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)
InfecInfecInfecInfecInfecTious Diseases in France Tious Diseases in France Tious Diseases in France Tious Diseases in France Tious Diseases in France
Main Research Centers
Main Research Centers
Main Research Centers
Main Research Centers
Main Research Centers

Institut Pasteur Lille
Institut Pasteur Cochin/Pitié/Cordeliers
Mondor/Bicêtre/Orsay/CEA
Bichat/St Louis

BIOPOLE Lyon-Grenoble

INFECTIPOLE Sud
Marseille-Montpellier-Nice

Bordeaux

Strasbourg
## INSERM - CNRS

<table>
<thead>
<tr>
<th></th>
<th>INSERM</th>
<th>CNRS</th>
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<tbody>
<tr>
<td><strong>State of Research</strong></td>
<td></td>
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<tr>
<td>Research Teams</td>
<td>103</td>
<td>56</td>
</tr>
<tr>
<td>Researchers</td>
<td>160</td>
<td>143</td>
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<tr>
<td><strong>Scientific Fields</strong></td>
<td></td>
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<tr>
<td>Virology</td>
<td>44%</td>
<td>24%</td>
</tr>
<tr>
<td>HIV, Hepatitis 42%</td>
<td></td>
<td></td>
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<tr>
<td>Bacteriology</td>
<td>21%</td>
<td>38%</td>
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<tr>
<td>Parasitology</td>
<td>16%</td>
<td>9%</td>
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<tr>
<td>Pathogenesis, translational research</td>
<td>18%</td>
<td>16%</td>
</tr>
<tr>
<td>Molecular and structural biology</td>
<td>1%</td>
<td>13%</td>
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Scientific production 2006-2007
Infectious diseases: 15% of biomedical publications

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<tr>
<th></th>
<th>France</th>
<th>INSERM</th>
<th>% INSERM compared to France</th>
<th>CNRS</th>
<th>% CNRS compared to France</th>
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<tbody>
<tr>
<td>Publications</td>
<td>8948</td>
<td>1926</td>
<td>21%</td>
<td>1286</td>
<td>14%</td>
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<tr>
<td>Total citations</td>
<td>37320</td>
<td>8606</td>
<td>23%</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Top 1%</td>
<td></td>
<td>6.1%</td>
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</table>
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
Institut national
de la santé et de la recherche médicale

French National Institute of Health and Medical Research
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 Rhônes-Alpes, 11 North-East
- 843 scientists; 160 Inserm
- €4,78m : 8.2% of total operating budget?