



JUNE 2024

DDH PROJECT NEWSLETTER

Supporting a Drug Discovery Hub
Development in Ghana

Funded by:

BILL & MELINDA
GATES foundation

Coordinated by:



TABLE OF CONTENTS

OUR TARGET

3

COORDINATION

5

PROJECT ACTIVITIES

8

Kick-off meeting

8

Chemistry Team visit to DDU/WCAIR

9

H3D Centre/H3D Foundation support to the DDH project

10

Expansion of the chemical series provided by MMV

12

Visit by the Biology Team

13

Visit of the DMPK team

14

Refurbishment of the Medicinal Chemistry Laboratory

16

REACH US

18

OUR TARGET

The overall vision of the project is to establish a drug discovery capability within Ghana, capable of undertaking hit discovery, hits to lead and lead optimisation across a range of diseases relevant to Ghana and the West African region.

The initial plan is to strengthen the network and the capabilities of the individual partners within a network of Universities across Ghana before expanding same across sub-Saharan Africa, particularly focusing on the West African region.

We are developing enhanced capabilities in screening, medicinal chemistry and drug metabolism and pharmacokinetics through a focused project on malaria drug discovery using six chemical start points identified through phenotypic antimalarial screening.

OUR TARGET

The project is;

- Building a screening cascade and drug discovery pathway for antimalarial drug discovery within Ghana.
- Validating and characterising in detail the hit series.
- Initiating hits to lead chemistry on at least 2 series.
- Driving one series to an early lead.
- Consolidating and further developing current capabilities in antimalarial screening and medicinal chemistry.
- Developing capabilities in in vitro drug metabolism and pharmacokinetics.
- Training scientists within Ghana to undertake drug discovery.

COORDINATION

The Project is managed and coordinated by the Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana. The consortium team leads include:



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**Senior Program Officer
The Gates Foundation
Dr. Gang Liu**
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**Principal Investigator (PI)
NMIMR
Prof. Dorothy Yeboah-
Manu**
—

COORDINATION

The Project is managed and coordinated by the Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana. The consortium team leads include:



Co-PI, UG Department of Chemistry, Chemistry Team
Prof. Richard Kwamla Amewu



Co-Investigator
NMIMR, Biology Team
Prof. Linda Eva Amoah



Co-Investigator
KNUST DMPK Team
Dr. Arnold Forkuo Donkor



DDU/WCAIR Team
Prof. Ian Gilbert



H3D Centre & H3D Foundation Team
Prof. Kelly Chibale

GRANT COORDINATION/ TECHNICAL SUPPORT TEAM



Project Administrator, NMIMR
Mrs. Griselda Osae-Amoako



Project Administrator, NMIMR
Ms. Afia Adoma Boakye



WCAIR Training Manager
Ms. Suze Farrell



**H3D research project
manager for the H3D team**
Dr. Susan Winks

The scientific support team in Ghana is made up of:
2 Post Doctoral Fellows
5 Research Assistants
2 Laboratory Technicians
PhD and Masters Students

PROJECT ACTIVITIES

KICK-OFF MEETING

The project kickoff meeting was held at the Noguchi Memorial Institute for Medical Research on 27th and 28th June, 2022 to discuss implementation of the project's objectives and deliverables.

At the meeting were representatives from the project funders, Bill and Melinda Gates Foundation, and other institutions including the World Health Organization-Ghana, University of Ghana, Kwame Nkrumah University of Science and Technology, University of Cape Coast, University of Health and Applied Sciences, University of Dundee, Medicines for Malaria Venture, Holistic Drug Discovery and Development Centre (H3D) at the University of Cape Town, and Centre for Plant Medicine.

The meeting was part of the Institute's ongoing continuous commitment to enhancing regional capacity for the creation and development of tools in



The DDU hosted Justice Akwensi from the Amewu lab at UG Chemistry department in October 2022.



Justice worked on the hit validation and expansion campaign of the series he had been working on in Ghana, MMV1900271. He designed and synthesized analogues of the original hit with the goal of establishing a structure-activity relationship map of the molecule, providing valuable information on what molecular features of this compound are important for its antiparasitic activity, hoping to improve the potency and the pharmacokinetic properties of the original hit.

During his 9 months in the lab, he focused on his own series but also spent time learning new techniques and skills that he could use on his return to Ghana. He submitted his project for a competition called 'The 3 Minute Thesis programme', where he made it to the final for the University and was awarded the People's Choice award. <https://wcair.dundee.ac.uk/wcair-trainee-justice-akwensi-reaches-final-of-the-dundee-3-minute-thesis-competition/>

H3D CENTRE/H3D FOUNDATION SUPPORT TO PROJECT

H3D provides the Ghana drug discovery researchers full access to integrated drug discovery platforms and services, and routinely supports the project with LCMS analysis and ADME screening.

Dr. Festus Kojo Acquah, from Noguchi Memorial Institute for Medical Research (NMIMR), and Mohammed Shaban, from the University of Ghana Chemistry Department, recently had the opportunity to visit H3D on a 5-week scientific exchange.

Festus was interested in learning new parasitology and tissue culture techniques, in particular the Plasmodium stage specificity assay and the parasite reduction ratio assay, which give insight into how novel drug candidates inhibit parasite growth. Festus also had the opportunity to learn how to run a standard cytotoxicity assay to assess the safety of potential novel drug candidates. The training was conducted under the mentorship of Nobomi Dontsa and Dr Dale Taylor.



H3D CENTRE/H3D FOUNDATION SUPPORT TO THE PROJECT

On the chemistry side, Shaban was keen to learn about lab safety and to tackle some of the synthetic challenges he was facing with his current malaria drug discovery project. Shaban joined the H3D medicinal chemistry team and worked under the mentorship of Dr Mziyanda Mbaba and Dr Sauvik Samanta. He gained extensive insight into the health and safety aspects of running a chemical laboratory and made some progress on a particularly challenging synthetic process.

While Festus and Shaban were in Cape Town, they also had the opportunity to attend a 4-day hands on workshop entitled “A Comprehensive Workshop on Preclinical Drug Discovery (CDD)” from Apr 16-19, 2024. The workshop included more than 40 participants from 11 African countries, including some fellow researchers from the Ghana drug discovery hub, Dr Arnold Forkuo-Donkor and Justice Akwensi.



H3D CENTRE/H3D FOUNDATION SUPPORT TO THE PROJECT

The H3D team, in partnership with Ersilia Open-Source Initiative, will be coming to Accra, Ghana on 9-12 September 2024 to present a 4-day workshop on “AI tools for drug discovery” for 30 researchers from the region.

If you are interested in learning more about drug discovery and H3D, you can [sign up for our drug discovery webinar series](#) and follow [H3D Foundation on LinkedIn](#).

EXPANSION OF THE CHEMICAL SERIES PROVIDED BY MMV

Fritz Plange joined the Dundee team in February 2024 and is staying until November 2024. He is working on the hit expansion campaign of a chemical series provided by the Medicines for Malaria Venture, MMV1960490. He is designing and synthesizing analogues of the original hit with the goal of completing the structure-activity relationship map of the molecule and hoping to improve the pharmacokinetic properties of the original hit.



As with Justice, Fritz will have the opportunity to learn new techniques and skills while in Dundee that he can hopefully utilise back in Ghana. This is not all lab-based skills, we have recently trained him in some presentation skills.

VISIT BY THE BIOLOGY TEAM

Prof. Linda Amoah joined the labs of Dr Susan Wyllie and Prof. Marcus Lee in Dundee for 3 months. While with the Wyllie lab, she learned techniques for resistance selection studies and found 5 clones with around 3-fold resistance to the test compound. Genomic DNA was isolated and sent for whole genome sequencing.

The compound was also tested in Prof. Lee's library of resistant parasites, and data so far suggests that it does not share a mechanism of action with the other drugs used to generate the panel.

Prof. Lee has also sent his DNAPol mutator line to NMIMR to allow resistance generation work to continue.

VISIT OF THE DMPK TEAM

With the installation of the LC-MS/MS, two members of the DDU team visited KNUST on two occasions to support the team.



Nicole Mutter is a DMPK trainer and in-vitro scientist and Dr Laura Frame is a bioanalyst who has used the specific MS unit before. They first visited in November 2023. By the end of the visit, the solubility and CHI LogD assays were running, and they provided some technical training on the microsomal clearance and PAMPA assays.

VISIT OF THE DMPK TEAM

A second visit in March 2024 allowed them to continue with the training, focusing on troubleshooting analytical issues, what DMPK data means and troubleshooting assay results. They optimised the microsomal protein quantification method and automating the data processing. A chemical stability protocol was also taught and is in the process of being implemented.



Refurbishment of the Medicinal Chemistry Laboratory

In a move to propel and expand the capacity of drug discovery research in Ghana, a brief ceremony was held to commission the refurbished Medicinal Chemistry Laboratory of the Drug Innovation Group at the Department of Chemistry. The refurbishment is part of the “Supporting a Drug Discovery Hub in Ghana” funded by the Bill and Melinda Gates Foundation.

Prof. Linda Eva Amoah, Co-PI of the project, who at the ceremony represented the Director of the NMIMR, explained that as part of the project’s objective, the laboratory is to help develop compounds or synthetic molecules that can be used to cure malaria.



Refurbishment of the Medicinal Chemistry Laboratory

Prof. Richard Kwamla Amewu, Associate Professor of Organic and Medicinal Chemistry and Co-PI of the project, explained that the laboratory, which is possibly the first of its kind in the country, will facilitate research and training of students.

This is a fantastic resource that the Bill and Melinda Gates Foundation have given us to facilitate our research, and our primary focus is to identify alternative treatments to existing drugs used to treat malaria.



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The Noguchi Memorial Institute for Medical Research

<https://noguchi.ug.edu.gh/wp-content/uploads/2024/05/NOGOLYMPICS.mp4>

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<https://www.ug.edu.gh>

<https://pharmacy.knust.edu.gh>

<https://h3d.uct.ac.za>



Wellcome Centre for Anti-Infectives Research

We launched The Wellcome Centre for Anti-Infectives Research (WCAIR) in April 2017. The...

 WCAIR



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