

Press Release

Approximately USD 8 million Investment for New Vaccine and Drug Development against Malaria in Sumitomo Pharma, Mitsubishi Tanabe Pharma and new product development in NTDs

TOKYO, JAPAN (September 27, 2023) — The Global Health Innovative Technology (GHIT) Fund announced today an investment of approximately 907 million yen (US\$6.2 million¹) for the development of a new prophylactic vaccine against malaria and a new anti-malarial drug, and approximately 273 million yen (US\$1.8 million¹) for multiple product development projects against Neglected Tropical Diseases (NTDs), totaling approximately 1.18 billion yen (US\$8.0 million¹).²

Malaria is an infectious parasitic disease transmitted by mosquitos that affects approximately 250 million people annually and was responsible for approximately 620,000 deaths in 2021.³ NTDs are a group of 20 preventable and treatable diseases that affect more than 1.6 billion people⁴ worldwide, particularly communities in low-income countries. Despite the need for diagnostics, vaccines and therapeutics, NTDs are under-researched, under-treated and under-funded. The GHIT Fund invests in new product development with the aim of contributing to global health through Japanese technology and innovation to address these neglected infectious diseases.

Next-generation malaria vaccine in pre-clinical stage by Ehime University, Sumitomo Pharma, EVI, and iBET

The GHIT Fund will invest approximately 573 million yen (US\$3.9 million¹) for the development of a new asexual-blood stage malaria vaccine by Sumitomo Pharma Co., Ltd., Ehime University (Japan), European Vaccine Initiative e.V. (EVI e.V.), and a Portuguese non-profit research institution, Instituto de Biologia Experimental e Tecnologica (iBET). Given the modest and short-term efficacy of the most advanced malaria vaccine, promotion of this project will lead to the development of a more effective next-generation vaccine.

The GHIT Fund will also invest approximately 334 million yen (US\$2.3 million¹) for the anti-malarial drug project by Mitsubishi Tanabe Pharma Corporation (MTPC), Medicines for Malaria Venture (MMV), and University of Georgia (UGA) with the aim of delivering a preclinical candidate with a novel mode of action.

In addition, as part of the product development projects towards NTDs, GHIT has decided to invest approximately 150 million yen (US\$1.0 million¹) for a leprosy vaccine project at a clinical trial stage by Sasakawa Health Foundation, American Leprosy Missions, Inc., and Oswaldo Cruz Institute (IOC/Fiocruz) and approximately 55 million yen (US\$0.3 million¹) and 66 million yen

(US\$0.4 million¹), respectively, in a development of diagnostics for schistosomiasis and onchocerciasis by a partnership including Medical & Biological Laboratories Co., Ltd., and an American non-profit company, Drugs & Diagnostics for Tropical Diseases (DDTD).

Dr. Osamu Kunii, CEO of the GHIT Fund, said “We are very pleased to invest in new product development towards malaria and NTDs with strong leadership from Japan and collaboration with our global partners. With the engagement of new partners, we aim to accelerate the product development in the GHIT 3.0 strategy and deliver the new products on the ground as soon as possible.”

As of September 27, 2023, there are 47 ongoing projects, including 19 discovery, 17 preclinical and 11 clinical trials⁵ in the GHIT Fund’s portfolio. The total amount of investments since 2013 is 30.2 billion yen (US\$207 million).

¹ USD1 = JPY146.20, the approximate exchange rate on August 31, 2023.

² These awarded projects were selected and approved as new investments from among proposals to RFP2023-001 for the Product Development Platform, which was open for applications from November 2022 to July 2023.

³ WHO (World Health Organization): <https://www.who.int/news-room/fact-sheets/detail/malaria>

⁴ Reference: World Health Organization (WHO) <https://www.who.int/health-topics/neglected-tropical-diseases>

⁵ This number includes the projects at registration phase.

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The GHIT Fund is a Japan-based international public-private partnership (PPP) fund that was formed between the Government of Japan, multiple pharmaceutical companies, the Bill & Melinda Gates Foundation, Wellcome, and the United Nations Development Programme (UNDP). The GHIT Fund invests in and manages an R&D portfolio of development partnerships aimed at addressing neglected diseases, such as malaria, tuberculosis, and neglected tropical diseases, which afflict the world’s vulnerable and underserved populations. In collaboration with global partners, the GHIT Fund mobilizes Japanese industry, academia, and research institutes to create new drugs, vaccines, and diagnostics for malaria, tuberculosis, and neglected tropical diseases.

<https://www.ghitfund.org/en>

Appendix 1. Project Details

G2021-208

Project Title	Towards the clinical development of the new asexual blood-stage malaria vaccine candidate PfRipr5 (PfRipr5-PD)
Collaboration Partners	1. Ehime University (Ehime) 2. Sumitomo Pharma Co., Ltd. (Sumitomo Pharma) 3. European Vaccine Initiative e.V. (EVI e.V.) 4. Instituto de Biologia Experimental e Tecnologica (iBET)
Disease	Malaria
Intervention	Vaccine
Stage	Pre-Clinical Development
Awarded Amount	¥572,951,478 (US\$3.9 million)
Status	Continued project
Summary	<p>[Project objective] This project will build on the established successful collaboration between the partners to further advance the development of the PfRipr5 malaria vaccine candidate. The main objectives are to:</p> <ol style="list-style-type: none"> 1. Establish a process for PfRipr5 production compliant with current Good Manufacturing Practice (cGMP) 2. Produce PfRipr5 for safety-toxicology study according to cGMP 3. Perform a safety-toxicology study to evaluate PfRipr5 formulated with the SA-1 adjuvant 4. Prepare the dossier for Phase I/IIa clinical trial <p>[Project design] The project workplan has been structured according to the four research objectives defined above. In objective 1, the production and purification processes of PfRipr5 will be fine-tuned using the optimal expression system identified in the previous project (T2018-151) funded by the GHIT Fund. In objective 2, the established manufacturing process will be transferred to the selected CDMO, where PfRipr5 will be produced in accordance with cGMP. PfRipr5 will be formulated with SA-1 and further evaluated in a pre-clinical GLP safety-toxicology study (objective 3). Finally, under objective 4, the clinical trial documentation will be prepared for subsequent ethical and regulatory approval to conduct a Phase I/IIa clinical trial.</p>
Project Detail	https://www.ghitfund.org/investment/portfoliodetail/detail/210/en

G2023-104

Project Title	Development of Enzyme Inhibitors as a SERCAP for Relapsing Malaria
Collaboration Partners	1. Mitsubishi Tanabe Pharma Corporation (MTPC) 2. Medicines for Malaria Venture (MMV) 3. University of Georgia (UGA)
Disease	Malaria
Intervention	Drug
Stage	Lead Optimization
Awarded Amount	¥334,238,778 (US\$2.3 million)
Status	Continued project
Summary	<p>[Project objective] The ultimate objective of the project will be to deliver a preclinical candidate, with a novel mode of action, with the potential for single dose treatment and/or prophylaxis of malaria. The 2-year project will aim to identify 1-3 Late Lead compounds, as defined by MMV's progression criteria, within 18 months and then to profile them in the subsequent 6 months to select a compound which meets MMV's late lead criteria suitable to progress into preclinical candidate profiling. As an additional objective, the project will endeavor to confirm the proposed mode of action against <i>P. vivax</i> hypnozoites. The project will also assess the potential of the late lead(s) to be developed as a SERCAP for relapsing malaria, which do not cause hemolysis, and thus not requiring G6PD testing.</p> <p>[Project design] A multi-disciplinary drug discovery approach will be used by the project, utilizing the inputs and diverse skills and experiences of medicinal chemists, molecular modelers, parasitologists, pharmacokineticists, toxicologists, formulation and scale-up chemistry. Starting with the identified Lead Series, rational and systematic modifications of the leading compounds will be undertaken to further improve their pharmacological, physicochemical, pharmacokinetic and toxicological properties, based on state-of-the-art capabilities and data generated at MMV, MTPC, UGA and our partners. As the putative target of these molecules is an enzyme that is essential to the growth of the malaria parasite, and structural information is available from analogous bacterial proteins, a structure-based drug design (SBDD) approach will be applied, supported at MTPC. This will provide the opportunity to rapidly and rationally design compounds with a higher likelihood of inhibiting the enzyme potently and selectively and achieving the project goals.</p>
Project Detail	https://www.ghitfund.org/investment/portfoliodetail/detail/211/en

G2023-110

Project Title	A Highly Sensitive and Specific Serological Rapid Diagnostic Test to Support WHO's Schistosomiasis Monitoring and Evaluation (M&E) Programs
Collaboration Partners	1. Medical & Biological Laboratories Co., Ltd. 2. Drugs & Diagnostics for Tropical Diseases (DDTD)
Disease	Schistosomiasis
Intervention	Diagnostics
Stage	Product Design
Awarded Amount	¥55,712,697 (US\$0.3 million)
Status	New project
Summary	<p>[Project objective] The overarching project goal is to deliver a Rapid Diagnostic Test (RDT) to detect exposure to <i>Schistosoma mansoni</i>, one of the main pathogens responsible for schistosomiasis. The RDT will meet the sensitivity and specificity requirements of the WHO TPP. At the end of this project, the test will be ready to be evaluated in the field. This test could be a standalone solution, or could be part of a total solution, in which people would be prescreened with the RDT at the point of contact, and positive results would later be confirmed in a laboratory using stool examination or molecular techniques.</p> <p>[Project design] Different assay formats will be generated and compared in terms of their performance. Great care will be given to demonstrating matrix equivalence between serum and whole blood, given that the test will be developed and validated with serum/plasma samples but eventually used with fingerstick blood, as required by the TPP. In addition to this, the TPP calls for a shelf life of minimally 18 months, and ideally 24 months, at 2–40°C and a relative humidity of 75%. Since stability studies are inherently long and intricate, we will commence them already at this very early stage and dedicate a significant amount of work to them. The antigen(s), or antigen combination, providing the best overall test performance in terms of sensitivity and specificity, as well as matrix equivalence and thermal stability, will be selected for further development.</p>
Project Detail	https://www.ghitfund.org/investment/portfoliodetail/detail/212/en

G2023-111

Project Title	Supporting WHO Onchocerciasis Elimination Programs: Progressing a Highly Sensitive and Ultra-specific Rapid Diagnostic Test to Commercialization Readiness
Collaboration Partners	1. Medical & Biological Laboratories Co., Ltd. 2. Drugs & Diagnostics for Tropical Diseases (DDTD) 3. Big Eye Diagnostics, Inc. (BEDx)
Disease	Onchocerciasis
Intervention	Diagnostics
Stage	Product Design, Development and Validation
Awarded Amount	¥66,870,532 (US\$0.4 million)
Status	New project
Summary	<p>[Project objective] The project team proposes a rapid diagnostic test (RDT) to detect exposure to <i>Onchocerca volvulus</i>, the pathogen responsible for onchocerciasis. Built in a bplex format, the team's test detects IgG4 antibodies specific for <u>two</u> <i>O. volvulus</i> antigens. Our RDT was shown by the CDC to be sensitive and specific enough to meet <u>both</u> WHO TPPs, with a specificity of >99.8% even at the lower bound 95% CI. GHIT and NIH funding will be used to generate the critical biological materials in ISO-13485 grade, and to transition test production from a low-throughput card-to-card format to a high-throughput, manufacturing-friendly reel-to-reel system, under ISO-13485 standards. Test performance will be validated in a laboratory setting by the CDC, and in regional laboratories of targeted onchocerciasis-endemic countries by the TFGH/USAID.</p> <p>[Project design] Given the demand forecast of up to 1 million tests/year, it will be critical to</p> <ul style="list-style-type: none"> - ensure constant product quality by minimizing the variability between different production lots, compliant with ISO13485 standards - replace the current, low-throughput card-to-card production process with a high-throughput, manufacturing-friendly reel-to-reel process. <p>The team will send the final candidate test to CDC for advanced testing to ensure that sensitivity and specificity criteria defined in the TPPs are met. The team will then organize a round-table meeting involving all key stakeholders (CDC/TFGH/USAID/NIH/BMGF/WHO/GHIT) with the goal to ensure alignment and accelerate the path towards a WHO recommendation to use the test for onchocerciasis elimination mapping and, depending on the test's exact performance profile, for potential additional clinical applications.</p>
Project Detail	https://www.ghitfund.org/investment/portfoliodetail/detail/213/en

G2023-114

Project Title	Engagement of people affected by leprosy in the LepVax Clinical Trial
Collaboration Partners	1. Sasakawa Health Foundation (SHF) 2. American Leprosy Missions, Inc. (ALM) 3. Oswaldo Cruz Institute (IOC/Fiocruz)
Disease	Leprosy
Intervention	Vaccine
Stage	Clinical Phase 1b/2a
Awarded Amount	¥150,379,601 (US\$1.0 million)
Status	New project
Summary	<p>[Project objective] LepVax clinical research is advancing the mission of interrupting transmission and eliminating leprosy disease. This project is a pivotal phase 1/2 safety study in a leprosy-endemic region of Brazil to demonstrate safety and immunogenicity of a defined subunit vaccine, LepVax, in healthy individuals and leprosy patients. A pioneering component of these clinical trials is the engagement of people affected by leprosy. We will work closely with the members of the organization of people affected by leprosy in Brazil, called MORHAN (Movement to Reintegrate Persons Affected by Hansen's Disease), to bring their perspectives and insight in the investigation, with the goal of realizing quality leprosy services and uptake of interventions in Brazil. Together, we can increase leprosy awareness and clinical opportunities leading to elimination of leprosy. This trial serves as a critical stage-gate for further development of LepVax for therapeutic and prophylactic indications.</p> <p>[Project design] Phase 1b and 2a trials are double-blind, randomized, placebo-controlled clinical trials designed to evaluate the safety, tolerability, and immunogenicity of LEP-F1 + GLA-SE study in healthy adult participants and leprosy patient adult participants, respectively. The phase 1b trial will evaluate a low dose of LEP-F1 antigen (2 µg) or high dose of LEP-F1 (10 µg) combined with GLA-SE adjuvant (5 µg) compared to saline placebo. There will be 18 participants per group. A dose selection of LEP-F1 is proposed for testing in paucibacillary (PB) and multibacillary (MB) leprosy patients. Outcome measures of the phase 1b trial are local and systemic reactions of each study injection and number of participants spontaneously reporting adverse events. LEP-F1 IgG antibody and specific T cell responses based on cytokine secretion will be evaluated as a secondary outcome. Biomarker immune modulation are exploratory outcomes. Outcome measures of the phase 2a trial will also include measurements of inactive lesions, bacillary load, frequency and intensity of leprosy reactions, and neurological function for potential reactogenicity effect of the vaccine.</p>
Project Detail	https://www.ghitfund.org/investment/portfoliodetail/detail/214/en

*All amounts are listed at an exchange rate of USD1 = JPY146.20, the approximate exchange rate on August 31, 2023.

Appendix 2. Investment Overview (as of September 27, 2023)

Investments to date

Total investments: 30.2 billion yen (US\$207million¹)

Total invested projects: 121 (47 active projects and 74 completed projects)

To learn more about GHIT Fund's investments, please visit

Investment Overview: <https://www.ghitfund.org/investment/overview/en>

Portfolio: <https://www.ghitfund.org/investment/portfolio/en>

Advancing Portfolio: <https://www.ghitfund.org/investment/advancingportfolio/en>

Clinical Candidates: <https://www.ghitfund.org/investment/clinicalcandidates/en>