



Advancing innovations for neglected diseases during and beyond the pandemic

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Defeating Malaria Together

MMV 
Medicines for Malaria Venture

Malaria | Human impact



Takes the life of a child **every 2 minutes**

Can kill **within 24 hrs** of symptom onset



Threatens **almost half** the world's population

Deprives African countries of **\$12-30 billion** every year



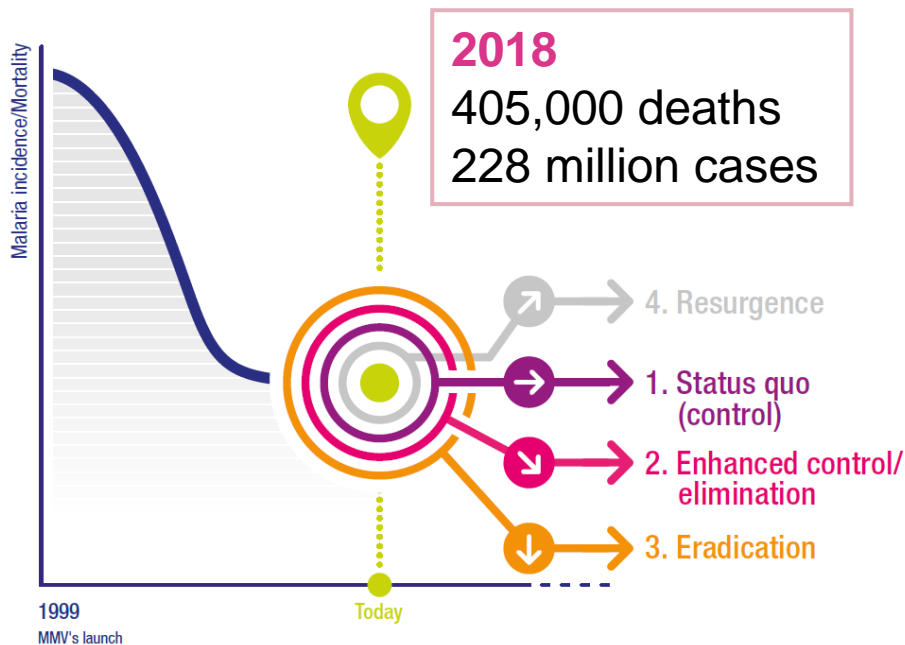
Is associated with drug resistance in Southeast Asia, where an estimated **> 20 million cases** occur every year



Is both a cause and consequence of poverty and predominantly affects **vulnerable populations** such as **pregnant women** and **children**

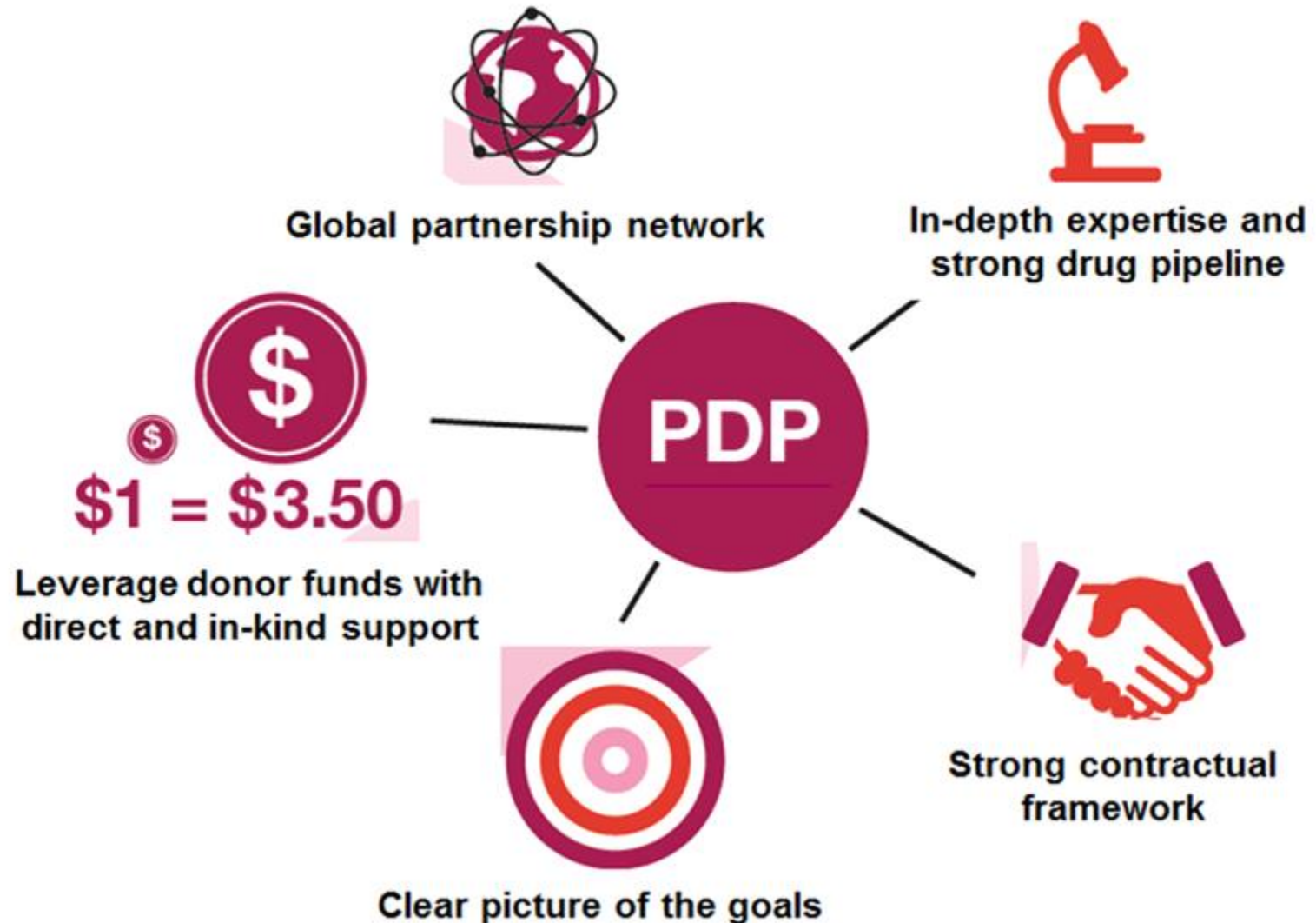
A malaria-free world | Future scenarios

“A **malaria-free world**, which has been **WHO’s vision since at least 1955**, remains the ultimate goal of the global health community,” *Dr. Pedro Alonso, director of WHO’s Global Malaria Programme*



- Strengthen existing malaria controls by **improving management** and **use of available tools**
- Stimulating the R&D pipeline for **new malaria medicines, vaccines**, and **mosquito control tools**
- Mobilizing **new financing** from malaria-endemic countries and donors (\$2 billion annually)

PDP model | Transforming drug discovery



MMV | Mission and strategy

MMV was launched in 1999. Our mission is to **discover**, **develop** and **deliver** new, effective and affordable **antimalarial drugs** for vulnerable populations in disease-endemic countries



While the antimalarial **drug market** is **huge** in terms of those in need, it is **small** in terms of **profit**...

...so **MMV** shares the costs and risks of drug development with partners and **makes antimalarial drug research happen**



Antimalarial drug discovery | Target profile

Discover



Develop



Deliver



1. New drugs for treatment or protection

Fast acting

Long duration

- Kill up to 10^{12} parasites in a patient (*c.f.* ACTs clear 4 \log_{10} units in 48 h)
- Typically requires a duration of exposure > efficacious concentration for to 4-6 days (treatment) or 7-28 days (prophylaxis) (*c.f.* Chloroquine $T_{1/2}$ = 20-60 days)
- Oral dose < 100 mg

2. Efficacy against all known field resistance

Low propensity for resistance

- New antimalarial drugs must have a low risk of resistance generation (MIR < 7)

3. Developable as a cheap, fixed dose child-friendly combo

Patient population

- Cost of treatment/prophylaxis course < \$1 (adult) / < \$0.25 (infants under 2 years)
- No contra-indication for use by children and women of child-bearing potential

GHIT | Unlocking Japanese innovation

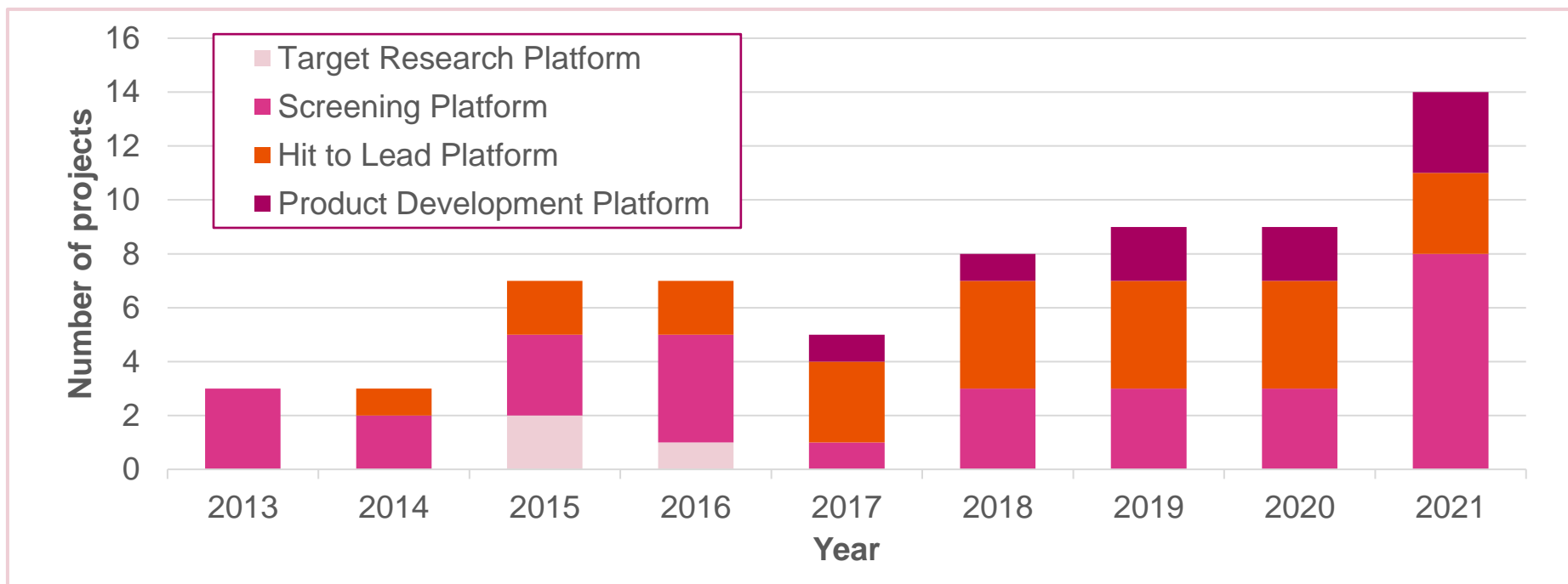


- Japanese scientists have an unparalleled **track record** in **infectious disease drug discovery**
- Japanese organizations have access to **novel compound libraries**
- Prior to GHIT, **MMV** had very **limited success** engaging with **Japanese organizations**
- **Connected** MMV to potential **partners** and helped to **build relationship** and **understanding**¹
- Provided clear **RFPs**, **portfolio management**, **milestone criteria**² and **governance**
- **Generous investment** (> ¥150,000,000)



1. Katsuno, K. *Parasitology International*, **80**, 102232 (2021)
2. Katsuno, K., *et al. Nature Reviews Drug Discovery*, **14**, 751–758 (2015)

GHIT-MMV | Malaria drug discovery portfolio

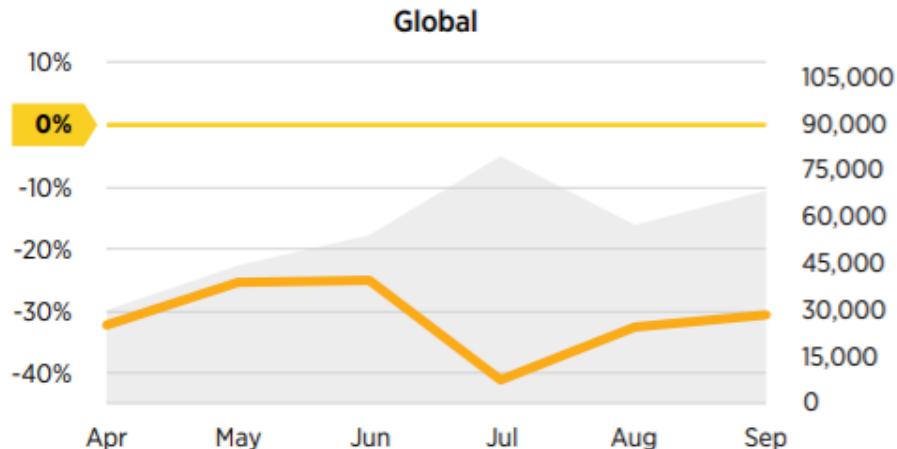


- **> 500,000** (novel) Japanese **compounds**/isolated natural products **screened**
 - Resulting in **5 Hit to Lead** projects and **2 Product development** projects
- **Novel** and **'high value'** malaria drug **targets** investigated: lipid kinases (PI4K), aminoacyl tRNA synthetases (KRS, PRS, etc.), enzymes (DHODH, etc.), etc.
- **4** projects with **potential** to deliver a **drug candidate** in **2022-2023**

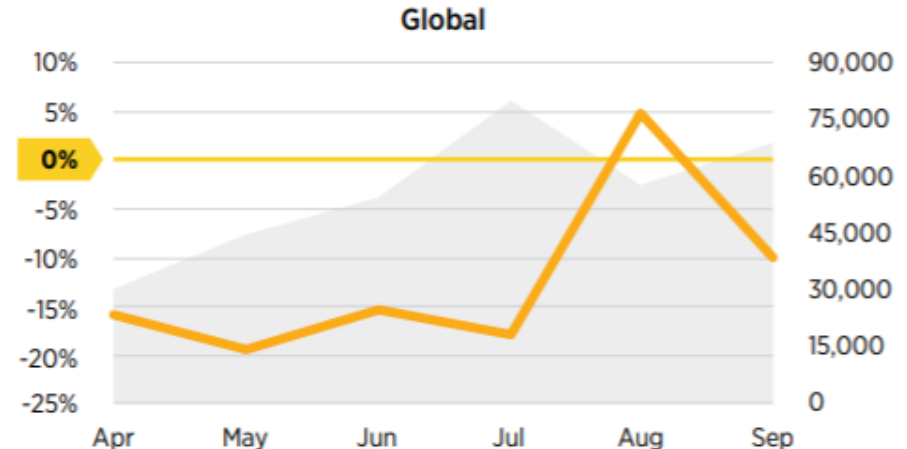
A malaria-free world | Impact of COVID-19

- Disruptions in malaria service delivery were projected to lead to a possible **doubling in malaria deaths in 2020** compared to 2018, equating to approximately **800,000 lives lost**¹
- Initial **data indicates** that **COVID-19** has had a **significant negative impact** on malaria **diagnosis** and **treatment**²

Malaria diagnosis



Malaria treatment



● Number of COVID-19 cases diagnosed
● Comparison Q2/Q3 2020 vs 2019 service records (%)

1. World Malaria Report 2020 (2020)
2. The Global Fund: “The Impact of COVID-19 on...Malaria Services and Systems” (2021)

PDP model | Beyond the target disease

- PDPs are equipped to help **prevent** and **respond** to **health threats***



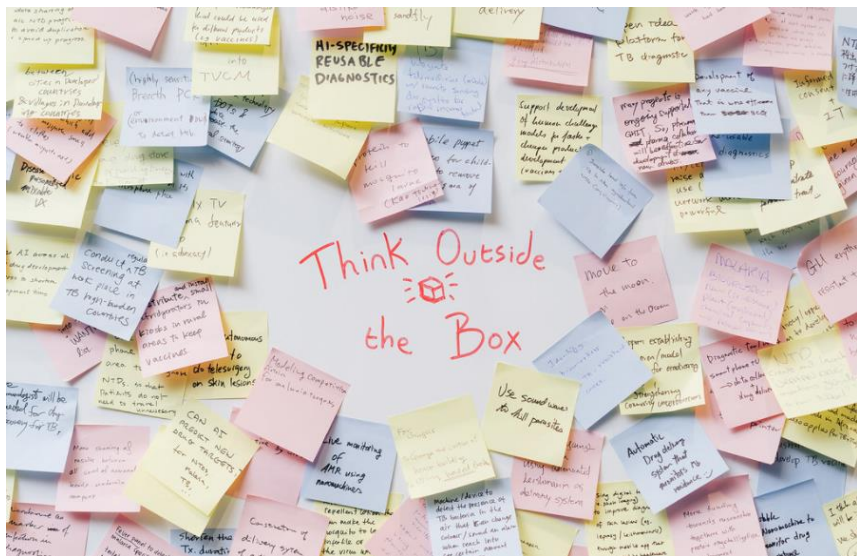
- MMV catalyzed the discovery of drugs for COVID-19 with the **COVID BOX** (a set of 80 drugs with predicted activity against SARS-CoV-2)
- Worked with partners on **COVID-19 clinical studies**, including **ReACT** and **ANTICOV**

- PDPs **build** local **capacity** to perform research and **strengthen health systems***



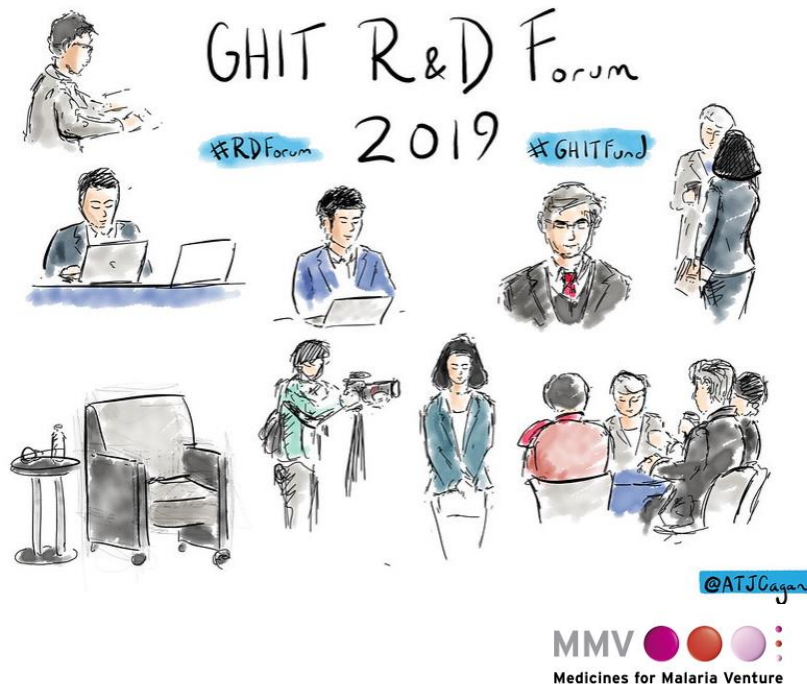
- Decades of **investment** in **healthcare infrastructure/personnel** enabled swift adaptation of malaria programmes in the light of **COVID-19**
- **State-of-the-art** MMV-supported **medical centers** and **staff** used for **COVID-19** testing

GHIT-MMV | Learnings from the partnership

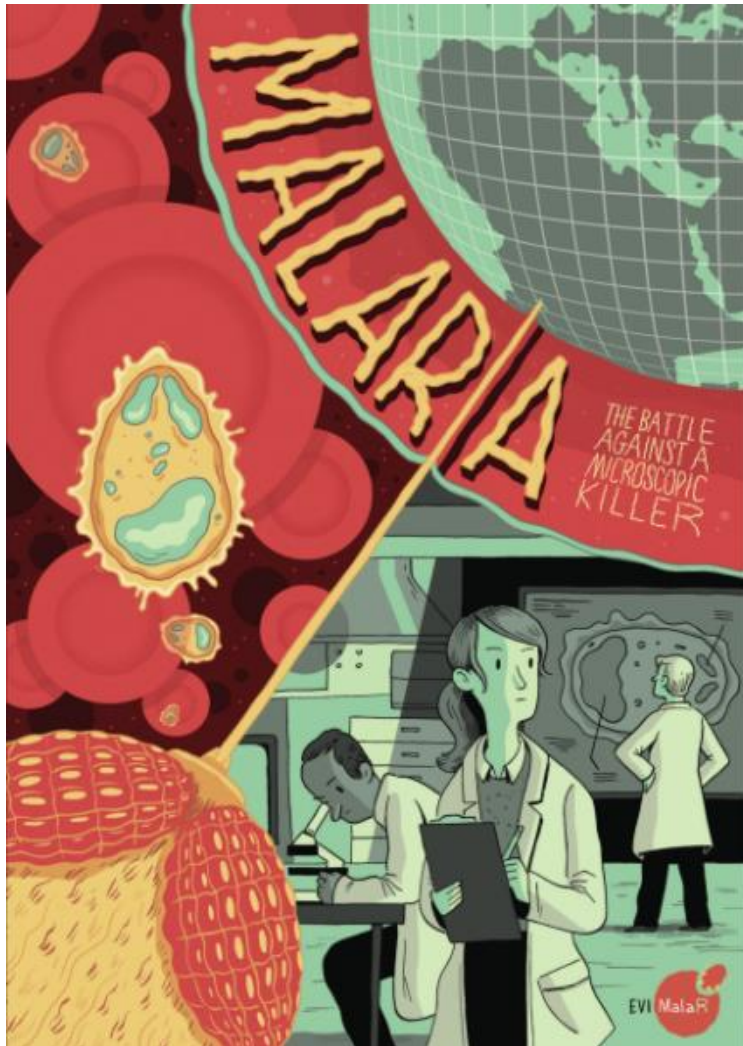


- Screening Japanese compound libraries has identified **novel chemistry** and **novel targets**
- Japanese partners have given **expert drug discovery** and **development input**

- Japanese scientists see the value of working on NTD projects and have built **productive project teams** with **strong mutual respect**
- GHIT **framework** has enabled **good decision making**
- GHIT **flexible 'open innovation' culture** has allowed different (productive) project team configurations



Final thoughts | Opportunities for partners



- Current **focus** of MMV discovery
 - Target-based as well as phenotypic projects
 - Series with potential for prophylaxis as well as case-management
 - Neglected patients ‘mothers and babies’
- ...and the **challenges**
 - Novel mechanism of action
 - Low risk of drug resistance
 - Long duration
 - Pediatric and maternal drug safety
- ...and the (new) **opportunities**.
 - Machine learning (AI)
 - Target ID
 - Development of low clearance compounds (and preclinical assays)
 - Development of preclinical assays for reprotoxicity, etc.

Final thoughts | Benefits for partners

Patents or patentable material, **know-how** and **research tools**

Incentive schemes
(e.g. orphan designation, accelerated regulatory review and Priority Review Voucher)

Non-dilutive financing



Expanded **R&D** capacity in **infectious diseases**, strengthened **reputation** in the **global health** community

Scientific and **access expertise**
(external and in-house)

GHIT-MMV | Project collaborators



Global Health Innovative Technology Fund



Daiichi-Sankyo



Mitsubishi Tanabe Pharma



東京大学
THE UNIVERSITY OF TOKYO



Okinawa Natural Products

OP Bio Factory



Sumitomo Dainippon
Pharma



北里大学
KITASATO UNIVERSITY



"The **GHIT Fund** has...a **pioneering model** of **partnership** that brings **Japanese innovation**, **investment** and **leadership** to the global fight against **infectious disease**." *Dr. Margret Chan, former Director-General of the WHO*

Built on partnerships | Stronger together



Thank you



MMV ● ● ● ● ● @20
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