

**Maladies  
infectieuses**



**Inserm**



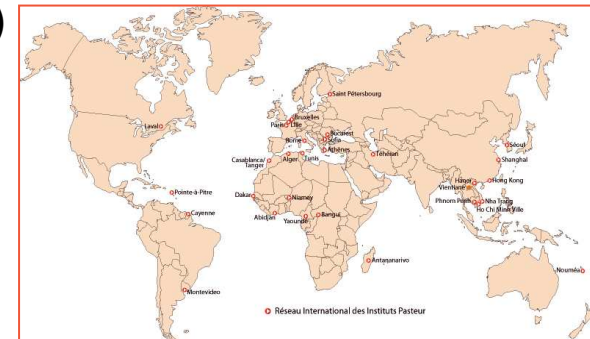
**Institut national  
de la santé et de la recherche médicale**

**French National Institute  
of Health and Medical Research**

# Infectious Diseases in France

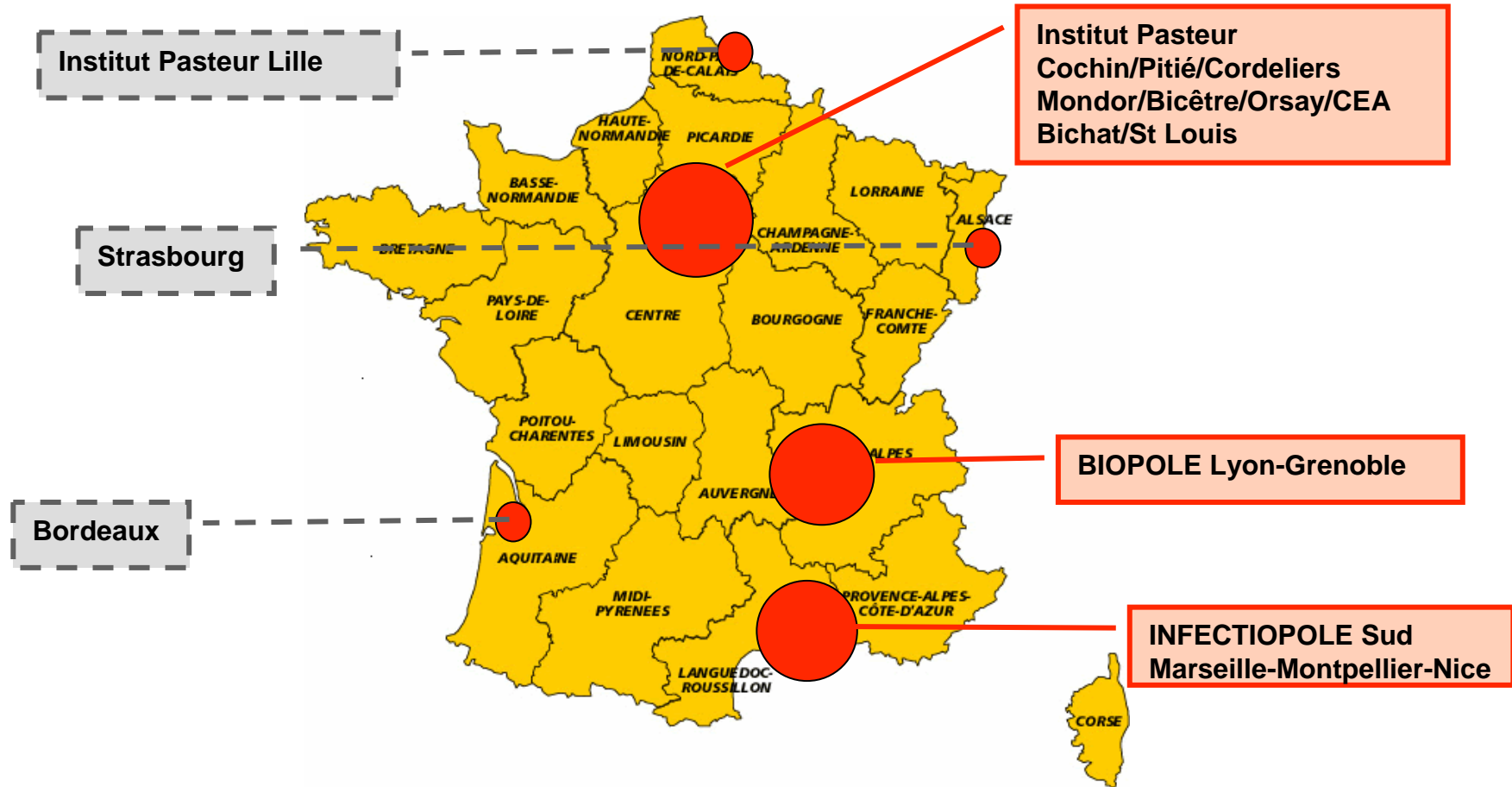
## Different actors

- **Inserm: 11% of research Units**
- **CNRS: 18% of research Units (Life Sciences Department)**
- **IRD (Institut de Recherche sur le Developpement)**
- **Institut Pasteur: 45% of Paris research Units**
- **ANRS: HIV and hepatitis**
- **Others: Universities, InVS (Institut de Veille Sanitaire), INRA (Institut National de Recherche en Agronomie), CEA, Army, Hospitals (Clinical Units and Laboratories)**
- **Lack of Private Foundation or organization**
- **Big Pharma only involved in antibiotics (Sanofi-Aventis)**



# Infectious Diseases in France

## Main Research Centers



# INSERM - CNRS

	INSERM	CNRS
<b>State of Research</b>		
• Research Teams	103	56
• Researchers	160	143
<b>Scientific Fields</b>		
• Virology	44% HIV, Hepatitis 42%	24% HIV, Hepatitis 31%
• Bacteriology	21%	38%
• Parasitology	16%	9%
• Pathogenesis, translational research	18%	16%
• Molecular and structural biology	1%	13%

## Scientific production 2006-2007

### Infectious diseases: 15% of biomedical publications

	France	INSERM	% INSERM compared to France	CNRS	% CNRS compared to France
<b>Publications</b>	<b>8948</b>	<b>1926</b>	<b>21%</b>	<b>1286</b>	<b>14%</b>
<b>Total citations</b>	<b>37320</b>	<b>8606</b>	<b>23%</b>	-	-
<b>Top 1%</b>		<b>6.1%</b>			

# ANRS

- **Public agency aimed at funding and coordinating research in all areas relevant to HIV/AIDS (1992) and Hepatitis (2004)**
- **From Basic Science to Clinical and Human and Social Science including developing countries**
- **No ANRS Researchers or Scientific Unit (Inserm, CNRS, I. Pasteur)**
- **HIV Vaccine program**
- **Research in developing countries as a priority**
- **Four main results:**
  - **Network of excellence for clinical research (15% of HIV+ patients)**
  - **International Second position for scientific production**
  - **Multidisciplinary approach**
  - **Interactions with NGOs and patients**

# Infectious Diseases in France

## Strengths and Weaknesses

- **Strengths**

- Collaborative programs between institutions
- Well organized HIV & Hepatitis research community (ANRS)
- Institut Pasteur, mainly dedicated to infectious disease
- Platforms: genomics, proteomics, metabolomics
- NGOs Involvement

- **Weaknesses**

- Basic Science in Virology (not related to specific virus)
- Translational research
- Clinical and epidemiological research
- PHRC (Programme Hospitalier de Recherche Clinique)
- Research in developing countries: « Lack of Global Vision »

# Scientific Challenges

- **A new vision of microbiology**
  - **Knowledge of the microbial world**
    - Human microbiome, Environmental metagenome
    - Emerging pathogens
  - **Infectious agents and chronic diseases:**
    - Non-infectious diseases linked to infectious agents: cancer, obesity .etc
    - New approaches: syndromic, surveillance, transdisciplinary
- **Host-pathogens interactions**



# Public Health Challenges

- **Health risks**

- **Coordination between public health surveillance and disease control (Research ↔ Ministry of Health)**
- **Long-term research**
  - **Vaccine programs**
  - **Antibiotic resistance**
  - **HIV and Hepatitis**
  - **Multi-drug resistant tuberculosis**
  - **Nosocomial infections**

- **Need for**

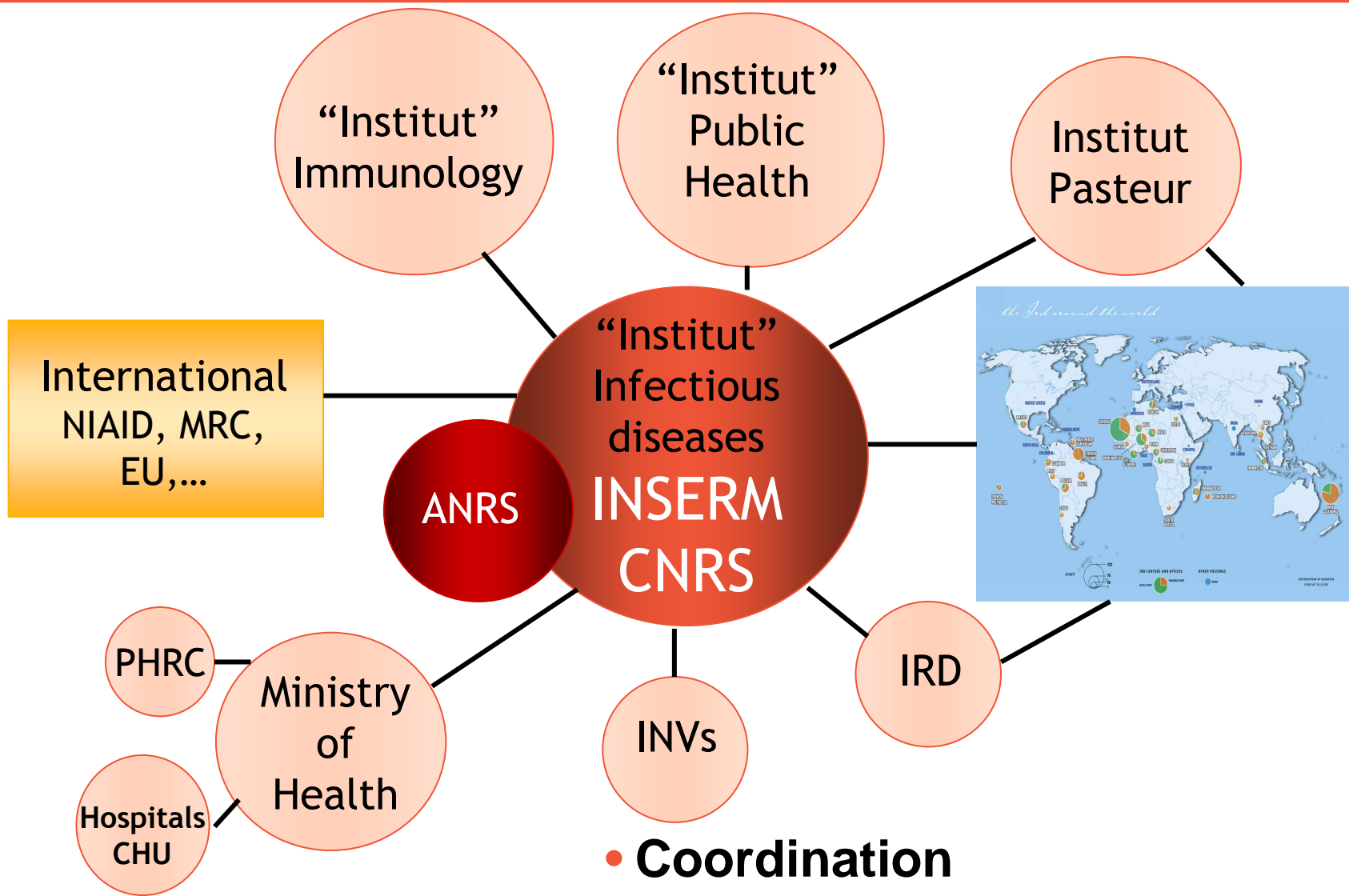
- **Research in human and social sciences**
- **International collaboration**
- **Partnerships with countries of the developing world: poverty-related diseases, emergent or neglected infections**

## Scientific priorities

- **Emerging or re-emerging infections (avian flu...)**
- **Chronic viral infections: HIV and hepatitis**
- **Drug resistance (including MDR Tuberculosis)**
- **Hospital-acquired infections**
- **Vaccination policies**
- **Infectious diseases in developing world**

# Proposals for action

- **Facilitate clinical and translational research**
  - Create clinical research network and large prospective cohorts of patients
  - Create clinical and biological databases
- **Develop host-pathogens interactions studies including animal models**
- **Enhance Access to genomic facilities (genomic, proteomic,...)**
- **Define priorities for research in developing countries**



- **Coordination**
- **Funding?**
  - **Public (ANR...), Industry**
  - **Foundations**

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# Institute of Infectious Diseases

## - Missions -

- **Inventory of resources**
- **Research organization**
  - **Scientific animation**
  - **Advise on operational issues**
- **Coordination : calls for proposals**
  - **Research priorities**
  - **International research**
  - **High risk research**

# Institute of Infectious Diseases

## - Stakes -

- **International collaboration**
  - **Multiplication of exchanges: circulation of infectious agents**
  - **European and international collaboration: HIV, public health decision- making**
  - **Partnerships with countries of the developing world: poverty-related diseases, emergent or neglected infections**
  - **International projects: basic and applied studies**

# Scientific priorities

- **Emerging or re-emerging infections**
  - **Emerging zoonotic and non-zoonotic infections**
    - **Important at the Local, National and International policy-making level**
    - **Lack of strategies and of specific tools, risk difficult to assess**
    - **Complex and dynamic phenomenon: transdisciplinary and international approaches**
  - **Research priorities**
    - **Impact of environmental changes and human behavior**
    - **Diagnostics, surveillance, detection of new pathogens**
    - **Host-pathogens interactions, pathogenesis, treatments and vaccines**
    - **Mechanisms of emergence, spread and inter-species movement**
    - **Consequences: ecological, social, politic and economic**



# **Institute of Infectious Diseases**

## **- Scientific priorities -**

- **Chronic viral infections: HIV and hepatitis**
  - **Research promoted, organized and supported by the ANRS**
  - **Main priorities**
    - **New criteria for new treatments: side effects, quality of life, compliance**
    - **Development of new strategies for prevention**
    - **Viral reservoir, viral regulation, viral latency**
    - **Cell entry of hepatitis C virus**
    - **International collaboration for development of new vaccines**
    - **Operational research in developing countries**

# Institute of Infectious Diseases

## - Scientific priorities -

- **Drug resistance**

- **Stakes:**

- **Comprehension of emergence and biological resistance**
    - **Diagnostic, therapeutic and prophylactic innovation**

- **Priorities**

- **Mechanisms and pathogenicity**
    - **Management of resistant infections**
    - **Dynamics of diffusion of resistant pathogens**
    - **Multi drug resistant tuberculosis**
    - **Risk anticipation**

# **Institute of Infectious Diseases - Scientific priorities -**

- **Hospital-acquired infections**
  - **Measurement and surveillance of morbidity and mortality**
  - **Evaluate control strategies**
    - **cost-benefit analysis**
    - **impact of rapid diagnostic techniques**
    - **prevention strategies**
    - **prospective cohorts and intervention trials**
  - **New methods of organization of the work**

# Institute of Infectious Diseases

## - Scientific priorities -

- **Vaccination policies**
  - **Difficult to implement: shift from collective paradigm to individual decision**
  - **Priorities**
    - **Theoretical evaluation of vaccination strategies for new vaccines**
    - **Immunological mechanism of vaccination failure**
    - **Social and psychological determinants of vaccination refusal**
    - **Multidisciplinary approach for an operational coordination**

# **Institute of Infectious Diseases**

## **- Scientific priorities -**

- **Developing World**
  - **Definition of the geographical space and of the thematic priorities**
  - **Improve coordination between French organisations**
  - **Improve public-private partnership as well as European and International collaborations**
  - **Set up strong partnership between North and South teams**
  - **Prioritize themes neglected by pharmaceutical industry**
    - **Drug development**
    - **Production and distribution of products**

# **Institute of Infectious Diseases - Challenges and Proposals -**

- **Strengthen the Microbiology Center**
- **Promote molecular taxonomy and new diagnostic techniques**
- **Emphasize research on pathogenesis and host-pathogens relations**
- **Promote drug resistance research**
- **Improve surveillance and infectious risk projections**
- **Develop research with developing countries**
- **Promote clinical, interface and vaccine research**
- **Encourage partnerships with private sector**

# Infectious Diseases

## - Organization of research -

- Fundamental research
- Interface research
- Public health research
- Research in developing countries

# Infectious Diseases

## - ANRS -



# Infectious Diseases - CNRS -

## Life Sciences Department

- 311 research units: 4,730 scientists
- Operating budget : €91,2m
- Infectious Disease
  - 56 research units
    - Molecular & cellular biology
    - Structural biology
    - Pharmacology
    - Genetics

# Infectious Diseases

## - Institut Pasteur Paris-

- 131 research units, 2,600 employees (1,876 Institut Pasteur)
- Operating budget: €86,5m.
- Infectious Disease
  - 85 research units
    - Bacteriology: 31.8%
    - Virology: 26% (HIV & Hepatitis: 50%)
    - Transverse research: 14%
    - Parasitology: 13%
    - Emerging diseases 8%, mycology: 7%

# Infectious Diseases

## - Institut de Veille Sanitaire -

- Missions: surveillance and alert
- 387 staff, mainly epidemiologists
- Budget: €59,8m.
- Infectious Diseases
  - 5 units
    - HIV, hepatitis, sexually transmitted diseases
    - Infection preventable by vaccination
    - Enteric, food-borne and zoonotic diseases
    - Air-route transmitted infections, imported & tropical diseases
    - Nosocomial infections

# Research in developing countries

- **International Network of Institut Pasteur**
  - 30 institutes in 6 continents: XXX staff
  - Public health, diagnosis, training and research, primarily in the field of infectious diseases
- **Institut de Recherche pour le Développement**
  - 30 centers: 2,100 staff (40% overseas)
  - Missions: research, expertise and training
  - Health & Social Sciences: 300 scientists, 80% in the field of infectious diseases

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# Infectious Diseases

- Programme Hospital of Clinical Research -

- Collaboration between university hospitals, CNRS and Inserm
- Calls for proposals every year, since 1996
- Infectious diseases:

# Infectious Diseases

## - Funding -

- French Research Agency: about €12 m of €955 m total
- ANRS:
- Other funding sources: difficult to assess
  - French funding: RTRS/RTRA, PRES, CPER, French regions, Ministry of Health, private sector .etc
  - European funding: PCRD
  - International funding:, Bill & Melinda Gates Foundation, NIH



# Institute of Infectious Diseases

## - Missions -

- Inventory of resources
  - Human resources, management structure (centers, units, teams), platforms
  - Budget: operating funding, grants
  - Research fields, scientific production
  - Clinical research
  - French and International collaboration, training

# Institute of Infectious Diseases

## - Missions -

- Research organisation
  - Animation: experts panel workshops, scientific meetings on research priorities, definition of needs
  - Advise on operational issues: recrutement, policy of sites, platforms

# Institute of Infectious Diseases

## - Missions -

- Coordination: calls for proposals
  - Research priorities
  - International research
  - High risk research
- Funding?

# Infectious Diseases

## - Inserm -

- 39/331 research units
- 103/1168 research teams: 49 île de France, 19 Rhône-Alpes, 11 North-East
- 843 scientists; 160 Inserm
- €4,78m : 8.2% of total operating budget ?