



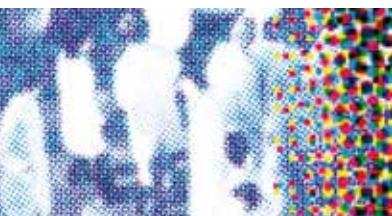
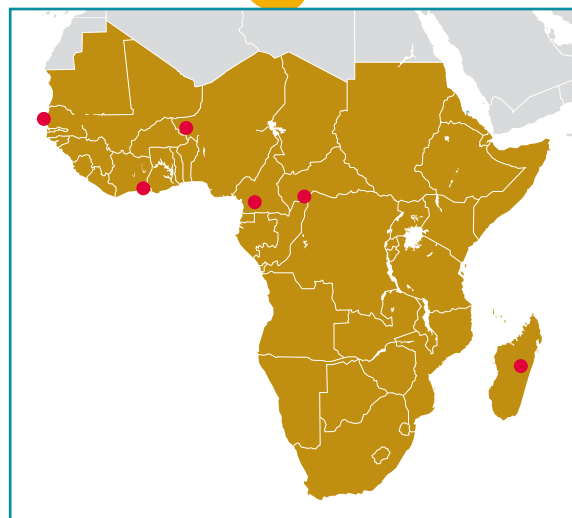
Region

Institut Pasteur
The Institut Pasteur
International Network

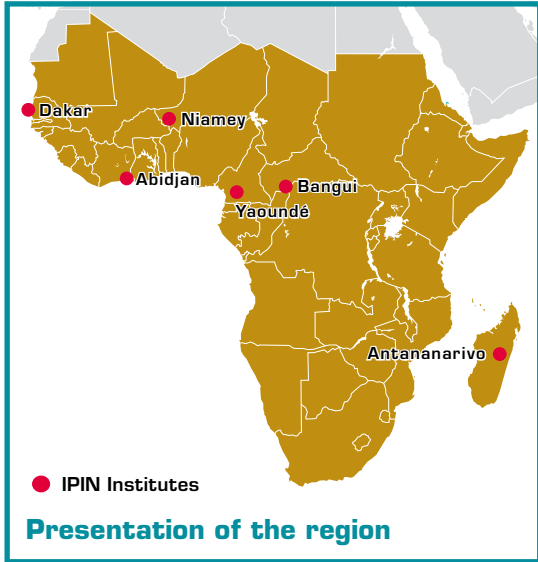
Sub-Saharan Africa and the Indian Ocean

*"Science has no native land,
it embraces all humankind."*

Louis Pasteur



Sub-Saharan Africa and the Indian Ocean



The involvement of governments in healthcare system reforms, the availability of resources, the experience drawn from successful health interventions, education, changes in behaviour... All of these reasons explain the significant progress made in healthcare development in the majority of sub-Saharan Africa and the Indian Ocean.

Present in six countries in this area, the Institut Pasteur International Network (IPIN) relies on substantial human skills, technical resources and close partnerships with local organisations and authorities to fight against the major epidemics and endemic diseases affecting the region.

> Multiple challenges

In sub-Saharan Africa infectious diseases are still the primary cause of mortality (69% of deaths). African and Indian Ocean countries will not be able to develop their economy or society without massive investments from governments in their healthcare systems.

90% of deaths caused by **malaria** occur in sub-Saharan Africa. This disease is a major cause of mortality in the region and between 500 and 800 million Africans, mainly young children and pregnant women, die from malaria each year. Access to a fast parasitological diagnosis and combined treatment containing artemisinin derivatives, intermittent preventive treatment and measures to prevent transmission, through massive international funding, have, in recent years, substantially reduced the extent of malaria in many endemic areas, including Africa and Madagascar. In these regions the epidemiology of malaria is being drastically transformed.

An estimated \$25 billion is necessary to fight against **HIV/AIDS**. Over 34 million people worldwide have AIDS of which approximately 22 million in sub-Saharan Africa. The battle against AIDS has yet to be won despite increased access to antiretroviral (ARV) drugs in the region (coverage rate has increased by 20% between 2009 and 2010) and a decrease in the number of new infections.

Each year 10 million people are infected with **tuberculosis** worldwide and 2 million die from the disease. With increasingly resistant forms developing and only \$20 billion invested in prevention, the disease is still a major hindrance to economic development in poor countries. Tuberculosis is the primary cause of death among those infected with HIV in Africa.

Viral haemorrhagic fevers (VHF) are on the increase again in Africa, with regular epidemics of yellow fever, the Ebola virus, Marburg virus, Rift Valley fever or Congo-Crimean haemorrhagic fever virus.

During the last important epidemic of 2009 the number of presumed cases of **meningitis** and death in the 14 countries closely monitoring meningitis in Africa was respectively 78,416 and 4,055 (weeks 1-22, 2009). However, introducing a conjugated vaccine (MenAfriVac™) for the serogroup A *meningococcus* should reduce meningitis-related mortality and morbidity in this region.

> Presence and Priority healthcare objectives

Making use of its existing infrastructure, its long-standing presence in sub-Saharan Africa, the Institut Pasteur International Network in sub-Saharan Africa aims to protect the health of populations in countries where it operates.



The Network: internationally renowned

Louis Pasteur had one wish: to fight against infectious diseases in the countries where they arise.

The Network provides a solution: a partnership of research institutes, public health institutes and training institutes, throughout five continents, recognised by the largest international organisations and the world's leading research institutes.

The Network:

- contributes to research adapted to local problems in an international framework
- assists the transfer of knowledge to develop local skills
- meet international excellence requirements works closely with national disease monitoring systems





Institut Pasteur in Bangui is a center of anti-rabies treatment in CAR.

The work of the Network in sub-Saharan Africa and the Indian Ocean

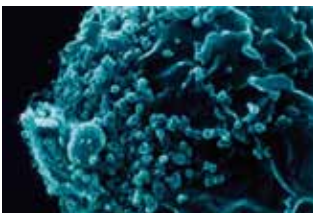
The main objective of the Institut Pasteur International Network is to provide innovative and efficient public health solutions, while assisting Africa and the Indian Ocean's Ministries of Health to monitor diseases, particularly emerging diseases.

Acknowledged as reference centres of expertise by the health authorities in the host countries, all of these institutes are at the heart of partnerships with Africa and the Indian Ocean's largest institutions on a national, regional and international level.

> Solid international cooperation

In Africa and the Indian Ocean the Institut Pasteur International Network (IPIN) and the Institut Pasteur, the NGOs and French and foreign research bodies work together in research and public health. They are involved in several major initiatives:

- Influenza project funded by the French **Ministry of Health** (Cameroon, Côte d'Ivoire, Madagascar, Niger, Central African Republic and Senegal)
- Funding from the French **Ministry of Foreign and European affairs** for international projects such as the Priority Solidarity Fund (FSP) for meningitis (Burkina Faso, Cameroon, Côte d'Ivoire, Mali, Central African Republic)
- Funding from the US **Department of Health and Human Services** (ASPR) for influenza projects and respiratory diseases (Cameroon, Côte d'Ivoire, Madagascar, Central African Republic and Senegal)



The HIV-1 virus on the surface of a lymphocyte

> Fight against HIV/AIDS

The IPIN's "**resistance to ARV**" programme, led in close partnership with the ANRS (the French Research Agency against AIDS), aims to set up technologies that can be applied to research using standardised methods, particularly in the area of mother to infant transmission. This involves the **Institutes' teams in Central African Republic and Cameroon.**

DID YOU KNOW?

One recent study conducted in **the Pasteur Centre in Cameroon** has demonstrated that the infection of pregnant women by the malaria parasite could increase the risk of in utero transmission of the AIDS virus to her child, confirming the importance of treating pregnant women infected with malaria.

Researchers at **the Institut Pasteur in Madagascar** recently showed that certain Madagascan populations with a blood group producing a resistance to the *Plasmodium vivax* infection (Duffy negative group) were susceptible to it after all. This discovery is likely to revolutionise the understanding of *P. Vivax* malaria. Further studies are necessary to determine the role of antigens at the surface of red blood cells in the susceptibility to this infection.

DID YOU KNOW?

The six institutes in Africa are National Reference Centres or Laboratories or WHO Partner Centres for influenza: the Institut Pasteur in Bangui, Côte d'Ivoire, Dakar, Madagascar, Centre Pasteur in Cameroon and CERMES (Centre de Recherche Médicale et Sanitaire à Niamey, Niger).

Earlier, over a period of three years, the **Resistance to anti-infectives** project helped to develop substantial work in Africa. Funded by the French Ministry of Foreign and European affairs, it aimed to facilitate North/South and South/South laboratory networks, to coordinate the monitoring of the agents responsible for infectious diseases (HIV, malaria, bacteria) and detect the arrival of new resistances.

The Pasteur Centre in Cameroon initiated a programme to prevent mother to infant transmission of HIV/AIDS. It also launched a study to improve the care of HIV-positive children.

The Institut Pasteur in Bangui conducts serological and molecular diagnoses while providing immunological and virological monitoring for patients infected by HIV/AIDS.

The Network conducts investigations into resistance to tuberculosis treatments in Cameroon, Madagascar, Cote d'Ivoire and the Central African Republic. In liaison with the Institut Pasteur in Paris, it conducts research on the methods and mechanisms involved in these resistances in the areas of genetic susceptibility.

> Malaria

The Network's malaria research concerns: the transmission, epidemiology, chemoresistance, entomology, biodiversity of parasites (especially in **Niger** and **Madagascar**) and research into therapeutic targets.

The Institut Pasteur in Dakar is part of a network of clinical trials platforms for vaccine candidates in West Africa and several teams in **Madagascar** and the **Central African Republic** are working to develop these trials.

> Influenza

The IPIN institutes, members of the WHO worldwide influenza monitoring programme, are greatly involved in monitoring and preventing the transmission of influenza viruses. They contribute to major programmes on a regional level:

- The project supported by the US DHHS (Department of Health and Human Services (ASPR)): the aim of this project is to strengthen networks monitoring influenza viruses in Africa and South-east Asia, particularly avian influenza, and to conduct epidemiological studies in the framework of the International Health Regulation. To reach its objectives, the programme is setting up suitable training to assist investigations in the event of an epidemic;



*Biosafety Level 3 Laboratory
(monitoring of hemorrhagic fever
in Central Africa)*

DID YOU KNOW?

The Institut Pasteur in Dakar, a WHO Partner Centre for arboviruses and viral haemorrhagic fevers, produces the yellow fever vaccine (10 million doses per year). As recent support for vaccination campaigns in Africa have drastically increased demand, this unit is undergoing major modernisation work to double its production capacity. In the long run, it is expected to constitute a powerful weapon against yellow fever in Africa.



*Strips for the diagnosis
of meningitis*

- The programme to strengthen an influenza monitoring network in Africa (French Ministry of Health): the main activities involve the detection and characterisation of influenza viruses and building up laboratories. Furthermore, the project subsidises the creation of a transversal study for typing influenza strains found in sub-Saharan Africa to gain a better understanding of transmission methods and seasonal variations.

> The plague

The Institut Pasteur in Madagascar is a WHO Partner Centre for the plague. Its expertise is called upon in this country and in other endemic areas (in Central Africa, South America and Asia). It has developed and produced rapid diagnostic tests that can be used in peripheral healthcare structures and hospitals to improve patient management and the monitoring of this disease, which has a huge epidemic potential. It was in this institute that the first plague vaccine was developed 80 years ago. The institute is now conducting research into the determining factors involved in plague epidemiology and into the *Yersinia pestis* reservoirs.

> Arboviruses and viral haemorrhagic fevers

The institutes in Paris, Bangui, Cameroon, Côte d'Ivoire, Dakar and Madagascar are involved together to set up a network platform for diagnosing and investigating into viral haemorrhagic fevers.

After the first **dengue** epidemic in Cape Verde in 2009 the Institut Pasteur in Dakar researchers confirmed that the epidemic was due to the dengue-3 virus, a particularly virulent strain and rarely found in Africa. The initial investigation was followed by support to laboratories, diagnosis and entomological and epidemiological studies.

> Meningitis

Although it is generally associated with the serogroup *A meningococcus*, an epidemic caused by the serogroup W135 in Burkina-Faso in 2002 and the persistence of this serogroup in sub-Saharan Africa has led to new monitoring strategies concerning the vaccine response. The situation became more complex in 2006 with the emergence of a serogroup *X meningococcus* epidemic in Niger for which there is no existing vaccine.

DID YOU KNOW?

The CERMES and the Institut Pasteur in Paris have developed a rapid diagnostic test for meningococcal meningitis in the form of strips that can be used at the patient's bedside and that are available in the most isolated healthcare structures.

Substantial epidemiological studies have been conducted in the “African meningitis belt” to identify the bacteria responsible, determine the factors causing the emergence of new variants and to guide vaccination practices. The introduction of a conjugated vaccine (MenAfriVac™) against the serogroup A *meningococcus* will influence the epidemiology of the *meningococcus*. The introduction of this vaccine has been associated with various types of studies (carriage, vaccine efficacy, etc.), particularly in Burkina Faso, Mali and Niger, the three first countries that have benefited from the conjugated vaccine.

The regional Meningitis FSP project

Funded by the French Ministry of Foreign and European affairs, this project involves bodies in Mali and Burkina Faso, the institutes in Niger, Côte d'Ivoire, Cameroon and the Central African Republic and also the Preventive Drugs Agency (AMP).

Its aim is to:

- improve capacities for epidemiological and microbiological meningitis monitoring by transferring molecular biology techniques to African laboratories;

- study the consequences of meningitis, the aetiology of cerebrospinal fluids negative for the three most common microorganisms and validate a rapid diagnostic test for meningococcal meningitis.

This is expected to lead to the improvement of the reference laboratory technical platform, the training of professionals in modern microbiological identification techniques and to give national and international health authorities access to epidemiological data to better guide vaccine strategies.

DID YOU KNOW?

Each year more than 70 African students attend the Institut Pasteur courses and workshops in Paris.

> Training in research

The Institut Pasteur International Network also aims to help improve human resource capacities in African countries.

The courses are funded in part or in full by the Institut Pasteur, and are available to all IPIN researchers and beyond. The training subjects offered cover a large number of the healthcare needs in the region.

The main training courses available in Africa and Madagascar

- International course “Malaria Workshop” in Madagascar
- Malaria workshop in English (Tanzania)
- Workshop on epidemiological monitoring and investigation into epidemics (Madagascar)
- The microbiology of *Mycobacterium ulcerans*, a pathogen responsible for the Buruli ulcer (Cameroon)
- From antibiograms to proper use of antibiotics (Côte d'Ivoire)
- Regional training workshop on antibiograms for national reference laboratory technicians in Africa (Cameroon)
- Regional course to strengthen national public health laboratory networks to monitor food-related infections (Cameroon)
- Applied epidemiology and IT (Benin)
- First summer university in Africa (South Africa)
- Training in laboratory techniques, diagnostics and antibiograms for gonococcus, for microbiologists in central Africa (Cameroon)
- Regional course on the detection and PCR typing of *meningococcus* for the MenAfriCar Consortium (Niger)

The Institut Pasteur: a global presence

As a not-for profit private foundation, the Institut Pasteur performs three public interest missions since it was created in 1887: research, public health and training.

At the very source of several disciplines — microbiology, immunology and molecular biology — it is one of the world's most efficient biomedical research centres. Ten Pasteurian scientists have been awarded the Nobel Prize in physiology or medicine.

Open to the world, it is at the heart of an International Network of around 30 institutes on every continents, most of which come under the public health care authorities in that country.

These institutions are associated by partnerships and cooperation agreements covering scientific research, training and public health services, and they share common values and objectives.

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