

SUPPORTING RESEARCH IN NEGLECTED TROPICAL DISEASES

Lessons from AbbVie's Neglected Diseases Initiative

Jane Nelson

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1. MAP International program in Bolivia/MAP International
2. Scientists at AbbVie working on the Neglected Diseases Initiative/AbbVie
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Executive Summary	5
<hr/>	
I. The need for collective action on Neglected Tropical Diseases	7
<hr/>	
II. AbbVie's engagement in tackling NTDs	9
<hr/>	
1. Harnessing the company's institutional and scientific capacity	10
1.1 The Executive Committee for Neglected Diseases (ECND)	10
1.2 Leveraging the company's scientific expertise and infrastructure	11
1.3 Supporting innovative agreements for product development partnerships	11
1.4 Aligning with the company's Corporate Responsibility strategy	12
<hr/>	
2. Leveraging the skills and commitment of individual scientists	13
<hr/>	
3. Engaging in cross-sector product development partnerships	16
3.1 Drugs for Neglected Diseases initiative (DNDi)	18
3.2 Medicines for Malaria Venture (MMV)	20
3.3 The TB Alliance and TB Drug Accelerator (TBDA)	22
3.4 The Anti-Wolbachia Consortium (A-WOL) and Macrofilariocidal Drug Accelerator (MacDA)	24
<hr/>	
4. Supporting the education of future scientists and health leaders	26
<hr/>	
5. Funding community projects and dialogues	27
5.1 MAP International in Côte D'Ivoire and Bolivia	27
5.2 The Sabin Vaccine Institute in Latin America	28
5.3 Convening public health officials and academics	29
<hr/>	
6. Participating in multi-stakeholder policy and advocacy platforms	29
6.1 The CEO Roundtable	29
6.2 The London Declaration on Neglected Tropical Diseases	30
<hr/>	
III. Conclusion and lessons learned	31
<hr/>	
Methodology and Acknowledgements	34
<hr/>	
Endnotes	34
<hr/>	

Neglected Tropical Diseases afflict about one billion of the world's poorest people. Yet these diseases are largely treatable. Moreover, controlling them offers a powerful strategy for tackling many of the conditions that promote poverty. We need to scale up action against these diseases and eradicate the ones we can.

Ban Ki-moon

United Nations Secretary-General¹

Executive Summary

Neglected Tropical Diseases (NTDs) undermine the physical and cognitive health and the economic opportunity of more than one billion people, most of them among the world's poorest and least able to access or advocate for solutions.

The burden of Neglected Tropical Diseases

Neglected Tropical Diseases (NTDs) undermine the physical and cognitive health and the economic opportunity of more than one billion people, most of them among the world's poorest and least able to access or advocate for solutions. As Hotez et al commented in a 2009 edition of *The Lancet*, "People in the bottom billion are the poorest in the world; they are often subsistence farmers, who essentially live on no money and are stuck in a poverty trap of disease, conflict and no education. One of the most potent reinforcements of the poverty trap is the neglected tropical diseases. Almost everyone in the bottom billion has at least one of these diseases."²

Although encouraging progress has been made in recent decades, the prevention, control, elimination and eradication of these diseases remain one of the great public health equity challenges of our generation. And given the impact of NTDs more broadly on nutrition, education, economic productivity, community resilience and health systems capacity, these efforts are also crucial to ending extreme poverty.

The need for new models of partnership

As outlined in Part I of this report, a key imperative in addressing the challenge is how to align the necessary scientific expertise, assets and financial resources needed to discover and develop drugs to prevent or treat these diseases. Global pharmaceutical and biotechnology companies have many of these capabilities, but with few exceptions, they have little or no commercial rationale to invest in many years of research and development (R&D) to bring such drugs to market. And even then, the drugs would still need to be made affordable, accessible and reliable for extremely poor patients often living in remote rural areas, urban slums and conflict zones.

As such, sustained efforts to discover, develop and deliver treatments for NTDs are simply not possible without new models of cooperation between public, private and nonprofit organizations.

From a research and development (R&D) perspective, one of the most encouraging institutional innovations in global health over the past 15 years has been the emergence of independent, nonprofit, often multi-stakeholder drug research organizations and alliances. These are facilitating new models of product development partnerships (PDPs) between companies, public, private and philanthropic donors, regulators, research institutes and universities, and governments and community organizations in endemic countries.

The role of corporate engagement

The emergence of these new types of PDPs has been accompanied by new models of corporate social responsibility and shared value creation by some of the world's leading pharmaceutical and biotechnology companies.

In some cases, companies are undertaking their own R&D in-house and/or exploring new licensing or pricing models for existing drugs and interventions. In others, they are supporting long-term product donations, capacity building and corporate philanthropy initiatives. And a number of them are enabling some of their top scientists to volunteer their skills, time and assets to share compounds for screening, provide technical expertise, and offer *pro-bono* program enhancement support to non-profit research partners.

None of these activities are easy or short-term in nature. They require support and a long-term commitment by corporate executives, as well as strong leadership and dedication by the scientists who engage. They require the ability to build internal coalitions within the company, both between different R&D teams and between these teams and colleagues in corporate responsibility, legal departments, public affairs, and the corporate foundation. And they require the ability to build non-traditional external partnerships and alliances, including with competitors, as well as with non-profit research organizations, donors, universities and governments.

The case of AbbVie

This case study focuses on AbbVie, a global, research-based biopharmaceutical company formed in 2013 following separation from Abbott Laboratories. The company's mission is to use its expertise, dedicated people and unique approach to innovation to develop and market advanced therapies that address some of the world's most complex and serious diseases. AbbVie employs more than 28,000 people worldwide and markets medicines in more than 170 countries.

AbbVie's engagement with some of the key nonprofit initiatives tackling NTDs is illustrative of the types of institutional, individual and collective leadership that are needed to support effective product development partnerships as well as public advocacy and awareness-raising in this field. Although AbbVie has no existing products or any commercial interest in discovering/developing drugs for NTDs, its senior management and scientists are committed to partnering with other organizations to help them to undertake such research and to implement other initiatives to tackle NTDs. Part II of the report looks at:

1 The work of the company's Executive Council for Neglected Diseases (ECND), with a focus on the roles of AbbVie's R&D, technology licensing and collaborations, corporate responsibility, government affairs, and philanthropic foundation teams. Coordination across these different parts of the company has been essential in enabling it to develop innovative external partnerships.

2 The leadership role being played by individual scientists to turn an institutional commitment into action. It focuses on Dr. Dale Kempf, one of AbbVie's Distinguished Research Fellows, Dr. Kennan Marsh, AbbVie's Director of Experimental Sciences and Senior Research Fellow, Development Science, and Dr. Tom von Geldern, one of several retirees working with his former colleagues on these initiatives.

3 Engagement between AbbVie's scientists and several key product development partnerships (PDPs), often alongside peers from other companies. The case focuses on AbbVie's engagement with the Drugs for Neglected Diseases *initiative* (DNDi), Medicines for Malaria Venture (MMV), TB Alliance, TB Drug Accelerator, Anti-Wolbachia Consortium (A-WOL), and Macrofilaricidal Drug Accelerator (MacDA).

4 AbbVie's support for a student summer internship program, through the Franciscan Institute for World Health, which aims to develop future scientific and leadership skills.

5 Examples of the AbbVie Foundation's philanthropic support for community-based delivery, capacity building and evaluation programs led by MAP International and the Sabin Vaccine Institute in parts of Africa and Latin America.

6 The company's participation in some of the broader multi-stakeholder platforms that have emerged to raise public awareness, support public advocacy, mobilize resources, and share knowledge. These include initiatives such as the Gates Foundation's Health CEO Roundtable, United Against NTDs, and the London Declaration Against NTDs.

Part III of the report concludes with reflections on some of the key lessons learned. It draws on these to offer recommendations on how companies can continue to play a leadership role, in partnership with others, to promote global public health and the Sustainable Development Goals (SDGs) more broadly. The SDGs are a set of 17 goals to end poverty, fight inequality and injustice, and tackle climate change and environmental degradation by 2030. They were adopted by more than 190 world leaders at the United Nations Sustainable Development Summit on 25 September 2015 as a core part of the *2030 Agenda for Sustainable Development*.³ SDG Goal #3: "To ensure healthy lives and provide well-being for all", is the most directly relevant in the fight against Neglected Tropical Diseases, although these diseases also have an impact on the achievement of several other goals.

I The need for collective action on Neglected Tropical Diseases

Neglected Tropical Diseases (NTDs) are "...a group of parasitic and bacterial diseases that cause substantial illness for more than one billion people globally."

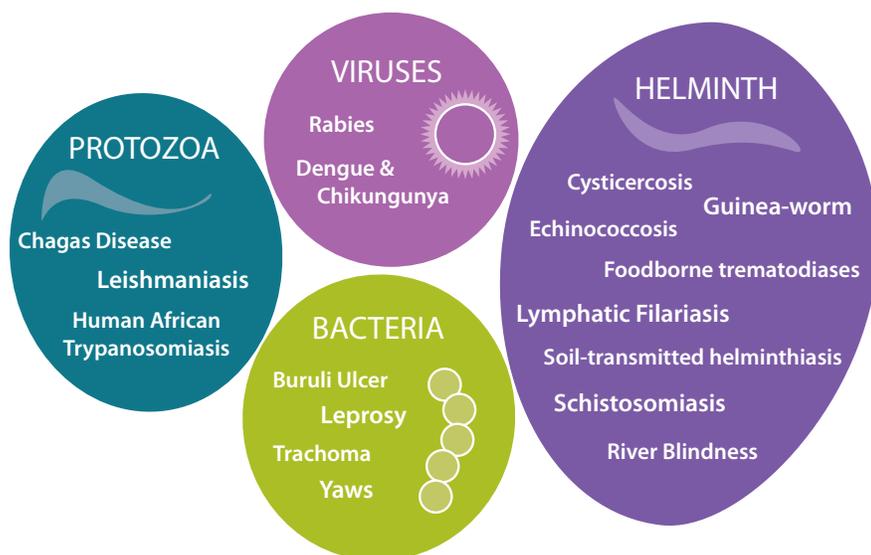
Affecting the world's poorest people, NTDs impair physical and cognitive development, contribute to mother and child illness and death, make it difficult to farm or earn a living, and limit productivity in the workplace. As a result, NTDs trap the poor in a cycle of poverty and disease.⁴ They represent a major humanitarian challenge and priority for improving global health equity, as well as an economic and development challenge.

The World Health Organisation (WHO) has prioritized 17 NTDs, which are endemic in 149 countries affecting some 1.4 billion people, and set targets for their prevention, control, elimination and eradication. The task is a complex and challenging one. As WHO points out, "The people who are most affected by these diseases are often the poorest populations, living in remote, rural areas, urban slums or conflict zones. ...Lacking a strong political voice, people affected by these tropical diseases have a low profile and

status in public health priorities. Lack of reliable statistics and unpronounceable names of diseases have all hampered efforts to bring them out of the shadows."⁵ And in turn, these characteristics make such diseases a low priority for commercial pharmaceutical research and development (R&D).

NTDs also provide an excellent example of the complex inter-relationships between the different Sustainable Development Goals (SDGs). As Peter Hotez, President of The Sabin Institute, and Neeraj Mistry, Managing Director of the Global Network for Neglected Tropical Diseases have commented, "... we need to consider the overlap between NTDs and other factors: nutrition; water, sanitation, and hygiene; maternal and child health; and education. Development goals cannot be achieved in isolation. In fact, NTDs are so inextricably linked to these development issues that their prevalence is seen as an effective proxy for broader socioeconomic and human development."⁷

Diagram 1 **The 17 Priority NTDs identified by the World Health Organization in 2010⁶**



Source: Rachel Cotton, Phd. student in Immunology, Harvard University. Neglected Tropical Diseases: Challenges for the Post-2015 Development Era. Public Library of Science (PLOS) Blogs: Student Blogs.

As a result, efforts to prevent, control, eliminate or eradicate NTDs require a combination of scientific innovation, social and economic interventions, policy support, and new financing mechanisms. They rely on the discovery, development and delivery of drugs and therapeutic treatments, where there are few commercial incentives for R&D, alongside concerted efforts to strengthen health systems and address broader environmental health issues such as unsafe water and sanitation. To be successful in these efforts there is a crucial need for leadership at the institutional, individual and collective level. In particular, there is the need for:

- Strong institutional support from individual governments, companies, international agencies, academic and research institutions, and foundations;
- Outstanding individual leadership from a wide range of people from research scientists and senior policy makers, public health officials and leaders in business and civil society to community healthcare workers; and
- More collaborative approaches to problem-solving and new models of partnership between governments, civil society and the corporate sector. These range from project-based and product development partnerships to multi-stakeholder collective action bringing together a large number of different actors at global and national levels.

Collaborative action to tackle NTDs has gained considerable momentum over the past decade. In 2009, building on lessons from earlier product development partnerships, the Bill & Melinda Gates Foundation convened its first CEO Roundtable to encourage pharmaceutical companies to work with the foundation and research NGOs to tackle NTDs. In 2012, WHO published a Roadmap for the control, elimination and eradication of 17 NTDs by 2020, which built on a decade of dialogue and lessons learned. In January 2012, the London Declaration on Neglected Tropical Diseases brought together a group of governments, companies, funders and research

organizations in a time-bound, public commitment to eradicate, eliminate or control ten of these NTDs by 2020. And in September 2015, more than 190 Member States of the United Nations approved the Sustainable Development Goals, with NTDs addressed in SDG#3 “Promoting Health and Wellness”, as part of the following target: *“By 2030 end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases.”*

In all these initiatives, there has been an increased focus on the role of pharmaceutical and biotechnology companies as partners in tackling NTDs. Depending on the company and NTD being addressed, roles can range from developing and delivering commercially viable drugs to leveraging the scientific and technical skills of employees, making product donations, and providing philanthropic or advocacy support to partner organizations.

The discovery and development of new drugs is particularly challenging. As the diagram below illustrates, getting to the point of regulatory approval usually takes about 14 to 16 years. Of every 5,000 to 10,000 new compounds synthesized in the discovery phase of the process, about 250 enter preclinical testing, five enter clinical testing, and one gets approved by regulators. In the case of NTDs, the long time horizons and low conversion rates are exacerbated by the lack of commercial incentives given that the people most affected by NTDs are amongst the world’s poorest. It is for these reasons that innovative product development partnerships, which bring together public, private and philanthropic funders and scientists play such a vital role in discovering and developing drugs to tackle NTDs.

The following profile of AbbVie outlines examples of leadership within the company as well as its engagement in external product development partnerships, community projects and alliances aimed at addressing NTDs.

Diagram 2 **Typical timeline for drug R&D to regulatory approval**



Source: Adapted by the author from a diagram provided by AbbVie.

II AbbVie's engagement in tackling NTDs

"We are proud to support our top scientists in their pro-bono research efforts to find treatments and cures for a number of tropical diseases. Our support of these efforts is not driven by commercial interests but by a recognition that our science and scientists can contribute to the discovery and development of needed medicines. Working with research partners such as DNDi, Gates Foundation's TBDA, MMV and some industry peers, I am confident that we can and will have a positive impact in turning the tide against many of these devastating diseases."

Jim Sullivan, Vice President, Discovery, Global Pharmaceutical R&D, AbbVie

AbbVie combines the scientific expertise and long-standing corporate legacy of an established global pharmaceutical company with the focus, innovative culture and capability of a leading biotech. That has given AbbVie the unusual opportunity to combine its proven scientific expertise and long-standing corporate responsibility legacy with a 'new' company mindset and efforts to build its own corporate culture, business identity and commercial success in the global marketplace. The company's commercial discovery and development efforts focus on therapeutic areas where it has proven expertise including in the areas of immunology, oncology, virology and neurology among others.

More than 6,000 scientists from diverse backgrounds and disciplines work in the research and development laboratories of AbbVie. Most are based in the company's headquarters in North Chicago, many thousands of miles away from the remote rural communities and urban slums in Africa, Asia and Latin America, where an estimated 1.4 billion people suffer from debilitating neglected tropical diseases. There is little commercial rationale for AbbVie to invest in the challenging, long-term process of discovering, developing, and manufacturing drugs to tackle these diseases. Yet, many of the company's highly qualified scientists have the skills and technologies that could help to make a positive difference. And they share a deep-seated professional commitment to advancing scientific knowledge and improving human health.

AbbVie has enabled more than 160 of its scientists to put this commitment into action. Unlike a number of its peers in the healthcare sector, the company does not have a commercial business focused on any of these diseases—and does not plan to develop one. However, some of its leading scientists recognized they could make a meaningful *pro bono*

contribution to the global effort against NTDs by contributing their time, expertise, and equipment to nonprofit product development partnerships that are doing research in this area.

AbbVie first engaged in global efforts to tackle NTDs in 2009, when part of Abbott. In 2009, the Bill and Melinda Gates Foundation (BMGF) convened its first CEO Roundtable to encourage pharmaceutical companies to work alongside the foundation and some of the nonprofit research organizations it was supporting to scale up and coordinate awareness, funding and R&D efforts in tackling NTDs. Concurrent with the meeting of pharmaceutical CEOs, top scientists from some of the participating companies met their counterparts in several of these research-based nonprofits. This dialogue was the basis for building personal relationships, strengthening mutual respect and trust, and identifying specific ideas for cooperation between the participating companies and nonprofit organizations. Shortly afterwards, the company established an internal, multi-disciplinary group to address NTDs, called the Executive Council for Neglected Diseases (ECND).

When AbbVie separated from Abbott in 2013 AbbVie's CEO, Richard Gonzalez, supported the continuation of the neglected diseases initiative. This included the continuation of the ECND, engagement in the BMGF CEO Roundtable and scientists' participation in external product development partnerships.

These decisions by senior management, provide a good example of values-based leadership that draws directly on the company's core scientific capabilities and assets to help address a global health challenge, but is not intended to

become a revenue-generating business for the company. While the time and skills of the company's scientists are being provided to their nonprofit partners on a *pro bono* basis, the initiative is being managed with a similar level of project management discipline and accountability, and is providing the same disciplines and quality of scientific expertise and professional advice, that would be applied to a commercial venture.

1 Harnessing the company's institutional and scientific capacity

The following examples illustrate how some of the company's research and development (R&D) teams are working with other functions within the company to manage the cross-functional effort on tackling neglected diseases. They review some of the activities being undertaken by the Executive Council for Neglected Diseases and the company's scientists as well as the Technology Licensing & Collaborations team and the Corporate Responsibility team.

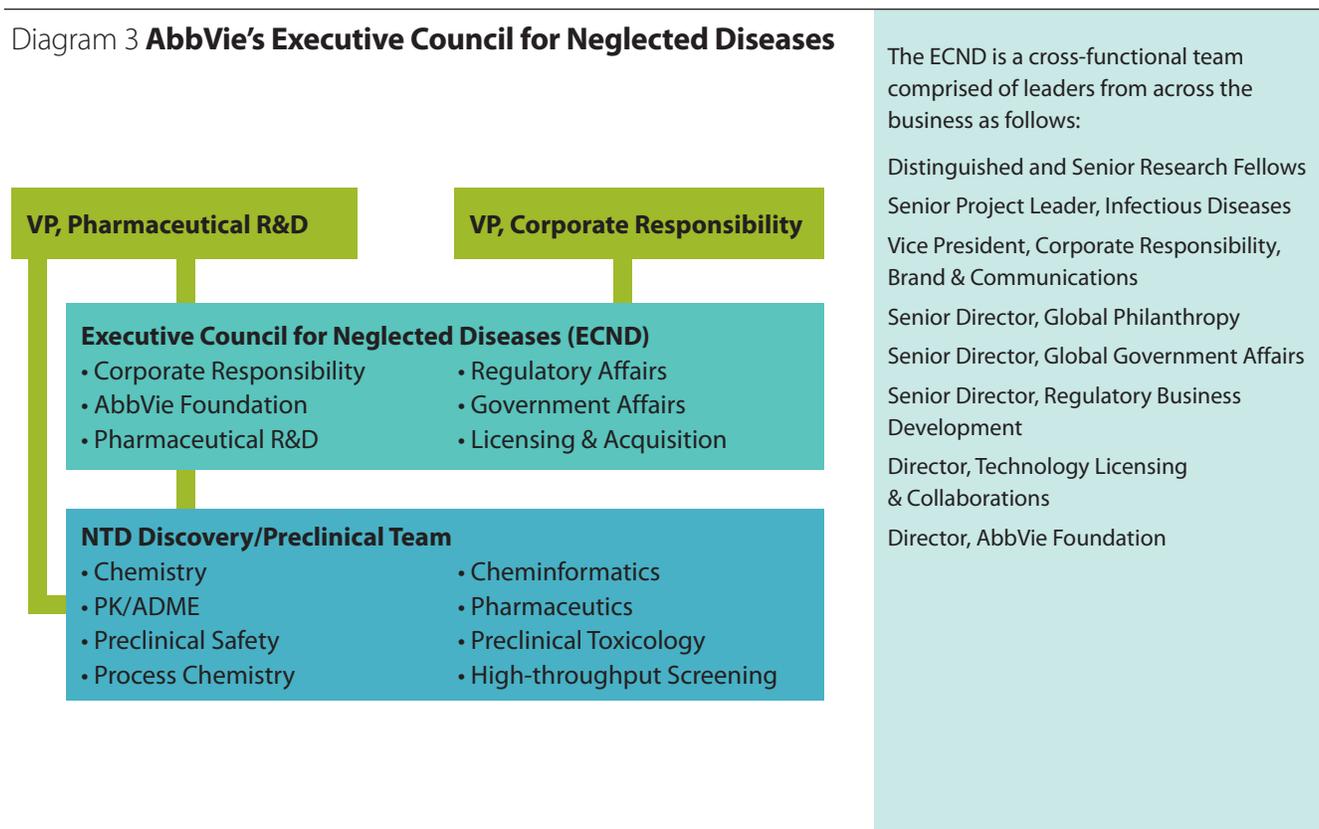
1.1 The Executive Council for Neglected Diseases (ECND)

ECND is a formal, permanent multi-disciplinary body that is co-lead by the company's Global Pharmaceutical R&D department and its Corporate Responsibility department. Its mission is as follows:

"In partnership with the public and private sectors, the Council will support the development or modification of new drugs to address unmet needs in areas of neglected disease prevention, diagnosis, treatment, and management. In this pursuit the Council will leverage the company's core competencies and existing resources as identified through intensive internal review."

The ECND identifies and collaborates with key stakeholders and experts both within the company and externally, aiming to bring AbbVie resources to partners working in some of these underserved disease areas, which will be discussed in more detail later in the case study. It is structured as follows:

Diagram 3 **AbbVie's Executive Council for Neglected Diseases**



1.2 Leveraging the company's scientific expertise and infrastructure

As outlined in the following section, some of AbbVie's most experienced scientists have played a crucial personal leadership role in establishing and building the company's partnerships on NTDS. They have done so with the support of company leaders, working within and being able to leverage the management structures and processes, as well as the scientific and technological assets and infrastructure of the company. In addition to their time, the scientists who are participating in the initiative are contributing a range of different scientific and technical skills, resources and research equipment.

The company tracks the time spent on these activities, and in 2014 and 2015, AbbVie scientists contributed 30,677 *pro bono* hours, partnering externally with the product development partnerships profiled later in the case study. This represents a doubling of the time spent by the company's scientists in the prior two year period. These scientists are drawn from the following four teams within the company's R&D group:

- **Discovery:** teams within the Discovery organization identify targets against which potential therapies may be directed. The teams synthesize new compounds, characterize the activity against the target and catalog any potential off-target (toxic) activities of the compounds. In this iterative process, optimized compounds that have the right properties to be drugs are designed.
- **Development Sciences:** teams within Development Sciences work to understand the behavior of compounds in animals, with the goal to predict the characteristics of the compounds in humans. Efforts focus largely on metabolism (how the compound is broken down in the body), pharmacokinetics (what dose and how often should a compound be given to be efficacious) and toxicology (how safe is the compound; what are the potential toxicities).
- **Drug Product Development:** the Drug Product Development team is responsible for preparing a dosage form (eg, capsule, tablet, solution) that will be used to deliver the compound to the patient.

- **Process Chemistry:** the Process Chemistry team is responsible for developing methods to manufacture large amounts (kilograms, metric tons, etc) of the new drug. The Process Chemistry team optimizes a cost efficient and environmentally respectful synthesis of each compound.

Section 3 of this chapter illustrates the engagement of AbbVie's scientists with the Drugs for Neglected Diseases initiative (DNDi), Medicines for Malaria Venture (MMV), TB Alliance and TB Drug Accelerator, Anti-Wolbachia Consortium (A-WOL), and Macrofilicidal Drug Accelerator (MacDA).

1.3 Supporting innovative agreements for product development partnerships

One of the major challenges in developing new models of partnership between nonprofit or public research organizations and commercial companies, where Intellectual Property (IP) is a crucial element of successful business models, is how to structure collaboration, licensing and other types of business development and legal agreements that meet the public health goals of the nonprofit or public research partners, while also protecting IP and managing risks to the company. This has required AbbVie's legal and transaction support teams as well as its scientists to think differently, to innovate, and to collaborate both internally and externally in non-traditional ways.

The role of the Technology Licensing & Collaborations (TLC) team, for example, is to provide transaction support to AbbVie's Research and Development, Medical Affairs and Operations teams for their "everyday" licensing and business needs. These transactions may include agreements for confidential disclosures (CDAs), material transfers (MTAs), sponsored research collaborations, consortia, registries, technology licenses, etc.

In the case of the company's scientists providing *pro bono* support for external product development partnerships in the area of neglected diseases, the TLC team has leveraged its professional expertise and time to provide broad transaction support for all aspects of these external relationships, including CDAs, MTAs and collaboration agreements.

AbbVie's approach to partnering in the NTD area has been to couple business development concepts to structuring relationships (for example a focus on mutually beneficial agreements, good governance, publications, publicity, licenses, etc.) and aligning these with the objectives to deliver on the goals of advancing global public health and corporate responsibility. Again, this provides a good example of leveraging the core capabilities of the company to support non-commercial initiatives that would not be possible in the absence of these capabilities.

1.4 Aligning with the company's Corporate Responsibility strategy

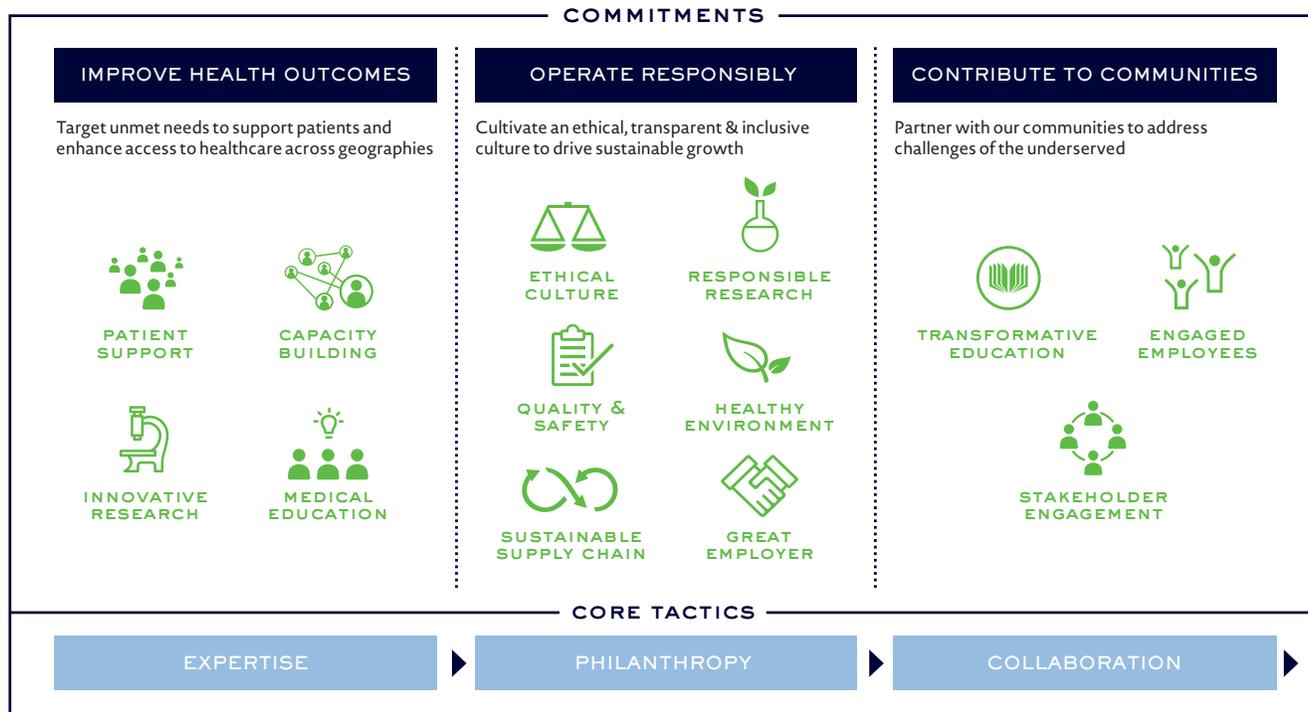
Alongside the Global Pharmaceutical R&D group, the Neglected Diseases initiative is co-led by AbbVie's Corporate Responsibility team. The company's corporate responsibility framework aligns with AbbVie's core purpose, and leverages the company's expertise, philanthropy and collaborations.

The framework has three central pillars:

- **Improve health outcomes:** Targeting unmet needs and enhancing access to healthcare.
- **Operate responsibly:** Developing a corporate culture and standards for responsible research, product quality and safety, workplace practices, human rights and environmental impacts.
- **Contribute to communities:** Partnering with selected communities in education and employee engagement.

The key elements of this corporate responsibility framework are outlined in the diagram below. In addition to co-leading the company's Executive Council on Neglected Diseases, the Corporate Responsibility team provides the framework and supports the *pro bono* work of AbbVie's scientists. As outlined in Section 5, The AbbVie Foundation, which is an independent 501(c)(3) organization that serves as one of the pillars of AbbVie's overall corporate responsibility strategy, is also providing philanthropic support to select community-based initiatives focused on tackling NTDS.

Diagram 4 **AbbVie's Corporate Responsibility Framework**



"It is very motivating for our scientists to get involved. Most came to the pharmaceutical sector because they want to use their science to impact peoples' lives. To them the success of drug discovery is measured in patients' lives saved or improved. Our Neglected Diseases program offers them an additional opportunity beyond their normal responsibilities."

Dr. Dale Kempf, Distinguished Research Fellow

2 Leveraging the skills and commitment of individual scientists

The effort to tackle Neglected Tropical Diseases calls for outstanding individual leadership that combines scientific, technical and managerial skills with the ability to build partnerships and a passionate commitment to the long and challenging process of improving health outcomes. The scientists who work inside large, research-based companies like AbbVie are one group of individual leaders who are playing an increasingly important role in the fight against these diseases.

As outlined in the previous section, the senior management of AbbVie has made a corporate-level commitment to support non-commercial, external product development partnerships that are focused on tackling NTDS. This executive support and institutional platform have been essential to enabling anything to happen. Yet, it is the skills, time and personal commitment of individual scientists that are at the heart of making these relationships a success—both in terms of managing the day-to-day projects and partnerships, and providing the type of world-class scientific expertise that is needed to discover and develop new drugs and treatments. It is also fair to say, that it has been the personal passion and determination of some of the company's top scientists that have underpinned AbbVie's initial engagement in tackling NTDS, and subsequently increasing the level of this commitment as more scientists have joined the *pro bono* effort in recent years.

Two such leaders are Dr. Dale Kempf, one of the company's Distinguished Research Fellows, a 30-year pharmaceutical R&D veteran and co-inventor of AbbVie's HIV/AIDS drugs, who leads the initiative on neglected diseases, and his colleague Dr. Kennan Marsh, the company's Director of Experimental Sciences and Senior Research Fellow, who brings more than 30 years of experience in conducting and

leading the type of preclinical studies that are crucial for advancing compounds from the laboratory to clinical studies in humans.

In 2009, when the Gates Foundation first convened the CEO Roundtable, Dr. Kempf was asked by senior management to represent the company. As he engaged with his fellow scientists from other companies, and with the nonprofit product development partnerships being supported by the Gates Foundation, he recognized the opportunity for the company, its scientists and their technological platforms to make a meaningful contribution, even though it had no commercial business focused on NTDS. This was the start of the Neglected Diseases initiative, which Dr. Kempf, Dr. Marsh and their colleagues have continued to build since the creation of AbbVie, taking it to a new level in terms of scope, scale and number of partnerships, with increasingly robust project management and measurement.

From the outset, Dr. Kempf and Dr. Marsh have played at least five crucial leadership roles in building the company's Neglected Diseases initiative and inspiring many others to get actively involved:

- They have provided their own world-class scientific expertise and networks to AbbVie's partner organizations, serving as technical experts and role models both internally and externally. The brief biographies in Box 1 provide an indication of their professional reputations and success as research scientists. As Dr. Kempf comments, "... between Kennan and myself, we have over 60 years worth of experience and a full understanding of what the drug discovery pathway looks like. We also have lots of contacts and networks, which we can tap into to support our partners."⁸
- In addition to carrying out scientific work on behalf of partner organizations, they have also played a broader

"It is the scale of our technology platforms as well as our scientific expertise and our procedural and process expertise that enable us to make a meaningful contribution to our nonprofit partners. ... We are able to help them ask the right questions and better understand what is happening with their integrated data. We are able to conduct assays and studies at a scale, scope and cost-effectiveness that our partners would not be able to do alone. Through these contributions, we can help them advance compounds from the laboratory to clinical studies in humans."

Dr. Kennan Marsh, Director, Experimental Sciences

- advisory, thought-leadership, field-building and policy dialogue role in the collaborative efforts to tackle NTDS. Dr. Kempf, for example, serves as a member of the Scientific Advisory Boards of Drugs for Neglected Diseases *initiative* (DNDi) and the Global Alliance for TB Research. Dr. Marsh serves on several MMV development teams and informally advises each NTD partner.
- They have led most of the project management and relationship building aspects of AbbVie's engagement with its nonprofit product development partners. Although these nonprofit organizations benefit from the scientific and technical platforms that AbbVie and other pharmaceutical and biotechnology companies can offer them, these are non-traditional relationships, in most cases without tried and tested approaches. In some cases there has also been a legacy of mistrust between the public health community and commercial companies. Even if not directly with these specific organizations, this is a broader challenge that needs to be addressed. As such, in order for the partnerships to be successful, there is an ongoing need for trust building, clarity of roles and responsibilities, good communications, team building and mutual respect—all of which take time and require effective relationship management skills above and beyond any scientific and technical assistance.
 - They have inspired and mentored more than 160 other AbbVie scientists to get involved. Although executives at the company have given their clear support to the Neglected Diseases effort, they do not require any of the company's scientists to participate. The scientists who are donating their time and expertise at different levels of the R&D organization and in different teams and ways, are doing so on a *pro bono* basis driven by their personal decisions. Many of them got engaged, especially in the early stages, through the encouragement and role models of Dr. Kempf and Dr. Marsh. As Dr. Marsh explains it, "There is always some 'white space' in everyone's working life. Because it is inspiring and different, and we take the effort to explain the value of the contribution, many of our scientists want to help. We tap into each other's networks to make it all possible."⁹ In addition to current employees, Dr. Kempf and Dr. Marsh have also enabled several of the company's retired scientists to get actively engaged in the initiative on a volunteering basis. One such example is Dr. von Geldern, who is profiled briefly in Box 1.
 - Dr. Kempf and Dr. Marsh have also played a crucial internal leadership and coordinating role as members of the company's Executive Council on Neglected Diseases, and by continuing to make a compelling case to senior executives about the value of this *pro bono* initiative to the company, to its partners, and to furthering the agenda of global public health more broadly. As Dr. Kempf has commented, "...both of us are at a place in our careers that enables us to accomplish a lot in doing this type of work—people listen. Although this is a grassroots program with no formal budget or staff allocation, we have been able to engage our colleagues to work alongside us and senior management to give us support."¹⁰

Box 1 Profiles in scientific leadership

These brief profiles illustrate the level of scientific expertise and leadership that three of the leaders in AbbVie's Neglected Diseases initiative are able to share with their internal colleagues and external partners:

Dr. Dale Kempf is the Distinguished Research Fellow and Director, Neglected Diseases Research at AbbVie. He has more than 30 years of experience in pharmaceutical R&D, mostly in antiviral research. He is the co-inventor of AbbVie's HIV protease inhibitors Norvir® and Kaletra®. Subsequently, Kempf co-directed AbbVie's hepatitis C virus (HCV) discovery program, leading to the development of Viekira Pak®, AbbVie's combination treatment for HCV. He currently serves on the company's Scientific Governing Board and Medicinal Chemistry Leadership Team, and directs its cross-divisional initiative to bring AbbVie resources to partners working on underserved disease areas. Dr. Kempf has received a number of scientific and industry awards, published widely in areas of medicinal chemistry, pharmacology and drug resistance, with more than 120 scientific publications and 50-issued United States patents to his credit.

Dr. Kennan Marsh is Director of Experimental Sciences and Senior Research Fellow at AbbVie. She has more than 30 years of experience in pharmaceutical R&D, with a major focus in preclinical compound optimization. As the head of the nonclinical pharmacokinetics group for >20 years, her team contributed to small molecule projects spanning antivirals, oncology, neuroscience, metabolic diseases and immunology. With expertise in pharmacokinetics, drug metabolism formulation, bioanalysis and toxicology, she has worked with project teams to integrate available information for compound selection and progression. Currently, Dr. Marsh directs her efforts to the NTD partners, providing similar expertise for compounds under evaluation by DNDi, TB Alliance and MMV. Recently Dr. Marsh received an award from the Scientific Governing Board for her broad impact across AbbVie R&D. She has published widely in areas of pharmacokinetics, with more than 240 authored or coauthored publications and more than a dozen issued US patents.

Dr. Tom von Geldern spent over 20 years in the pharmaceutical industry, serving among other roles as a Research Fellow and Senior Group Leader at Abbott Laboratories. In this capacity he led medicinal chemistry efforts resulting in the identification of clinical candidates in the areas of oncology, inflammation, cardiovascular and metabolic diseases. Since his retirement from Abbott in 2007, he has been an independent consultant to the pharmaceutical and biotech industries, specializing in medicinal chemistry and discovery strategy and tactics, and with a particular focus on the development of treatments for neglected tropical diseases. He has served as a volunteer board member or advisor to a number of health-related nonprofit organizations, and he and his wife are actively engaged in community-level volunteering, especially on environmental issues. He is an author of 84 peer-reviewed articles, an inventor on 52 US patent applications, and has lectured by invitation on more than 65 occasions.

"As drug discovery scientists, we tend to have an idealistic view of our job; we're advancing scientific understanding, and at the same time working to improve human health. To pursue these goals, for the benefit of patients whose health needs have historically been neglected... it just doesn't get any better than that! AbbVie has generously provided infrastructural support that allows me, and some of our other retired scientists, to participate in their effort."

Dr. Tom von Geldern, AbbVie Retiree and volunteer

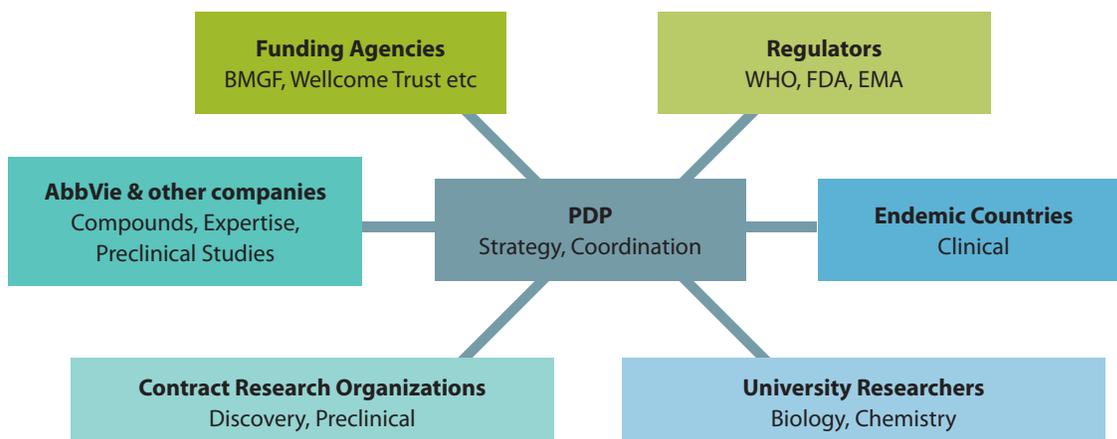
3 Engaging in product development partnerships

A core strategy of AbbVie's Neglected Diseases initiative has been engaging in product development partnerships (PDPs) with a small number of nonprofit, science-based organizations that are committed to tackling NTDS, and are open to working with companies, alongside governments and other research partners to achieve their goals. Diagram 5 illustrates the general division of labor between the key types of organization engaged in such partnerships, and illustrates AbbVie's approach to engagement.

This case focuses on AbbVie's engagement with the Drugs for Neglected Diseases *initiative* (DNDi), Medicines for Malaria Venture (MMV), TB Alliance and TB Drug Accelerator (TBDA), Anti-Wolbachia Consortium (A-WOL), and Macrofilicidal Drug Accelerator (MacDA). These PDPs are profiled on pages 18-25. The company's partnerships with these organizations are focused around three main areas of activity:

- **Sharing compounds for screening** – Prior to the creation of these and other cross-sector PDPs, the vast majority of chemical compounds in pharmaceutical company libraries had never been tested against the pathogens causing NTDS. The ability to access well-annotated compound libraries and then screen thousands of these compounds is a crucial early stage in the R&D process of identifying potential drug candidates. As DNDi noted in a ten-year review of its experiences and lessons, "Gaining access to classes of compounds with drug-like characteristics from companies is vital as it offers access to knowledge and know-how associated with compound series to ensure more efficient drug development."¹¹ Since 2009, AbbVie has provided its nonprofit partners with more than 120,000 compounds for screening. The engagement has ranged from targeted screening of compounds with anti-infective activity to high-throughput screening (HTS) of random collections. The largest screening campaign has been with the Infectious Diseases Research Institute (IDRI) in the context of the TB Drug Accelerator, followed by the company's partnership with DNDi. The company initially provides samples for testing, and then certain active ones that are scientifically interesting are donated.

Diagram 5 **The Product Development Partnership Model**



Source: AbbVie

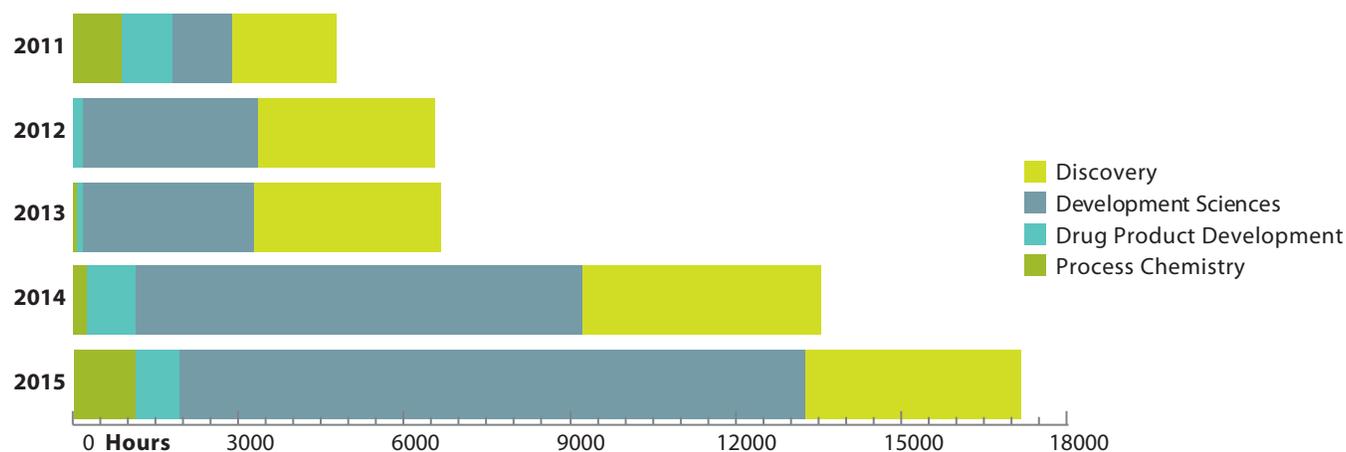
- Supporting program enhancement** – AbbVie scientists are also adding value to selected PDP programs by providing a *pro bono* service in areas where the company has particular expertise or technology that can move partner programs more rapidly towards ‘go’ or ‘no go’ milestones. Dr. Kempf explains, “We work with our partners to identify opportunities that are likely to have the biggest impact—matching the company’s capabilities with our partners’ needs. Regardless of where the relevant program or compounds come from, if they look promising based on initial screening we can provide partner organizations with valuable, low-cost and good quality information in key areas such as safety and toxicology through running both routine and specialized assays and tests. In this way we are able to harness the scale of our technology platform as well as our scientific and process expertise to provide substantial in-kind support worth thousands of hours in terms of scientists’ time and costs.”¹² To date, AbbVie scientists have undertaken hundreds of scientific tests on behalf of their product development partners.

- Providing technical expertise and advice** – Although the PDPs have been able to attract remarkable scientists to work for them, they also need to be able to draw on a much greater breadth and depth of scientific expertise and experience than is possible in a relatively small organization. A number of AbbVie’s scientists serve as advisors and consultants on a *pro bono* basis to these initiatives. Dr. Kempf, for example, serves on DNDi’s Scientific Advisory Committee, which advises the organization on matters related to R&D and the choice of projects as well as quality of the scientific work and on a similar body for the TB Alliance. Dr. Marsh provides expertise to all of AbbVie’s NTD partners, and particularly with MMV on preclinical development aspects for several of their compounds.

In addition to formal advisory roles, many of the participating AbbVie scientists are also available to provide technical expertise and advice on a more *ad hoc* basis as needed and requested.

Diagram 6 NTD Partnership Projects: Contributions by Year

Since 2011, AbbVie’s scientists have increased the number of volunteer hours contributed to the product development partnerships they are engaged with from about 5,000 a year to more than 17,000 hours a year. The allocation of these hours among activities in discovery, development sciences, drug product development and process chemistry is summarized below.



Source: AbbVie

3.1 DRUGS FOR NEGLECTED DISEASES *initiative* (DNDi)

DNDi was one of the first product development partnerships to bring together public and private research institutions with the goal of developing safe, affordable and effective treatments for patients suffering from the most neglected tropical diseases in countries with some of the most limited healthcare systems. It was created in 2003, following recommendations of a working group established by the humanitarian organization, Médecins Sans Frontières (MSF). In addition to MSF, its founding supporters were five public sector institutions—the Oswaldo Cruz Foundation from Brazil, the Indian Council for Medical Research, the Kenya Medical Research Institute, the Ministry of Health of Malaysia and France's Pasteur Institute, with the UNDP / World Bank / WHO's Special Programme for Research and Training

in Tropical Diseases (TDR), acting as a permanent observer to the initiative. Today, DNDi's funders number over 60 public institutional donors, private foundations and private individual donors.

To achieve its goals, DNDi has pioneered innovative agreements to partner on drug discovery, development and treatment activities with over 150 pharmaceutical and biotechnology companies, universities, public and private research institutes, contract research organizations, Ministries of Health, hospitals, NGOs, and other product development partnerships. It operates as—and coordinates—a 'virtual research ecosystem' whereby these diverse partners collaborate on targeted projects to discover and develop new drugs, produce new

formulations of existing drugs, and strengthen capacity in disease-affected countries and communities to enhance local research and clinical trials and improve treatment delivery.

In the short-term, the network of partners aims to improve existing treatments, making them more affordable, safer, easier-to-use and effective. Over the long-term it aims to develop new drugs. As of 2015, six new treatments had been delivered to millions of patients, and a pipeline established of 13 new drug candidates. DNDi and its partners are also active in advocacy to promote public awareness, and increase public policy and financial support for NTDS.

Box 2: NTDS focused on by DNDi

DNDi currently focuses on five of the most serious NTDS in terms of the numbers of people at risk or infected, and the spread and severity of the disease. They are:¹³

Sleeping Sickness or Human African Trypanosomiasis (HAT), which causes severe mental debilitation and coma and can kill if left untreated, with 36 million people at risk, especially in 8 African countries.

Leishmaniasis or Kala-azar, different types of which cause either fever, weight loss, spleen/liver swelling, anaemia and potential fatality or disfiguring skin lesions and social stigma, with more than

350 million people at risk in 98 countries, and children the most affected.

Chagas disease or American Trypanosomiasis, which is the leading cause of infectious heart disease in Latin America, with over 100 million people at risk, 8 million infected and some 12,000 deaths every year.

Filarial Diseases, which cause blindness, swollen limbs and genitals, intense itching and chronic pain, with about 1.5 billion people at risk, and 25 million infected with onchocerciasis (river blindness) and 120 million with lymphatic filariasis (elephantiasis).

Paediatric HIV/AIDS, which affects 3.3 million children, mostly in Sub-Saharan Africa. Without treatment, over half of these children will die before they are two and 80% by the age of five, resulting in 600 children currently dying every day.

DNDi previously supported research on malaria, but has transferred this portfolio of work to Medicines for Malaria Venture (MMV). Since 2015, it has also started working on mycetoma and Hepatitis C.

3.1 DRUGS FOR NEGLECTED DISEASES *initiative* (DNDi)

DNDi's agreements with its partners are structured to facilitate transparency in its R&D activities as well as accessibility and affordability of any drugs and treatments that result from them, while also clarifying and protecting intellectual property (IP) ownership, which is usually retained by the partner and in some cases co-owned, and facilitating licensing. In this way, DNDi maintains clear financial and scientific independence, while being able to catalyze and leverage world-class research by drawing on the scientific, technical, material and financial resources of its public and private partners to advance its mission.

AbbVie has been one of DNDi's corporate partners since 2009, expanding the partnership in recent years. In 2011, they signed a four-year joint research & non-exclusive licensing agreement to undertake research on new treatments for Chagas disease, helminth infections, leishmaniasis and sleeping sickness, which is currently being renewed. IP related to this agreement, existing relevant AbbVie IP and new IP generated by this collaboration will be subject to a principle of non-exclusive licensing to address NTDS in endemic countries. Any products developed as a result of this partnership will be provided to endemic countries at the lowest sustainable price to ensure the greatest patient access. Joint projects underway currently include:

- Provision of more than 35,000 compounds for screening against visceral leishmaniasis, Chagas disease, onchocerciasis, and lymphatic filariasis. Promising lead compounds from these screenings are fed into an ongoing discovery collaboration. In 2014-2015, three new progressible hit series for filarial disease and one progressible hit series for leishmania were entered into the AbbVie-DNDi collaboration agreement, allowing for further study of these compound series. Additionally, a characterization of T cruzi inhibitor hits was completed, and one series of inhibitors was progressed into hit-to-lead. This joint venture provides DNDi with access to selected classes of AbbVie's proprietary molecules, and AbbVie scientists participate in the collaborative Discovery team to identify new preclinical candidates.
- AbbVie also participates in the DNDi Lead Optimization Latin America (LOLA) team. Through this collaboration, AbbVie provides advice and helps to characterize DNDi's lead compounds, providing high-quality scientific results at no cost to DNDi.
- In addition to the project-based technical expertise and advice that is provided by AbbVie scientists through the above activities, Dr. Kempf also provides broader strategic advice on R&D issues as a member of DNDi's Scientific Advisory Committee.

Targets for the partnership between AbbVie and DNDi in 2016 include demonstrating progress on one new compound for Chagas or Leishmaniasis into hit-to-lead and renewing and expanding the DNDi collaboration agreement to include additional active series.

A note on drug discovery terminology: High throughput screening (HTS) techniques are used to screen thousands of compounds and to select a few promising active compounds. Hit-to-lead is the stage at which these hit molecules from HTS are evaluated and undergo limited optimization to identify promising lead compounds. In the subsequent lead optimization stage, many new analogs are synthesized and evaluated in an iterative process to identify optimized preclinical drug candidates, which then pass from the discovery phase into preclinical drug development.

3.2 MEDICINES FOR MALARIA VENTURE (MMV)

Approximately 3.2 billion people live at risk of malaria, and some 438,000 die from the disease every year, most of them children. Many infected adults face not only poor health, but also a loss in their work productivity, wages and household income, exacerbating the cycle of poverty. The disease costs Africa an estimated \$12-30 billion in lost GDP annually, and accounts for some 40% of all public health spending on the continent.¹⁴

Medicines for Malaria Venture (MMV) is a product development partnership aimed at “discovering, developing and facilitating delivery of new, effective and affordable anti-malarial drugs” to reduce the burden of malaria in the most severely affected countries.¹⁵ It was established in 1999 with initial financing of \$4 million from government donors and private foundations, with the recognition that there were insufficient anti-malarial treatments being developed due to low

commercial viability and investment in R&D. As of 2015, MMV had successfully grown to more than \$850 million in received or pledged funding from some twenty government agencies, private foundations, international organizations, corporations, corporate foundations, and private individuals.

A crucial factor in MMV's success has been its partnership-based research network including over 400 pharmaceutical and biotechnology companies, universities, international research institutes and country-level public, private and nonprofit partners in 50 countries. Its research approach and portfolio are outline in Box 3.

Pharmaceutical and biotechnology companies have been increasingly important participants in MMV's research network. This has been especially the case for those companies, such as GlaxoSmithKline, Sanofi, Pfizer, Novartis, Guilin Pharmaceutical and

Cipla, that develop and manufacture antimalarial drugs and vaccines on a commercial basis. At the same time, a number of companies that do not have commercial interests related to malaria are engaging with MMV on a *pro bono* basis, of which AbbVie is a good example.

MMV describes how its engagement with companies, “leverages the facilities, knowledge and expertise of the pharmaceutical and biotechnology industries, drawing on their valuable experience and resources at every stage of the drug development process and applying it to our own. ...where MMV is funding a research program, we expect the partner, at a minimum, to match the value of the contract through in-kind contributions (for example staff costs, laboratory space, equipment, overheads), thus maximizing MMV's financial resources.”¹⁶

Box 3: MMV's research approach and portfolio

<p>MMV's research network focuses on, “delivering efficacious medicines that are affordable, accessible and appropriate for use in malaria endemic areas. Specifically, the goal is to develop products that will provide: efficacy against drug-resistant strains of <i>Plasmodium falciparum</i>, potential for intermittent treatments (infants and pregnancy), safety in small children (less than 6 months old), safety in pregnancy, efficacy against <i>Plasmodium</i></p>	<p><i>vivax</i> (including radical cure), efficacy against severe malaria, and transmission-blocking treatment.”¹⁷</p> <p>Today, MMV is regarded as managing one of the world's most significant portfolios of anti-malarial R&D with over 65 projects underway covering the spectrum of research, translational and development activities. To-date, together with its partners, MMV has screened over</p>	<p>5 million compounds, advanced new drugs along the development pipeline, demonstrated the potential of new technologies and delivery channels, and dispatched 300 million treatments of Coartem® Dispersible, and delivered 36 million vials of Artesunate injections, both of which are life-saving medicines.</p>
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3.2 MEDICINES FOR MALARIA VENTURE (MMV)

AbbVie started to collaborate with MMV in 2010. Their partnership has focused primarily on AbbVie scientists supporting preclinical program enhancement for one of MMV's major drug candidates—DSM265—and DSM421, a potential follow-on compound for DSM265. The collaboration also extends to earlier nonclinical optimization of alternate chemical series.

- **DSM265:** The collaboration focused originally on DSM265, which if successful could result in a potential single dose cure for malaria. DSM265 inhibits the plasmodial pyrimidine biosynthetic enzyme dihydroorotate dehydrogenase (DHODH), an enzyme essential to *Plasmodium falciparum* (*P.f.*) and *Plasmodium vivax* (*P.v.*) parasites. It has now completed Phase I study which characterized the pharmacokinetics and safety following single oral doses in healthy volunteers. Phase IIa clinical trials on DSM265 continue in Peru and an Investigational New Drug application (IND) was opened with the Federal Drug Administration (FDA) in December, 2015.

Prior to clinical development, AbbVie conducted studies to profile the pharmacokinetics in mice, dogs, pigs and monkeys and assisted in metabolite identification (understanding of how the body breaks down the compound). AbbVie contributed to the development of the formulation used in the Phase 1 study and continues to contribute

to the development of formulations optimized for treatment of malaria in tropical climates. In 2015, IND overview documents were completed by AbbVie scientists to support the IND filing for DSM265.

At present, AbbVie scientists are contributing expertise towards the conduct of long term toxicology studies and specialized toxicology studies which evaluate the safety for future dosing of DSM265 in children and pregnant women.

- **DSM421:** AbbVie is also contributing to the nonclinical development plans for DSM421 (considered a "next generation compound"), a more soluble version of DSM265. As with DSM265, the AbbVie contributions to DSM421 have centered around gaining an understanding of metabolism (through metabolite ID studies) and the pharmacokinetic profile in selected nonclinical species (monkey, dog, pig). Toxicology study design and interpretation are part of the company's ongoing contributions to the preclinical characterization of DSM421.

- **Next Generation Compounds:** To stimulate the discovery of drugs for neglected diseases, MMV has gathered 400 diverse drug-like molecules which are made available for free to research teams (Pathogen Box). The compounds have confirmed activity against at least one of the key pathogens that cause some of the most neglected diseases on the planet. To provide additional

information on the "pharmaceutical properties" of the compounds, AbbVie has contributed to the *in vitro* characterization of the compounds in the Pathogen Box, with *in vitro* profiles of metabolic stability, protein binding, solubility, permeability, the potential for drug-drug interactions and cellular toxicity.

In 2016, AbbVie will assist MMV with the toxicology studies required prior to dosing in children and pregnant women as well as those studies required for repeated dosing in humans. AbbVie will also conduct a clinical study with DSM265 to characterize the pharmacokinetics of a new, more cost effective formulation developed for tropical regions.

3.3 THE TB ALLIANCE and TB DRUG ACCELERATOR (TBDA)

Tuberculosis (TB) is now the world's leading infectious killer. In 2014, it resulted in 1.5 million deaths, about 9.6 million infections, and some 480,000 multidrug-resistant (MDR-TB) cases.¹⁸ There is also the ongoing challenge of people suffering from co-infection with TB and HIV. The vast majority of people affected are among low-income populations in developing countries. The human and economic costs of TB are exacerbated by the fact that existing drugs and therapies are not only outdated, but also require a minimum of six months to cure patients. This long treatment regimen in turn contributes to high default rates on

treatments, which can lead to increased transmission, higher mortality rates, and the growing challenge of drug resistance.

The TB Alliance was established as a nonprofit product development partnership in 2000, in recognition of the fact that at time there were no TB drugs in clinical development, due mainly to the lack of market incentives to develop them, despite the need for new drugs and the potential for scientific innovation. The TB Alliance is dedicated to, "the discovery and development of better, faster-acting and affordable tuberculosis drugs that

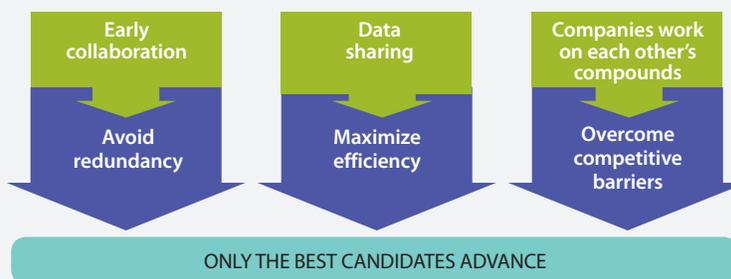
are available to those who need them."¹⁹ Similar to its fellow PDPs, it aims to, "... combine the research and development expertise of its own staff with the skills and resources of its partners (which include pharmaceutical and biotech companies, research institutes and NGOs, academia, donors, governments and patients groups) to harness the most promising science wherever it may exist around the world. The model minimizes costs, including overhead and investments in infrastructure, while optimizing scientific capacity to speed new TB drug development."²⁰ Today, the TB Alliance manages the largest pipeline of new TB drugs in history.

Box 4: Accelerating progress on TB research through increased collaboration

In August, 2012, the Bill & Melinda Gates Foundation (BMGF), with urging from the CEO Roundtable, took ongoing collaborative efforts in TB research a step further by establishing the TB Drug Accelerator (TBDA). Currently under the TBDA, eight companies (AbbVie, AstraZeneca, Bayer, Eli Lilly, Eisai, GSK, Merck & Co. and Sanofi), work alongside eight research institutions and universities (the Infectious Diseases Research Institute, the National Institute of Allergy and Infectious Diseases (NIAID), the Drug Discovery Unit at Dundee University, the California Institute for Biomedical Research (Calibr), Texas A&M University, Weill Medical College at Cornell University, Rutgers Biomedical and Health Science, Colorado State University and the University of Cape Town), and the TB Alliance, with participation from BMGF.

Their goal is to dramatically accelerate the discovery and development of an affordable TB treatment that will cure patients in one month instead of the current six months, and thereby keep more people on treatment, reduce mortality and reduce resistance development. They are working together to generate multiple mechanistically distinct TB drug candidates sufficient to advance a drug regimen to a one-month clinical proof-of-concept by 2024.

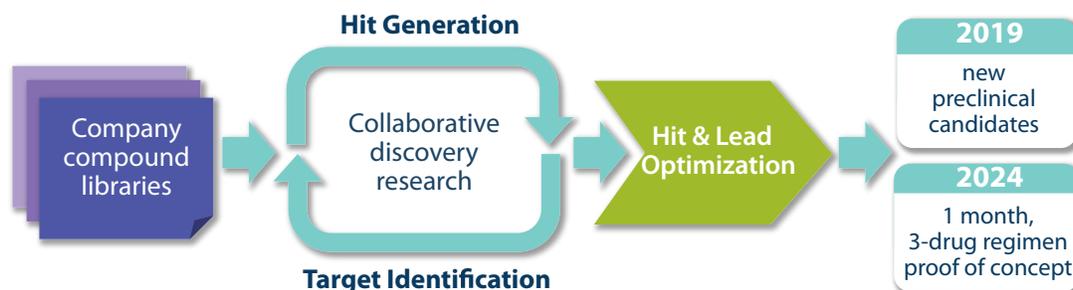
TBDA's model is one of unprecedented collaboration. It breaks from traditional R&D practices, which result in silo'ed work streams, no sharing of compounds, and often redundant research efforts, to an approach that is based on collaboration at the early stage of drug discovery, sharing of compound libraries and data, better coordination, and joint efforts to develop the best prospects, regardless of where the drug originates.



Source: TBDA

3.3 THE TB ALLIANCE and TB DRUG ACCELERATOR (TBDA)

Diagram 7 **Bringing compounds from library to development: How the TBDA works**



Source: TBDA

Since 2012, AbbVie scientists have provided technical expertise for several TB Alliance programs. Dr. Kempf serves on the TB Alliance Scientific Advisory Committee and AbbVie provides preclinical support for selected TB Alliance programs, recently completing three screening toxicology studies on their behalf. The company's bilateral discovery partnership with the TB Alliance has been superseded by a research collaboration within the TBDA. This currently includes the following activities:

- AbbVie has provided over 100,000 proprietary compounds for screening against the TB bacteria. Any promising screening hits are disclosed to TBDA members and advanced within a collaborative drug discovery TBDA sub-team consisting of AbbVie, Eli Lilly, and the Infectious Disease Research Institute (IDRI). In 2014-2015, seventeen new progressible hit series from screening of the AbbVie compound collection were disclosed to the TBDA.

- Within the TBDA, AbbVie also provides substantial in-kind support for other sub-teams' programs, conducting discovery and preclinical studies on compounds from the University of Dundee, the University of Cape Town, Texas A&M University, and the TB Alliance. These studies provide early information on the safety of compounds being explored in the partners' programs.
- Collaborative screening efforts are also currently underway with NIAID, Cornell University, and Texas A&M University. These studies provide information about the activity of compounds against TB under other conditions found in the human lung or look for new active compounds through alternate screening techniques. These techniques can allow for even higher numbers of compounds to be assessed; for example, a collection of over 250,000 AbbVie compounds was screened at AbbVie against a TB protein target provided by NIAID.

In addition, millions of compounds are being 'virtually screened' against other TB protein targets through computational techniques, after which the predicted active compounds are sent for actual testing.

In 2016, the scientists are focused on progressing additional series into hit-to-lead and completing the screening of a large AbbVie compound collection against a second TB protein target.

3.4 THE ANTI-WOLBACHIA CONSORTIUM (A-WOL) and MACROFILARICIDE DRUG ACCELERATOR (MacDA)

Filarial worm or nematode infections cause a number of the most debilitating neglected tropical diseases including onchocerciasis (“river blindness”) and lymphatic filariasis (“elephantiasis”).

Onchocerciasis affects up to 37 million people, especially in Africa, and results in skin disease and blindness, with some 500,000 people becoming blind as a result of the disease. It is caused by a large worm (*Onchocerca volvulus*) which is transmitted to humans by black flies that breed in tropical rivers and streams. Lymphatic filariasis is the 2nd leading cause of global disability. It is caused by nematode worms that live in the lymphatic vessels of humans and affects an estimated 120 million people in more than 80 countries, with more than 1.5 billion people at risk of infection. People affected with the disease can develop severely swollen limbs and thickened skin resulting in loss of mobility, poor quality of life, and often social stigma and exclusion.²¹

Control of filariasis currently relies on Mass Drug Administration (MDA) programs that are dependent on the longstanding and generous drug donation programs for Mectizan® (ivermectin from Merck & Co. Inc) and albendazole from GSK. Eisai also donates DEC. These drugs are administered singly or in combination through community-based treatment, and need to be taken for extended periods to cover the reproductive lifespan of the long-lived adult worms. Current treatment and eradication challenges include the absence of

a drug with permanent sterilization capabilities and the development of drug resistance by the worms.²²

The A-WOL consortium was founded in 2007 to address these challenges with grants of over \$40m from the Bill & Melinda Gates Foundation (BMGF). Its aim is to discover and develop new anti-*Wolbachia* drugs with shorter and more effective activity and to improve regimens of existing treatments for use as alternative strategies where needed, as well as raising awareness of the urgent need to tackle these diseases and the barriers to their elimination goals and targets. Its approach is to target *Wolbachia*—which is a type of symbiotic bacteria that lives inside the cells of the parasitic worms. The worms are dependent on these bacteria for their development, fertility and survival, and so eliminating the bacteria with antibiotic drugs will kill the worms and deliver a new, practical and cost-effective solution for eliminating these diseases.²³

The A-WOL Consortium is coordinated by a management team based at the Liverpool School of Tropical Medicine (LSTM), and consists of internationally recognized scientists working in academic and corporate laboratories. AbbVie initially engaged with the A-WOL Consortium in 2010, and the relationship has evolved into the following two initiatives:

The TylAMac Program

This program began as a screening partnership in 2010 between AbbVie

and the LSTM, through which AbbVie provided a small subset of its antibiotic collection for screening. This effort, and subsequent evaluation at LSTM, the University of Bonn and TRS Labs, led to the identification of Tylosin A as an important lead compound. AbbVie then launched a medicinal chemistry optimization effort in conjunction with the Franciscan Institute for World Health, leading to the identification of analogs that were highly active in animal models of filarial disease. As this so-called TylAMAc (“Tylosin Analog Macrofilaricide”) program advanced, the collaboration expanded in 2014 to include DNDi, which received a grant from the BMGF to work on pre-clinical and clinical development in filarial diseases.

In 2014-2015, two lead compounds were identified as possible preclinical candidates for onchocerciasis and lymphatic filariasis: A-1535469 and A-1574083. They were approved by the Scientific Advisory Committee of the A-WOL Consortium and DNDi's Preclinical Candidate process to be advanced through additional efficacy, safety, and toxicology studies. These two preclinical candidates were scaled up to >3kg to support initial two-week toxicology studies in both rats and dogs. The A-1574083 compound was candidate selected by DNDi in 2016 and is progressing through further toxicology studies, ultimately leading to the initiation of studies in humans.

Scientists from AbbVie and LSTM presented the first results from this

3.4 THE ANTI-WOLBACHIA CONSORTIUM (A-WOL) and MACROFILARICIDE DRUG ACCELERATOR (MACDA)

program at the BMGF Grand Challenges meeting in Beijing and the American Society of Tropical Medicine and Hygiene conference in Philadelphia in October 2015.

The Macrophilicidal Drug Accelerator (MacDA)

Building on the success of the TB Drug Accelerator model for collaborative tuberculosis drug discovery, in 2014 the BMGF proposed a similar approach to the development of new agents to kill adult filarial worms ("macrofilariae"). The MacDA (**Macrophilicidal Drug Accelerator**) was established in March 2015 as a collaborative venture between 11 companies, research institutions, and nonprofit organizations to discover and advance new macrofilaricides for the treatment and elimination of onchocerciasis and lymphatic filariasis.

AbbVie has served as a founding member of the consortium with the goal of consolidating and synergizing overlapping streams of research.

Within the MacDA, AbbVie participates in a dedicated drug discovery sub-team along with DNDi, the University of Bonn, and the Northwick Park Institute for Medical Research. A library of more than 700 selected high-quality AbbVie compounds was initially screened, resulting in the identification of four novel series of leads that directly attack the filarial worm, as opposed to the TylAMac compounds that attack the symbiotic bacteria. These are now being advanced through hit-to-lead, with AbbVie scientists guiding the medicinal chemistry aspects of the program. It is hoped that in 2016 one of these series can be optimized toward a potential preclinical candidate.

"AbbVie's multigenerational NTD drug discovery team is made up of chemists, biologists, biochemists, pharmacologists, computer scientists, managers, technicians, administrative assistants, and lawyers. It is the personal involvement that these individuals have with the interns each summer that has the greatest impact. Through these relationships the students begin to appreciate what is not learned through a textbook, classroom, or laboratory course. It is not only personal passion and drive that is passed on through shared experiences, but also the oral tradition and institutional memory of a well-established pharmaceutical company. These relationships also provide renewed energy and job satisfaction for the seasoned and retired scientists, as well as an opportunity to give back with their professional talents and expertise both in the education of the next generation of scientists and in the immediate impact that these projects can have on people afflicted with NTDS today."

Dr. Jeffrey Rohde, Professor of Chemistry, Franciscan University

4 Supporting the education of future scientists and health leaders

In addition to mobilizing more than 160 of AbbVie's own scientists, since 2011, another element of the Neglected Diseases initiative has been co-sponsoring a summer internship program with the Franciscan Institute for World Health (FIWH) based at the Franciscan University of Steubenville, Ohio.

The aim is to provide educational, humanitarian, and scientific career training to undergraduate science students working on NTD projects. AbbVie scientists provide hands-on supervision and coordinate student projects with AbbVie's NTD partners. The internship is a ten week, 40 hour/week, intense experience of full-time collaborative research on NTD targets side-by-side with AbbVie drug discovery scientists and Dr. Jeffrey Rohde. Dr. Rohde is a previous in-house medicinal chemist of nearly 13 years at Abbott, current Professor of Chemistry at Franciscan University, founder of the FIWH NTD Initiative, and co-director of the summer internship program together with Dr. Kempf.

The specific drug targets and collaborative projects for the summer are determined in real-time by AbbVie's strategic partnerships with organizations like the DNDi. Interns assume responsibility for a critical step in this global effort: preparing new compounds and developing new assays for potential novel drug therapies. In 2014 and 2015, for example, the students conducted projects focused on TB, Chagas disease, onchocerciasis and leishmaniasis, producing a number of compound series for testing through their screening efforts.

Immersed in a state-of-the art scientific environment, students learn to:

- Conduct drug discovery research;
- Follow and evaluate experiments using the latest techniques and technologies;
- Record progress and results in electronic-notebooks;
- Register compounds into AbbVie's compound repository; and
- Regularly give updates on their progress in team meetings.

The summer concludes for each intern with a poster presentation to the larger company, a summary lecture to the full project team, and a comprehensive professional performance evaluation of their summer work by the team and project leaders.

Over thirty interns, representing more than a dozen colleges and universities and including international students from Ghana, Singapore, and Trinidad-Tobago, have participated in the program over the first five-years. Most of those interns, upon completion of their undergraduate degrees, have embarked on the next step in their educational progressions in doctoral programs and medical schools. A few, based upon and with the benefit of this industrial experience, have gone directly into the health sciences workforce at entry level positions.

The internship program has also led to an increase in student-led NTD research projects at the university, a campus-wide summer research program, and a number of similar programs being established at other universities, as well as two new programs that will be piloted this summer with Abbott and Eli Lilly.

5 Funding community projects and dialogues

In addition to leveraging the expertise of its people, philanthropic support is provided through the AbbVie Foundation to partners that are tackling NTDS. The foundation's mission to build "strong communities, sustainable healthcare systems and effective educational programs" that help to meet the needs of some of the world's most underserved people.²⁴

A core element of the foundation's strategy is to partner with experienced humanitarian and public health nonprofit organizations that have on-the-ground delivery capability and a solid evidence-based approach to selecting projects and measuring progress. The foundation works with global and local partners in both the nonprofit and public sector across a number of countries and on a number of global health challenges of which NTDS is just one.

In the area of NTDS, the foundation is working with MAP International and the Sabin Vaccine Institute to support select community-based interventions and evaluations aimed at advancing NTDS programs and reaching underserved populations in parts of Africa and Latin America. Additionally, previously the foundation funded efforts to prevent and control lymphatic filariasis in Haiti.

5.1 MAP International in Côte D'Ivoire and Bolivia

The foundation works with MAP International in Côte D'Ivoire and Bolivia. MAP International combines medical assistance with programs to train, equip and empower individuals and families living in poor communities, so that they are better able to prevent and fight diseases and improve the conditions they live in more broadly. Its three core focus areas are: the provision of essential medicines and medical supplies, disaster and emergency relief and treatment and prevention of neglected tropical diseases.

Tackling buruli ulcer in Côte D'Ivoire

In 2010, the AbbVie Foundation (at the time still the Abbott Fund) launched a buruli ulcer (BU) program in several health districts in Côte D'Ivoire, in support of an ongoing initiative led by MAP International. Côte D'Ivoire is the world's most endemic country for buruli ulcer. It is caused by a germ, *Mycobacterium ulcerans* which results in infection that often

leads to extensive destruction of skin and soft tissue with the formation of large ulcers usually on limbs. Only about 30 percent of cases are healed without disabilities. More than 2,500 cases have been reported in the country, accounting for over half the cases reported worldwide.

AbbVie's support is focused on 97 health facilities in three of the country's most endemic health districts. The program focuses on improving early detection, strengthening disease surveillance, monitoring and evaluation systems as well as early detection and patient care for BU patients in these districts, with the goal of minimizing BU-related morbidity and preventing long-term disability.

During 2014-2015, the program standardized collection tools and data processing methods, and consolidated district-wide data into an electronic database. These improvements in data collection, reporting and management in turn made it easier for staff to monitor the distribution of positive BU cases in the project districts. The program also emphasized the importance of patient adherence, which has remained high with at least 95% of patients on antibiotics completing their full course of treatment.

Another focus has been building the capacities of health workers and local communities. In 2015, the program provided education sessions on BU case management and disease surveillance, which trained 120 community health workers, reached over 14,000 students in primary schools and educated more than 13,000 community members about BU case detection awareness. Nearly 90% of suspected BU cases underwent confirmatory diagnostic testing, exceeding the goal of 60%. These and other activities also helped to enhance overall health system capacity and community response mechanisms to BU prevention and control.

To achieve these results, MAP has worked with and supported the priorities of the National Buruli Ulcer Control Programme, the Directorate of Forecasting, Planning, Evaluation and Health information, and the Pasteur Institute of Côte D'Ivoire. This offers a good example of how a private sector foundation can support the work of an NGO implementing partner in a way that aligns with government public health priorities and enhances a more systemic approach to problem-solving, drawing on the resources and capacities of all sectors.

Addressing chagas disease in Bolivia

In 2014, the AbbVie Foundation partnered with MAP International in Bolivia, where 80 percent of the country is endemic for chagas disease, with 1.8 million people at risk of infection.²⁵ Left untreated, the disease can lead to serious heart, digestive, neurological and systemic conditions.

The focus of the foundation's support in this country is on community-driven activities aimed at training community health workers in prevention, raising community awareness, disease surveillance, screening, early diagnosis and improving the treatment referral process. In addition, efforts are underway to implement environmental control strategies targeted at preventing and controlling chagas disease, with the ultimate goal of elimination.

With AbbVie Foundation support in 2014, MAP operated in 33 communities training community healthcare workers and healthcare professionals, conducting home visits to identify vulnerable families and repairing selected homes reaching nearly 3,000 community members. The program was expanded in 2015 to reach over 7,000 community members in 40 different communities with continued expansion expected in 2016.

5.2 The Sabin Vaccine Institute in Latin America

The Sabin Vaccine Institute is a nonprofit organization that was founded in 1993 by a group of scientists, researchers and advocates. It is named in honor of the oral polio vaccine developer Dr. Albert B. Sabin. One of its main programs is the Global Network for Neglected Tropical Diseases, which aims to raise the awareness, political will, and funding necessary to control and eliminate the seven most common NTDs.

In 2014, the AbbVie Foundation began its partnership with the Sabin Vaccine Institute on two initiatives in Latin America with the goal of making a positive impact on finding, educating, testing, linking and treating some of the poorest people impacted by NTDs in the region.

Fighting soil-transmitted helminths in Colombia

From 2014 to 2015 AbbVie's funds helped catalyze NTD efforts working with Sabin's Global Network for Neglected Tropical Diseases alongside a Colombian organization called Sinergias (Estratégicas para la Salud y el Desarrollo Social),

and with support from the Colombian Ministry of Health and provincial and local health staff to reach 18 indigenous communities in the country's Vaupes province located in the remote Amazonas region. The program focused on improving the coverage for prevention, control and elimination of five prioritized neglected tropical diseases of soil-transmitted helminths (STH). STH is a public health problem in the province, which has the highest frequency of infection in the country.

In addition to providing treatment, the program also undertook hygiene and health education complemented by home visits and a community health surveillance system to ensure more healthy housing practices to reduce the risk of these diseases. The program successfully strengthened local capacity of health institutions in indigenous communities by training for local disease surveillance.

Assessing progress of STH and malaria programs in Mexico

In 2014, the AbbVie Foundation provided the Sabin Institute a research grant to assess the impact of the national albendazole program by determining the prevalence and intensity of infection of soil transmitted helminth (STH) infections and asymptomatic malaria infections among school-aged children in ten of the poorest states in Mexico.

The study is being conducted in collaboration with the Pan American Health Organization (PAHO), the National Center for Infant and Adolescent Health (CeNSIA), the Institute of Epidemiological Diagnosis and Reference (InDRE), and the National Center of Disease Prevention and Control (CENAPRECE). Again, this offers a useful model of public-private cooperation aimed at achieving greater scale and systemic impact than could be achieved alone.

Over the course of the study, a key goal and outcome has been to build local capacity. For example, more than 120 public health and lab technicians have been trained to take samples for analysis from 500 children in 10 Mexican states, for a target sample of 5,000 to be tested for STH and malaria. A basic assessment of water and sanitation facilities at participating schools is also being conducted. The research findings will contribute to disease surveillance efforts in Mexico, as well as inform future NTD interventions.

5.3 Convening public health officials and academics

In addition to supporting community-driven health programs, local and national capacity building and independent impact assessments, another role that corporate foundations can play is to support forums that enable dialogue between health experts, policy makers and funders.

In September 2015, for example, the AbbVie Foundation supported a one-day symposium at Rice University's Baker Institute for Public Policy, which explored challenges faced by Mexico and the U.S in handling NTDS, the relationship between public health outcomes and economic circumstances, and opportunities to work collaboratively in shaping public policy to combat these diseases. The event was entitled, "The United States and Mexico: Addressing a Shared Legacy of Neglected Tropical Diseases and Poverty."

The conference was organized in collaboration with Baker Institute's Center for Health and Biosciences and the Mexico Center, as well as the END FUND, the National School of Tropical Medicine at Baylor College of Medicine, and the Texas Children's Hospital Center for Vaccine Development. The convening power of these diverse organizations that span the public policy, public health and economic development agendas, enabled the conference to attract senior policy makers from both countries as well as academic, civil society, philanthropic and medical leaders. Deliverables from the conference, include a policy report based on symposium findings and a series of articles highlighting different NTDS impacting the two countries.

The examples outlined above, ranging from community-driven projects to public policy dialogues, illustrate the contribution that can be made by a corporate foundation. They show how the AbbVie Foundation is working with nonprofit partners—from delivery focused NGOs to academic and research institutions—and with public sector institutions to convene dialogues, support research, and enhance community-based health delivery, capacity building and evaluation of NTD programs. There is growing potential for corporate foundations to take this systemic type of approach to help strengthen health systems in resource-constrained contexts.

6 Participating in multi-stakeholder policy and advocacy platforms

No matter how much is being done by individual companies, governments, and research organizations or even disease-specific product development partnerships to discover, develop and deliver effective and affordable treatments for NTDS, these efforts are necessary but not sufficient. Collective action and better coordination is also needed to mobilize additional financial resources and business support, to advocate for greater action by national leaders in all sectors and influence policy reforms, and to address some of the broader systemic challenges of health systems strengthening.

Over the past decade a number of multi-stakeholder platforms have been convened around achieving these objectives. They include initiatives such as Uniting to Combat NTDS, the END Fund, the Global Network for Neglected Tropical Diseases, the Coalition for Operational Research on NTDS, the NTD Non-Governmental Development Organizations Network, and the CEO Roundtable convened by the Bill & Melinda Gates Foundation (BMGF) as well as the increasingly proactive coordinating role on NTDS played by WHO over the past decade. In many cases the PDPs described earlier in the case study are active participants in the platforms, alongside individual companies, other UN and donor agencies, foundations, governments and universities.

6.1 The CEO Roundtable

From a business perspective, the Gates CEO Roundtable, which was first convened in 2009, has been a valuable platform for mobilizing collective action and new models of partnership. The BMGF's strategy in global health is to, "harness advances in science and technology to save lives in developing countries. [It] works with partners to deliver proven tools—including vaccines, drugs, and diagnostics—as well as to discover path-breaking new solutions that are affordable and reliable."²⁶ The CEO Roundtable was convened by Bill Gates to proactively engage senior executives and scientists from some of the world's leading pharmaceutical companies in a joint effort to improve the health of the world's poorest people. There are currently three work streams: Neglected Tropical Diseases; Tuberculosis; and Access and Affordability. In addition to these work streams,

participants in the CEO Roundtable have agreed on three cross-cutting objectives:

- To accelerate R&D for priority new drugs, vaccines and diagnostics
- To deliver and enhance access to priority medicines in developing countries
- To enhance awareness and resource mobilization through advocacy, knowledge-sharing and information exchange.

The Gates CEO Roundtable is itself a good example of the power of individual leadership and the vital convening role that a foundation such as the BMGF can play. It would have been difficult for an individual corporate CEO to bring together his or her peers and competitors around the topic of neglected diseases. It would have been unlikely that any of the nonprofit research organizations, at that time mostly at a fledgling stage in their existence, would have had the status and convening power to get CEOs of the world's major pharmaceutical companies around the same table. Bill Gates used his personal convening power and the platform of the foundation to enable the initial dialogue to happen.

Throughout the process, the BGMF has continued to provide strong advocacy support for the potential of science and technology, financial support, the expertise of its own global health team, and the neutral convening space and structure that is needed for continued dialogue, trust building and emerging collaboration to take place. At the same time, many of the participating organizations have strengthened their own bilateral relationships and partnerships.

Early discussions were structured to include not only company CEOs, but also scientists from the companies and the nonprofit research organizations, in the context of one of the Roundtable's working groups. This in turn led to the generation of specific project ideas and partnerships, and the building of trust and shared commitment that has been essential in making them work. Initiatives such as the TB Drug Accelerator have taken joint efforts to a new level of shared resources and commitment, and AbbVie has participated from the outset.

6.2 The London Declaration on Neglected Tropical Diseases

Another important milestone in the growing momentum to tackle NTDS was achieved on January 30th, 2012.

Under the leadership of the World Health Organisation (WHO) and Uniting to Combat NTDS, the following group of pharmaceutical companies, public donors, private foundations and NGOs came together to endorse *The London Declaration on Neglected Tropical Diseases*:²⁷

AbbVie • AstraZeneca • Bayer • Becton Dickinson • Bill & Melinda Gates Foundation • Bristol-Myers Squibb • Children's Investment Fund Foundation • UK Department for International Development (DFID) • Drugs for Neglected Diseases initiative • Eisai • Gilead • GlaxoSmithKline • Johnson & Johnson • Lions Club International • Merck KGaA • Merck & Co. Inc. (MSD) • Mundo Sano • Novartis • Pfizer • Sanofi • United States Agency for International Development (USAID) • the World Bank.

The London Declaration is a public statement that sets out clear goals and specific commitments from the participants aimed at scaling up the level of collaboration needed to control, eliminate or eradicate 10 of the 17 major NTDS by 2020. It has led to targeted working groups and a transparent process of reporting progress against the commitments made, and illustrates the potential for non-competitive collaboration towards improving public health in some of the world's poorest communities.

III Conclusion and lessons learned

This case study has aimed to illustrate some of institutional, individual and collective leadership that has been undertaken by one company and some of its scientists, managers and external partners to support effective product development partnerships as well as community-based health programs, and public advocacy and awareness-raising in this field of NTDs. In this particular example, the company does not currently have a commercial business in the NTD drugs and treatments that it is addressing through its external partnerships and no relevant drugs to donate, but is focused on sharing the skills, expertise and time of some of its leading scientists, as well as sharing relevant compounds and supporting program enhancement through providing *pro bono* laboratory platforms and tests where relevant.

As of early 2016, AbbVie had shared more than 120,000 compounds with nonprofit research partners, and hundreds of scientific tests had been undertaken in the company's laboratories on their behalf. Over the past several years some 160 AbbVie scientists have been working in the company's neglected diseases effort, with support from the company's senior executives, and managers in its corporate responsibility, government affairs and technology licensing and collaborations teams. It has engaged in a number of product development partnerships, most notably with the Drugs for Neglected Diseases *initiative* (DNDi), Medicines for Malaria Venture (MMV), TB Alliance and TB Drug Accelerator (TBDA), Anti-Wolbachia Consortium (A-WOL), and Macrofilicidal Drug Accelerator (MacDA). These collaborative efforts are ongoing, both internally and externally.

The example illustrates the potential of:

- **Strengthening institutional leadership** – inside companies through setting up a cross-functional leadership council; prioritizing key diseases or geographies through dialogue and alignment between R&D and corporate responsibility strategies; and coordinating different research and functional teams to work effectively together on an essentially *pro bono* basis.
- **Harnessing individual leadership** – from scientists and functional managers, encouraging them to engage in initiatives beyond their “day-jobs”, which nonetheless draw

deeply on the skills, expertise and networks that they have built through these jobs.

- **Building collective leadership** – making a commitment to work in non-traditional ways with non-traditional partners through product development partnerships, community-based programs, and multi-stakeholder alliances and platforms that serve to coordinate resources and capabilities, and leverage impact and influence

Some key lessons from both the internal coordination within AbbVie and its external partnerships are as follows:

1 Leverage core expertise and capabilities

Even when a company does not have a direct business interest or commercial imperative to engage in partnerships aimed at tackling a global health or sustainable development challenge, it can still make a valuable contribution through engaging the skills and passions of its employees and other relevant corporate capabilities and assets. As Dr. Kempf concludes, “There is a tremendous desire within the industry to make a difference in the world. That is why we took these jobs. The volunteer NTD program gives our scientists an opportunity to do something extra to make a difference—to make a real impact. The response by the scientists at AbbVie has been overwhelming.”²⁸ All companies have core expertise and capabilities that can be creatively leveraged to support global goals in a way that either directly or indirectly benefits the company and its employees.

2 Sustain senior executive support

The AbbVie Neglected Diseases initiative is led by its scientists, but relies on the sustained support of the company's senior executives. Almost all successful initiatives where companies are engaged in supporting global goals—whether through their core business operations and products, the skills and time of their employees, or their philanthropic contributions—require clear and ongoing senior executive leadership. In some cases, it is the CEO or other senior executives who take the lead, both internally and externally. In many situations, the senior executives create the enabling environment for their employees to take a lead, and a small group of relevant experts or managers emerge as champions for a particular company-wide initiative. If such initiatives are not recognized and supported by the CEO

and other senior executives, it is difficult if not impossible for them to be sustained over the long-term. This support is even more important when there is no direct commercial benefit or products involved in the program.

3 Think outside institutional silos

In many companies and other large institutions, people tend to stay within their organizational and operational boundaries—working within their own teams and divisions, with little incentive or even permission to build professional relationships across these boundaries. AbbVie's example illustrates the potential to build cross-boundary structures and relationships that can enhance team-building and cooperation in a way that 'business as usual' would struggle to achieve. The Executive Council on Neglected Diseases has given the company a cross-functional structure or platform for its program, but even more valuable has been the day-to-day cooperation that has emerged, both within the R&D division and between this and other parts of the company. Dr. Kempf observes, "Generally, our NTD program operates in a decentralized fashion. But through informal networking we are able to bring a lot of people from different scientific backgrounds together to produce substantial collective impact."²⁹

4 Take time to build trust and shared understanding with external partners

The types of multi-sector product development partnerships profiled in this case study demonstrate relatively new approaches to addressing market failures, governance gaps and other obstacles to achieving global goals. The core rationale of such partnerships is to leverage diverse resources and capabilities in order to tackle an issue more cost-effectively, rapidly, systemically or equitably than any one organization or sector can address alone. The power of the partnership is in the diversity of the partners. Yet, such diversity often means that the participating individuals and organizations speak 'different languages', have different motives, different incentives and even different time horizons.

As such, intermediary leaders are often needed to facilitate the collaboration, build trust, strengthen communication and clarify roles and responsibilities. This role is probably less crucial in situations where technical or scientific expertise is

essential—as the scientists or technical experts in for-profit, nonprofit and public institutions are more likely to share a common language. As Dr. Kempf comments, "The scientists in most of our partners—such as DNDi, MMV and TB Alliance—have worked in the pharma industry and understand the significant challenges of developing a new drug. We speak a common language and share a common approach that contributes greatly to moving forward more rapidly."³⁰ Even in cases like this, however, time and effort needs to be invested in building trust and strong relationships.

5 Explore opportunities for non-competitive industry collaboration

It is often difficult for competitors to work together, regardless of industry sector, and yet some of the greatest advances in addressing systemic global health and sustainable development challenges can come from non-competitive coalitions. Often, a neutral convener or backbone organization plays an essential role in bringing companies together.³¹ In this particular case, for example, working with the Gates CEO Roundtable has created the platform for various company scientists to join in several fruitful partnerships, both with each other as well as nonprofit and public sector partners.

The TB Drug Accelerator model is an experiment in which companies are sharing information in a non-competitive fashion to develop new antibiotics. This approach could be applied to other challenges, within the global health field and beyond—for example in areas such as agriculture, financial inclusion, small enterprise development, energy access, clean water and sanitation.

6 Undertake rigorous measurement of projects

As with any project or program, what gets measured gets managed. There is an ongoing challenge in the fields of global health and sustainable development to measure not only inputs and outputs, but also impacts and outcomes. This is difficult to do even when only one organization is involved and even more challenging in the case of multi-stakeholder partnerships with multiple contributions and interventions. At the same time, in the field of drug discovery and development, there are clear and well-tested metrics to evaluate results of the actual R&D process, and a growing body of empirical analysis on assessing affordability,

Conclusion

accessibility and sustainability of delivery and treatment regimens. Collaborative efforts can play a valuable role in further improving metrics and communicating results of these evolving product development and delivery partnerships.

7 Encourage values-based and multi-disciplinary leadership

One of the clearest lessons that come out of this case study and similar ones is the crucial importance of values-based leadership and actively encouraging diverse disciplines, functions and perspectives. Current leaders—be they at the top of the organization or leading a *pro bono* program, must create an environment where everyone is encouraged to build so-called ‘soft skills’. These include the ability to collaborate and work as a team, especially across silos, respect for and ability to embrace diversity of skills and experiences, personal integrity and accountability for results alongside a willingness to share credit, and a commitment to creating communities of practice, both within and external to the organization.

The ability of current leaders to model these behaviors, while also emphasizing the importance of domain expertise, such as scientific, technical and managerial skills is a key factor in determining the success of business partnerships that aim to support global goals. And they are a key determinant for building respectful and productive working relationships and organizations more generally.

These lessons are relevant not only in initiatives and partnerships aimed at tackling NTDs and improving global health, but in any effort to achieve the sustainable development goals.

The shared goal of combating NTDs to improve the health and economic prospects of over a billion of the world’s poorest people remains a complex and daunting one. Efforts to discover, develop and deliver new drugs and implement more collaborative approaches will take years, not months.

Governments must take a lead, but companies and nonprofit organizations also have an important role to play, especially those with scientific and technological expertise. Individuals like Dr. Dale Kempf, Dr. Kennan Marsh, Dr. Tom von Geldern, and their fellow scientists play a vital role within their companies to advance these efforts. By partnering with governments, universities, and other public and non-profit health organizations as well as their peers and competitors, these companies can enable their scientists to leverage world-class technical expertise for the public good, whether on a *pro bono* basis, as in this example, or commercially or through hybrid models that combine both private and public sector resources.

As Dr. Kempf concludes, “Only through committed long-term partnerships will we be likely to achieve significant victories against diseases that have devastated humankind for too long”.³² Such long-term partnerships are not easy to create. They are even more challenging to sustain. Yet, they offer one of the best hopes we have in today’s world, not only for tackling neglected diseases, but for fighting inequality and injustice and improving the quality of peoples’ lives more broadly.

METHODOLOGY AND ACKNOWLEDGMENTS

This case study is not intended to be a program evaluation or impact assessment. It is a descriptive overview of some of the institutional, individual and collective leadership mechanisms that are being used by one company and some of its leading scientists and managers to collaborate internally and with external product development partnerships, humanitarian organizations and universities to support a broader global effort aimed at combating neglected tropical diseases. And to do so in a situation where the company in question does not have a commercial business focused on discovering, developing or delivering treatments for these diseases. The case study is based on in-person interviews, review of internal documents and desk-based research of publicly available materials on NTDs, and product development partnerships.

AbbVie was selected as the topic of the case study in its capacity as one of the companies that participate in the Corporate Responsibility Initiative at Harvard Kennedy School. This participation includes the provision of funding for student engagement, research and policy outreach activities, and participation in a Visiting Practitioners Program whereby

company employees meet with students to discuss dilemmas and opportunities in the field of responsible business practices, global health and global development. The initiative and our students also undertake research and learn from these companies and their public sector and nonprofit partners, while making every effort to ensure independence of thinking, analysis and recommendations.

We are grateful for the participation of some of AbbVie's senior scientists and for the time they have given us to share their views and to educate us on some of the challenges, as well as the potential of drug discovery and development in the case of NTDs. In particular, we would like to acknowledge Dr. Dale Kempf, Dr. Kennan Marsh, Dr. Tom von Geldern and Dr. Jeffrey Rohde. Thanks also to Tracie Haas, Katharine Jensen, David Schaffer, Christopher Lynch, Veronica Arroyave and Jeff Richardson for their input and feedback. And to Kari Straus at the University of Wisconsin-Madison and the teams at DNDi, MMV, TBDA, and A-WOL. At Harvard Kennedy School thanks to Justin Miletti and Scott Leland for supporting research and administration and to Alison Beanland who designed the report.

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About the Corporate Responsibility Initiative (CRI)

The Corporate Responsibility Initiative (CRI) at the Harvard Kennedy School's Mossavar-Rahmani Center for Business and Government (M-RCBG) is a multi-disciplinary and multi-stakeholder program that seeks to study and enhance the public contributions of private enterprise. The initiative explores the intersection of corporate responsibility, corporate governance, and public policy, with a focus on analyzing institutional innovations that help to implement the corporate responsibility to respect human rights, enhance governance and accountability and achieve key international development goals. It bridges theory and practice, builds leadership skills, and supports constructive dialogue and collaboration among business, government, civil society and academics. Founded in 2004, the CR Initiative works with a small Corporate Leadership Group consisting of global companies that are leaders in the fields of corporate responsibility, sustainability or creating shared value. The Initiative also works with other leading corporate responsibility and sustainability organizations, government bodies, non-governmental organizations, foundations and companies to leverage innovative policy research and examples of good practice in this field.



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