International Federation
of Pharmaceutical
Manufacturers & Associations

Pharmaceutical R&D Projects

to Discover Cures for Patients with Neglected Conditions

2012 status report on pharmaceutical R&D to address diseases that disproportionately affect people in low- and middle-income countries

IFPMA

"The research-based pharmaceutical industry is actively involved in the fight against diseases primarily affecting vulnerable populations. The R&D pipeline is growing, with 132 compounds in development, showing its commitment to this pressing health challenge. Recent progress shows the benefits of a multi-stakeholder approach: four of five R&D projects are carried out through innovative collaborations with non-industry partners."

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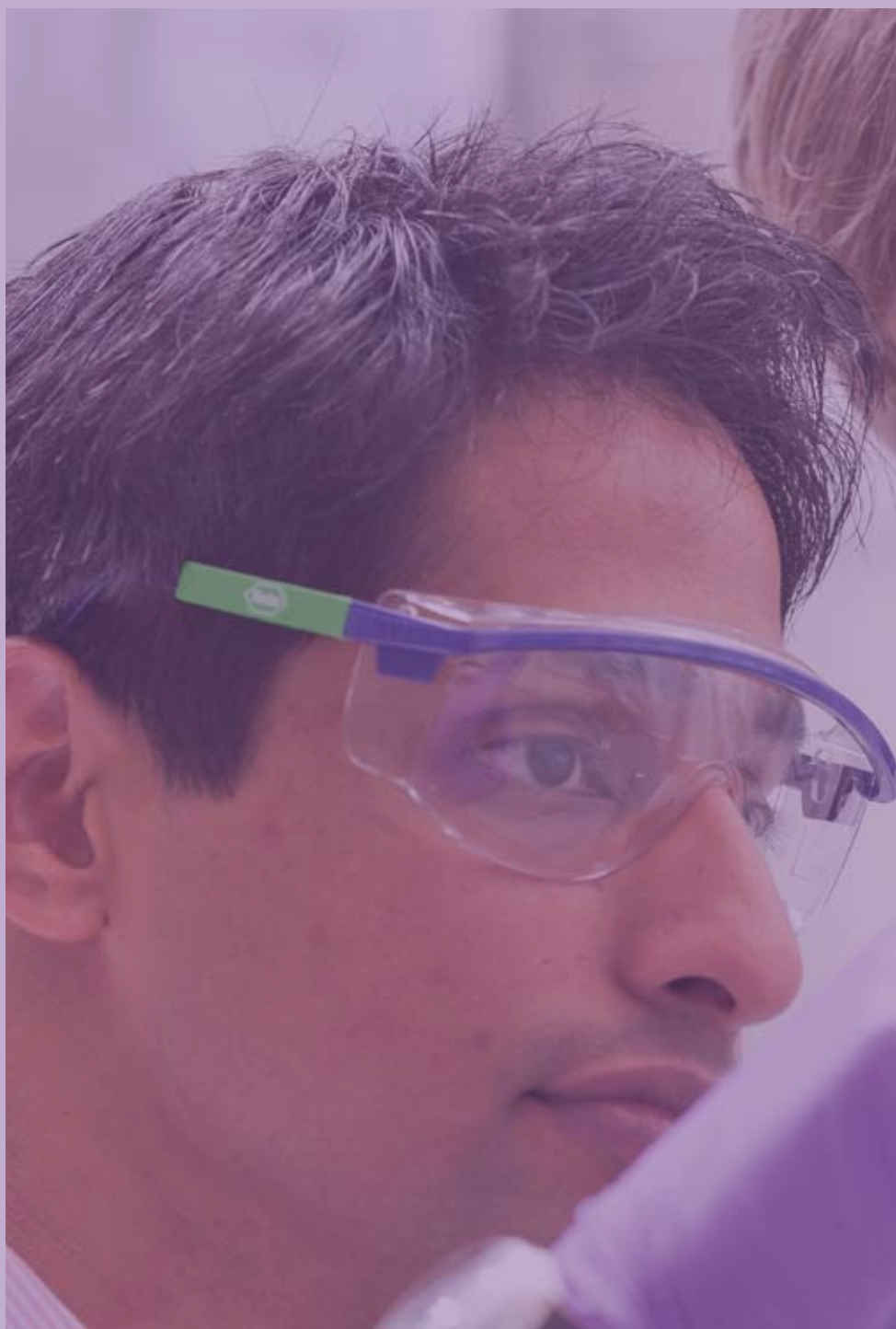


Cutting-edge R&D for unmet health needs

One billion people affected worldwide. One person in seven suffers from one or more neglected diseases. Each year neglected diseases disproportionately kill or disable millions of poor people primarily in tropical and subtropical areas of the world.

Neglected diseases are a group of debilitating conditions linked to poverty. They can cause blindness, chronic pain, severe disability, disfigurement or even death. Affecting both children and adults, these diseases can impair childhood development, lead to stigmatization and hinder economic productivity by limiting the ability of infected individuals to work. Their impact on individuals and communities is devastating. As long as neglected diseases continue to be endemic in poor countries, they will remain a contributor to a vicious cycle of poverty in these regions.

Neglected diseases by the numbers

132 R&D projects to develop new medicines and vaccines for ten diseases that are prioritized by TDR, the Special Programme for Research and Training in Tropical Diseases, sponsored by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the World Bank and WHO.

Pharmaceutical R&D investment reached total **USD 525.1 million** in 2011, increasing our investments by 4.2% in a year when most public and philanthropic funding levels decreased.

Pharmaceutical industry is the **3rd largest funder** of R&D for neglected diseases.

14 billion treatments donated this decade to support the elimination or control of nine key neglected diseases.

16% of health partnerships programs implemented by the research-based pharmaceutical industry are fully dedicated to fighting neglected diseases.

Eliminating or controlling neglected diseases is achievable. Success relies on multi-stakeholder approaches, which not only drive further R&D but also integrate environmental improvements, boosting capacity-building efforts, effective health policies, better screening, and availability of quality, safe and effective medicines.

A comprehensive effort to fight against neglected diseases is needed. The pharmaceutical industry is the third largest funder of R&D for neglected diseases. In addition, as a partner in global health, the pharmaceutical industry works with the WHO and other partners to implement capacity-building efforts in low- and middle-income countries. These efforts are complemented by medicine donation programs.

This status report provides a snap shot of the R&D projects funded by IFPMA members in 2012.

R&D projects to discover new or improved treatments to cure neglected diseases

The research-based pharmaceutical industry contributes to the fight against neglected diseases in several ways. First, through cutting-edge R&D: IFPMA member companies currently work on 132 R&D projects.[1] The focus is on improving or developing new medicines and vaccines for ten diseases that are prioritized by TDR, the Special Programme for Research and Training in Tropical Diseases, sponsored by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the World Bank and WHO. These diseases are: tuberculosis, malaria, human African trypanosomiasis (sleeping sickness), leishmaniasis, dengue, onchocerciasis (river blindness), American trypanosomiasis (Chagas disease), schistosomiasis, leprosy, and lymphatic filariasis.

In 2012, of the 132 R&D projects listed in this status report, 112 are product development partnerships (PDPs) involving IFPMA member companies, the remaining 20 (15%) projects are company-only undertakings. The number of medicine and vaccine R&D projects has increased by over 40%, from 93 in 2011 to 132 in 2012.

1 A project is a compound in development for a specific disease target, or a program to screen compounds against a specific disease. Data are from responses to IFPMA queries and open sources.

Growing R&D pipeline by industry and partners for neglected diseases

	2005	2006	2007	2008	2009	2010	2011	2012
Medicines	32	43	50	58	75	91	82	117
Vaccines	(not counted)	6	8	9	9	11	11	15
Totals projects	32	49	58	67	84	102	93	132

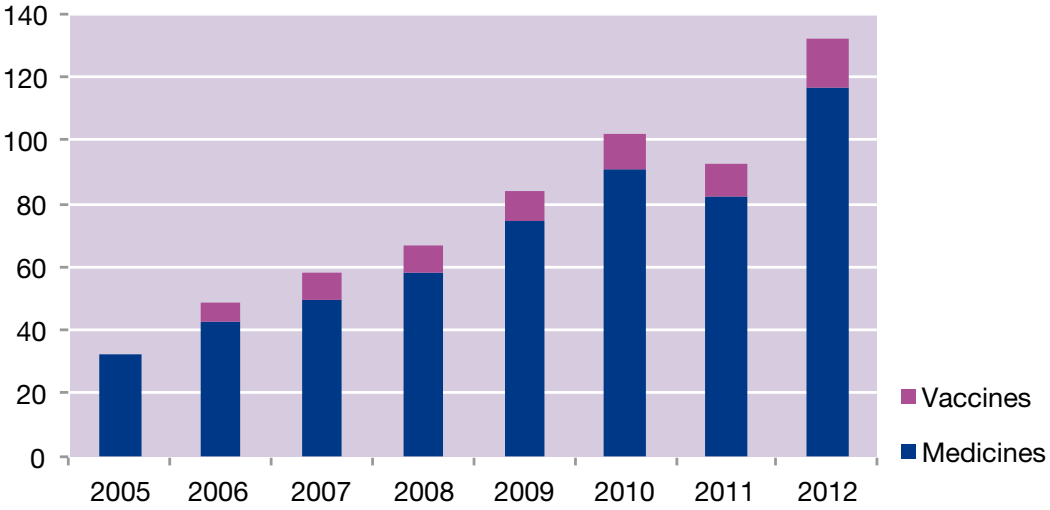


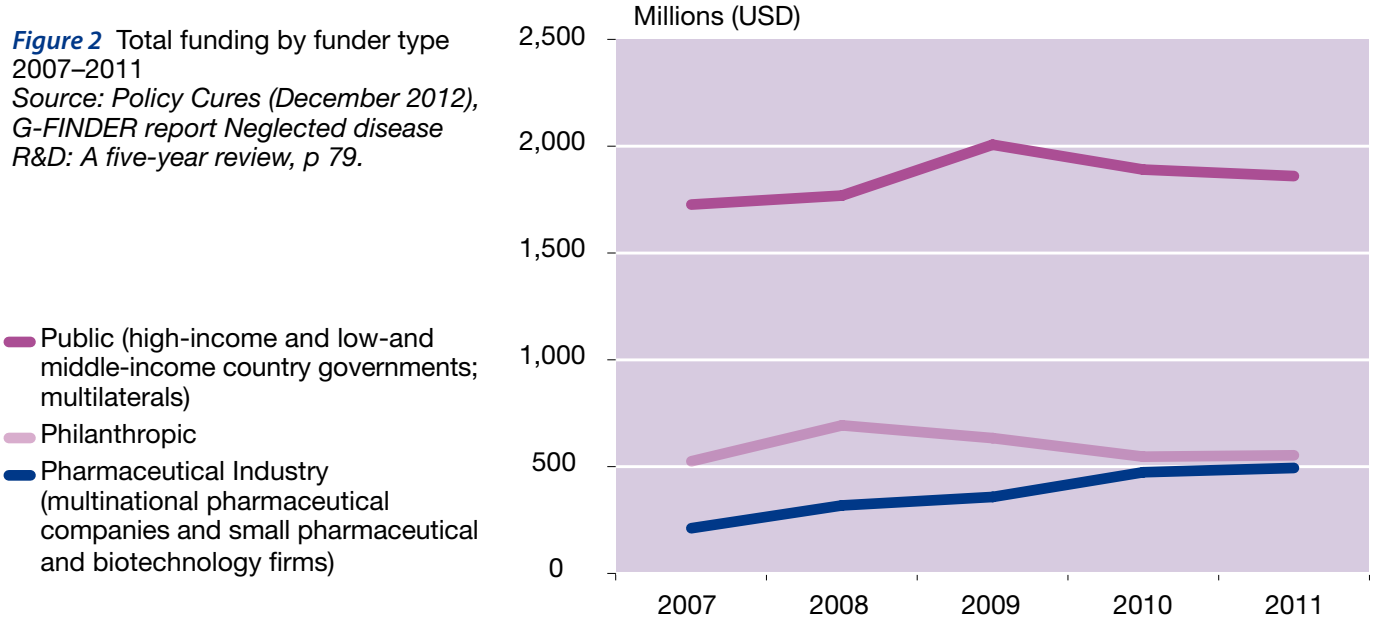
Figure 1 R&D projects that focus on improving or developing new medicines and vaccines for ten diseases that are prioritized by TDR
Source: Responses to IFPMA queries and open sources

Diseases	Ongoing medicines R&D projects	Ongoing vaccines R&D projects	Approvals since 2005	R&D projects terminated since 2005
Tuberculosis	37	3	0	13
Malaria	31	6	3	21
Other neglected diseases	49	6	3	17
Totals	117	15	6	51

Global investment into R&D of new products for neglected diseases

New data from the fifth annual G-FINDER report "Neglected disease R&D: A five-year review" shows total R&D funding for neglected diseases as USD 3.05 billion in 2011. The public sector provides nearly two-thirds (USD 1.9 billion, 64%) of global funding for R&D followed by the philanthropic sector contributions (USD 570.6 million, 18.7%) and the pharmaceutical industry (USD 525.1 million, 17.2%). In 2011, the largest sectoral increase came from the pharmaceutical industry which rose by USD 20 million (+4.2%). In terms of five-year trends, both public and philanthropic sector funding have dropped since the global financial crisis, although both still reached higher levels in 2011 than in 2007. Meanwhile, multinational pharmaceutical company investment increased dramatically since 2008 with a USD 193.6 million increase.

Figure 2 Total funding by funder type 2007–2011
Source: Policy Cures (December 2012), G-FINDER report Neglected disease R&D: A five-year review, p 79.



Emergence of dedicated pharmaceutical industry R&D centers searching for cures to neglected diseases

The industry's efforts are supported by R&D centers which are dedicated solely to diseases that disproportionately affect people in low- and middle-income countries. Some companies integrate these R&D activities within their broader R&D organization while others provide financial and technical support to independent institutions. For example, Lilly supports the Infectious Disease Research Institute (IDRI) in Seattle, USA, for early phase drug discovery efforts for new or improved therapies for tuberculosis, including multidrug-resistant strains.

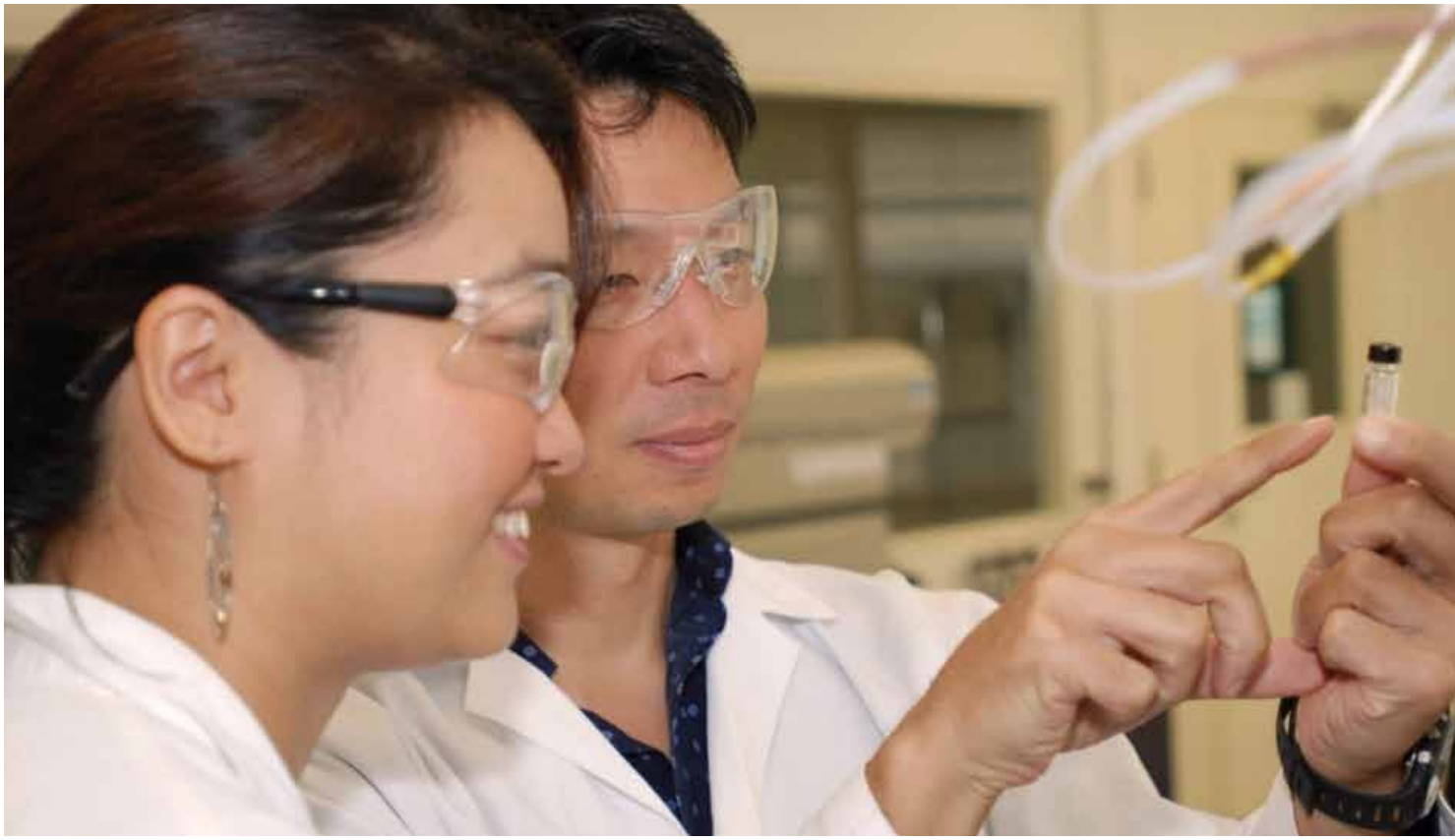
Company	R&D center	Location	Disease	Since
AstraZeneca	Bangalore Research Institute	Bangalore, India	Tuberculosis Malaria	2003 2009
GlaxoSmithKline	Tres Cantos Medicines Development Campus	Tres Cantos, Spain	Malaria Tuberculosis Kinetoplastids	2002
MSD/Merck & Co.	MSD Wellcome Trust Hilleman Laboratories	New Delhi, India	Rotavirus	2009
Novartis	Novartis Institute for Tropical Diseases (NITD)	Singapore	Dengue fever Malaria Tuberculosis	2002
Novartis	Novartis Vaccines Institute for Global Health (NVGH)	Siena, Italy	Diarrheal diseases Salmonella	2008
Novartis	Genomics Institute of the Novartis Research Foundation (GNF)	La Jolla, USA	Chagas disease Leishmaniasis Malaria	2010
Novartis	Novartis Institutes for Biomedical Research (NIBR)	Horsham, UK	Infectious diarrhea	2009

WIPO Re:Search: a collaborative platform to boost R&D

Launched in October 2011, the WIPO Re:Search consortium provides access to intellectual property, pharmaceutical compounds, technologies, know-how and data for R&D of neglected tropical diseases, tuberculosis, and malaria. By providing a searchable, public database of available intellectual property assets and resources, WIPO Re:Search facilitates new partnerships to support organizations that conduct research on treatments for neglected tropical diseases, ultimately improving the lives of those most in need.

Involved IFPMA member companies are: AstraZeneca, Eisai, GlaxoSmithKline, MSD/Merck & Co., Inc., Novartis, Pfizer, and Sanofi.

More information is available at http://www.wipo.int/research/en/



A holistic approach to fight neglected diseases

Taking a holistic approach involving partnerships is key to tackling neglected diseases and reducing the burden on people. In addition to R&D, as a partner in global health, IFPMA members work with the WHO and other partners to implement capacity-building efforts in developing countries. These efforts are complemented by medicine donation programs.

Implementation of capacity-building efforts: an integrated approach combining prevention, training, and treatment

To address neglected diseases in low- and middle-income countries, IFPMA members work with the WHO and other partners to implement prevention/awareness/outreach programs, improvements in health system infrastructure, and training.

The IFPMA Developing World Health Partnerships Directory[2] is the most comprehensive online database for health development programs involving the research-based pharmaceutical industry and documents 220 health partnerships currently running in the developing world. running in the developing world. These include access, capacity-building and R&D programs that focus on neglected diseases.

2 http://partnerships.ifpma.org and Business Social Responsibility (BSR) (September 2012), Working toward Transformational Health Partnerships in Low- and Middle-Income Countries.

A life-changing pledge: research-based pharmaceutical industry donating an average of 1.4 billion treatments per year to eliminate or control neglected diseases

As part of the pharmaceutical industry's commitment to improve global health, IFPMA members have pledged[3] to donate an average of 1.4 billion treatments for each of the ten years from 2011 to 2020. The 14 billion treatments over this period will help eliminate or control the nine neglected diseases that represent more than 90% of the global neglected diseases burden (human African trypanosomiasis, Chagas disease, lymphatic filariasis, soil-transmitted helminthiases, onchocerciasis, schistosomiasis, leprosy, fascioliasis, and blinding trachoma). This pledge can only reach patients through strong commitment from both concerned countries and implementation partners.

WHO/TDR Career Development Fellowship (CDF) on clinical R&D

TDR, the Special Programme for Research and Training in Tropical Diseases, is a global program of scientific collaboration that helps coordinate, support and influence global efforts to combat a portfolio of major diseases of the poor and disadvantaged.

The WHO/TDR Career Development Fellowship Program consists of 12-month placements in host institutions having the necessary resources to provide supervision and mentorship to the fellow, through a staff member in its clinical department. The program also offers networking opportunities through an electronic alumni network, as well as annual meetings of past and current fellows. The alumni network contributes to the long-term sustainability of the program by providing a forum for discussion, improved interaction, collaboration, and tracking.

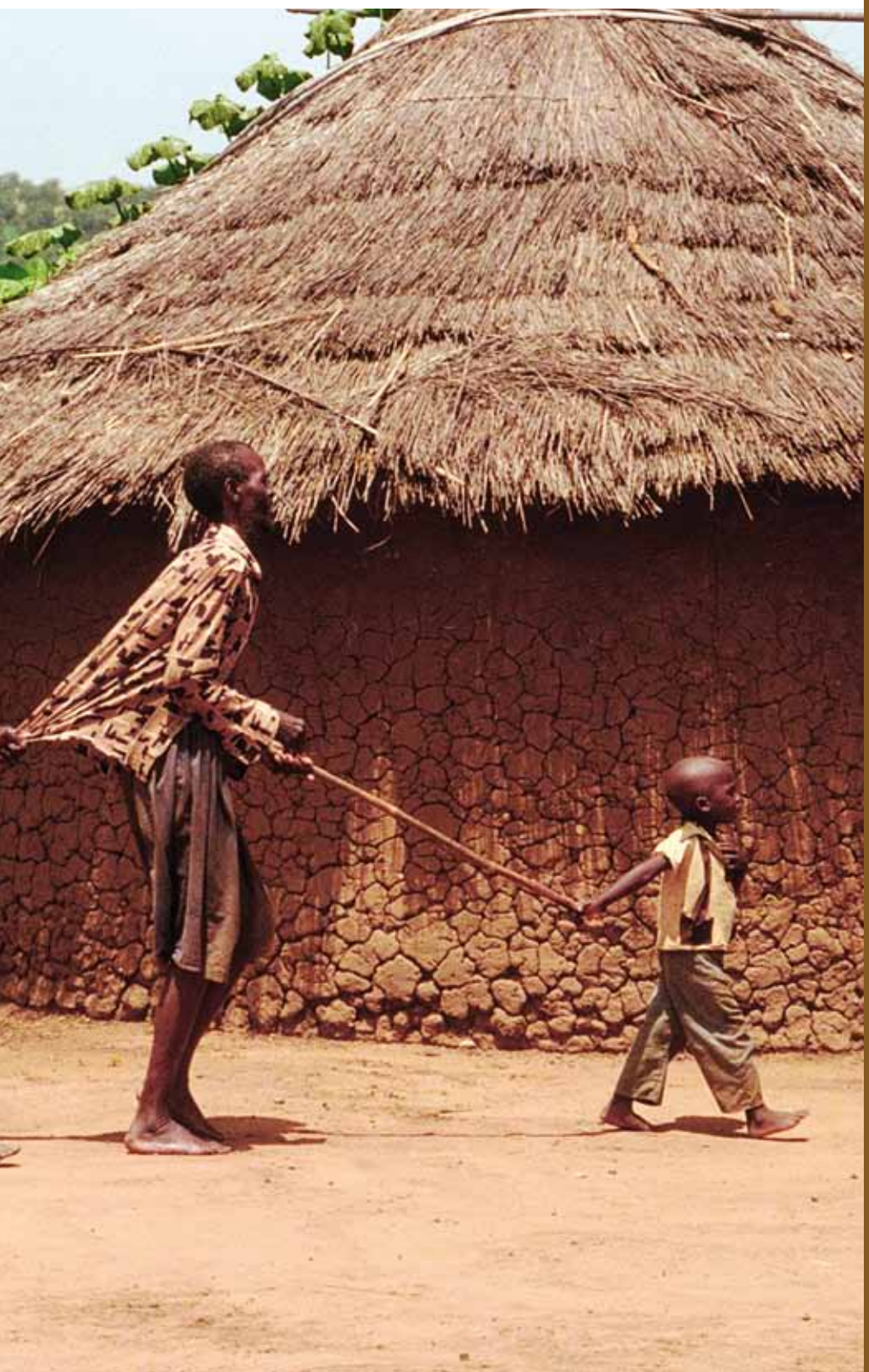
IFPMA supports the TDR Career Development Fellowship on Clinical Research and Development and has the following member companies participating as host institutions in the program: Astellas US LLC; Eisai; Janssen (J&J); GlaxoSmithKline Biologicals; GlaxoSmithKline UK; Novartis Pharma AG; Novartis Vaccines and Diagnostics; Pfizer; and Sanofi Pasteur.

More information is available at http://tdrfellows.tghn.org/

3 IFPMA (January 2011), Ending Neglected Tropical Diseases, IFPMA member companies support eliminating and controlling neglected tropical diseases over the next decade through landmark donations.

R&D pipeline to develop new medicines and vaccines[4]

4 IFPMA members' R&D projects.



Tuberculosis

Disease impact In 2011, there were an estimated 8.7 million new cases of TB (13% co-infected with HIV) and 1.4 million people died from TB, including almost one million deaths among HIV-negative individuals and 430,000 among people who were HIV-positive.

Available therapies WHO recommends Directly Observed Treatment, Short-Course (DOTS) to ensure patients adhere to long treatment with anti-TB cocktail (options include Isoniazid, Rifampicin, Pyrazinamide, Streptomycin and Ethambutol), but this places a heavy burden on health care resources. Length of treatment (standard six-month course) encourages non-adherence, which facilitates development of resistance and now multi-drug resistance. TB is closely linked to HIV/AIDS, but incompatibility of ARVs and TB therapies is an issue. Access to MDR-TB treatment is still a challenge: only a reported 55,597 patients with MDR-TB were enrolled on treatment out of the estimated 310,000 cases of MDR-TB among the 4.7 million cases of pulmonary TB reported to WHO in 2011. Currently used regimens require five or more drugs, to be taken for a minimum of 18 months.

Access/Capacity Building AstraZeneca, Bayer HealthCare, Lilly, Novartis, Otsuka, Sanofi, and Takeda.

Products approved since 2005 None to date.

Terminated projects since 2005 Methyl erythritol pathway inhibitors (AstraZeneca), isocitrate lyase inhibitors (GlaxoSmithKline/TB A), peptide deformylase inhibitors (GlaxoSmithKline/TB A), peptide deformylase, PDF (Novartis) and nitroimidazole backup compounds (Novartis), pleuromutilins (GlaxoSmithKline/TB A), target based approaches (5) (Sanofi), nitroimidazole PA 824 (Novartis/TB A), anaerobic screen and other cell-based TB screens (Novartis/NIAID), screening, target identification (multiple) (AstraZeneca), malate synthase Inhibitors (GlaxoSmithKline/TB A), compound library screening (Daiichi Sankyo/DBT), nitroimidazole backup compound (Otsuka).

Notes The Critical Path to TB Drug Regimens (CPTR) initiative will test promising combinations of TB drug candidates and includes scientists from the US FDA and AstraZeneca, Bayer HealthCare, GlaxoSmithKline, Johnson & Johnson, Novartis, Otsuka, Pfizer, and Sanofi. Daiichi Sankyo TB compound library screening program was previously managed by its Ranbaxy affiliate. Lupin of India has licensed Gatifloxacin from Kyorin Pharmaceutical of Japan for tuberculosis.

In April 2012, eight pharmaceutical companies and four research institutions, working with the Bill & Melinda Gates Foundation, launched a groundbreaking partnership that aims to speed the discovery of essential new treatments for tuberculosis. The partnership, known as the TB Drug Accelerator (TBDA), will target the discovery of new TB drugs by collaborating on early-stage research. The long-term goal of the TBDA is to create a TB drug regimen that cures patients in only one month. The participating pharmaceutical companies – Abbott, AstraZeneca, Bayer, Lilly, GlaxoSmithKline, MSD/Merck & Co, Inc., Pfizer, and Sanofi – will open up targeted sections of their compound libraries and share data with each other and four research institutions: the Infectious Disease Research Institute; the National Institute of Allergy and Infectious Diseases, part of the US National Institutes of Health; Texas A&M University; and Weill Cornell Medical College.

Company	Partners	Project	Phase
Abbott	TB A	Compound screening	Lead identification
Abbott	TB A	Technical consulting and support	Preclinical
Abbott	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
AstraZeneca	TB A	Joint research collaboration agreement	Lead identification
AstraZeneca	Wellcome Grant	Screening, lead generation	Lead identification
AstraZeneca	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
AstraZeneca	NIAID	AZD5847	Phase II
AstraZeneca	MM4TB (EUFW7)	Screening, target identification (multiple)	Lead identification
AstraZeneca	Wellcome grant to AstraZeneca and Cellworks	Predicting efficacious drug combinations to treat TB	Translation
Bayer HealthCare	TB A, BMRC, UCL	Moxifloxacin	Phase III
Bayer HealthCare	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
GlaxoSmithKline	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
GlaxoSmithKline	TB A	Whole-cell screening program	Lead optimization
GlaxoSmithKline	Frame Work 7	InhA inhibitors	Lead identification
GlaxoSmithKline	TB A	Whole-cell hit to lead screening program	Lead identification
Janssen (J&J)	TB A	Diarylquinoline TMC207	Phase II
Janssen (J&J)	TB A	Next generation diarylquinoline	Lead optimization
Lilly	IDRI, NIH	CPZEN-45	Preclinical
Lilly	IDRI, NIH, TB A	Screening program	Discovery
Lilly	IDRI, NIH, TB A	Lead generation/optimization portfolio	Discovery
Lilly	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
MSD/Merck & Co., Inc.	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
Novartis	various	3 discovery projects	Discovery and lead optimization
Otsuka	company	Delamanid (OPC-67683)	Phase III
Pfizer	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
Pfizer	company	PNU-100480	Phase IIa
Roche	Zurich Uni	Protein secretion system	Discovery
Roche	Harvard Medical School	Novel enzymatic target for drug development	Discovery
Roche	Harvard Medical School	Identify novel target genes and new genotypic-based diagnostic and therapy	Discovery
Sanofi	TBTC	Rifpentine (new regimen development for active TB)	Phase II
Sanofi	company	Rifapentine (new regimen development for latent TB)	Registration
Sanofi	NIAID	Rifapentine (new regimen development for latent TB)	Phase III
Sanofi	company	Antimycobacterial screening program (2 groups)	Discovery
Sanofi	MM4TB FP7	Non growing TB phenotypes	Discovery
Sanofi	Cornell	Non growing TB phenotypes	Discovery
Sanofi	TB A	Portfolio	Discovery
Sanofi	Gates Foundation TB Drug Accelerator Program	Whole-cell screening program	Lead identification
Vaccines			
Crucell	Aeras	Aeras-402 vaccine (AdVac®)	Phase II
GlaxoSmithKline	Aeras	Vaccine (GSK M72)	Phase II
Sanofi	SSI, Aeras, Intercell	Vaccine HyVac4 IC31 (AERAS-404)]	Phase I

Malaria

Disease impact In 2010, malaria caused an estimated 660,000 deaths (with an uncertainty range of 490,000 to 836,000), mostly among African children.

Available therapies WHO recommends Artemesinin combinations to slow continually evolving resistance.

Access/Capacity Building Abbott, GlaxoSmithKline, Novartis, Pfizer, Sanofi, and Takeda.

Products approved since 2005 Artesunate-Amodiaquine FDC (Sanofi/DNDi) in Morocco and sub-Saharan countries (2007), WHO prequalified (2008), Pediatric Coartem® Dispersible (Novartis/MMV) (2009), Synriam™ (Ranbaxy (Daiichi Sankyo)) in India (2012), ASMQ FDC (DNDi/Farmanguinhos/Cipla) WHO prequalified (2012).

Terminated projects since 2005 Artemifone (Bayer HealthCare/MMV), peptide deformylase inhibitor (GlaxoSmithKline/MMV), protein franesyltransferase inhibitors (BMS/MMV), intrarectal quinine (Sanofi), 4(1H)-pyridone derivate (GlaxoSmithKline/MMV), fatty acid bionsynthesis/Fab I (GlaxoSmithKline/MMV), chloroproguanil-dapsone-artesunate (GlaxoSmithKline/MMV), falcipain inhibitors/cysteine protease (GlaxoSmithKline/MMV/UCSF), novel macrolide (GlaxoSmithKline/MMV), P. falciparium vaccine (Sanofi/Inst. Pasteur), N-tert butyl Isoquine (GlaxoSmithKline/Liv Uni/MMV), Novel Macrolide (GlaxoSmithKline/MMV), 4(1H) pyridones Lead – GSK 932121 (GlaxoSmithKline/MMV), compound screening (Daiichi Sankyo/MMV), trioxaquine and trioxaquine backup (Sanofi), pyrazoles (Novartis/Drex Uni/Wash Uni), compound library screening (Pfizer/TDR), compound library screening (Pfizer/MMV), pyridone back-up (GlaxoSmithKline/MMV), DHODH inhibitors (GlaxoSmithKline/MMV), compound screening (Eisai), cysteine protease inhibitors (Abbott/Penn Uni/MMV).

Notes Ranbaxy's RBx 11160 initially with MMV. Bayer HealthCare stopped Artemifone in 2005, the University of Hong Kong has taken it to Phase II with MMV. MSD/Merck & Co., Inc. MK-4815 was initially with MMV.

Company	Partners	Project	Phase
Abbott	NIH	Lopinavir/ritonavir (potential preventive therapy)	Preclinical
Abbott	MMV	DSM265 PK studies, formulation evaluation and toxicology	Preclinical
Abbott	MMV	MMV390048 PK studies, formulation evaluation	Preclinical
Abbott	University of Washington (Seattle)	Compound screening, preclinical characterization of lead compounds	Lead identification/optimization
AstraZeneca	MMV	Mini portfolio	Lead identification & lead optimization
Eisai	Academia	Compound screening	Discovery
Eisai	Fiocruz	Toll-like receptor 9 (TLR9) antagonists	Preclinical
Genzyme (Sanofi)	MMV, BI	Mini-portfolio	Lead generation
Genzyme (Sanofi)	MMV, BI	Aminoindole	Lead optimization
Genzyme (Sanofi)	MMV	DHODH	Lead optimization
GlaxoSmithKline	MMV, WRAIR	Tafenoquine (radical cure of P vivax)	Phase IIb
GlaxoSmithKline	MMV	Anti-malarial whole-cell inhibitors	Lead optimization
Merck KGaA	TDR	Lead optimization	Lead optimization
MSD/Merck & Co., Inc.	company	Targeted compound screening	Discovery
MSD/Merck & Co., Inc.	company	MK4815	Preclinical
Novartis	Well, MMV, BPRC, Swiss TPH	Backup compound KDU691	Lead optimization
Novartis	Well, MMV, BPRC, Swiss TPH	Preclinical compound KDU691	Preclinical
Novartis	Well, MMV, BPRC, Swiss TPH	Imidazolopiperazines (KAF156)	Phase I
Novartis	Well, MMV, BPRC, Swiss TPH	Spiroindolone (KAE609)	Phase II
Novartis	MMV	Coartem® Dispersible	Phase IV
Pfizer	MMV, LSHTM	Azithromycin/chloroquine in IPTp for pregnant women	Phase III
Pfizer	company	Azithromycin/chloroquine	Phase III completed
Ranbaxy (Daiichi Sankyo)	company	Arterolane (RBx 11160) and piperaquine	Phase III
Sanofi	PATH - iOWH	Semi-synthetic artemisinin	Industrialization
Sanofi	DNDi, MMV	Artesunate-amodiaquine winthrop ASAQ FDC	Phase IV
Sanofi	company	Bis-thiazolium (SAR97276A/T3)	Phase II
Sanofi	CNRS	Thiazolium back-up	Discovery
Sanofi	company	Ferroquine (SSR97193)	Phase II
Sanofi	MMV	Discovery portfolio	Lead generation
Sanofi	Inst. Pasteur	Discovery	Lead generation
Sanofi	Academia	Discovery	Lead generation
Vaccines			
Amgen	company	MSP1-42 and AMA-1 vaccine	Phase I
Crucell	MVI	AdVac®-based malaria vaccine	Phase I completed, under evaluation
Crucell	NIAID	AdVac®-based malaria vaccine	Phase I completed, under evaluation
Eisai	Fiocruz	Novel vaccines using adjuvant E6020	Preclinical
GlaxoSmithKline	MVI	RTS,S/AS01E vaccine	Phase III
MSD/Merck & Co., Inc.	NY University	CSP synthetic peptide (NANP)6-OMPC conjugate	Discovery

Human African trypanosomiasis (sleeping sickness)

Disease impact Since 2009, the number of new cases reported annually has been fewer than 10,000 for the first time in 50 years, with 9,875 new cases in 2009, 7,139 in 2010 and 6,743 in 2011.

Available therapies Eflorinithine, melarsoprol, pentamidine, nifurtimox, and suramin.

Access/Capacity Building Bayer HealthCare, Novartis, and Sanofi.

Products approved since 2005 Nifurtimox oral and Eflornithine IV combination (Epicentre/MSF/DNDi/Swiss TPH/TDR/Sanofi/Bayer HealthCare) included in WHO essential medicines list (May 2009) and is available via WHO.

Terminated projects since 2005 Compound screening (Pfizer/TDR), compound library screening (Pfizer/DNDi), target screening and hit optimization (Merck KGaA/TDR), target screening and hit optimization (MSD/Merck & Co., Inc./DNDi).

Company	Partners	Project	Phase
Abbott	DNDi	Compound screening/hit characterization	Lead identification
Abbott	Sussex University	Cheminformatics support	Lead identification
Astellas	DNDi	Reprofiling of selected compounds	Discovery
AstraZeneca	DNDi	Focused compound library screening	Lead identification
GlaxoSmithKline	DNDi	Focused compound library screening	Lead identification
Novartis	company	Early discovery efforts	Discovery
Sanofi	DNDi	Fexinidazole (antiprotozoal compound)	Phase II
Sanofi	DNDi	Discovery	Lead optimization

Leishmaniasis

Disease impact Approximately 1.3 million new cases occur annually, of which 300,000 are visceral and 1 million are cutaneous or mucocutaneous. An estimated 20,000 to 40,000 people die from visceral Leishmaniasis annually.

Available therapies The number of treatments has increased in the past decade, but there are numerous drawbacks to each of the treatments, such as difficulty to administer, length to treat, toxicity, cost, and increasing parasitic resistance to treatment: Pentavalent antimonials: toxic and increasingly ineffective due to resistance, 30-days of hospital-based parenteral treatment; Amphotericin B: dose-limiting toxicity, 15–20 days of hospital-based IV treatment; Paromomycin: registered in India, and recommended as first line treatment in East Africa in combination with SSG & PM; Liposomal amphotericin B (AmBisome®): excellent, but IV, registration being broadened; Miltefosine: first orally available drug registered in India, but expensive and teratogenic (through the WHO, significant cost reduction of both AmBisome® and miltefosine is available for the public sector of developing countries as of 2007).

Access/Capacity Building Novartis and Sanofi.

Products approved since 2005 Miltefosine/Impavido® (Zentaris – sold to Paladin Labs in 2008 – TDR), Paromomycin IM (iOWH), SSG & PM (DNDi).

Terminated projects since 2005 Compound screening (Pfizer/TDR), Sitamaquine (WR6026) (GlaxoSmithKline).

Company	Partners	Project	Phase
Abbott	DNDi	Compound screening/hit characterization	Lead identification
Abbott	DNDi	Buparvaquone formulation and pharmacokinetics	Preclinical
Astellas	DNDi	Reprofiling of selected compounds	Discovery
AstraZeneca	DNDi	Focused compound library screening at IPK, Dundee Uni, Swiss TPH	Lead identification
Eisai	DNDi	Compound screening	Discovery
GlaxoSmithKline	DNDi	Focused compound library screening	Lead identification
GlaxoSmithKline	Dundee Uni	LO project	Lead optimization
MSD/Merck & Co., Inc.	DNDi	Target screening and hit SAR development	Discovery
MSD/Merck & Co., Inc.	NIH	Anti-IL-10 monoclonal antibody combination therapy	Phase I/II
Novartis	company	Early discovery efforts	Discovery
Pfizer	DNDi	Compound screening	Lead identification
Sanofi	company	Development of topical formulations	Preclinical
Sanofi	DNDi	Focused compound library screening	Discovery
Vaccines			
Eisai	SVI	Adjuvant to support vaccine development	Preclinical
Eisai	Fiocruz	Novel vaccines using adjuvant E6020	Preclinical

Dengue/Dengue hemorrhagic fever

Disease impact The incidence of dengue has grown dramatically around the world in recent decades. Over 2.5 billion people – over 40% of the world's population – are now at risk from dengue. WHO currently estimates there may be 50–100 million dengue infections worldwide every year. An estimated 500,000 people with severe dengue require hospitalization each year, a large proportion of whom are children. About 2.5% of those affected die.

Available therapies None.

Access/Capacity Building Novartis and Sanofi.

Products approved since 2005 None to date.

Terminated projects since 2005 NS3 helicase and protease inhibitors (Novartis), exploratory program (Roche), tetravalent live attenuated vaccine (GlaxoSmithKline/WRAIR/PDVI), compound library/plant extract screening (Daiichi Sankyo/ICGEB, DBT).

Company	Partners	Project	Phase
Janssen (J&J)	company	Lead generation	Discovery
Novartis	Multiple	4 discovery projects	Discovery and Lead optimization
Roche	Harvard Medical School	Search for Prophylaxis and Treatment	Discovery
Vaccines			
GlaxoSmithKline	WRAIR, Fiocruz	Dengue purified and inactivated virus vaccine candidate	Preclinical
MSD/Merck & Co., Inc.	company	Tetravalent subunit	Preclinical
Sanofi	company	Tetravalent live attenuated chimeric vaccine	Phase III

Onchocerciasis (river blindness)

Disease impact More than 100 million people are at risk for infection.

Available therapies In some countries, onchocerciasis has been controlled through spraying of blackfly breeding sites with insecticide. More broadly, the disease is treated with an annual dose of ivermectin, which also relieves the severe skin itching caused by the disease. Ivermectin kills the young worms and with sufficient coverage on the community level, can prevent transmission. Treatment of LF and onchocerciasis can be combined through the administration of ivermectin + albendazole in areas where both are endemic.

Access/Capacity Building MSD/Merck & Co., Inc.

Products approved since 2005 None to date.

Terminated projects since 2005 Compound screening (Pfizer/TDR), Moxodectin (Pfizer/TDR).

Company	Partners	Project	Phase
Abbott	LSTM	Compound repurposing; collaborative discovery	Preclinical/Lead identification
Abbott	DNDi	Flubendazole formulation and toxicology	Preclinical
Abbott	DNDi	Compound screening/hit characterization	Lead identification
AstraZeneca	DNDi	Focused compound library screening at NPIMR	Discovery
Janssen (J&J) lead/ Pfizer partner	DNDi	Formulation of flubendazole flubendazole + IND enabling studies	Preclinical
Sanofi	DNDi	Repositioning and label extension of marketed/advanced medicines	Discovery/Preclinical

American trypanosomiasis (Chagas disease)

Disease impact About 7 to 8 million people worldwide are estimated to be infected and 25 million are at risk, primarily in Latin American countries. More than 10,000 die each year from this disease, mostly from cardiac complications.

Available therapies The preferred treatment for acute Chagas disease is a 60-day course of benznidazole (supplied by the LAFEPE, part of the Government of Brazil) or, as second-line treatment, a 60–90-day course of nifurtimox (supplied by Bayer HealthCare). However, the timeliness of the intervention is crucial as there is no cure for organ damage stemming from a chronic infection.

Access/Capacity Building Bayer HealthCare, Novartis, Roche, and Sanofi.

Products approved since 2005 Paediatric formulation of benznidazole (LAFEPE/DNDi) (2011).

Terminated projects since 2005 Compound screening (Pfizer/TDR), Compound library screening (Pfizer/DNDi).

Company	Partners	Project	Phase
Abbott	DNDi	Compound screening/hit characterization	Lead identification
Astellas	DNDi	Reprofiling of selected compounds	Discovery
AstraZeneca	DNDi	Focused compound library screening at Swiss TPH, IPK	Lead identification
GlaxoSmithKline	DNDi	Focused compound library screening	Lead identification
Eisai	DNDi	E1224	Phase II
MSD/Merck & Co., Inc.	DNDi	Targeted screening and hit SAR development	Discovery
MSD/Merck & Co., Inc.	company	Posaconazole	Phase IIb
Novartis	company	2 discovery projects	Lead optimization
Sanofi	DNDi	Discovery	Lead identification
Vaccines			
Eisai	SVI	Adjuvant to support vaccine development	Preclinical

Schistosomiasis

Disease impact At least 237 million people need preventive chemotherapy for schistosomiasis, 90% of them live in sub-Saharan Africa.

Available therapies The major medical intervention used to control schistosomiasis is praziquantel, accompanied by the provision of safe water and adequate sanitation.

Access/Capacity Building Merck KGaA.

Products approved since 2005 None to date.

Terminated projects since 2005 Oxominiquine and Praziquantel (TDR), Compound screening (Pfizer/TDR), compound library screening (Merck KGaA/ TDR).

Company	Partners	Project	Phase
Astellas, Merck KGaA	Swiss TPH, TI Pharma, Farmanguinhos Fiocruz	Consortium formed for new pediatric formulation of praziquantel to treat children under the age of 6 years	Preclinical
AstraZeneca	DNDi	Focused compound library screening at Swiss TPH	Lead identification
MSD/Merck & Co., Inc.	company	Targeted screening	Discovery
Pfizer	DNDi	Targeted compound screening	Discovery
Sanofi	DNDi	Repositioning and label extension of marketed/advanced medicines	Discovery

Leprosy

Disease impact The total number of new cases detected in 2011 and reported by 105 countries was 219,075.

Available therapies Early diagnosis and treatment with multidrug therapy (MDT) remain key elements in eliminating the disease as a public health concern. MDT has been made available free of charge to all patients worldwide through donations from Novartis and the Novartis Foundation for Sustainable Development since 1995 and since 2000 respectively. To reach all patients, treatment of leprosy needs to be fully integrated into general health services and political commitment is critical.

Access/Capacity Building Novartis.

Products approved since 2005 None to date.

Terminated projects since 2005 None to date.

Lymphatic filariasis

Disease impact Globally, 1.393 million people require preventive chemotherapy.

Available therapies Recommended treatment is a single dose of two medicines given together. Albendazole and ivermectin are used in areas where onchocerciasis (river blindness) is also endemic. Diethylcarbamazine citrate (DEC) is used with albendazole where onchocerciasis is not co-endemic.

Access/Capacity Building Abbott Fund, Eisai, GlaxoSmithKline, MSD/Merck & Co., Inc. and Sanofi.

Products approved since 2005 None to date.

Terminated projects since 2005 None to date.

Company	Partners	Project	Phase
Abbott	LSTM	Compound repurposing; collaborative discovery	Preclinical/Lead identification
Abbott	DNDi	Flubendazole formulation and toxicology	Preclinical
Abbott	DNDi	Compound screening/hit characterization	Lead identification
AstraZeneca	A-WOL, LSTM	Focused compound library screening	Lead identification
Janssen (J&J) lead/ Pfizer partner	DNDi	Formulation of flubendazole + IND enabling studies	Preclinical

Abbreviations

A-WOL	A-WOL Consortium
Aeras	Aeras Global TB Vaccine Foundation
BI	Broad Institute
BMRC	British Medical Research Council
BPRC	The Netherlands Primate Centre
CNRS	Centre national de la recherche scientifique
Cornell	Cornell University, USA
DNDi	Drugs for Neglected Diseases initiative
Drex Uni	Drexel University
Dundee Uni	Dundee University
Epicentre	Epicentre Biotechnologies
Fiocruz	Fundação Oswaldo Cruz
Inst. Pasteur	Institut Pasteur
IPK	Institute Pasteur Korea
PATH - iOWH	PATH - Institute for OneWorld Health
Liv Uni	Liverpool University
LSHTM	London School of Hygiene and Tropical Medicine
LSTM	Liverpool School of Tropical Medicine
MMV	Medicines for Malaria Venture
MVI	Malaria Vaccine Initiative
NIAID	National Institute of Allergy and Infectious Diseases
NIH	National Institutes of Health
PDVI	Pediatric Dengue Vaccine Initiative
Penn Uni	University of Pennsylvania
SSI	Statens Serum Institute
Sussex Uni	University of Sussex
Swiss TPH	Swiss Tropical and Public Health Institute
SVI	Sabin Vaccine Institute
TBTC	Tuberculosis Trials Consortium
TB A	Global Alliance for TB Drug Development
TDR	Special Programme for Research and Training in Tropical Diseases (UNICEF, UNDP, World Bank and WHO)
UCL	University College London
UCSF	University of California, San Francisco
Zurich Uni	University of Zurich
Wash Uni	University of Washington
Well	Wellcome Trust
WRAIR	Walter Reed Army Institute of Research

About IFPMA

IFPMA represents the research-based pharmaceutical companies and associations across the globe. The research-based pharmaceutical industry's 1.3 million employees research, develop and provide medicines and vaccines that improve the life of patients worldwide. Based in Geneva, IFPMA has official relations with the United Nations and contributes industry expertise to help the global health community find solutions that improve global health.

IFPMA manages global initiatives including: IFPMA Developing World Health Partnerships initiative studies and identifies trends for the research-based pharmaceutical industry's long-term partnership programs to improve health in developing countries, IFPMA Code of Practice sets standards for ethical promotion of medicines, IFPMA Clinical Trials Portal helps patients and health professionals find out about on-going clinical trials and trial results.

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January 2013

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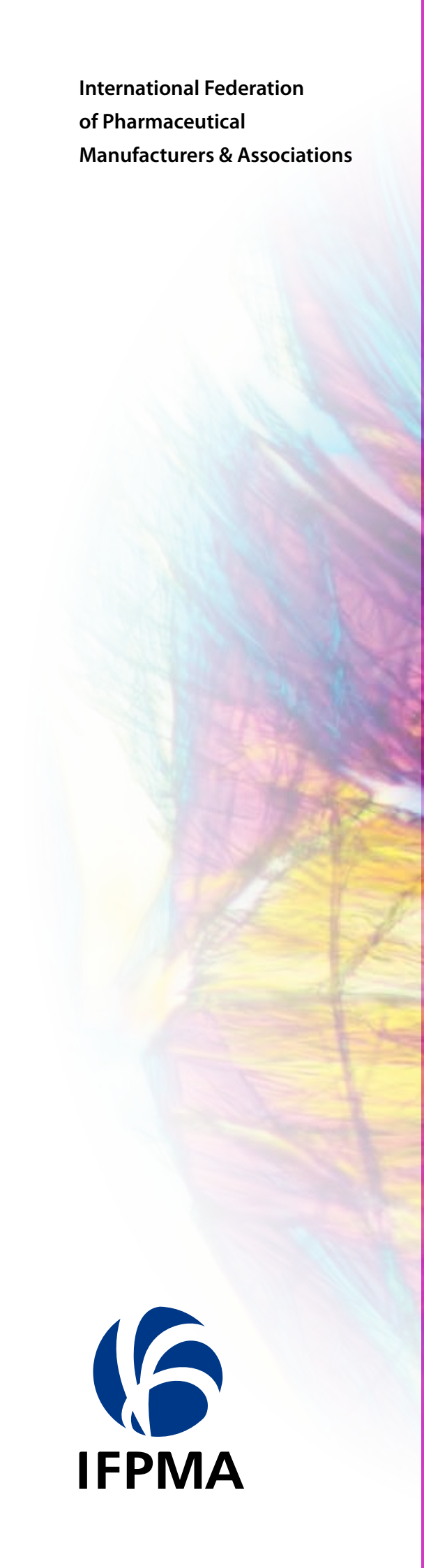

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ISBN 978-2-940498-19-2