Strengthening R&D capacity, financing and coordination among developing countries

Carlos M. Morel
Director
Centre for Technological Development in Health (CDTS)
Oswaldo Cruz Foundation (Fiocruz)
Ministry of Health of Brazil
Rio de Janeiro, RJ, Brazil
Outline of this presentation

• Developing countries, from the 1950s’ → today
  o North / South dichotomy
  o “Three Human Development Clubs”

• We live in a networked world
  o Health innovation networks
  o Innovative Developing Countries (IDCs)

• Neglected diseases, epidemiological transition and the challenges ahead
  o The economic impact of new interventions

• Capacity building: Three examples
  o Internal capacity building on NTDs in Brazil
  o South-South cooperation
  o Global-South cooperation
Developing countries, from the 1950s’ → today

The end of “North-South” dichotomy?
Three Human Development Clubs
The world, 1948-2011: economy and health

1948: a bipolar world
North/South, rich/poor

Today: a multipolar world
North, South, BRICS, IDCs*

Income per person, GDP/capita, PPP$ inflation-adjusted

Life expectancy (years)

The Emergence of Three Human Development Clubs

Sebastian Vollmer\textsuperscript{1,2*}, Hajo Holzmann\textsuperscript{3}, Florian Ketterer\textsuperscript{3}, Stephan Klasen\textsuperscript{1}, David Canning\textsuperscript{2}

\textsuperscript{1}Department of Economics and Courant Research Center “Poverty, Equity and Growth in Developing Countries”, University of Göttingen, Göttingen, Germany, \textsuperscript{2}Department of Global Health and Population, Harvard School of Public Health, Boston, Massachusetts, United States of America, \textsuperscript{3}Department of Mathematics and Computer Science, University of Marburg, Marburg, Germany

Abstract

We examine the joint distribution of levels of income per capita, life expectancy, and years of schooling across countries in 1960 and in 2000. In 1960 countries were clustered in two groups; a rich, highly educated, high longevity “developed” group and a poor, less educated, high mortality, “underdeveloped” group. By 2000 however we see the emergence of three groups; one underdeveloped group remaining near 1960 levels, a developed group with higher levels of education, income, and health than in 1960, and an intermediate group lying between these two. This finding is consistent with both the ideas of a new “middle income trap” that countries face even if they escape the “low income trap”, as well as the notion that countries which escaped the poverty trap form a temporary “transition regime” along their path to the “developed” group.

Science, technology and production in developed and developing countries

Patents/USPTO, 1985-2012
Brazil and South Korea

South Korea

Brazil

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011

1 10 100 1000 10000 100000

39 50 14.440 336
The Sisyphus Challenge in Brazil

Health Economic Industrial Complex

Source: GIS/ENSP–VPPIS/FIOCRUZ, from data of Rede Alice (SECEX/MDIC), 2010.
Note: values in US$ billion, updated by North-American CPI
We live in a networked world

Health Innovation Networks
Innovative Developing Countries
Evolution of the scientific enterprise. (Left) For centuries, creative individuals were embedded in an invisible college, that is, a community of scholars whose exchange of ideas represented the basis for scientific advances. Although intellectuals built on each other’s work and communicated with each other, they published alone. Most great ideas were attributed to a few influential thinkers: Galileo, Newton, Darwin, and Einstein. Thus, the traditional scientific enterprise is best described by many isolated nodes (blue circles). (Middle) In the 20th century, science became an increasingly collaborative enterprise, resulting in such iconic pairs as the physicist Crick and the biologist Watson (left), who were responsible for unraveling DNA’s structure. The joint publications documenting these collaborations shed light on the invisible college, replacing the hidden links with published coauthorships. (Right) Although it is unlikely that large collaborations—such as the D0 team in particle physics or the International Human Genome Sequencing Consortium pictured here—will come to dominate science, most fields need such collaborations. Indeed, the size of collaborative teams is increasing, turning the scientific enterprise into a densely interconnected network whose evolution is driven by simple universal laws.
Health Innovation Networks

Health Innovation Networks to Help Developing Countries Address Neglected Diseases


Gross inequities in disease burden between developed and developing countries are now the subject of intense global attention. Public and private donors have marshaled resources and created organizational structures to accelerate the development of new health products and to procure and distribute drugs and vaccines for the poor. Despite these encouraging efforts directed primarily from and funded by industrialized countries, sufficiency and sustainability remain enormous challenges because of the sheer magnitude of the problem. Here we highlight a complementary and increasingly important means to improve health equity: the growing ability of some developing countries to undertake health innovation.

“

All developing countries can undertake health innovation to varying degrees. Some developing countries, however, are more scientifically advanced than others and are starting to reap benefits from decades of investments in education, health research infrastructure, and manufacturing capacity. We refer to these as innovative developing countries (IDCs)”

Network model of drug development (Kaitin, 2010)

PDPs are working with a constellation of biopharmaceutical and academic partners

Note: Size of halo and number in red represent number of partner’s connection to PDPs.
* Beckton Dickinson is a medical device company, and Bio Merieux and Cibitess are diagnostic companies.

Neglected diseases, epidemiological transition and challenges ahead

The economic impact of new interventions
2001: The *Fatal Imbalance* Report

What kinds of needs does the pharmaceutical market cover?

A represents Global Diseases, such as cancer, cardiovascular diseases, mental illness and neurological disorders, which constitute the major focus of the R&D-based pharmaceutical industry. Although affecting developed and developing countries, most people in developing countries who have needs for drugs to treat these diseases cannot afford them, and are thus not covered by the pharmaceutical market.

B represents Neglected Diseases, such as malaria and tuberculosis (TB), for which the R&D-based pharmaceutical industry has only marginal interest. Although also affecting people in wealthy countries, for example TB patients or people who get malaria while travelling, these illnesses primarily affect people in developing countries.

C represents the Most Neglected Diseases, such as sleeping sickness, Chagas disease and leishmaniasis, which exclusively affect people in developing countries. Because most of these patients are too poor to pay for any kind of treatment, they represent virtually no market and for the most part fall outside the scope of the drug industry’s R&D efforts, and thus outside the pharmaceutical market.

Z represents the part of the pharmaceutical market for products addressing conditions other than those which are purely medical (such as cellulite, baldness, wrinkles, dieting, stress and jet-lag), which nonetheless represent a highly profitable market segment in wealthy countries.

2012: The CEWG Report

Research and Development to Meet Health Needs in Developing Countries: Strengthening Global Financing and Coordination


Transforming Individual Successes into Sustainable Change to Ensure Health Innovation for Neglected Patients: WHY AN ESSENTIAL HEALTH R&D CONVENTION IS NEEDED

DNDi POLICY BRIEF
April 2012

World Health Organization

DNDi
Drugs for Neglected Diseases initiative
Global epidemiological transition, 2004 → 2030

**Figure 1.1. Projected changes in the ten leading causes of burden of diseases in 2004 and 2030**

<table>
<thead>
<tr>
<th>2004 Disease or injury</th>
<th>As % of total DALYs</th>
<th>Rank</th>
<th>2030 Disease or injury</th>
<th>As % of total DALYs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower respiratory infections</td>
<td>6.2</td>
<td>1</td>
<td>Unipolar depressive disorders</td>
<td>6.2</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>4.8</td>
<td>2</td>
<td>Ischaemic heart disease</td>
<td>5.5</td>
</tr>
<tr>
<td>Unipolar depressive disorders</td>
<td>4.3</td>
<td>3</td>
<td>Road traffic accidents</td>
<td>4.9</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>4.1</td>
<td>4</td>
<td>Cerebrovascular disease</td>
<td>4.3</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>3.8</td>
<td>5</td>
<td>Chronic obstructive pulmonary disease</td>
<td>3.8</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>3.1</td>
<td>6</td>
<td>Lower respiratory infections</td>
<td>3.2</td>
</tr>
<tr>
<td>Prematurity and low birth weight</td>
<td>2.9</td>
<td>7</td>
<td>Hearing loss, adult onset</td>
<td>2.9</td>
</tr>
<tr>
<td>Birth asphyxia and birth trauma</td>
<td>2.7</td>
<td>8</td>
<td>Refractive errors</td>
<td>2.7</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>2.7</td>
<td>9</td>
<td>HIV/AIDS</td>
<td>2.5</td>
</tr>
<tr>
<td>Neonatal infections and other</td>
<td>2.7</td>
<td>10</td>
<td>Diabetes mellitus</td>
<td>2.3</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>2</td>
<td>13</td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td>Refractive errors</td>
<td>1.8</td>
<td>14</td>
<td>Prematurity and low birth weight</td>
<td>1.9</td>
</tr>
<tr>
<td>Hearing loss, adult onset</td>
<td>1.8</td>
<td>15</td>
<td>Birth asphyxia and birth trauma</td>
<td>1.9</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.3</td>
<td>19</td>
<td>Diarrhoeal diseases</td>
<td>1.6</td>
</tr>
</tbody>
</table>

*Source: WHO (2008).*
Figure 1.2. Projected global deaths for selected causes, 2004-2030

The BioPharma Landscape

Surveying Tomorrow’s BioPharma Landscape
The NASDAQ Biotech Index Up Close

EvaluatePharma
Small molecules $\rightarrow$ Biologics $\rightarrow$ $\$\$\$\$\$

Figure 3. Percentage of biologics vs. small molecules on the market and in the pipeline

Source: EvaluatePharma® (May 30, 2012)

- **Marketed & Approved Products**
  - Small Molecules: 92%
  - Biologics: 8%

- **Pipeline Products**
  - Small Molecules: 58%
  - Biologics: 42%
Table 2. Top 20 NBI pipeline products (Phase I, II, III, or Filed) ranked by estimated 2018 sales

Source: EvaluatePharma® (May 30, 2012)
Sales data are for sales made by the NBI company and do not include sales revenue of partners

<table>
<thead>
<tr>
<th>Rank</th>
<th>Product</th>
<th>Company</th>
<th>Therapeutic Category</th>
<th>2018E ($M)</th>
<th>Phase (Current)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GS-7977</td>
<td>Gilead Sciences</td>
<td>Systemic Anti-infectives</td>
<td>$5,359</td>
<td>Phase III</td>
</tr>
<tr>
<td>2</td>
<td>BG-12</td>
<td>Biogen Idec</td>
<td>Central Nervous System</td>
<td>$3,400</td>
<td>Filed</td>
</tr>
<tr>
<td>3</td>
<td>Quad</td>
<td>Gilead Sciences</td>
<td>Systemic Anti-infectives</td>
<td>$2,793</td>
<td>Filed</td>
</tr>
<tr>
<td>4</td>
<td>Qnexa</td>
<td>VIVUS</td>
<td>Gastro-Intestinal</td>
<td>$983</td>
<td>Filed</td>
</tr>
<tr>
<td>5</td>
<td>Kyprolis</td>
<td>Onyx Pharmaceuticals</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$897</td>
<td>Filed</td>
</tr>
<tr>
<td>6</td>
<td>Ponatinib</td>
<td>ARIAD Pharmaceuticals</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$884</td>
<td>Phase II</td>
</tr>
<tr>
<td>7</td>
<td>AV-951</td>
<td>AVEO Oncology</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$515</td>
<td>Phase III</td>
</tr>
<tr>
<td>8</td>
<td>AMR101</td>
<td>Amarin</td>
<td>Cardiovascular</td>
<td>$510</td>
<td>Filed</td>
</tr>
<tr>
<td>9</td>
<td>VX-809</td>
<td>Vertex Pharmaceuticals</td>
<td>Respiratory</td>
<td>$490</td>
<td>Phase II</td>
</tr>
<tr>
<td>10</td>
<td>GRN163L</td>
<td>Geron</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$468</td>
<td>Phase II</td>
</tr>
<tr>
<td>11</td>
<td>Seasonal Flu VLP Vaccine</td>
<td>Novavax</td>
<td>Systemic Anti-infectives</td>
<td>$462</td>
<td>Phase II</td>
</tr>
<tr>
<td>12</td>
<td>Ganetespib</td>
<td>Synta Pharmaceuticals</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$449</td>
<td>Phase III</td>
</tr>
<tr>
<td>13</td>
<td>GALNS</td>
<td>BioMarin Pharmaceutical</td>
<td>Various</td>
<td>$429</td>
<td>Phase III</td>
</tr>
<tr>
<td>14</td>
<td>Allovecitin-7</td>
<td>Vical</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$419</td>
<td>Phase III</td>
</tr>
<tr>
<td>15</td>
<td>ALN-TTR01</td>
<td>Alnylam Pharmaceuticals</td>
<td>Various</td>
<td>$385</td>
<td>Phase I</td>
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<tr>
<td>16</td>
<td>Elvitegravir</td>
<td>Gilead Sciences</td>
<td>Systemic Anti-infectives</td>
<td>$367</td>
<td>Phase III</td>
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<tr>
<td>17</td>
<td>Cabozantinib</td>
<td>Exelisix</td>
<td>Oncology &amp; Immunomodulators</td>
<td>$327</td>
<td>Phase III</td>
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<td>18</td>
<td>Gattex</td>
<td>NPS Pharmaceuticals</td>
<td>Gastro-Intestinal</td>
<td>$310</td>
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<td>19</td>
<td>PEGylated-IFN β-1a</td>
<td>Biogen Idec</td>
<td>Central Nervous System</td>
<td>$308</td>
<td>Phase III</td>
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<td>20</td>
<td>ENB-0040</td>
<td>Alexion Pharmaceuticals</td>
<td>Musculoskeletal</td>
<td>$302</td>
<td>Phase III</td>
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</table>
Déficit da Balança Comercial

Fonte: elaborado por GIS/ENSP/FIOCRUZ, 2011, a partir de dados da Rede Alice / MDIC.

Déficit no patamar de US$ 10 bilhões
Capacity building: Three examples

- Capacity building on NTDs in Brazil
- South-South cooperation
- Global-South cooperation
Capacity building: First example

Strengthening R&D on neglected diseases in Brazil
Collaboration academia – Ministry of Health on NTDs

Doenças negligenciadas: estratégias do Ministério da Saúde

Neglected diseases: the strategies of the Brazilian Ministry of Health
## R&D Funding of NTDs by the MoH, Brazil, 2003-09

<table>
<thead>
<tr>
<th>Year</th>
<th>Call for Applications</th>
<th>R$ (million)</th>
<th>US$ (million)</th>
<th>Exch. rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>TB network</td>
<td>$1.90</td>
<td>$0.66</td>
<td>2.889</td>
</tr>
<tr>
<td>2004</td>
<td>Dengue</td>
<td>$0.95</td>
<td>$0.36</td>
<td>2.654</td>
</tr>
<tr>
<td>2005</td>
<td>Leprosy</td>
<td>$2.50</td>
<td>$1.07</td>
<td>2.337</td>
</tr>
<tr>
<td>2006</td>
<td>Neglected Diseases</td>
<td>$17.00</td>
<td>$7.97</td>
<td>2.1342</td>
</tr>
<tr>
<td>2007</td>
<td>Neglected Diseases</td>
<td>$22.00</td>
<td>$12.42</td>
<td>1.7713</td>
</tr>
<tr>
<td>2008</td>
<td>Malaria network</td>
<td>$15.40</td>
<td>$6.59</td>
<td>2.3362</td>
</tr>
<tr>
<td>2009</td>
<td>Dengue network</td>
<td>$22.70</td>
<td>$13.04</td>
<td>1.7404</td>
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<tr>
<td></td>
<td></td>
<td><strong>$82.45</strong></td>
<td><strong>$42.11</strong></td>
<td></td>
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</table>

Co-authorship Network Analysis: A Powerful Tool for Strategic Planning of Research, Development and Capacity Building Programs on Neglected Diseases

Carlos Medicis Morel¹*, Suzanne Jacob Serruya²a, Gerson Oliveira Penna³, Reinaldo Guimarães⁴

¹ National Institute for Science and Technology on Innovation on Neglected Diseases (INCT/IDN), Center for Technological Development in Health (CDTS), Oswaldo Cruz Foundation (Fiocruz), Rio de Janeiro, Brazil, ² Department of Science and Technology (DECIT), Secretary of Science, Technology and Strategic Goods (SCTIE), Ministry of Health, Brasilia, Brazil, ³ Secretary of Health Surveillance (SVS), Ministry of Health, Brasilia, Brazil, ⁴ Secretary of Science, Technology and Strategic Goods (SCTIE), Ministry of Health, Brasilia, Brazil
Collaboration MoH-INPI (National Institute Industrial Property)

Enabling Policy Planning and Innovation Management through Patent Information and Co-Authorship Network Analyses: A Study of Tuberculosis in Brazil

Alexandre Guimarães Vasconcellos¹, Carlos Medicis Morel²*

¹ National Institute of Industrial Property (INPI), Rio de Janeiro, RJ, Brazil, ² National Institute for Science and Technology on Innovation on Neglected Diseases (INCT/IDN), Center for Technological Development in Health (CDTS), Oswaldo Cruz Foundation (Fiocruz), Rio de Janeiro, RJ, Brazil

Figure 7. Status of patent applications related to TB medicines or diagnostics applied by Brazilian nationals, 1995–2008. doi:10.1371/journal.pone.0045569.g007
Capacity building: Second example

South-South cooperation
Initiative for Antiretrovirals and Additional Drugs Factory Plant Installation in Mozambique

A Project of the International Technical Cooperation between Brazil and Mozambique in Health

licia@far.fiocruz.br
Brazilian References in International Cooperation

- Ministry of Agrarian Development
  - Family farming
- Ministry of Education
  - School feeding
- Ministry of Social Development
  - Conditional cash transfer programs
- Ministry of Health
  - HIV/AIDS treatment, human milk banks, policies for the public production of generic drugs
International priorities

• UNASUR - Union of South American Nations (www.unasursalud.org)

• ACTO - Amazon Cooperation Treaty Organization (www.otca.org.br)

• CPLP - Community of Portuguese Speaking Countries: Africa, Asia, Europe (www.cplp.org)
THE INITIATIVE

Objective: To create a public enterprise in Mozambique aimed at sustainable production of antiretrovirals and additional drugs

“Sociedade Moçambicana de Medicamentos” (SMM S.A.)
Aquisition of an area of 20,000 m², in Matola, Maputo´s Province, (3,000 m² for the new factory)
Activities of the initiative

- Training of human resources in Mozambique, both at the technical and managerial levels
- Technology transfer for industrial production and quality control of medicines by the SMM
- Assistance in the technical and administrative management of the pharmaceutical business
- Goal: international certification for Good Manufacturing Practices (GMP)
Financing

- The Initiative is co-financed by the governments of Brazil and Mozambique over a 8-year period
  - Brazil invested about 21 million dollars
  - Mozambique about 15 million dollars
- Additional contribution of 4.4 million dollars donated by “Vale”, a private Brazilian company that operates in Mozambique
Expected outcomes

- Highly specialized local industry
- Economically sustainable public enterprise
- Strengthening the regulatory agency
- Demand to formulate pharmaceutical policies more articulated to other health policies
- Economic sustainability from year 7
2009 – 2011: Local capacity building and acquisition of equipment
2011 – 2012: Delivery and installation of equipment
2012: Installation of equipment and local capacity building
2012: Capacity building at Farmanguinhos, Fiocruz, Rio de Janeiro
2012: Start up of the SMM operation
Visits of President Lula to SMM, 2008 and 2010
2012: Visit of the Vice-President of Brazil, Michel Temer
Challenges

- Composition of the public budget is 40% dependent of foreign donation
- Country is more than 80% dependent of medicines supplied by international donations.
- The country also faces an HIV/AIDS epidemic that affects about 18% of the population
- Treatment reaches less than 40% of adults and 25% of the infected children
MAIN AGENTS INVOLVED IN THE INITIATIVE

DEPARTMENT OF PHARMACEUTICALS MINISTRY OF HEALTH -MISAU
MINISTRY OF FINANCE
MINISTRY OF FOREIGN AFFAIRS AND COOPERATION
IGEPE - INSTITUTE OF MANAGEMENT OF STATE PARTICIPATIONS

Additional information:
licia@far.fiocruz.br
Capacity building: Third example

Global-South cooperation: Translation Science at Fiocruz
Fundação Oswaldo Cruz (Fiocruz)
Oswaldo Cruz Foundation
Ministry of Health of Brazil

1900 - 2014

www.fiocruz.br
1900s’
Fertile grounds

Can Brazil use its booming economy and abundant natural resources to become a life-sciences juggernaut? Gene Russo finds out.
DISTRIBUTION OF FIOCRUZ TECHNICAL UNITS in BRAZIL

10 Research Institutes
3 Health Schools
2 Hospitals
2 Production Plants
1 Technological Center
1 Health History Center
1 Information Center
1 Quality Control Center
1 Public Health Center
Fiocruz: Some figures

- **Staff**: > 12 thousand, including 900 PhDs
- **Budget**: > US$ 1 billion
- **Research**: ~1,800 R&D ongoing projects and an average of 1,500 research papers per year
- **Teaching**: >10 thousand students
- **Annual industrial production**
  - ~110 million doses of vaccines
  - ~4 billion pharmaceutical units
  - ~3 million diagnostic tests
TECHNOLOGICAL PRODUCTS

PHARMACEUTICAL PRODUCTION
Malaria, leishmaniasis, leprosy, TB, Chagas, hepatitis
Anti-retrovirals
Phytoterapeutic drugs; Bioinsecticides
Allergy, hypertension, diabetes

VACCINE PRODUCTION
• Actual production 150M/year:
  Yellow fever, measles, polio, meningitis A+C,
  DPT + Hib, triple viral
• New developments
  Double viral, tetra bacterial

Quick diagnostic test
  HIV - Dengue
  Leptospirosis - Leishmaniasis
Health & Medical Care Reference Centers

INFECTION DISEASES
Leishmaniasis, mycoses, tuberculosis and other mycobacteria
Sexually transmitted diseases and HIV-AIDS
Dengue and other acute fevers
Focus on TB

MATERNAL & INFANT CARE
High risk pregnancy, neonatology, genetic counseling,
Pediatrics, lactation and human milk banks
Cervical and uterine cancers

HEALTH CENTER - PRIMARY CARE
Health promotion protocols (seniors, AIDS, drug addiction)
Prenatal care
Immunization programs
Clinical trials
Déficit da Balança Comercial

Fonte: elaborado por GIS/ENSP/FIOCRUZ, 2011, a partir de dados da Rede Alice / MDIC.

Déficit no patamar de US$ 10 bilhões
How Fiocruz is shaping its innovation pipeline

CDTS & CIPBR at Fiocruz, Rio de Janeiro
CDTS + CIPBR: Strengthening Fiocruz technological innovation pipeline

At a glance

- Headquarters in Rio de Janeiro
- Over 10,000 people in 22 units across 11 cities in Brazil, with one office in Maputo, Mozambique
- Budget of over US $1 billion
- Remit: research; education; technological production; reference services; information/communication; planning and management

CDTS AND CIPBR

- The Center for Technological Development in Health (CDTS) and Integrated Center for Prototypes, Biopharmaceuticals and Reagents for Diagnoses (CIPBR) are two major, far-reaching ‘structuring’ Fiocruz projects, representing a US $200 million investment by the Brazilian Government
- CDTS – focused on late discovery and preclinical stages of development of health products under Good Laboratory Practices
- CIPBR – centred on late development, clinical stages and regulatory aspects of development and manufacture of health products under Good Manufacture Practices

FIOCRUZ and CAPES agreed to sponsor a Fellowship Program to attract Visiting Scientists and Post-doctoral candidates for the Foundation’s new Center for Technological Development in Health (CDTS)

An advertisement about the Program was published in the scientific journals *Science* and *Nature* on August 2006

Applications received were analyzed and prioritized by a scientific committee nominated by both institutions
40 applications were short-listed during the period August 11- October 10, 2006

Areas of expertise of the 16 approved candidates
Bioinformatics; Comparative Genomics; Immunology; Pharmacogenetics; Pharmacoproteomics; Protein Chemistry; Purification of Recombinant Proteins
Scientists attracted by the Fellowship Program

Jochen Junker
Germany
NMR

Nicolas Carels
Belgium
Bioinformatics

William Provance
USA
Cell Biology
VISITING-PROFESSOR, POST-DOCTORAL LONG-TERM COLLABORATION PROGRAM

The Oswaldo Cruz Foundation (Fiocruz; www.fiocruz.br), an institution affiliated to the Brazilian Ministry of Health, is building the Center for Technological Development in Health (CDTS for its acronym from Portuguese). Following its inauguration in 2014, the buildings of the CDTS will host technological platforms, animal experimentation and flexible laboratories in 20,000 m² of state of the art facilities. The CDTS will provide the necessary infrastructure to fully implement the spirit of the Brazilian 2004 Law on Innovation, which encourages partnerships between public and private sectors. Fiocruz has mandated the CDTS to establish and work in collaboration with other centers of scientific excellence for the joint development of health products against diseases that are of epidemiological or economic importance to Brazil, especially neglected tropical diseases.

To mobilize and strengthen the human resources needed, Fiocruz and CAPES (an agency of the Ministry of Education) have dedicated the following fellowships for PhDs to collaborate with the CDTS. In the long term the program aims to establish sustained partnerships between Fiocruz and other leading institutions, both public and private.

1. Post-doctoral Program

Open to Brazilian candidates who have completed their PhD/ DSc work and are willing to perform post-doctoral training at public or private institutions in Brazil or abroad with a commitment to join a CDTS project upon the completion of the program.

- **RD-BR**: up to 20 (twenty) Post-doctoral Fellowships to train young Brazilian scientists in public or private R&D centers of excellence in Brazil (maximum 48 months);

- **PD**: up to 10 (ten) Post-doctoral fellowships to train young Brazilian scientists at institutions abroad (maximum 12 months).

2. Visiting Professor Program

open to scientists and technology management professionals at PhD/ DSc or equivalent level, from institutions of public or private sectors, with proven experience and outstanding achievement. Citizens from countries that maintain a diplomatic relationship with Brazil are eligible. The program is available for stays lasting from one week to one year and can be renewed. The work will be conducted at Fiocruz. Stipends will be determined based on experience.

- **PD-ES**: up to 10 (ten) Visiting Professor Fellowships to support senior Brazilian scientists to conduct research abroad (maximum 18 months);

- **PVE**: up to 10 (ten) Visiting Professor Fellowships to support foreign professionals for collaboration on projects within the CDTS and to participate in Fiocruz graduate programs (maximum 48 months);

- **PVNS**: up to 10 (ten) Visiting Senior Professor Fellowships to support senior Brazilian scientists to collaborate on projects within the CDTS and to participate in Fiocruz graduate programs (maximum 48 months).

Candidates will be selected by a six-member expert panel nominated by Fiocruz and CAPES.

The program will run until 2016.

For further information or to express interest, contact: Center for Technological Development in Health (CDTS)

Centro de Desenvolvimento Tecnológico em Saúde (CDTS)

Av. Prof. Mário de Campos Leme, 770 - Rio de Janeiro - RJ - 21941-900 - Brasil

E-mail: cdts@fiocruz.br

Phone: +55 21 3842 5291
2nd Phase of the Program

CAPES-Fiocruz/CDTS Fellowship Program: Results of the Call for Applications
109 candidates from 26 countries / 41 selected from 14 countries
2-6 December 2013: Meeting in Rio de Janeiro, Brazil, with all 31 Visiting Professors

**Translational Science at Fiocruz:**
**Building International Collaborations**
Thank you
Muito obrigado
morel@cdts.fiocruz.br
cmmmorel@gmail.com