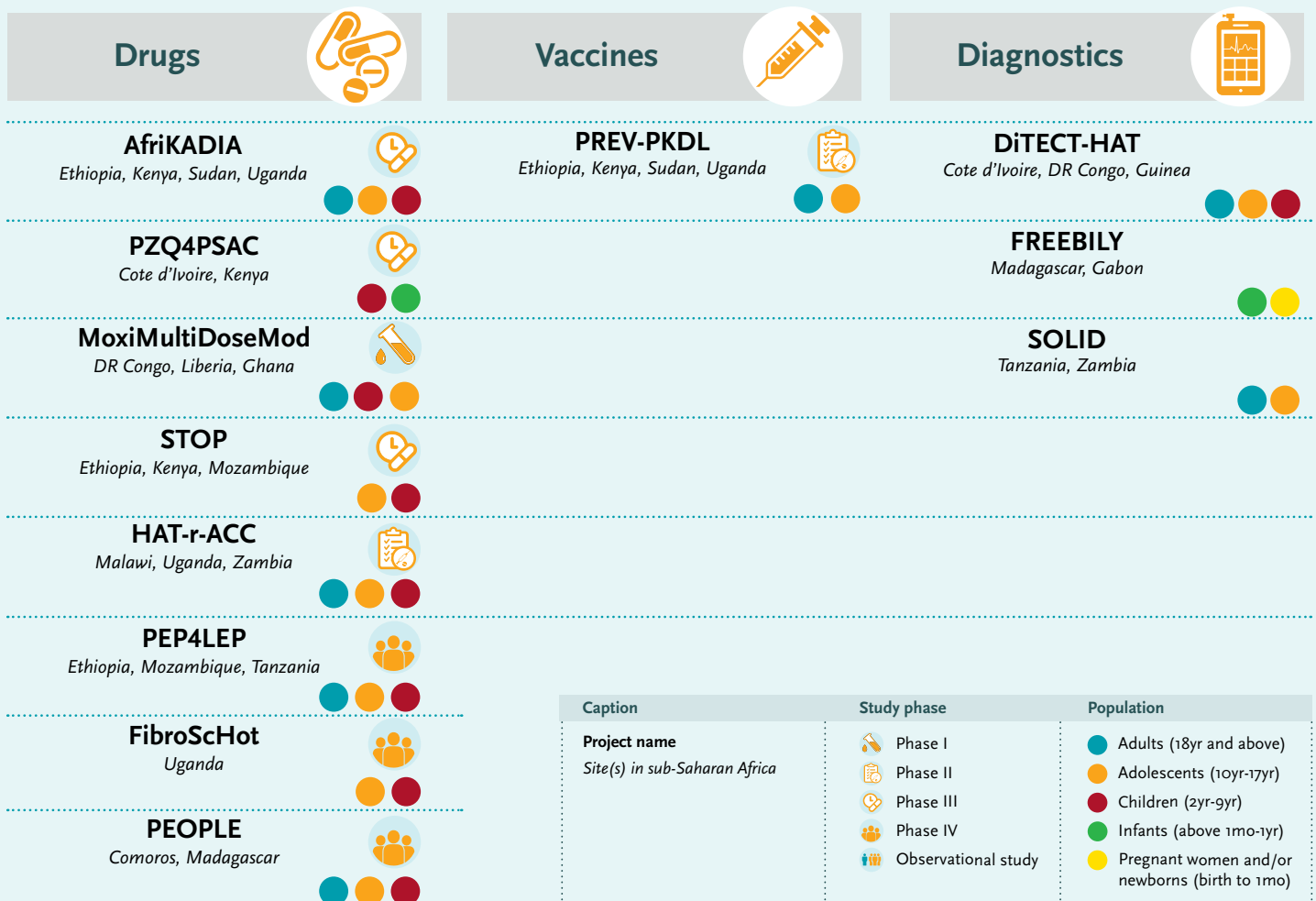


Vaccines  
1 grant  
€8 M



Diagnostics  
4 grants  
€10.80 M

## EDCTP portfolio: Neglected infectious diseases





# Improving diagnosis and treatment of visceral leishmaniasis

*The AfriKADIA project is developing treatments for visceral leishmaniasis (kala azar) and testing diagnostic tools better suited to challenging African settings.*

## The challenge

*Leishmania* infections of body tissues (visceral leishmaniasis or kala azar) can be fatal if untreated. East Africa is particularly badly affected by visceral leishmaniasis, and up to 70% of infections occur in children.

Treatment of visceral leishmaniasis has typically relied on drugs that have unpleasant side effects and are difficult to administer, requiring daily injections for 17 days. Diagnosis is also difficult, and some methods are associated with a significant risk of harm.

## The project

The AfriKADIA project aims to improve management of visceral leishmaniasis, by developing safer and easier to administer treatments and by evaluating new tools for rapid diagnosis of infections. It has a particular focus on approaches that are suitable for the remote rural populations characteristic of affected East African countries.

The project is developing a combination therapy, based on miltefosine and paromomycin, that can be given orally and is suitable for use in remote settings with limited access to healthcare facilities. Following studies of the metabolism of this combination in patients, it will be tested in a large phase III trial comparing its safety and efficacy with the standard 17-day treatment.

The project will also evaluate possible tests to determine whether patients have been cured or are at risk of relapse, as well as rapid point-of-care tests for detecting new infections.

## Impact

The AfriKADIA project will generate key evidence on the efficacy of the miltefosine and paromomycin combination, to inform decision-making on its introduction in East Africa. In addition, it will identify tools that

## Project at a glance

**Project:** AfriKADIA study

**Project lead:** Dr Jorge Alvar, Drugs for Neglected Diseases initiative, Switzerland

**Countries involved:** Ethiopia, Kenya, The Netherlands, Spain, Sudan, Switzerland, Uganda

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €5.6 M

**Total project funding:** €11.6 M

could be adopted to improve control of visceral leishmaniasis and ultimately drive forward elimination of the disease in the region.



# Partnering up in the battle against parasitic infections

*EDCTP has joined forces with a Japanese funding agency to progress a young children's version of a drug treatment for schistosomiasis, a common and debilitating parasitic disease.*

## The challenge

Schistosomiasis, a neglected infectious disease caused by parasitic flatworms, affects around 250,000 people a year, most of them in Africa. It causes a variety of symptoms, including abdominal pain and diarrhoea, and may lead to more serious organ damage and even death. In children, infections interfere with growth and development, and therefore have lifelong impact.

Schistosomiasis can be treated with a drug known as praziquantel. However, currently used praziquantel pills are difficult for young children to swallow, cannot be crushed, and have an unpleasant bitter taste.

## The project

The Pediatric Praziquantel Consortium, funded primarily by the Japan-based Global Health Innovative Technology Fund (GHIT), has developed a new praziquantel pill that dissolves in the mouth, making it easier to give to young children. In partnership with EDCTP, the Consortium will undertake one clinical trial to test the safety and efficacy of this new formulation in young children in Cote d'Ivoire and Kenya. The trial will be carried out to international regulatory standards, so that their results can feed directly into submissions to regulatory agencies and the new pills can rapidly be made available to young children.

## Impact

The new formulation will enable more young children to gain the benefits of praziquantel – potentially both for treatment and in mass drug administration campaigns to prevent infections. More generally, the project is the first outcome of an ongoing partnership between EDCTP and GHIT, organisations with common interests in HIV/AIDS, malaria, TB and poverty-related infectious diseases.

## Project at a glance

**Project:** Praziquantel for Pre-School-Age Children (PZQ4PSAC) trial

**Project lead:** Dr Remco de Vruh, Stichting Lygature, Netherlands

**Countries involved:** Cote d'Ivoire, Germany, Kenya, Netherlands, Switzerland, and the United Kingdom

**Target population(s):** Children aged 3 months to 6 years

**Sample size:** 311

**Year funded:** 2018

**EDCTP funding:** €2.0 M

**Total project funding:** €12.1 M

**Project website:** [www.pediatricpraziquantelconsortium.org](http://www.pediatricpraziquantelconsortium.org)





## Accelerating elimination of river blindness

*The MoxiMultiDoseMod study is evaluating the suitability of a new river blindness drug for use in mass drug administration campaigns and disease elimination.*

### The challenge

The tissue-dwelling parasitic worm *Onchocerca volvulus* produces millions of tiny larvae (microfilariae), which live in the skin but can also invade the eye. Inflammatory reactions cause skin conditions and, in the eye, loss of sight – ‘river blindness’. Around 200 million people are at risk of infection, nearly all of them in 31 African countries.

Use of ivermectin in mass drug administration campaigns has had a major impact on disease burden. However, better treatments are required to support full elimination.

### The project

In 2018, the US Food and Drug Administration (FDA) approved moxidectin – the first new treatment for river blindness in 20 years. In trials in Africa, moxidectin was much better than ivermectin at clearing microfilariae from the skin and had longer-lasting effects, owing to its significantly longer half-life in the body.

FDA approval of moxidectin was for single-dose use in people 12 years old and older. However, for use in mass drug administration campaigns, moxidectin would have to be used repeatedly and in children under the age of 12 years. The MoxiMultidoseMod study is comparing the safety and efficacy of moxidectin and ivermectin given annually or every six months over three years. Additionally, the study is gathering more safety data on the use of a single dose of moxidectin.

It will also undertake safety and pharmacokinetic studies to assess moxidectin usage in 4–11-year-olds. And it will carry out modelling analyses to compare the time to disease elimination and cost-effectiveness of campaigns based on use of either moxidectin or ivermectin.

### Project at a glance

**Project:** MoxiMultiDoseMod study

**Project lead:** Dr Michel Vaillant, Luxembourg Institute of Health

**Countries involved:** Belgium, Democratic Republic of the Congo, Ghana, Luxembourg, the Netherlands, and the United Kingdom

**Target population(s):** Adults; children

**Year funded:** 2019

**EDCTP funding:** €4.8 M

**Total project funding:** €6.4 M

### Impact

Moxidectin could accelerate *Onchocerca* elimination in countries that have lagged behind in parasite control and in fragile settings where regular mass drug administration campaigns are difficult to organise. The project will provide policymakers with key evidence on the comparative advantage of moxidectin, which could be introduced using existing mass drug administration infrastructures.

# Better tools for control of parasitic worm infections

*The STOP study is developing a convenient pill to improve control of parasitic worm infections in Africa.*

## The challenge

One in four of the world's population have parasitic worm infections, with the most deprived communities particularly badly affected. Worm infections affect children's physical and mental development, and can have long-lasting impact on their success in life.

Control of parasitic worms is based on mass drug administration campaigns with albendazole and mebendazole, targeting pre-school and school-aged children. However, these drugs do not work against threadworm (*Strongyloides stercoralis*) and are losing their ability to kill whipworm (*Trichuris trichiura*). In addition, use of drugs individually increases the risk that parasites will develop resistance.

## The project

The STOP study is exploring whether adding ivermectin will improve the effectiveness of mass drug administration campaigns. Ivermectin is effective against *S. stercoralis* and its activity against *T. trichiura* is enhanced when it is used in combination with albendazole. A combination approach would also reduce the risk of resistance development.

The STOP team has extensive experience of drug development and formulation for parasitic diseases. It will carry out a large-scale phase III trial comparing the parasite-clearance performance of a single tablet combining albendazole and ivermectin, given either as a single dose or in a three-dose regime, with the usual treatment with albendazole.

## Impact

The STOP study will generate key evidence to support a licensing decision on the albendazole–ivermectin co-formulation. The combination could improve the effectiveness of mass drug administration campaigns against common but

## Project at a glance

**Project:** STOP study

**Project lead:** Dr Jose Muñoz Gutierrez, Instituto de Salud Global (ISGlobal), Spain

**Countries involved:** Ethiopia, Kenya, Mozambique, the Netherlands, Spain, and the United Kingdom

**Target population(s):** Children

**Year funded:** 2018

**EDCTP funding:** €4.9 M

neglected parasitic worm infections, and protect a vital drug against the development of resistance.





## Treating East African sleeping sickness

*The HAT-R-ACC study is assessing whether a new treatment is effective against a type of sleeping sickness mainly found in East Africa.*

### The challenge

Sleeping sickness (human African trypanosomiasis, HAT) is a parasitic disease that can be fatal without effective treatment. It is usually caused by a single-celled parasite, *Trypanosoma brucei gambiense*, but a relative, *T. b. rhodesiense*, can cause a similar but more acute disease (r-HAT). r-HAT is found mainly in East Africa, with Malawi and Uganda accounting for 88% of global infections.

Treatment of r-HAT has traditionally relied on either a toxic arsenic-based drug, melarsoprol, or a less toxic but difficult-to-administer drug, suramin, depending on how far disease has progressed.

### The project

Recently, a highly effective, safe oral treatment – fexinidazole – has been developed for HAT caused by *T.b. gambiense*. The HAT-R-ACC study will determine whether fexinidazole could also be adopted for treatment and control of r-HAT.

The HAT-R-ACC project will carry out a clinical trial to determine whether fexinidazole is a suitable alternative to replace both melarsoprol and suramin at different stages of disease. The project will also work with local communities to raise awareness of the condition and treatment, and build local capacity to undertake scientific studies.

### Impact

The study will fill a major gap in knowledge on a rare but deadly disease having a significant regional impact, addressing an urgent WHO request for information on methods of r-HAT control in East Africa. Fexinidazole could also provide a key tool in the ultimate elimination of r-HAT in Africa.

### Project at a glance

**Project:** HAT-R-ACC study

**Project lead:** Dr Olaf Valverde Mordt, Drugs for Neglected Diseases initiative, Switzerland

**Countries involved:** France, Malawi, Portugal, Switzerland, Uganda

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €3.8 M

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03974178?term=fexinidazole&rank=2>

# Limiting the spread of leprosy

*The PEP4LEP study is comparing two possible approaches for screening and pre-emptively treating those at risk of leprosy infections.*

## The challenge

Leprosy is a chronic infection affecting the skin and nerves, and loss of sensation can lead to tissue damage in areas such as the hands and feet. Affecting much of Africa, it is associated with considerable social stigmatisation.

Single-dose rifampicin is used to prevent infection in those exposed to people with leprosy infections. A major challenge is to identify the best way to deliver preventive treatments.

## The project

The PEP4LEP project is a highly practical implementation study comparing two possible approaches for screening and identifying people at risk of developing leprosy.

It will carry out a randomised implementation trial comparing two possible strategies. One will be community based: 'skin camps' will be set up to screen around 100 people likely to have been in contact with a leprosy patient. The second approach will be focused on health facilities, with contacts invited to attend screening sessions. Both approaches will include wider dermatological assessments to identify common skin conditions and neglected infectious diseases affecting the skin.

The study will determine which is the better model for detecting new infections and reducing delays in detection. It will also explore community acceptability and cost-effectiveness.

## Impact

The PEP4LEP project will provide policymakers with highly relevant information on the effectiveness and cost-effectiveness of two methods for improved leprosy control, ultimately ensuring that more people benefit from an intervention of proven efficacy.

## Project at a glance

**Project:** PEP4LEP study

**Project lead:** Ms Liesbeth Mieras, Nederlandse Stichting voor Leprabestrijding, the Netherlands

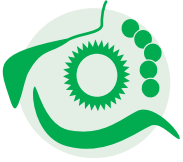
**Countries involved:** Ethiopia, Germany, Mozambique, the Netherlands, Tanzania

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €3.2 M





## Intensified prevention of schistosomiasis

*The FibroScHot study is assessing whether a more intensive preventive drug treatment programme can reduce the incidence of liver damage caused by parasitic flatworm infections.*

### The challenge

Infections with schistosomes, parasitic flatworms, affect hundreds of millions of people globally – schistosomiasis is the second most socioeconomically impactful parasitic disease after malaria. Africa accounts for 90% of cases, with children and young adults bearing the brunt of disease.

Mass drug administration programmes with praziquantel have been the cornerstone of schistosome control efforts. However, in badly affected countries such as Uganda, despite good coverage, many children are still being infected and developing debilitating symptoms. In particular, inflammatory responses to schistosome parasites can cause the build up of fibrous tissue (fibrosis) in blood vessels in the liver, which can lead to dangerously high blood pressure.

### The project

The FibroScHot study is evaluating whether increasing the frequency of mass drug administration reduces the prevalence of liver fibrosis in hotspots of persistent schistosomiasis.

In areas where schistosomiasis is less common, mass drug administration campaigns target school children. The FibroScHot study will carry out a controlled trial in areas of high transmission, comparing usual community campaigns with an intensified campaign that includes treatment in schools, to see if this reduces the prevalence of liver fibrosis.

The project will also explore community attitudes to mass drug administration campaigns, immune responses associated with liver fibrosis, and genetic features of parasites associated with fibrosis and poor responses to drug treatment.

### Project at a glance

**Project:** FibroScHot study

**Project lead:** Dr Shona Wilson, University of Cambridge, United Kingdom

**Countries involved:** Denmark, Uganda, and the United Kingdom

**Target population(s):** Children

**Year funded:** 2018

**EDCTP funding:** €3 M

**Project website:** [www.fibroschot.eu](http://www.fibroschot.eu)

### Impact

The study will determine whether a readily implementable intervention, building on existing approaches to schistosomiasis control, protects more children against a common, debilitating and potentially deadly neglected infectious disease. The approach would be practical to adopt in Uganda and other countries in which childhood schistosomiasis persists.

It will also establish an integrated trial platform spanning Makerere University and the Ministry of Health in Uganda, increasing capacity for clinical trials on neglected infectious disease, and build research capacity in a range of areas, including parasite genomics, immunology and anthropology.

# Protecting against leprosy infection

*The PEOPLE study is exploring a new way to prevent the spread of leprosy, an ancient but neglected tropical disease.*

## The challenge

Leprosy, caused by infection with *Mycobacterium leprae*, is a disfiguring and disabling disease associated with considerable social stigma. Although it can be treated, efforts to eliminate the disease have stalled and new approaches are needed.

One promising option is post-exposure prophylaxis. In this approach, the contacts of people diagnosed with leprosy are pre-emptively treated with anti-leprosy drugs to protect them against infection.

## The project

The PEOPLE trial is evaluating a range of approaches to post-exposure prophylaxis in Madagascar and the Comoros, two island states in which leprosy is endemic and current control programmes have not succeeded in reducing the numbers of infections.

The trial will compare the impact of three models of post-exposure prophylaxis using rifampicin, a highly effective leprosy drug. Rifampicin will be provided either to household contacts of a person newly diagnosed with leprosy, to all contacts within 100 metres, and to household contacts and nearby contacts with immunologic evidence of *M. leprae* infection.

The study will start with a consultative phase to assess the best way to implement the study. It will also carry out a molecular genotyping study of *M. leprae* infections and analyse social networks, to shed light on leprosy transmission patterns and factors affecting them.

## Project at a glance

**Project:** PEOPLE study

**Project lead:** Professor Bouke de Jong, Institute of Tropical Medicine, Belgium

**Countries involved:** Belgium, Comoros, France, Madagascar, the Netherlands

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €3 M

## Impact

The study will reveal whether post-exposure prophylaxis is an effective approach for controlling the spread of leprosy. If it is, policymakers in Madagascar, the Comoros and other African countries in which leprosy is endemic would have a new tool for reinvigorating national leprosy control programmes.





## Preventing a life-changing skin disease

*A new vaccine, being evaluated in the PREV\_PKDL study, could prevent a disfiguring parasitic skin condition that blights the lives of hundreds of thousands of people.*

### The challenge

Some 350 million worldwide, mostly society's poorest, are at risk of the single-celled parasite *Leishmania*. In the most severe cases, *Leishmania* migrates deep within the body, causing a potentially fatal condition known as visceral leishmaniasis or kala azar. Effective drugs are now available to treat kala azar, but patients may respond by developing a disfiguring chronic skin condition, post-kala azar dermal leishmaniasis (PKDL).

PKDL can have a dramatic effect on quality of life, particularly of women and children. In addition, it may provide a reservoir of *Leishmania* that can be transmitted to others, thwarting attempts at eradication.

### The studies

The PREV\_PKDL study will determine whether a newly developed vaccine, which stimulates immune responses known to be lacking in PKDL patients, is able to clear PKDL infections. The team will carry out a trial in Sudan on people who have been cured of visceral leishmaniasis by drug treatment. They will test the safety and efficacy of a single dose vaccination in preventing PKDL.

In addition, the team will work with an East African network, the Leishmaniasis East African Platform, to characterise the immune response to *Leishmania* and in response to drug treatments. Such studies should reveal why some patients are at risk at developing PKDL, and whether any immune responses can be used as markers to detect those at risk so they can be vaccinated.

### Impact

The PREV\_PKDL trial will provide data on the safety and efficacy of the new vaccine, and whether a large phase III trial would be justified – a key step in its clinical evaluation. The study will also help to develop the capacity of East African countries in immunology research, enhancing their ability to carry out research on poverty-related neglected infectious diseases.

### Project at a glance

**Project:** PREV\_PKDL study

**Project lead:** Dr Sophie Houard, European Vaccine Initiative, Germany

**Countries involved:** Germany, Ethiopia, Kenya, Sudan, Uganda, and the United Kingdom

**Target population(s):** Adults, children

**Sample size:** 300

**Year funded:** 2018

**EDCTP funding:** €8 M

### Key reference

Osman M et al. A third generation vaccine for human visceral leishmaniasis and post kala azar dermal leishmaniasis: First-in-human trial of ChAd63-KH. *PLoS Negl Trop Dis.* 2017;11(5):e0005527.



# Better detection of sleeping sickness

*The DiTECT-HAT study is evaluating a range of tools that will make it easier to detect, treat and ultimately eradicate sleeping sickness.*

## The challenge

The numbers of cases of sleeping sickness (human African trypanosomiasis, HAT) have fallen markedly in the past decade, raising hopes that the disease can be eliminated entirely. Efficient methods of detecting the cause of sleeping sickness, the parasite *Trypanosoma brucei gambiense*, will be pivotal to eradication, enabling monitoring of at-risk populations for infections, and would also provide valuable tools for evaluating new treatments in clinical trials.

## The project

The DiTECT-HAT study will evaluate three different approaches for detecting trypanosome infections. The first is based on new rapid diagnostic tests, which could be used to screen for infections in people visiting clinics, who could then immediately be started on treatment. This approach is being evaluated in three countries.

The second approach is designed for large-scale monitoring of populations at risk to assess the effectiveness of elimination campaigns. Blood samples will be collected on filter paper by health workers travelling door to door, and then sent to central laboratories for analysis. This method is being tested in three countries where sleeping sickness is now rare.

In the third strand of the project, the DiTECT-HAT team will see whether sophisticated molecular tests can provide a rapid indication that drug treatments are killing parasites, which could help to speed up the development of new drugs. This work will take advantage of an ongoing clinical trial in the Democratic Republic of the Congo.

## Project at a glance

**Project:** DiTECT-HAT study

**Project lead:** Dr Veerle Lejon, Institute of Research for Development, France

**Countries involved:** Belgium, Burkina Faso, the Democratic Republic of the Congo, Cote d'Ivoire, Guinea, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2016

**EDCTP funding:** €3 M

**Project website:** [www.ditect-hat.eu](http://www.ditect-hat.eu)

## Impact

The different scenarios require slightly different methods for detecting trypanosome infections. By evaluating different tools and pathways of analysis, the DiTECT-HAT could identify how the range of diagnostic tools could be deployed most effectively to treat infection in routine care, to support eradication campaigns, and to facilitate the development of new drugs.





## Better detection of tapeworm infection and brain cysts

*The SOLID study is field testing a new point-of-care diagnostic that can detect both adult tapeworm infections and larval cysts in the brain.*

### The challenge

The tapeworm *Taenia solium* is the leading food-borne cause of death and disability, responsible for the loss of 2.8 million years of healthy life every year. One of the most severe consequences of *Taenia* infection is the migration of larvae to body tissues including the brain, where they form cysts known as neurocysticerci. In endemic areas, these cysts are responsible for 30% of cases of epilepsy.

Although accurate diagnostics have been developed for cysticercosis, they are expensive, complex and require specialist skills.

### The project

The US Centers for Disease Control and Prevention (CDC) has developed a more practical dipstick diagnostic able to detect antibodies to both adult tapeworms and cysticerci. It holds great promise as a tool for simultaneously detecting tapeworm infections and cysticercosis using finger-prick blood samples.

However, the CDC test has not been evaluated in field settings. The SOLID study is comparing its performance in primary care and community settings in Tanzania and Zambia, comparing results with gold standard tests and radiographic scanning to detect brain cysts.

### Impact

The SOLID study will provide key evidence on the field use of the CDC diagnostic. A point-of-care diagnostic for *Taenia* infections and neurocysticercosis would be a major advance, enabling early identification and treatment of neurocysticercosis cases, as well as treatment of tapeworm infections to reduce the risk of transmission. It would also enable more information to be gathered on the distribution, disease burden and dynamics of transmission of *Taenia*, supporting control efforts and advocacy.

### Project at a glance

**Project:** SOLID study

**Project lead:** Dr Pierre Dorny, Institute of Tropical Medicine, Belgium

**Countries involved:** Belgium, Denmark, Germany, Tanzania, Zambia

**Target population(s):** All age groups

**Sample size:** 3800

**Year funded:** 2016

**EDCTP funding:** €1.9 M

**Total project funding:** €2.9 M

**Project website:** [www.ugent.be/di/vph/en/research/fpz/solid](http://www.ugent.be/di/vph/en/research/fpz/solid)

**Clinical trial registration:** <https://pactr.samrc.ac.za/TrialDisplay.aspx?TrialID=2788>

# Rapid detection of schistosome infections

*The FREEBILY study is accelerating the development of schistosome diagnostics for pregnant women and young children.*

## The challenge

Among parasites, schistosomes (flatworms) are second only to malaria in terms of their health and socioeconomic impact. Around 700 million people live in countries where schistosomiasis occurs, and 90% of those requiring treatment live in Africa.

Control of schistosomiasis relies mainly on mass drug administration with praziquantel. As the condition becomes less common, there is an increasing need for accurate diagnostics to support more targeted strategies. In particular, diagnostics could ensure that vulnerable groups, such as pregnant women and young children, are not unnecessarily exposed to praziquantel.

## The project

Diagnostic tests have been developed to detect schistosome infections. The point-of-care POC-CCA test is good for detecting intestinal schistosomiasis but has lower sensitivity for urinary schistosomiasis. By contrast, the UCP-LF test is highly sensitive and specific but requires laboratory facilities.

The FREEBILY project is evaluating the use of these tests to detect schistosome infections in women and young children in different contexts. One application being assessed is use of the POC-CCA test in routine mother and child clinics, to support 'test and treat' strategies.

The project is also evaluating use of the UCP-LF test to detect *S. haematobium* and provide an accurate measure of praziquantel efficacy in a trial of praziquantel use in pregnant women in Gabon.

## Impact

FREEBILY will provide evidence on the effectiveness and cost-effectiveness of test-and-treat strategies for schistosomiasis in pregnant women and young children, as well as additional data on the UCP-LF test. Although the studies

## Project at a glance

**Project:** FREEBILY study

**Project lead:** Dr Govert van Dam, Leiden University Medical Centre, the Netherlands

**Countries involved:** Gabon, Germany, Madagascar, the Netherlands, Spain

**Target population(s):** Pregnant women, young children

**Year funded:** 2018

**EDCTP funding:** €3 M

**Project website:** <https://freebily.eu>

are being conducted in areas of high and low schistosome endemicity in Madagascar and Gabon, the results will be generalisable to other countries affected by schistosomiasis.





## Emerging diseases

2014-2019



9 grants  
€41.61 M



Drugs  
1 grant

€0.49 M



Vaccines  
2 grants

€19.12 M



Diagnostics  
2 grants

€1 M



Combined  
interventions  
4 grants

€21 M

### EDCTP portfolio: Emerging diseases

Drugs	Vaccines	Diagnostics	Combined interventions
PEAU-EBOV-RDC	NIFTY <i>Senegal, Uganda</i>	AdjustEBOVGP-Dx	PANDORA-ID-NET
	PREVAC-UP <i>Guinea, Liberia, Mali, Sierra Leone</i>	MobEBO-DRC	ALERTT
			EPIRISK-Ebov
			CAPA-CT II

Caption	Study phase	Population
<b>Project name</b>	Phase I	Adults (18yr and above)
<i>Site(s) in sub-Saharan Africa</i>	Phase II	Adolescents (10yr-17yr)
	Phase III	Children (2yr-9yr)
	Phase IV	Infants (above 1mo-1yr)
	Observational study	Pregnant women and/or newborns (birth to 1mo)



## Improving care of Ebola patients

*The PEAU-EBOV-RDC study is building the capacity of the Democratic Republic of the Congo to evaluate new diagnostics and treatments for Ebola, to reduce very high fatality rates.*

### The challenge

Fatality rates in Ebola outbreaks in the Democratic Republic of the Congo (DRC) have been very high – two-thirds of people with infections have died. There is some evidence that early diagnosis and high-quality patient management can improve survival rates.

In addition, a range of new diagnostics and treatments have been developed since the West Africa Ebola outbreak. They may aid survival, but their performance and effectiveness can only be truly tested in outbreak situations.

### The project

The PEAU-EBOV-RDC project is carrying out a range of activities to improve the care of patients with Ebola infections, by enhancing the quality of supportive care and by evaluating new diagnostics and treatments.

The DRC's national public health laboratory, l'Institut National de Recherche Biomédicale, has the responsibility for coordinating research on experimental emergency interventions for Ebola, and has developed an Ebola viral disease research plan. The PEAU-EBOV-RDC project will support a key aim of this plan, strengthening national capacities to undertake trials of experimental treatments and to collect and use high-quality safety data. It will also support the national priority of strengthening capacity to handle suspected Ebola samples and diagnose infections.

The project has been developed in partnership with an existing EDCTP-funded network building epidemic preparedness capacities in sub-Saharan Africa, the African Coalition for Epidemic Research, Response and Training (ALERTT).

### Impact

The PEAU-EBOV-RDC project will play a key role in supporting the development of research capacities

### Project at a glance

**Project:** PEAU-EBOV-RDC study

**Project lead:** Professor Jean-Jacques Muyembe-Tamfum, Institut National de Recherche Biomédicale, Democratic Republic of the Congo

**Countries involved:** Belgium, Democratic Republic of the Congo, France, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €0.5 M

*This project was funded through an emergency funding mechanism launched in response to the 2018 Ebola outbreak in the Democratic Republic of the Congo.*

in the DRC, ultimately identifying approaches that enhance the survival of patients with Ebola infections.

# Making yellow fever vaccine go further

*The NIFTY trial will determine whether smaller doses of yellow fever vaccine stimulate protective immune responses – which could enable more people to benefit from a vaccine in limited supply.*

## The challenge

Yellow fever has shown a resurgence in recent years. It affects 34 countries in Africa, causing up to 170,000 cases and 60,000 deaths a year. A safe and highly effective vaccine is available, but it is difficult to manufacture and shortages in supply contribute to limited routine immunisation and inadequate stockpiles to deal with major outbreaks.

To address supply shortage, WHO recently recommended the use of ‘fractional dosing’ – using one fifth of the standard vaccine dose – in emergency outbreak situations. This is thought to be appropriate as studies have shown that even fractional doses stimulate immune responses in excess of those thought to provide protection from infection. However, the shortage of data (including the absence of data from Africa) prevented WHO from recommending wider use of fractional dosing.

## The study

The NIFTY trial will generate key data on fractional dosing of yellow fever vaccine in adults and children to guide policymaking. Immune responses will be monitored in nearly 2000 adults vaccinated with the full dose and three fractional doses of decreasing volume. The lowest fractional dose generating protective responses in adults will then be compared with the full dose in 700 children. Immune responses will be evaluated after a month and a year.

## Impact

In 2015, UNICEF estimated that global demand for yellow fever vaccine was more than 40% higher than supply. Fractional dosing could enable more individuals to receive a potentially life-saving vaccine but it will be important to ensure that this does not compromise vaccine effectiveness – and the NIFTY trial will generate key data to answer this question.

## Project at a glance

**Project:** Non-inferiority of Fractional Doses Trial for Yellow Fever Vaccine (NIFTY)

**Project lead:** Professor Philip Bejon, Wellcome–KEMRI– Oxford Collaborative Research Programme, Kenya

**Countries involved:** France, Kenya, Senegal, Uganda, and the United Kingdom

**Target population(s):** Adults; children

**Sample size:** 1935 adults; 700 children (targets)

**Year funded:** 2018

**EDCTP funding:** €3.2 M

## Key references:

Trial protocol: <https://clinicaltrials.gov/ct2/show/NCT02991495>

WHO. Yellow fever vaccine: WHO position on the use of fractional doses – June 2017. *Weekly Epidemiological Record*. 2017;92; 345–356





## Long-term data on Ebola vaccines

*The PREVAC-UP study is ensuring that additional years' data are obtained on a range of important experimental Ebola vaccines.*

### The challenge

Effective vaccines will be central to the control of future Ebola outbreaks. Following the devastating West Africa Ebola outbreak of 2014–16, Ebola vaccine development has been accelerated globally and several promising vaccines are in the pipeline.

The rVSVΔG-ZEBOV-GP vaccine was initially deployed in the 2018/19 Ebola outbreak in the Democratic Republic of the Congo, and a second vaccine, Ad26.ZEBOV, was introduced later. Nevertheless, there are limited data on their effectiveness.

### The project

The global PREVAC consortium has been running a phase IIb trial assessing the anti-Ebola immune responses generated by rVSVΔG-ZEBOV-GP (as a single dose and with a 'boost' from the same vaccine) and by Ad26.ZEBOV, with a boost from a second vaccine, MVA-BN-Filo. The trial is taking place in three African countries.

The PREVAC-UP study is enabling the team to extend data collection from one year to five years. A total of 1,400 adults and 1,400 children are being followed to determine the long-term safety of the vaccine regimens and the persistence of protective antibody and cell-mediated immune responses to vaccination.

### Impact

The PREVAC-UP study will generate long-term data on immune responses generated by two of the most advanced Ebola vaccines, in children as well as adults. It will provide key evidence on the likelihood that individuals remain protected against Ebola infection in the years after vaccination. In particular, the study will provide data on responses in children, who were particularly vulnerable to Ebola in the 2014–16 outbreak and for whom little evidence on vaccine responses currently exists.

### Project at a glance

**Project:** PREVAC-UP study

**Project lead:** Professor Yazdan Yazdanpanah, Institut National de la Santé et de la Recherche Médicale, France

**Countries involved:** France, Guinea, Mali, Sierra Leone, and the United Kingdom

**Target population(s):** All age groups, including children

**Year funded:** 2018

**EDCTP funding:** €15.9 M

**Total project funding:** €29.7 M



# Rapid detection of Ebola infection

*The AdjustEBOVGP-Dx project is developing and testing a rapid point-of-care diagnostic to detect Ebola virus and to distinguish Ebola from a close relative, Marburg virus.*

## The challenge

Ebola and Marburg viruses cause severe viral haemorrhagic fevers with a high fatality rate. However, during the early stages of infection, symptoms are similar to other tropical infectious diseases.

Current diagnostic tools for Ebola and its relatives are costly, require laboratory facilities, and are too slow to support effective clinical care and disease control. Point-of-care tests have recently been developed for Ebola but these do not detect its relatives such as Marburg virus.

## The project

Monoclonal antibodies have been developed that recognise a structure, known as filovirus glycoprotein (GP), which is common to a range of viruses in the Ebola family. However, these antibodies have not been able to detect GP in samples from infected patients, probably because GP is biochemically modified after it is made.

The AdjustEBOVGP-Dx project is exploring whether a range of biochemical treatments can strip away these modifications, enabling monoclonal antibodies to access GP. It is developing a prototype point-of-care diagnostic that will combine this biochemical pretreatment with monoclonal antibody-based detection of GP.

The prototype will then be tested in the ongoing Ebola outbreak in the Democratic Republic of the Congo.

## Impact

The AdjustEBOVGP-Dx project could provide a new tool to support the early detection of and rapid response to Ebola virus infections. Importantly, it would also be the first diagnostic able to identify infections with both Ebola and Marburg virus, another lethal viral infection with epidemic potential.

## Project at a glance

**Project:** AdjustEBOVGP-Dx study

**Project lead:** Dr Misaki Wayengera, Makerere University, Uganda

**Countries involved:** France, Greece, Poland, South Africa, Sweden, Uganda

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €0.5 M

*This project was funded through an emergency funding mechanism launched in response to the 2018 Ebola outbreak in the Democratic Republic of the Congo.*





## Onsite detection of Ebola

*The MobEBO-DRC project is enabling teams in the Democratic Republic of the Congo to use a mobile 'laboratory in a suitcase' successfully deployed in Guinea in the 2014–16 West Africa Ebola outbreak.*

### The challenge

Rapid diagnosis of Ebola infection is essential for effective control. However, standard methods of diagnosis require laboratory facilities, and even field-based tent laboratories take time to generate results and are not truly mobile.

To speed diagnosis, a mobile suitcase laboratory was developed and successfully in Guinea in 2014. It provides the tools for safe on-site extraction of DNA and molecular identification of Ebola virus. It delivered the first on-site detection of Ebola virus in Guinea, and proved able to diagnose infections in less than an hour.

### The project

The aim of the MobEBO-DRC project is to enable use of the mobile suitcase laboratory, a proven diagnostic technology, in the Democratic Republic of the Congo (DRC).

The team behind the development of the technology will work with groups in the DRC to train teams on field use of the mobile suitcase laboratory in outbreak settings.

### Impact

The MobEBO-DRC project is ensuring that the DRC can benefit from a proven mobile diagnostic technology. It has brought together the existing development team with the leading Ebola research group in the DRC, strengthening the group's capacity to respond to outbreaks. A wide international network has also been established to explore use of point-of-care tests. Ultimately, rapid and accurate detection of Ebola infections will be an essential tool in the swift control of potential outbreaks.

### Project at a glance

**Project:** MobEBO-DRC study

**Project lead:** Dr Manfred William Weidmann, University of Stirling, and the United Kingdom

**Countries involved:** Canada, Democratic Republic of the Congo, Germany, Senegal, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €0.5 M

*This project was funded through an emergency funding mechanism launched in response to the 2018 Ebola outbreak in the Democratic Republic of the Congo.*

# Accelerating research in emergency situations

*The ALERRT consortium will ensure that African countries are better prepared to carry out research during emergency infectious disease outbreaks.*

## The challenge

Africa is at risk of a multitude of emerging and re-emerging infections, including Ebola and other viral haemorrhagic fevers, yellow fever and plague. If not controlled effectively, outbreaks can have a catastrophic human and economic impact – the 2014–16 Ebola epidemic claimed 11,000 lives and cost the three countries affected an estimated US\$2.2 B in lost GDP in 2015 alone.

Clinical evaluation of new interventions for emerging infections is particularly challenging as new vaccines, drugs and diagnostics can only be tested during emergency outbreak situations. At these times, public health responses are naturally focused on treatment and prevention of spread, but outbreaks also provide an opportunity when much can be learned that could improve treatment and prevention of future outbreaks. It is therefore vital that research is embedded in these responses.

## The project

ALERRT is a multidisciplinary consortium building a patient-centered clinical research network to respond to epidemics across sub-Saharan Africa. It aims to reduce the public health and socio-economic impact of disease outbreaks by building a sustainable clinical and laboratory research preparedness and response network.

Since speed of response is critical in emergency situations, capacity for clinical research and response procedures must be established in advance and maintained at an appropriate level of readiness to allow rapid mobilisation when needed. The network will enable high-quality and ethical clinical research studies to be designed and launched rapidly in response to outbreaks.

Its work will span development of laboratory infrastructure and IT platforms to support research, as well as training to ensure rapid initiation of operations. Extensive community engagement will be undertaken to ensure that

## Project at a glance

**Project:** African Coalition for Epidemic Research, Response and Training (ALERRT)

**Project lead:** Professor Peter Horby, University of Oxford, and the United Kingdom

**Countries involved:** Belgium, Cameroon, Central African Republic, the Democratic Republic of the Congo, Cote d'Ivoire, France, Germany, Ghana, Madagascar, Senegal, Uganda, and the United Kingdom

**Year funded:** 2018

**EDCTP funding:** €10 M

its activities are accepted and welcomed by local communities.

## Impact

ALERRT has already been called into action, following a formal request from the Republic of Congo for help with control of an Ebola outbreak in 2018. The consortium provided advice on local surveillance activities and diagnostic tools, and organised training on the rapid and rigorous review of research proposals for emergency situations.

The 2014–16 Ebola epidemic illustrated that the world was poorly prepared to organise and coordinate clinical research during outbreak situations, when vital information could have been obtained on new vaccines and drug treatments. Alongside global initiatives to coordinate research during emergency situations, and together with a complementary EDCTP-funded initiative, PANDORA-ID-NET, ALERRT will ensure that African countries are better prepared to prevent, respond to and minimise the impact of infectious disease outbreaks.





## Boosting preparedness for infectious disease outbreaks

*The PANDORA-ID-NET Consortium is enhancing the capacity of African regions to detect and respond to infectious disease outbreaks through a 'one health' approach encompassing human and animal medicine.*

### The challenge

The 2014–16 Ebola outbreak, which claimed the lives of at least 11,000 people, illustrated the devastating impact of emerging infections. Recently, Africa has experienced multiple other outbreaks, including yellow fever, plague and Ebola-related viral infections. In addition, given the growth in international air travel, Africa is at risk of importing emerging infections from other regions, such as Middle East respiratory syndrome coronavirus (MERS-CoV). Finally, there is an ongoing risk that entirely new infections will jump species from animals to humans, with potentially devastating consequences.

Central to the control of emerging and re-emerging infections is early detection and rapid response, to treat those affected and to initiate measures to halt further spread of infection. Countries therefore need to be prepared for outbreaks, with effective epidemiologic surveillance for infections and mechanisms in place for rapid responses when new outbreaks are detected. As infectious diseases are no respecters of national borders, international cooperation is essential.

### The project

PANDORA-ID-NET is a major new international consortium that is strengthening outbreak response capabilities across Africa, in partnership with national governments and other key stakeholders in Africa and Europe. Given the intimate relationship between humans, livestock and wild animals, and the potential for transmission through animal and environmental reservoirs, the consortium has adopted a 'one health' approach, with key input from both human medicine and veterinary science.

Its work with national governments and public health bodies will promote a wider awareness of the importance of infectious disease control and

### Project at a glance

**Project:** Pan-African Network for Rapid Research, Response, Relief and Preparedness for Infectious Disease Epidemics (PANDORA-ID-NET)

**Project lead:** Professor Francine Ntoumi, Fondation Congolaise pour la Recherche Médicale, Republic of the Congo

**Countries involved:** Republic of Congo, France, Gabon, Germany, Ghana, Italy, Nigeria, Sierra Leone, Sudan, Tanzania, Uganda, United Kingdom, and Zambia

**Year funded:** 2018

**EDCTP funding:** €10 M

outbreak preparedness. It is establishing rapid response teams that can be mobilised within days in all four African regions. It is also developing capacity for research on emerging infections, before and during outbreaks.

### Impact

PANDORA-ID-NET has already been called into action, following a formal request from the Republic of the Congo for help with control of an Ebola outbreak in 2018. The consortium provided advice on local surveillance activities and diagnostic tools, and organised training on the rapid and rigorous review of research proposals in emergency situations. In the longer term, together with a complementary EDCTP-funded initiative, the African Coalition for Epidemic Research, Response and Training (ALERRT), PANDORA-ID-NET will help to ensure that African regions are better prepared to prevent, respond to and minimise the impact of infectious disease outbreaks.

# Enhancing Ebola preparedness

*The EPIRISK-Ebov project is supporting Ebola preparedness in the Republic of the Congo, a neighbour of the Democratic Republic of the Congo that is at risk of importing Ebola infection.*

## The challenge

The Republic of Congo shares a border with the Democratic Republic of the Congo (DRC), marked by the River Congo. In 2018, Ebola infections were detected along the River Congo, as well as in the major outbreak in the north of the DRC.

Recognising the risk of spillover, the Republic of the Congo adopted a preparedness approach and formally requested international assistance.

## The project

The EPIRISK-Ebov project is carrying out a range of activities to support preparedness in the Republic of the Congo. Its main aim is to provide additional epidemiological information of exposure to Ebola virus along the border with the DRC, by identifying individuals carrying antibodies to Ebola and comparing the numbers with a control population in Brazzaville.

The project will also investigate the properties of Ebola-specific antibodies and cell-based immune responses, and explore risk factors for Ebola infection among the local population.

An additional strand of work will focus on identifying the most common viral and bacterial infections in the local population, using state-of-the-art diagnostic technologies.

## Impact

The EPIRISK-Ebov project will provide important benchmark data on past exposures to Ebola virus and on current patterns of infection in the Republic of the Congo. Importantly, it will be involved in training of staff from key national research and public health institutions in the Republic of the Congo, building capacity in diagnostics, biosafety, immunological and other laboratory procedures, and social science. The project will maintain regular communication with the Ministry of Public Health, involve key ministry staff and integrate activities fully into national surveillance activities.

## Project at a glance

**Project:** EPIRISK-Ebov study

**Project lead:** Professor Francine Ntoumi, Fondation Congolaise pour la Recherche Médicale, Republic of the Congo

**Countries involved:** Republic of the Congo, France, Gabon, Germany, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €0.5 M

*This project was funded through an emergency funding mechanism launched in response to the 2018 Ebola outbreak in the Democratic Republic of the Congo.*





## Boosting Ebola preparedness in Uganda

*The CAPA-CT 2 study is building on past EDCTP investments to enhance Ebola preparedness in a country bordering the Democratic Republic of the Congo.*

### The challenge

The 2018/19 Ebola outbreak in the Democratic Republic of the Congo (DRC) has been concentrated in the north-east of the country, an area that shares a border with Uganda.

With an estimated 8–10,000 people crossing the border on market days, there is a significant risk that the outbreak could spread to Uganda, and several cases have been reported. The country has therefore implemented a range of preparedness measures since 2018.

### The project

The CAPA-CT 2 project will carry out multiple activities to support Ebola preparedness in Uganda, building on the capacity developed by previous EDCTP funding (the CAPA-CT and VirTUAL projects and the EDCTP Senior Fellowship awarded to Dr Michael Walimbwa).

One strand of work will focus on pharmacokinetic studies on an unlicensed drug, remdesivir, being used in the Ebola outbreak as an emergency control measure. Metabolism and distribution of the drug will be monitored in healthy volunteers and people with HIV infections taking antiretroviral therapy, and modelling will be used to determine the most appropriate dose for clinical use.

The project will also strengthen surveillance activities in Uganda. A third strand of work will evaluate a novel capacity-building model to rapidly build local skills in laboratory biosafety and infection prevention and control to improve the management of patients with suspected Ebola infections.

### Impact

The CAPA-CT 2 project will add to the evidence base on a potentially important new drug therapy for Ebola infections, and contribute to national Ebola preparedness and the development of global health security capacity in Uganda.

### Project at a glance

**Project:** CAPA-CT 2 study

**Project lead:** Dr Mohammed Lamorde, Infectious Diseases Institute, Uganda

**Countries involved:** Italy, Uganda, and the United Kingdom

**Target population(s):** All age groups

**Year funded:** 2018

**EDCTP funding:** €0.5 M

*This project was funded through an emergency funding mechanism launched in response to the 2018 Ebola outbreak in the Democratic Republic of the Congo.*





PATIENT

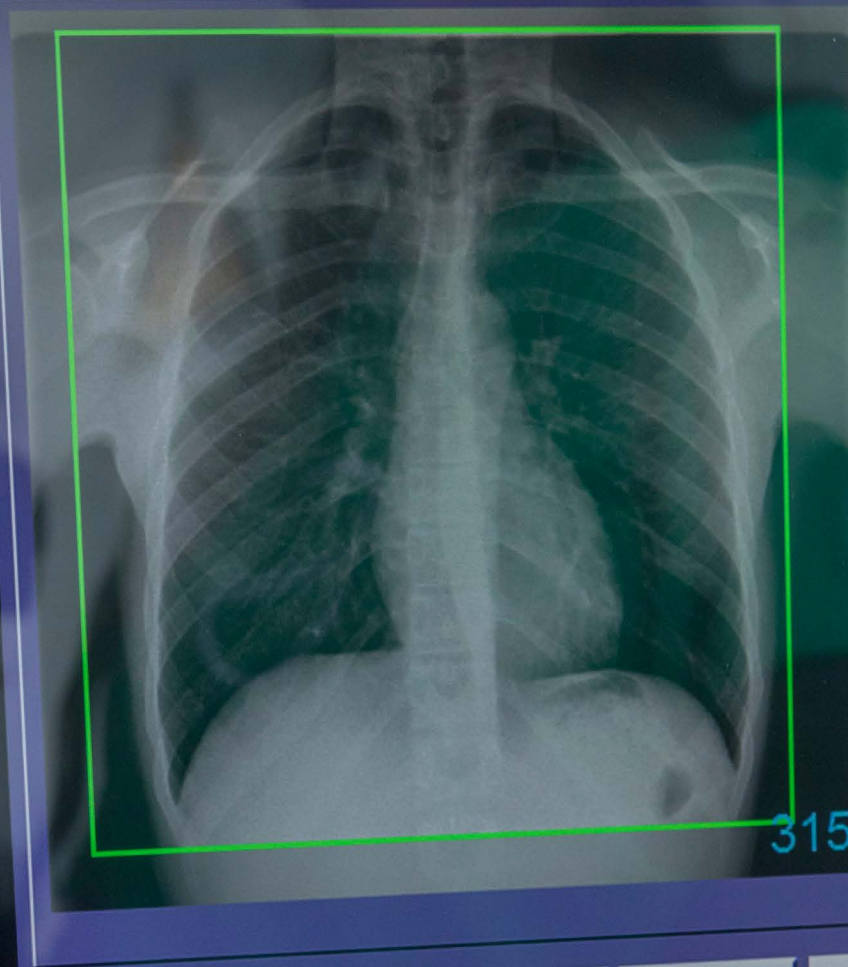
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# Diarrhoeal diseases and lower respiratory tract infections

2014-2019



9 grants  
€73.58 M



Drugs  
3 grants  
€18.09 M












































Vaccines  
5 grants  
€49.51 M



Product-focused  
implementation research  
1 grant  
€5.98 M

## EDCTP portfolio: Diarrhoeal diseases and lower respiratory tract infections

Drugs	Vaccines	Product-focused implementation research
<b>COAST-Nutrition</b> Kenya, Uganda   	<b>ETEC Vaccine Efficacy</b> The Gambia, Zambia     	<b>BabyGel</b>    
<b>PediCAP</b> South Africa, Uganda, Zambia, Zimbabwe    	<b>THECA</b> Burkina Faso, DR Congo, Ghana, Madagascar    	
<b>EMPIRICAL</b> Code d'Ivoire, Malawi, Mozambique, Uganda, Zambia, Zimbabwe   	<b>ShigOraVax</b> Burkina Faso, Zambia      	
	<b>PREPARE</b> South Africa, Uganda  	

Caption	Study phase	Population
<b>Project name</b>	 Phase I	 Adults (18yr and above)
<b>Site(s) in sub-Saharan Africa</b>	 Phase II	 Adolescents (10yr-17yr)
	 Phase III	 Children (2yr-9yr)
	 Phase IV	 Infants (above 1mo-1yr)
	 Observational study	 Pregnant women and/or newborns (birth to 1mo)



## Reducing deaths from pneumonia

*The COAST-Nutrition study is investigating whether nutritional supplements help young children recover from pneumonia.*

### The challenge

Pneumonia is the leading cause of death in children under the age of five years. Current approaches to hospital care are still associated with relatively high mortality (9–16%). In addition, children are still at risk of dying after they are discharged from hospital, particularly if they are malnourished.

There is considerable scope to improve the treatment of young children with pneumonia. Key questions include when oxygen therapy should be used, and the most effective way it could be delivered, particularly in settings that lack equipment for mechanical ventilation. In addition, there is no formal evidence that supplementary feeding improves survival in under-nourished children.

### The project

The COAST-Nutrition team is undertaking a clinical trial, funded by Wellcome and the UK Medical Research Council, which is evaluating different ways to deliver oxygen therapy to children hospitalised with pneumonia. EDCTP funding is being used to take advantage of this platform to assess the benefits of wider use of supplemental feeding, which is currently only given to the most severely under-nourished children.

Children that survive to 48 hours will be enrolled in a further trial to see if supplemental feeding to day 28 improves survival at 90 days. The team will also carry out other studies to see if simple measures or diagnostics are predictive of viral or bacterial pneumonia, to provide tools for improved care of children and targeting of antibiotic therapy in hospitals without microbiology services.

### Impact

The COAST-Nutrition trial will reveal whether extending the use of food supplementation beyond the most severely under-nourished children improves longer-term survival after

### Project at a glance

**Project:** COAST-Nutrition

**Project lead:** Professor Kathryn Maitland, Imperial College, and the United Kingdom

**Countries involved:** Finland, Kenya, the Netherlands, Uganda, and the United Kingdom

**Target population(s):** Children

**Year funded:** 2018

**EDCTP funding:** €3.4 M

**Total project funding:** €5.9 M

**Project website:** <https://coastnutrition.tghn.org>

**Clinical trial registration:** [www.isrctn.com/ISRCTN10829073](http://www.isrctn.com/ISRCTN10829073)

hospitalisation for pneumonia. ‘Ready-to-use therapeutic foods’ are safe and widely available, so could be relatively straightforward to implement if evidence suggests that they reduce mortality.

# Optimising treatment of childhood pneumonia

*The PediCAP study aims to identify the optimal treatment for children hospitalised with severe pneumonia.*

## The challenge

Pneumonia is the leading cause of death of children under five years of age. Globally, it kills an estimated 1.4 million children every year, and accounts for 18% of deaths of young children. An estimated 500,000–750,000 of these deaths occur in sub-Saharan Africa.

WHO recommends that hospitalised children with severe or very severe pneumonia should be given injectable antibiotics for at least five days. However, this leads to long hospital stays, high costs and an increased risk of hospital-acquired infection.

## The project

The PediCAP study is investigating less intensive treatment strategies based on a switch from injected to oral antibiotics, for which little evidence currently exists. Treatment could be switched to amoxicillin, or to a co-amoxiclav, a combination of amoxicillin and a second type of antibiotic; the latter would protect against a wider range of bacteria but could have more side effects and might select for antibiotic resistance. It is also unclear how long oral antibiotics should be given for – courses should be long enough to kill pathogens but not so long that they promote the development of resistance.

The PediCAP team will use an innovative trial design to compare the switch from injected antibiotics to either amoxicillin or to co-amoxiclav, and to assess different durations of treatment. As well as recovery rates, the trial will monitor side effects and the development of resistance. It will also examine whether optimal duration of treatment depends on factors such as age or severity of disease, which could allow treatment regimes to be tailored to particular subsets of patients.

## Project at a glance

**Project:** PediCAP study

**Project lead:** Professor Carlo Giaquinto, Fondazione PENTA Onlus, Italy

**Countries involved:** Belgium, Italy, South Africa, Switzerland, Uganda, United Kingdom, Zambia, and Zimbabwe

**Target population(s):** Children (3 months to 10 years)

**Year funded:** 2018

**EDCTP funding:** €7 M

**Project website:** <https://projectpedicap.org>

## Impact

The PediCAP study will fill a large gap in the evidence base for treatment of pneumonia in children. As increasing numbers of children are being treated for pneumonia in hospital, optimised treatments that achieve high cures rates while minimising lengths of hospital stay, side effects and resistance could have a major impact.





# Enhancing treatment of respiratory infections in HIV-infected infants

*The EMPIRICAL study is exploring whether a greater emphasis on treatment of TB and cytomegalovirus improves survival of young children with HIV.*

## The challenge

In 2016, around 160,000 children became infected with HIV, and more than 90% of HIV-infected children live in sub-Saharan Africa. Young children are particularly vulnerable to HIV infection – death rates are highest for HIV-infected children less than four years of age.

Respiratory tract infections are the main cause of death of children with HIV. WHO guidelines recommend treatment with antibiotics against common bacteria and the opportunistic pathogen *Pneumocystis jirovecii*, but mortality remains very high.

## The project

Evidence has emerged that TB and *cytomegalovirus* – a common virus that only rarely causes disease – are major unrecognised causes of death in children infected with HIV. Each may account for up to 20% of deaths.

As diagnostics for these infections are generally not available in resource-poor settings, the EMPIRICAL trial is evaluating whether empirical treatment against TB and *cytomegalovirus* improves survival of HIV-infected infants with severe pneumonia.

HIV-infected infants aged between one month and 12 months will receive the usual pneumonia treatment of antibiotics, cotrimoxazole and prednisolone. Those thought to have a TB infection will receive anti-TB treatment, and half will also be given an antiviral, valganciclovir. Those not thought to have TB will randomly receive either valganciclovir or anti-TB treatment, on top of the usual pneumonia treatment. Survival will be compared at 15 days and after a year.

## Impact

The EMPIRICAL study will determine whether empirical treatment of TB and *cytomegalovirus* reduces pneumonia mortality in young HIV-

## Project at a glance

**Project:** EMPIRICAL study

**Project lead:** Dr Pablo Rojo, Servicio Madrileña de Salud, Spain

**Countries involved:** Côte D'Ivoire, France, Italy, Mozambique, The Netherlands, Spain, Uganda, United Kingdom, Zambia, and Zimbabwe

**Target population(s):** Infants with HIV

**Sample size:** 624

**Year funded:** 2018

**EDCTP funding:** €7.7 M

**Clinical trial registration:** <https://clinicaltrials.gov/ct2/show/NCT03915366>

infected infants – who currently have the worst survival of all age groups.

# Preventing *E. coli* diarrhoea

*The ETEC Vaccine Efficacy study is evaluating a vaccine against one of the most common causes of diarrhoeal disease in children.*

## The challenge

Although *E. coli* is found in all human guts, some strains – known as enterotoxigenic *E. coli* (ETEC) – cause a severe and potentially life-threatening diarrhoea. Around 75 million infections occur each year globally, causing at least 50,000 deaths, mainly in young children. Death rates are highest in Africa.

In addition, ETEC interferes with child growth and development, so it also has longer-term impacts on health and economic wellbeing

## The project

The ETVAX<sup>®</sup> vaccine is the most advanced oral vaccine against ETEC. It is a mix of engineered strains of *E. coli* that produce high levels of four proteins known to stimulate protective immune responses, plus a hybrid protein that combines *E. coli* and cholera toxins. An adjuvant known as dmLT is also used, to stimulate more powerful immune responses.

Following positive results in European adults, the ETEC Vaccine Efficacy study will first conduct a series of safety studies in adults and progressively younger children in Zambia, including children 10–23 months old and infants 6–9 months old.

Assuming no safety issues arise, the project will then progress to a phase IIb study in infants 6–18 months old in The Gambia. The project will also provide a platform for testing of new point-of-care diagnostic tests for ETEC, which would provide a clearer picture of its disease burden.

## Impact

The study will provide key data on the efficacy of ETVAX<sup>®</sup> in African children, and will also strengthen clinical trial and laboratory capabilities in Zambia and The Gambia, which will facilitate further vaccine trials.

## Project at a glance

**Project:** ETEC Vaccine Efficacy study

**Project lead:** Mr Björn Sjöstrand, Scandinavian Biopharma Holding AB, Sweden

**Countries involved:** Finland, The Gambia, Sweden, United Kingdom, and Zambia

**Target population(s):** Young children

**Year funded:** 2018

**EDCTP funding:** €7.4 M

**Total project funding:** €14.9 M





## Making the case for typhoid fever vaccination

*The THECA study will provide important evidence on the impact of typhoid fever vaccination in Africa.*

### The challenge

Typhoid fever, caused by infections with *Salmonella Typhi*, affects around 22 million people every year, causing more than 200,000 deaths. African countries are at particular risk of typhoid fever outbreaks.

A typhoid conjugate vaccine, Typbar-TCV®, has been licensed despite limited data on its efficacy. The Bill & Melinda Gates Foundation is supporting three trials – two in Asia and one in Malawi – to generate additional evidence on safety and efficacy.

### The project

The THECA study complements the Gates Foundation trials by conducting two additional studies in Ghana and the Democratic Republic of the Congo (DRC).

The Ghana study is a randomised controlled trial that will generate data on safety and efficacy and population-level protection, adding to the pool of African data provided by the Malawi trial.

The DRC study, by contrast, will be embedded within a mass vaccination campaign, with a case-control design used to assess efficacy. This study will provide additional data on protection when the vaccine is used within routine public health systems, as well as valuable insight into feasibility, programmatic barriers and enablers, and cost-effectiveness.

### Impact

The THECA study will provide policymakers in Africa with additional data on the safety and efficacy of Typbar-TCV®, but also information on its performance in real-life settings and factors that influence its effectiveness in practice. This will enable them to make much more informed decisions on whether to introduce the vaccine and how to use it.

### Project at a glance

**Project:** THECA study

**Project lead:** Dr Florian Marks, University of Cambridge, United Kingdom

**Countries involved:** Bangladesh, Belgium, Burkina Faso, Democratic Republic of the Congo, France, Ghana, Republic of Korea, Madagascar, and the United Kingdom

**Target population(s):** Children

**Year funded:** 2019

**EDCTP funding:** €13 M

**Total project funding:** €35 M

# Preventing dysentery in young children

*The ShigOraVax study is collecting essential data to advance the development of vaccines against Shigella, a key cause of diarrhoeal disease in low-income countries.*

## The challenge

*Shigella* is the second most common cause of deaths from diarrhoea in children under five years of age. In 2013, *Shigella* infections were responsible for at least 34,000 deaths of children under five years of age, but recent use of more specific diagnostics suggests that the impact of *Shigella* has been significantly underestimated.

Although several *Shigella* vaccines are in development, their evaluation is hampered by a limited understanding of disease burden.

## The project

The most common forms of *Shigella* are *S. flexneri* strains 2a, 3a and 6 and *S. sonnei*, all of which are associated with severe diarrhoeal disease. The ShigOraVax project aims to develop a whole-cell inactivated vaccine that is protective against all these strains, can be administered orally, and is cheap and easy to manufacture.

The project will first test the vaccine's safety in European and African adults, before beginning safety studies in children in Burkina Faso. A phase II multicentre trial will be organised in Burkina Faso and Zambia.

Importantly, the project will also collect data on children with moderate to severe diarrhoea at trial sites, to generate a clearer picture of the disease burden attributable to *Shigella* and to provide a foundation for assessing the efficacy of the vaccine.

## Impact

The ShigOraVax study will advance the development of a vaccine against one of the most common causes of severe diarrhoea in young children. It will also strengthen the capacity of Burkina Faso and Zambia to carry out vaccine research, and provide much-needed data on the *Shigella* disease burden in Africa.

## Project at a glance

**Project:** The ShigOraVax study

**Project lead:** Dr Hilde Depraetere, European Vaccine Initiative, Germany

**Countries involved:** Burkina Faso, Germany, India, the Netherlands, Sweden, Zambia

**Target population(s):** Young children

**Year funded:** 2019

**EDCTP funding:** €8.6 M

**Total project funding:** €9.8 M





# Preventing stillbirths and neonatal meningitis

*The PREPARE study is speeding up the development of vaccines that protect women, newborns and young infants against group B streptococci.*

## The challenge

Group B streptococci are carried by a third of adults and one in five pregnant women, in the digestive system or lower vaginal tract. They usually cause no problems, but they can be transmitted to babies in the womb or during birth. Because of their immature immune systems, babies are at greater risk of invasive disease such as meningitis and septicaemia, and group B streptococci can also cause stillbirth.

There are an estimated 410,000 cases of serious infection each year, leading to 147,000 stillbirths and infant deaths globally. The highest burden is in Africa, which accounts for 64% of stillbirths and infant deaths.

## The project

The PREPARE study aims to facilitate the development of vaccines against group B streptococci. Although serious – one in ten babies with an infection are likely to die, and half of those who survive meningitis will have long-term impairments – it is relatively rare, so large-scale phase III trials are difficult to conduct.

The PREPARE study is partnering with manufacturers to test two experimental vaccines, in women with and without HIV. To facilitate trials, the project will collect data on group B streptococcal infections and pregnancy outcomes in 70,000 women attending a hospital in Uganda. A biobank of blood samples will also be created, so links between antibody production and protection against group B streptococci-associated disease in mothers and babies can be investigated.

## Impact

The PREPARE study will generate important data on the efficacy of experimental vaccines against group B streptococci, but will also provide additional evidence on disease burden in sub-Saharan Africa and on the immune responses linked to protection. A deeper understanding of

## Project at a glance

**Project:** PREPARE study

**Project lead:** Dr Kirsty Le Doare, St George's University of London, United Kingdom

**Countries involved:** Denmark, France, Italy, Malawi, The Netherlands, South Africa, Uganda, United Kingdom, and the United States

**Target population(s):** Pregnant women (with and without HIV), newborns

**Year funded:** 2019

**EDCTP funding:** €10 M

**Total project funding:** €21 M

the latter could provide a more convenient way to assess the efficacy of vaccines, to inform licensing decision-making and accelerate the introduction of a vaccine.



# Preventing neonatal infection with hand rub

*The BabyGel study is examining whether giving mothers an alcohol-based hand rub can reduce severe infections in newborns.*

## The challenge

Infections account for an estimated 26% of neonatal deaths. Around 750,000 newborns die each year, and neonatal mortality is highest in sub-Saharan Africa, where nearly half of all deaths of children under five years occur. The annual economic burden attributable to severe neonatal infections could be as high as US\$469 B.

Simple water, sanitation and hygiene interventions could dramatically cut infections rates, if widely adopted.

## The project

The BabyGel study is exploring whether giving pregnant women alcohol-based hand rub for household use after they have given birth helps to reduce the risk of severe infections in the first three months of life. A pilot study has already shown that BabyGel alcohol-based hand rub could be distributed to women, was widely used and was safe.

The trial is taking place in rural Uganda. Expectant mothers will be given a BabyGel kit including five litres of perfumed alcohol-based hand rub, two dispensers and information about when to use it, emphasising the three key moments of neonatal hand hygiene (before touching baby, for initial cord care and after known risk exposures such as using the toilet).

Expectant mothers will receive the BabyGel kit in addition to a standard birthing kit and antenatal education. The trial will examine if provision of BabyGel has an impact on severe infant illness or death in the first 90 days of life, or on diarrhoeal disease and lower respiratory tract infections.

## Impact

The BabyGel study will determine the impact of a simple and widely implementable hygiene intervention that could reduce one of the leading causes of infant death in sub-Saharan Africa. Alcohol-based hand rub is cheap to produce

## Project at a glance

**Project:** BabyGel study

**Project lead:** Professor Andrew Weeks, University of Liverpool, United Kingdom

**Countries involved:** Norway, Uganda, and the United Kingdom

**Target population(s):** Pregnant women, newborns

**Year funded:** 2019

**EDCTP funding:** €6 M

locally, active against a wide range of infectious organisms, and easier to use than soap and water.



## **European & Developing Countries Clinical Trials Partnership**

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