PROGRESS AGAINST SUPERBUGS

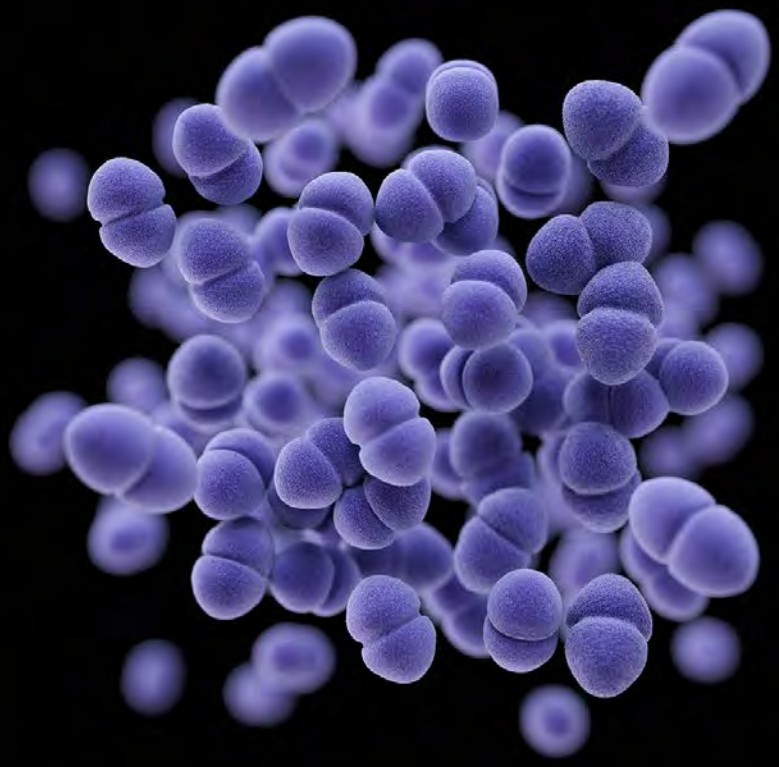
ANNUAL REPORT 2017-2018

CARB-X

Combating Antibiotic Resistant Bacteria

CARB-X MISSION

Accelerate a diverse portfolio of high-quality antibacterial products towards clinical development focusing on drug-resistant bacteria prioritized by the WHO and CDC.



A GLOBAL SOLUTION

The world urgently needs new antibiotics, rapid diagnostics and other innovative approaches to address the rise of drug-resistant bacteria.

CARB-X is delivering solutions. Funded by BARDA, Wellcome Trust, the UK Government's Global Antimicrobial Resistance Innovation Fund (GAMRIF), and the Bill & Melinda Gates Foundation, with in-kind support from NIAID, CARB-X is investing more than $500 million between 2016-2021 in antibacterial R&D to accelerate the development of new antibiotics, rapid diagnostics, vaccines and other life-saving products. CARB-X projects are selected through a global competitive process. Applications are vetted by the CARB-X Advisory Board, comprised of leading antibiotic and diagnostic professionals, as well as experts in other modalities including vaccines, microbiome, phage and immunology.

The goal is to support projects in the early phases of development through Phase 1, so that they will attract additional private or public support for further clinical development and eventual approval for use in patients. The scope of CARB-X funding is restricted to projects that target drug-resistant bacteria highlighted on the Antibiotic Resistant Threats list published by the US Centers for Disease Control and Prevention (CDC), or the Priority Bacterial Pathogens list published by the World Health Organization (WHO) – with a priority on those pathogens deemed Serious or Urgent on the CDC list or Critical or High on the WHO list.

A non-profit partnership headquartered at Boston University School of Law, CARB-X (Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator) was launched July 28, 2016, by two divisions of the US Department of Health and Human Services: the Biomedical Advanced Research and Development Authority, a component of the Office of the Assistant Secretary for Preparedness and Response (ASPR/BARDA) and the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health (NIAID/NIH), as well as by Wellcome Trust, a global charity based in the UK working to improve health globally.

Photo: Center for Disease Control and Prevention

2017-2018 PROGRESS

CARB-X is driven by a clear purpose: accelerate the development of innovative antibiotics, vaccines, rapid diagnostics and other life-saving products to address the threat of drug-resistant bacteria and to achieve sustainable health security for everyone around the world.

We made remarkable progress in 2017-18:

- Two new partners – the UK Government's Global Antimicrobial Resistance Innovation Fund (GAMRIF) and the Bill & Melinda Gates Foundation – joined the CARB-X partnership in May 2018, enhancing our mission with their vision and boosting our ability to fund a focused scope of innovative projects. They join BARDA, Wellcome Trust and NIAID in the CARB-X partnership.
- CARB-X funded more projects in 2017-18, and a broader diversity of high-quality projects including new classes of antibiotics, non-traditional therapeutics, vaccines and rapid diagnostics. The CARB-X portfolio had 33 innovative research projects in seven countries at the end of the fiscal year – the world's largest most diverse early development antibacterial portfolio focused on the deadliest drug-resistant bacteria.
- CARB-X grew more efficient and effective as an organization. We continued to build expertise and capacity in everything we do to select and support projects. While building strength in our operations, we are committed to efficiency.

Support for CARB-X has grown steadily since it was established in July 2016. CARB-X is recognized by industry and government, including the G20, as a vital player in driving early development antibacterial innovation. CARB-X represents a new economic model to deliver life-saving products for the most urgent bacterial threats – focused, innovative and essential to winning the race against superbugs.

A distinct strength of the CARB-X model is that it allows each partner to bring unique motivation, resources and priorities to the table. Although their missions are diverse, the ultimate goal is the same: combat antimicrobial resistant infections to save lives and strengthen global and national health security.

Looking to the year ahead, we will continue to fund the most innovative early development projects from around the world, focus our resources on the most urgent medical needs, and expand our global network of accelerators to support our growing portfolio.

But we know that more investment is needed, at sustained levels, to deliver innovative antibacterial products the world needs. CARB-X is entrusted with generous funding from our partners but more is needed to win the race against drug resistance. Governments and organizations around the world should support antibacterial R&D in a concerted way; we applaud the efforts at GARDP, JPIAMR, IMI ENABLE, REPAIR, and others to work with us to restore the fragile pipeline of life-saving products.

There is no quick fix to solving the global drug-resistance crisis. It will take increased sustained funding to accelerate innovation and concerted global action on stewardship, access and many other fronts to win this battle. CARB-X will continue to work with partners around the world to accelerate the delivery of life-saving antibacterial products to those who need them.

Kevin Outterson
Executive Director, CARB-X
Professor, Boston University

2017-2018 IN REVIEW

TOP ACHIEVEMENTS IN CARB-X'S SECOND YEAR

Partnership strengthened

A major highlight of 2017-18 was the expansion of the CARB-X partnership with two new funding partners. The UK Government's Global Antimicrobial Resistance Innovation Fund (GAMRIF) and the Bill & Melinda Gates Foundation joined the CARB-X partnership in May 2018 to invest in research to develop new vaccines, preventatives, and other products against drug-resistant bacterial infections, particularly among vulnerable populations in low- and middle-income countries.

The UK Government has committed up to £20 million, and the Bill & Melinda Gates Foundation up to US$25 million, to CARB-X over four years. Combined with existing funding commitments from Wellcome Trust and the US Government (BARDA and NIAID), CARB-X now has more than US$500 million to invest in antibacterial development. CARB-X is now the world's leading non-profit partnership focused on accelerating the early development of antibiotics, vaccines, diagnostics and other products to address the rising threat of superbugs.

> *"Drug-resistant infections claim the lives of hundreds of thousands of people from around the world every year. If we do not act now, the situation will get much worse. We must work together to tackle this problem and that is why I'm delighted the UK Government and the Bill & Melinda Gates Foundation are joining the CARB-X partnership. Through CARB-X, the UK Government's Global AMR Innovation Fund will be supporting research into the development of new vaccines and other life-saving products to tackle drug-resistant infections in developing countries where the burden is greatest."*
>
> – Dame Sally Davies
> England's Chief Medical Officer

The expanded CARB-X partnership was announced at the launch of the Global Antimicrobial Resistance R&D Hub during the 71st World Health Assembly (WHA) meeting in Geneva. The WHA is the decision-making body of the World Health Organization (WHO).

Pipeline expanded in size and diversity

CARB-X's portfolio grew to 33 projects in seven countries by year end, almost double the number of R&D projects in the 2016-17 portfolio. As of July 31, 2018, the end of the fiscal year, CARB-X was actively managing $91.1 million in awards to R&D projects, plus an additional $96.5 million if project milestones are met, to accelerate the development of antibiotics and other products. These funds are in addition to investments made by the product developers themselves.

Growth in the pipeline focused on rapid diagnostic projects and new classes of antibiotics. At year end, the portfolio had 10 new classes of antibiotics, 5 rapid diagnostic projects, 10 non-traditional therapeutics including 3 microbiome projects, and 11 new molecular targets. Projects in the portfolio advanced as well: 5 CARB-X-funded projects have achieved Phase 1 or beyond.

The pipeline is evolving. Early development research is risky and costly and it is expected that many projects will fail for any number of reasons in the preclinical and clinical phases of development. But if only one project succeeds in being approved for use in patients, it will represent a tremendous step forward.

CARB-X selects the most promising and innovative research through a competitive review process involving world-leading experts on the Advisory Board. The goal is to support the development of products from the early phases of development through Phase 1 clinical testing, so that they will attract additional private or public funding for further clinical development. The scope of CARB-X funding is restricted to projects that target drug-resistant bacteria highlighted on the **CDC's Antibiotic Resistant Threats list**, or the **Priority Bacterial Pathogens list published by the WHO in 2017** with a priority on those pathogens deemed Serious or Urgent on the CDC list or Critical or High on the WHO list.

A full view of the diversity and scope of the pipeline can be found at **carb-x.org/portfolio/gallery/**

Innovation selected from around the world

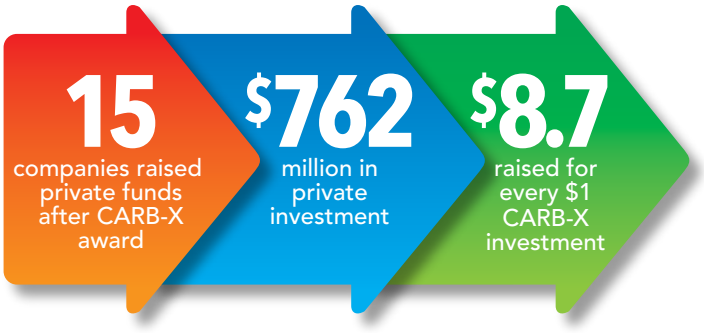
CARB-X initiated two rounds of funding in 2018. More than 100 applications were received in Round 1, the scope of which was restricted to new classes of direct-acting small molecule and direct-acting large molecule antibacterials that target certain Gram-negative bacteria. More than 300 applications were received to Round 2 funding, which included direct-acting therapeutics and a broader scope of therapeutics, vaccines, diagnostics and devices. The scope of each funding round was carefully designed to meet the most urgent needs in the global pipeline to treat or prevent drug-resistant bacterial infections and respond to the rising threat of drug-resistant bacteria.

Each application is carefully reviewed by a panel of experts on the Advisory Board, and decisions on funding are made by the Joint Oversight Committee, CARB-X's governing board, based on recommendations from the Advisory Board.

The companies selected for funding in the 2018 rounds will be announced starting in early 2019. We are also planning additional funding rounds in 2019.

CARB-X funding helped generate private investment

CARB-X's non-dilutive funding has helped companies generate private investment. As of June 30, 2018, 15 companies in the CARB-X portfolio had raised $762 million in private funds since their awards were announced.



Accelerator network expanded

As CARB-X's portfolio has grown in both global and scientific diversity, the need for more expertise and support has also grown. In February 2018, CARB-X announced it is expanding its network of accelerators to support its funded companies. We are currently negotiating with a number of accelerators around the world and expect to announce new members in the fall 2018.

Business and technical support, as well as expertise in product development, is critical to ensure that projects advance as quickly and as smoothly as possible toward the clinical phase of development. The role of accelerators is to provide companies with the support they need to progress their project.

CARB-X's accelerator network currently includes RTI International, MassBio, the California Life Sciences Institute (CLSI) and the Broad Institute of Harvard and MIT.

Efficiency increased

We have built an exciting entrepreneurial culture at CARB-X, shaping it to have the agility and drive of a biotech combined with the global reach and resources of a larger organization.

Administrative and legal support for CARB-X is provided by Boston University. CARB-X is headquartered in the School of Law and benefits from a broad range of services provided by the University, including accounting, purchasing, legal and administrative support.

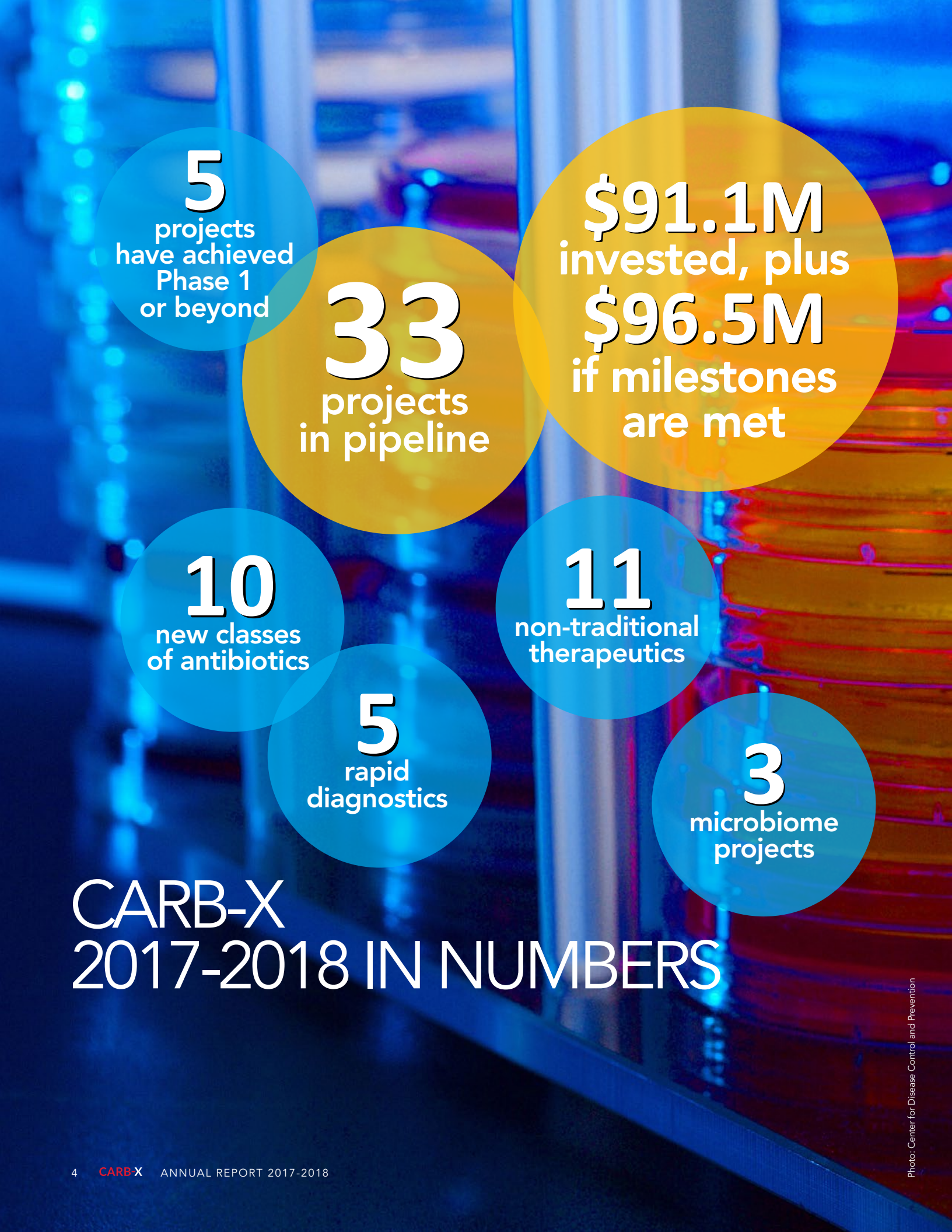
During fiscal 2017-18, CARB-X strengthened its administrative processes to ensure the highest standards in everything we do. We expanded the CARB-X team to improve support for funded companies, the application review process and portfolio oversight.

Awareness heightened

Raising awareness about drug resistance and the urgent need for solutions is critical to building support for global concerted action. As part of our mission, we communicate openly about the work CARB-X does, our business and research priorities and the projects that we fund.

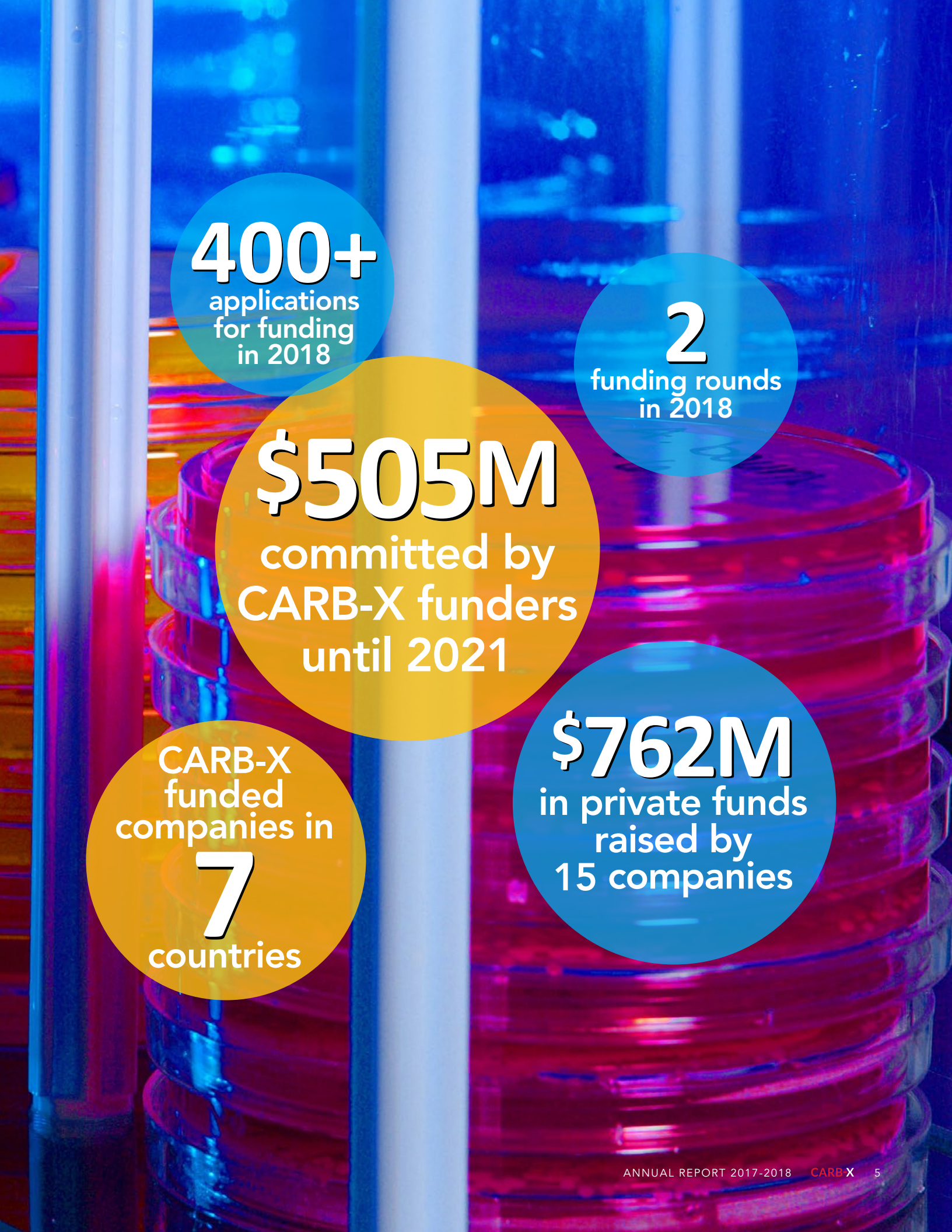
In 2017-18, we announced our new partners, two funding rounds and 19 awards to companies. In addition, we launched a new website to raise awareness about our pipeline: **carb-x.org**
We issued a call for proposals to expand our accelerator network. In collaboration with GARDP, we sponsored talks at major scientific conferences and made the content available on our website. Positive articles on the CARB-X partnership and pipeline appeared in publications throughout the year, including The Telegraph, STAT, Chemistry World and Nature Reviews Drug Discovery.

In January 2018, a study titled *Revitalizing the Antibiotic Pipeline: Stimulating Innovation while Driving Sustainable Use and Global Access*, produced by DRIVE-AB (Driving Re-investment in research and development for antibiotics and advocating their responsible use), called for greater funding for non-profit accelerators like CARB-X and GARDP to drive innovation.
drive-ab.eu/news/drive-ab-report/



CARB-X 2017-2018 IN NUMBERS

Photo: Center for Disease Control and Prevention


400+
applications for funding in 2018
2
funding rounds in 2018
$505M
committed by CARB-X funders until 2021
CARB-X funded companies in 7 countries
$762M
in private funds raised by 15 companies

PIPELINE GROWING WITH GREAT SCIENCE

Reinvigorating the pipeline of antibiotics in development is more critical today than ever. Too few new antibiotics are in development to treat the most dangerous infections. Studies by the Pew Charitable Trusts and the World Health Organization show that of the 48 drugs in development in September 2017, only 12 have the potential to address the most critical Gram-negative pathogens.

CARB-X has the world's largest antibacterial pipeline addressing drug resistance at year end, with 10 new classes of antibiotics, 5 rapid diagnostics, vaccines and other innovative life-saving therapeutics.

New classes of antibiotics to battle the deadliest superbugs

Gram-negative pathogens are gaining ground against existing antibiotics and new antibiotics are urgently needed to treat infections that can no longer be treated with existing antibiotics.

VenatoRx Pharmaceuticals and **Entasis Therapeutics** are developing novel antibiotic classes targeting penicillin-binding proteins (PBPs) which are impervious to inactivation by beta-lactamases, an enzyme family which degrades important antibiotics and has led to significant resistance issues.

Some of the most important broad-spectrum antibiotics are DNA gyrase and topoisomerase inhibitors, and high rates of resistance against these drugs has been observed. **Bugworks** is developing a gyrase-topoisomerase-inhibitor for intravenous and oral treatment of multi-drug resistant bacterial infections. **Idorsia** has discovered several novel bacterial topoisomerase inhibitors (NBTI) with potent inhibition of bacterial gyrase and topo IV, via a novel mechanism of action. These broad-spectrum compounds have demonstrated *in vivo* efficacy against *Enterobacteriaceae, Pseudomonas* and *Staphylococci* in mouse infection models.

The bacterial ribosome is another important clinically validated antibacterial drug target. **Curza** is targeting a new, highly conserved site on the bacterial ribosome, with a novel small molecule and a unique mechanism of action not affected by resistance to other ribosomal antibiotics.

Melinta Therapeutics has designed and is developing a new class of ribosome inhibitors called pyrrolocytosines to target a new ribosome site. So far, Melinta's compounds have an *in vitro* activity profile that is not affected by current resistance mechanisms of concern and are active in multiple animal models of infection.

Debiopharm International is working on a novel class of oral antibiotics which inhibit bacterial fatty acid biosynthesis, an essential pathway in major pathogens, including *Neisseria gonorrhoeae*, the causative bacterium in the sexually transmitted disease gonorrhoea. **Summit Therapeutics** is also targeting *Neisseria gonorrhoeae*, including multi-drug resistant strains, using its Discuva Platform to deliver novel oral antibiotics. **EligoChem Ltd.** is developing a novel helical antimicrobial peptide antibiotic with Gram-negative activity. These peptides are potentially non-toxic and could lead to a lower occurrence of antimicrobial resistance development. **Forge Therapeutics** is using its proprietary chemistry approach to develop small molecule inhibitors targeting metalloenzymes. Forge's lead effort is focused on LpxC, a zinc-metalloenzyme found only in Gram-negative bacteria, and a highly sought-after antibacterial drug target.

Rapid diagnostics = faster treatment = saving patients' lives

A vital tool in fighting life-threatening drug-resistant infections is the ability to diagnose the infection and prescribe the right treatment. Currently, it can take days of laboratory testing to diagnose a lethal pathogen and to understand its drug-resistant profile.

Rapid diagnostics provide quick answers to doctors and take the guesswork out of treatment decisions, reducing the chance of life-threatening sepsis and other complications. Faster diagnosis enables medical staff to treat the patient in the first critical hours and days of illness with the appropriate antibiotic and minimize unnecessary antibiotic use.

Specific Diagnostics, **Helixbind** and **T2 Biosystems** are developing innovative systems focusing on rapid diagnosis of bloodstream infections, which can lead to life-threatening sepsis and other urgent complications.

Gonorrhoea is on the rise around the world, affecting millions, with strains of multidrug-resistant superbug gonorrhoea detected in a number of countries. **Talis Biomedical** is developing a high-performance, low-cost point-of-care system to deliver critical information quickly to allow doctors to treat appropriately.

Proteus, which was CARB-X's first diagnostic project, is a revolutionary molecular imaging technology used in conjunction with optical fluorescent reporters, aiming to provide bedside diagnosis of bacterial infections in the lungs. A specially designed fibre bundle allows doctors to see the infection inside the lungs, identify the precise class of bacteria, and to make quick decisions about treatment.

Preventing superbug infections

CARB-X is embarking on an ambitious plan to significantly increase the number of new vaccines, preventatives, and other products against drug-resistant bacterial infections, particularly among vulnerable populations in low- and middle-income countries. CARB-X has one vaccine in its portfolio so far.

Integrated Biotherapeutics is developing a vaccine to prevent Methicillin-resistant *Staphylococcus aureus*, better known as MRSA, bacteria which cause skin and wound infections, pneumonia and bloodstream infections that can cause sepsis and death. The project represents a new approach to MRSA, which secretes toxins that cause tissue destruction, disable the patient's immune system, and help bacteria disseminate in the body. IBT-V02 is the first multivalent *S. aureus* vaccine entirely based on rationally designed toxoids. They include seven attenuated toxoids that collectively provide protection against three large families of toxins secreted by the *S. aureus* pathogen.

Recharging existing classes

Existing antibiotics classes are relied on for all types of modern medical procedures including cancer treatments and routine surgeries like hip replacements. Several CARB-X-funded companies are developing the next-generation of these important therapies.

Achaogen is working on next-generation aminoglycoside antibiotics to treat highly-resistant pathogens. **Entasis** is developing a novel oral betalactamase inhibitor. **Macrolide** is exploring modifications of the macrolide scaffold to increase the spectrum of this class to include Gram-negative infections. **MicuRx** is developing a polymyxin with potentially fewer side effects. **Shionogi** is working on a novel ß-lactam. **Iterum Therapeutics** is developing a novel oral and IV penem. **Tetraphase** is developing a novel synthetic tetracycline to target unmet medical needs, including MDR Gram-negative bacteria such as carbapenem-resistant Enterobacteriaceae and carbapenem-resistant *Acinetobacter baumanii*.

Photo: Center for Disease Control and Prevention

Inhibit the superbug's ability to do damage

Superbugs have developed many ways to avoid being destroyed by hosts as they invade tissues and damage host cells. Scientists at **Microbiotix** have discovered a virulence modifier – T3SS Inhibitor – to stop the superbug from establishing an infection and spreading by facilitating killing of the bacteria by the host immune response or adjunctive antibiotics. Microbiotix's novel inhibitors are unique in that they have been shown to reverse the pathogen's disruption of the host innate immune response, and are not subject to efflux or existing antibiotic resistance mechanisms. **Antabio** is working on inhibitors of *Pseudomonas* elastase, which reduce a bacterium's ability to evade the immune system, and help to clear *P. aeruginosa* infections when given alongside antibiotics. The inhibitor project is in development for the treatment of infections associated with cystic fibrosis.

Amicrobe is developing a topical antimicrobial therapeutic (Amicidin-ß, a large molecule single chain amino acid polymer) to treat surface wounds that become infected with drug-resistant bacteria.

ContraFect has discovered novel Gram-negative lysins and is developing a potential treatment for invasive infections caused by *Pseudomonas aeruginosa*. Lysins are bacteriophage-derived enzymes with potent antibacterial activity against antibiotic-resistant pathogens, robust anti-biofilm activity, a low propensity for resistance development, and pronounced synergy when used in combination with conventional antibiotics in pre-clinical studies.

Fighting fire with fire – boosting the microbiome

The human microbiome is our ecosystem of bacteria – trillions of microbial cells - that boosts our immune system, prevents infection and regulates metabolism. When our microbiome is weakened, sometimes due to a course of antibiotics that harms healthy bacteria along with the bad, the stage is set for superbugs to flourish.

Three CARB-X-backed projects focus on new drugs that will boost the microbiome's ability to fight off superbugs. If successful, these could be game-changers in the treatment of superbug infections.

SciBac is developing a novel biotherapeutic, SCB-102, to fight recurrent *Clostridium difficile* infections (CDI). Known as deadly diarrhea, CDI is at the top of the CDC's Antibiotic Resistant Urgent Threat List. SCB-102 consists of microbes specifically designed to kill *C. difficile*, stop its colonization of the colon, neutralize its toxins, and prevent spore formation.

Vedanta Biosciences is using research to identify good bacteria that can be given in pill form – VE303 – that colonize the gut, and safely outcompete *C. difficile* bacteria.

Seres Therapeutics is developing SER-155, a preclinical stage rationally-designed consortium of bacterial spores to improve outcomes in patients receiving stem cell or whole organ transplantation. By boosting the microbiome, SER-155 aims to reduce the risk of both graft vs. host disease and bacterial infection.

Jeanette Mucha, CEO of SciBac, leads a team of researchers developing biotherapeutic microbes to treat recurrent *C. difficile* infections

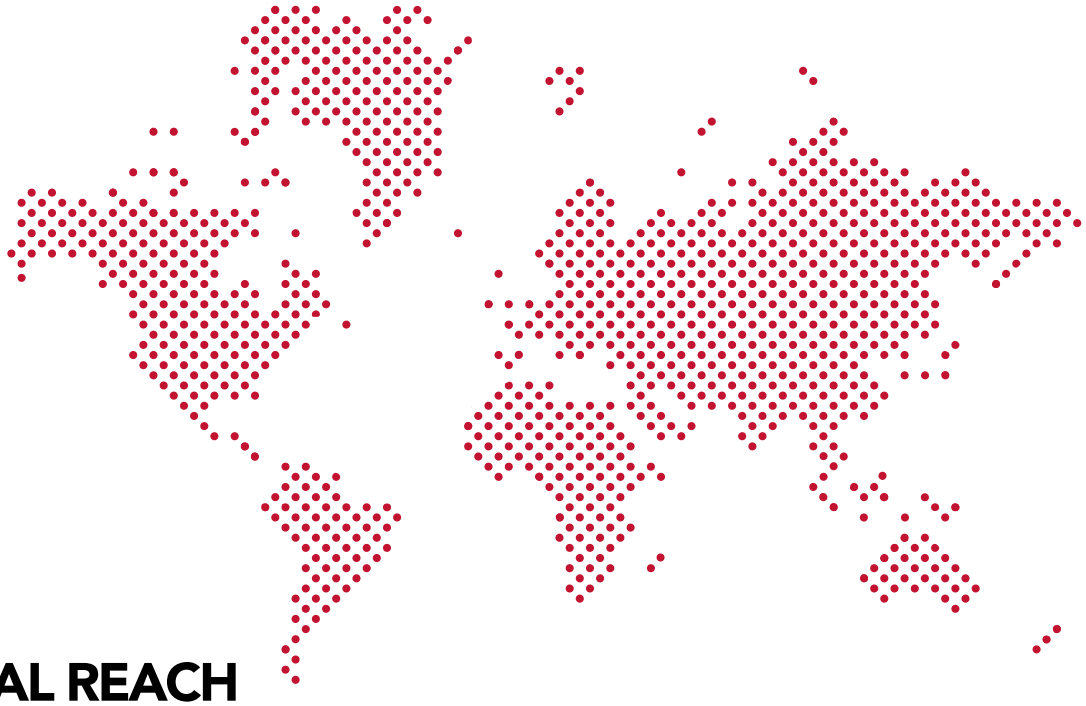
Antibodies – Precision targeting to destroy superbugs

Antibodies are molecules designed to target and interface with specific antigens. Antibody conjugates combine the cell-killing ability of drugs that are too toxic to be used on their own with antibodies that have targeting capabilities that allow them to discriminate between infected and healthy tissues.

Visterra is working on an antibody conjugate with a one-two punch to kill deadly multi-drug resistant Gram-negative *Pseudomonas aeruginosa* superbugs. First, the antibody component of the drug attaches itself to the bacteria and signals to the body's immune system to attack the bacteria, and the conjugated antimicrobial peptide facilitates killing of the bacteria directly.

Cidara's Cloudbreak antibody-drug conjugates (ADCs), unlike traditional small molecule antibiotics, physically link surface targeting antibacterial agents to specific innate immune system components to eradicate the pathogens via dual killing mechanisms. These killing mechanisms could potentially limit resistance development in target pathogens. Cidara's ADCs also possess an extended half-life to support once-weekly or bi-weekly dosing, making them well suited as immunotherapeutic agents to treat multidrug-resistant Gram-negative infections.

Scientists at **Inhibrx** are working on an innovative treatment which uses llama antibodies to attack one of the world's most difficult to treat, drug-resistant bacteria – *Pseudomonas*. Llamas, like alpacas, camels and other members of the Camelids mammal family, have an immune system which produces single domain antibodies (sdAbs). These can be made small to reach places that normal mammalian antibodies – including human – cannot reach.



GLOBAL REACH
CARB-X FUNDS 33 PROJECTS IN 7 COUNTRIES*

North America

Forge Therapeutics
San Diego, CA

Cidara Therapeutics
San Diego, CA

Inhibrx
La Jolla, CA

Amicrobe Inc.
Calsbad, CA

Talis Biomedical
Menlo Park, CA

MicuRx Pharmaceuticals
Hayward, CA

Achaogen
South San Francisco, CA

SciBac
San Francisco, CA

Specific Diagnostics
Mountain View, CA

Curza
Salt Lake City, UT

VenatoRx Pharmaceuticals
Malvern, PA

Integrated Biotherapeutics
Rockville, MD

Contrafect Corporation
Yonkers, NY

Melinta Therapeutics
New Haven, CT

Seres Therapeutics
Cambridge, MA

Vedanta Biosciences
Cambridge, MA

T2 Biosystems
Lexington, MA

Helixbind Inc.
Marlborough, MA

Visterra Inc.
Cambridge, MA

Tetraphase Pharmaceuticals
Watertown, MA

Macrolide Pharmaceuticals
Watertown, MA

Entasis Therapeutics
Waltham, MA

Microbiotix Inc.
Worcester, MA

Europe and Asia

Iterum Therapeutics plc
Dublin, Ireland

Proteus IRC
Edinburgh, Scotland

Oppilotech Ltd.
London, UK

Eligochem Ltd.
Sandwich, UK

Summit Therapeutics
Oxford, UK

Antabio
Labège, France

Idorsia Pharmaceuticals Ltd.
Allschwil, Switzerland

Debiopharm International S.A.
Lausanne, Switzerland

Bugworks Research India Pvt Ltd.
Bangalore, India

Shionogi & Co. Ltd
Osaka, Japan

* As of July 31, 2018

CARB-X

GREAT SCIENCE HAS NO BOUNDARIES

CARB-X GOVERNANCE

JOINT OVERSIGHT COMMITTEE

CARB-X is governed by the Joint Oversight Committee (JOC), which acts as the board of directors with full oversight for CARB-X operational and financial activities, ensuring the highest scientific and ethical standards. The JOC is made up of representatives of CARB-X's funding organizations and management team.

The JOC makes research investment decisions based on recommendations from the Advisory Board which reviews applications for funding selected through a global competitive process.

THE ADVISORY BOARD

The Advisory Board is comprised of leading antibiotic and diagnostic professionals, as well as experts in other modalities including vaccines, microbiome, phage and immunology. Current membership of the Advisory Board can be found at **carb-x.org/about/advisory-board/**

Members of the JOC and the Advisory Board complete a conflict-of-interest process and are excluded in participating in any decision in which they may have a conflict.

We thank them sincerely for their work.

JOC MEMBERS:

Mark Albrecht, PhD
Acting Chief, Antibacterials Division of CBRN Medical Countermeasures, BARDA

Nick Adkin
Deputy Director, Global Health Security
UK Department of Health and Social Care

Dennis M. Dixon, PhD
Chief, Bacteriology and Mycology Branch, NIAID

Ann E. Eakin, PhD
Senior Scientific Officer, NIAID

Barry Eisenstein, MD
Chair of the Advisory Board, CARB-X

Karen Gallant, PhD
Global Project Director, CARB-X

Christopher Houchens, PhD
Acting Director, Division of CBRN Medical Countermeasures, BARDA

Timothy Jinks, PhD
Head of Drug-Resistant Infections Programme, Wellcome Trust

Tyler Merkeley, MS, MBA, PMP
DRIVe Acting Director, BARDA

Kevin Outterson, JD
Executive Director, CARB-X

Ed Whiting
Director of Policy and Chief of Staff, Wellcome Trust

CARB-X FINANCIALS

CARB-X has been entrusted with more than US$500 million to invest in accelerating the development of antibacterial products. BARDA and Wellcome Trust have committed $405 million to CARB-X in 2016-2021 for early stage antimicrobial research ($250 million from BARDA and $155.5 million from Wellcome Trust). NIAID has committed in-kind pre-clinical services valued at $50 million over five years to support the funded projects. The UK Government has committed up to £20 million, and the Bill & Melinda Gates Foundation up to $25 million to CARB-X over the next four years. CARB-X's fiscal year runs from August 1 to July 31.

CARB-X Cumulative Expenses and Active Award Commitments* (in $US million)

R&D awards issued (33 base projects + 5 options)	$91.3
Business support (Broad Inst., CLSI, RTI)	4.5
CARB-X operations (Program staffing and resources)	2.8
General Administration (Institutional support from BU)	2.2
Total	**$100.6**

*cumulative from August 1, 2016 to fiscal year ending July 31, 2018

A NON-PROFIT PARTNERSHIP WITH A CLEAR GOAL

CARB-X is dedicated to accelerating the development of antibacterial products to address the rising threat of drug resistance. Partners have generously contributed more than $500 million to invest in 2016-2021.

The CARB-X partnership is special in that each partner brings unique motivation, goals and perspective. Although our perspectives are diverse, our goal is the same: accelerate scientific research to combat drug-resistant bacterial infections and save lives.

CARB-X's founding US partner, the United States Department of Health and Human Services Biomedical Advanced Research and Development Authority (BARDA), part of the Office of the Assistant Secretary for Preparedness and Response (ASPR), is focused primarily on emergency preparedness and strengthening national health security. The US National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health (NIH), is focused on basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases in the US and elsewhere.

CARB-X's founding UK partner, Wellcome Trust, is one of the world's largest global charitable foundations working to improve health globally.

The UK Government's Global Antimicrobial Resistance Innovation Fund (GAMRIF) and the Bill & Melinda Gates Foundation joined the CARB-X partnership in May 2018 to support the development of new vaccines, preventatives, and other products against drug-resistant bacterial infections, particularly among vulnerable populations in low- and middle-income countries.

Funders

ASPR Assistant Secretary for Preparedness and Response

BARDA Biomedical Advanced Research and Development Authority

Wellcome

NIH National Institute of Allergy and Infectious Diseases

UKaid from the British people

Alliance Partners

Bill & Melinda Gates foundation

Other partners and Accelerators

Boston University

RTI International

CLSI California Life Sciences Institute

Wellcome

Broad Institute

MassBio Massachusetts Biotechnology Council

CARB-X

This annual report is supported by the Cooperative Agreement Number IDSEP160030 from ASPR/BARDA and awards from Wellcome Trust, the Global AMR Innovation Fund (GAMRIF) funded by the UK Government Department of Health and Social Care (DHSC), and the Bill & Melinda Gates Foundation, as administrated by CARB-X. The content is solely the responsibility of the authors and does not necessarily represent the official views of the US Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response or other funders.

"Antimicrobial resistance is one of the world's biggest public health threats. If we do not act more quickly, we could be facing a future where people go for routine surgery and die from infections that cannot be treated by antibiotics.

With vision and support from our funders, CARB-X is accelerating the early development of new antibiotics, rapid diagnostics, vaccines and other life-saving products to address the most urgent drug-resistant superbugs.

We are making progress. But to win the battle against superbugs will require all of us to work together. We need urgent collaboration to drive and sustain innovation."

— Kevin Outterson
Executive Director, CARB-X

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