



**UNIVERSITY  
OF GHANA**

**Noguchi Memorial Institute  
for Medical Research**



# NMIMR NEWSLETTER

JANUARY-JULY 2022 EDITION //

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**NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH**  
College of Health Sciences, University of Ghana, Legon



# Editorial

## Disease diagnostics and research at NMIMR

The Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana was established in 1979 as a biomedical research institute. Its core mandate is to research diseases of public health importance, equip postgraduate students with up-to-date skills in biomedical research and offer specialized diagnostics. The Institute has grown over the years and its nine research departments are all endowed with highly skilled research staff and has specialized state-of-the-art equipment in various aspects of clinical laboratory research and practice.

Diagnosis has important implications for patient care, research, and policy. NMIMR has supported the diagnostic activities of Ghana Health Service, Africa Centre for Disease Control and Prevention (Africa CDC) and the World Health Organization (WHO), providing accurate and timely diagnoses of infections that require specialized equipment and skills.

The NMIMR has been a major player in providing technical know-how for the detection of dangerous pathogens and the diagnosis of the diseases that they cause during major epidemics such as HIV/AIDS, H1N1 Pandemic Flu, LASSA fever, Yellow fever and Ebola virus. In 1982, Scientists from NMIMR were the first in Ghana to detect the Human Immunodeficiency virus (HIV) that causes Acquired Immune Deficiency Syndrome (AIDS). The Institute has since served as a reference and confirmatory HIV laboratory in the country and continues to conduct genomic and antigenic analysis and characterization of HIV1 and HIV2 towards future vaccine development. Additionally, NMIMR serves as the national HIV drug resistance monitoring laboratory and supports the monitoring of anti-retroviral therapy for HIV/AIDS.

NMIMR was the first to confirm the outbreak of avian influenza in domestic poultry in Ghana. The NMIMR currently serves as the National Influenza Centre, coordinating Influenza surveillance in the country and providing data to the WHO influenza monitoring programme. In this way, the Institute's diagnostic capability complements national health surveillance systems and protects the Ghanaian public from Avian Flu. Due to its capacity for detection of viruses using both culture and molecular techniques, the Institute hosts the Rotavirus Reference Laboratory (RVRF) that serves West and Central Africa and is a regional WHO accredited laboratory for surveillance and diagnosis of poliomyelitis in the sub-region. In 2014, the Ebola virus disease (EVD) outbreak that affected the West African sub-region threatened the security of many countries in the sub-region as it affected more than 28 000 people and resulted in over 11000 deaths. Fortunately, Ghana did not report an EVD case, but NMIMR was one of the WHO accredited laboratories charged with testing suspected case samples, confirming of presumptive positive tests and ensuring External Quality Assurance (EQA) within the sub-region.

The Institute is still at the forefront of diagnosis of several other viral infections such as Yellow Fever which holds a special place in the history of the Institute as it was the disease that brought Dr. Hideyo Noguchi to Ghana, led to his demise and formed the basis for the establishment of the Institute. Although official

estimates from the WHO indicate Ghana possesses a high population immunity against yellow fever (roughly 88 percent); pockets of unvaccinated persons remain at risk of infection and further disease spread leading to the occasional outbreak for which the Institute offers diagnostic support. Lassa fever (LF) is an acute viral hemorrhagic illness that is caused by an arenavirus. In December 2011, the first two laboratory-confirmed cases of Lassa fever were reported in Ghana based on real-time polymerase chain reaction (RT-PCR) tests at NMIMR.

The diagnostic capacity of NMIMR came into sharp focus during the COVID-19 pandemic. The NMIMR was the first institution in Ghana to test suspected samples for SARS-CoV-2 and was initially the only institution with the capacity to test for COVID-19 disease using RT-PCR assay. The Institute proceeded to offer training to many other laboratories in both the public and private sectors to increase national testing capacity and this has resulted in over 40 testing centres across the country.

Aside from disease diagnosis and surveillance, NMIMR has also been at the forefront of the development of specialized diagnostics for bacterial infections such as tuberculosis, Buruli ulcer, anthrax, meningitis, cholera, and foodborne bacterial pathogens to name a few. Pathogen culture is the gold standard for TB diagnosis and currently, NMIMR is the only Institution in Ghana that has a pathogen level 3 laboratory for TB culture and was the first to detect an extensive drug-resistant TB case in Ghana. With the use of molecular techniques and specialized TB assays, NMIMR supports the National TB Control Programme (NTP) as a referral laboratory for TB diagnosis and drug resistance testing. The Institute is a member of the WHO-recognized laboratories for confirmation of Buruli ulcer (BU). One of the sought-after point-of-care diagnostic (LAMP) for early diagnosis of BU has been developed by NMIMR scientists and is going through Foundation for Innovative New Diagnostics (FIND)-WHO evaluation. Most recently, efforts at identifying diagnostic biomarkers for malaria infection from human saliva have begun at the Institute, in collaboration with Aqsens Health.

Parasitic infections abound in Ghana and the sub-region and NMIMR through its research has provided diagnostics for the detection and monitoring of schistosomiasis, onchocerciasis, and malaria in endemic communities. The West African Centre for International Parasite Control (WACIPAC), situated at NMIMR, continues to be the hub for surveillance of parasitic diseases within the sub-region.

In recent times, NMIMR has developed the capacity to test for neglected tropical diseases (NTDs) such as Yaws, Leishmaniases, and several skin diseases under the skin NTDs programme.

At the apex of this massive diagnostic capacity is critical equipment and facilities such as the pathogen level 3 laboratories, the only Transmission electron microscope in Ghana, modern molecular biology suites, set up for immunological diagnosis, and one of the most advanced genetic sequencing and bioinformatics platforms in Ghana. The Advanced Research Lab (ARL), which was a timely addition to NMIMR's facilities in March 2019, has certainly enhanced the diagnostic capacity of the Institute and this was evident during the COVID-19 pandemic.

Several students, researchers, interns and health staff from Ghana, other African countries and several countries outside Africa continue to benefit from training in disease diagnostics from NMIMR. For the Institute to maintain its status as the beacon of hope for such specialized diagnostics in Ghana and the sub-region, there is the need for investment to build additional capacity for both research personnel and up-to-date equipment including a cell bank and other storage facilities. The Institute, therefore, continues to seek resources for these developments and to always be in readiness for any future outbreaks of diseases within the sub-region.



# RESEARCH HIGHLIGHTS

## *Possible dissemination of Escherichia coli sequence type 410 closely related to B4/H24RxC in Ghana*

### **Authors:**

Samiratu Mahazu <sup>1,2</sup>, Isaac Prah <sup>1,3</sup>, Alafate Ayibieke <sup>1</sup>, Wakana Sato <sup>1</sup>, Takaya Hayashi <sup>3</sup>, Toshihiko Suzuki <sup>4</sup>, Shiroh Iwanaga <sup>2</sup>, Anthony Ablordey <sup>5</sup>, Ryoichi Saito <sup>1</sup>

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## **Lay abstract**

Bacteria (germs) cause several kinds of diseases in humans and animals. Some of these germs cause more severe diseases than others. Antibiotics are medicines that help to kill germs in our bodies or make them weak to be unable to cause disease. For some reasons including our improper use of antibiotics, these germs are able to survive the effects of antibiotics. In other words, some antibiotics are no longer effective against the germs and the germs are constantly finding new ways to prevent the antibiotics from affecting them. The objective of this study was to grow and identify germs in two hospitals in Ghana and determine whether they are resistant to some antibiotics or not and also learn about what causes them to become resistant to antibiotics. Another objective of the study was to compare the germs with those from hospitals in other countries, covering five continents: Africa, Asia, Australia, Europe and North America.

We cultivated twenty-one germs (bacteria) from clinical samples of sick people in two Ghanaian hospitals. Some 18 antibiotics were checked to see how well they work on these germs. We went further to check how and what is helping the germs spread from one person to another, and from country to country. We also tried to understand how different the germs from these two Ghanaian hospitals are, from germs causing diseases in other countries.

We identified some particular germs that cause severe diseases and have certain properties that help them fight the effect of antibiotics. We also found that they use certain specialized systems to pass on the properties to other bacteria helping them to spread easily and faster.

In order to save the lives of sick people, it is important that we learn proper ways to take antibiotics when we are sick so that they can work effectively on the germs and prevent them from spreading.

**Conclusion:** In order to save the lives of sick people, it is important that we learn proper ways to take antibiotics when we are sick so that they can work effectively on the germs and prevent them from spreading.

## **Towards large-scale identification of HLA-restricted T cell epitopes from our vaccine candidate antigens in a malaria endemic community in Ghana.**

### **Authors:**

Kwadwo Asamoah Kusi<sup>1\*</sup>, Ebenezer Addo Ofori<sup>1</sup>, Kwadwo Akyea-Mensah<sup>1</sup>, Eric Kyei-Baafour<sup>1</sup>, Augustina Frimpong<sup>1</sup>, Nana Aba Ennuson<sup>1</sup>, Maria Belmonte<sup>2,3</sup>, Harini Ganeshan<sup>2,3</sup>, Jun Huang<sup>2,3</sup>, Linda Eva Amoah<sup>1</sup>, Eileen Villasante<sup>2</sup>, Martha Sedegah<sup>2</sup>

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Achieving complete protection against malaria through vaccination is not an impossible goal. This has been proven in animal and human experimental infection studies using the form of the malaria parasite that infects the liver. Several antigens of the malaria parasite are known to be targets for destruction of the parasite by the immune system. The first licensed malaria vaccine, known as RTS,S, offers less than 50% protection against malaria in children from endemic areas and the mechanisms that confer full protection against malaria are not fully understood. It is however known that immune cells that are able to kill malaria infected cells through direct contact with those cells (cytotoxic CD8 T cells) can recognize malaria antigens displayed on the surface of infected liver cells. Upon parasite antigen recognition, these immune cells produce molecules such as interferon gamma and granzyme B that mediate parasite-killing in the liver. Since a single antigen may have several potential targets that are recognizable by CD8 T cells from different individuals, this study set out to find the specific CD8 T cell targets, known as epitopes, within four malaria vaccine candidate antigens that induce potent interferon gamma and granzyme B responses in 300 adults with life-long exposure to malaria. To do this, immune cells of adults living in the high malaria transmission areas of Ghana were stimulated with pooled antigen fragments from the malaria parasite antigens known as circumsporozoite protein (CSP, 9 pools), apical membrane antigen 1 (AMA1, 12 pools), thrombospondin related anonymous protein (TRAP, 6 pools) and cell traversal for ookinetes and sporozoites (CelTOS, 4 pools). The number of T cells that responded to the stimulation by producing either

interferon gamma or granzyme B or both were quantified via a fluorospot assay (which shows spots that fluoresce when any of the targeted killer molecules are produced). The results obtained revealed that a higher number of malaria-infected persons produced interferon gamma in response to peptide stimulation than those that made granzyme B. The tail end of the CSP antigen was the most potent at inducing immune responses while the TRAP and CelTOS antigens were the least potent. Also, the presence or absence of an active malaria infection in the study participants did not influence the production of these killer molecules from their T cells.

In conclusion, CSP and AMA1 antigens were better triggers of the killing activity of immune cells in adults with life-long malaria parasite exposure compared to the other two antigens tested. This highlights the continued relevance of these two antigens as malaria vaccine candidates.

## **Molecular characterization of circulating viruses in an outbreak of Yellow Fever from October 2021 to February 2022 in communities in Ghana**

### **Authors:**

Joseph Humphrey Kofi Bonney<sup>1</sup>, Terrel Sanders<sup>2</sup>, Deborah Pratt<sup>1</sup>, Bright Agbodzi<sup>2</sup>, Dennis Laryea<sup>3</sup>, Selassie Kumordjie<sup>2</sup>, Keren Attiku<sup>1</sup>, Patience Adams<sup>1</sup>, Gifty Mawuli<sup>1</sup>, Clara Yeboah<sup>2</sup>, John Kofi Odoom<sup>1</sup>, Samuel Dadzie<sup>4</sup>, Chrysantus Kubio<sup>5</sup>, Franklin Asiedu-Bekoe<sup>3</sup>.

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Yellow fever, a viral disease that causes internal bleeding and transmitted by infected mosquitos is still a major public health problem, especially in West Africa where it causes disease outbreaks every year. In Ghana, a trend of YF outbreaks has been observed in a five-year cycle, at least in the last 20 years. Nevertheless, laboratory investigations during these outbreaks have labored due to the type of detection methods deployed and partly contributed to increased spread and fatalities. Besides, little is known about the genetic make-up of the virus and how it evolves, mainly due to a limited number of genomic sequences from wild virus isolates. Our aim during this outbreak investigations was to rapidly detect and confirm or otherwise the presence of the yellow fever virus with the use of molecular assays. Additionally, we set out to establish and clearly know the type of Yellow fever viruses circulating by characterizing the positive cases from the outbreak in the communities within the identified regions in Ghana. By engaging a relatively more sensitive and gold standard approach in pathogen detection, we reduced the time between the onset of the outbreak and when the first cases were detected. The multiple effects of this were the prompt response and effective disease management which were essential components for the successful control of infectious disease outbreaks and for ensuring global health security.

# PERSONALITY PROFILE

## MR. ISAAC AFAAKWEI HUDSON-ODOI



**M**r. Isaac Afaakwei Hudson-Odoi is the Audio Visual Technician of the Institute. He started working as Messenger Cleaner at the Electron Microscopy Unit (Now Department of Electron Microscopy and Histopathology) of the Institute on 3rd October 1983 under the direct supervision of Ms. Susan Damanka (now Dr. Damanka).

Mr. Hudson-Odoi had his basic education at Hamsted Preparatory School, completed in 1978 and proceeded to Somanya Technical Institute the same year where he was trained as an Auto mechanic.

He was taught photography by Ms. Damanka from the very scratch where he developed and printed micrographs. His passion for photography started growing at this point.

His interest in photography gave him the opportunity to work closely with every department and unit at the Institute, as well as with undergraduate and postgraduate students from the University of Ghana Medical School, Allied Health Science,s and the Microbiology Department of the University. He has been acknowledged in over fifty (50) publications for his photography works by Research Fellows at the Institute as well as undergraduate and postgraduate students from the University.

He was trained as a Medical Photographer at the University of Ghana Medical School (Illustration Unit) in 1996.

His ability to use a digital camera,, develop and project colored slides in 2005, made him popular at NMIMR and beyond as this was not common at the time.

On February 10 2005, Mr. Hudson-Odoi traveled to Japan on the ticket of the West Africa Centre for International Parasite Control (WACIPAC) at the NMIMR, to be trained in photography for the enhancement of his skills in the profession. While in Japan, he gained hands-on training in photography, editing as well as uploading pictures and videos. He acquired a certificate in Multimedia Technology for E-education upon completion of the training in Okinawa, Japan.



*Mr. Odoi-Hudson in his youthful days while in Japan*



*Mr. Odoi-Hudson in his youthful days while in Japan*

On November 20, 2006, he was designated as the official photographer of the NMIMR.

Over the past thirty-eight (38) years, Mr. Hudson-Odoi has progressed steadily from Messenger Cleaner to Technical Assistant (Grade 1 and 2), He got promoted to Assistant Technician and to Technician. Currently, he is head of the Audiovisual Unit that handles all photography and sound system operations of the NMIMR.

In addition to his audiovisual duties, Mr. Odoi directs and oversees the general running and management of the Noguchi Conference Hall and Combined Seminar Room. He oversees bookings for events at the Conference Hall and Combined Seminar Room.

Mr. Hudson-Odoi has been instrumental in the growth of NMIMR and has contributed his quota significantly to the development of the Audiovisual Unit. He has been available to capture key and memorial moments at the Institute helping to build a great reservoir of pictures. He has also ensured the effective functioning of his unit by appealing for computers, microphones, projectors and other key equipment to enhance the smooth running of the unit.

His commitment and selfless attitude towards work has earned him utmost recognition and appreciation by staff and international collaborators of the Institute. His good work ethics has set many of his trainees on the path of discipline and positive attitude towards work.

Mr. Isaac Afaakwei Hudson-Odoi remains the only long-serving staff of the Institute still at post since its establishment in 1979 and we congratulate him for this great achievements.



# AWARDS



The Institute receives the 'Excellence in Malaria Research Award' by the Ghana Health Service in May 2022

# SPECIAL FEATURES

## New Japanese Ambassador paid a courtesy call to Noguchi

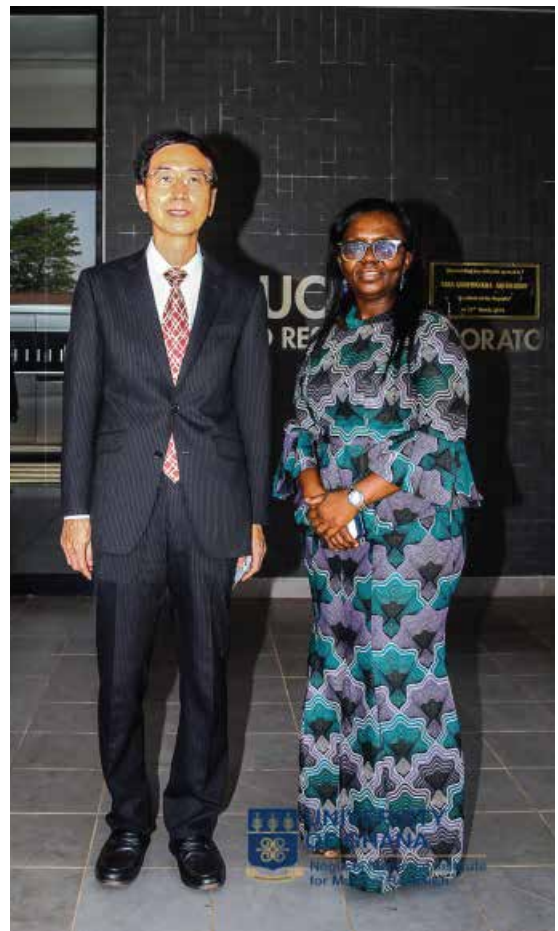
The Institute was honoured by a working visit from the new Japanese Ambassador to Ghana, H.E Mochizuki Hisanobu, on Wednesday January 19, 2021.



Ambassador Hisanobu, who was accompanied by officials from the Embassy of Japan in Ghana, was given a tour of the Institute's facilities and departments. The Institute's Director, Prof. Dorothy Yeboah-Manu led the tour to give them insight into the day-to-day activities and the role the Institute plays as a biomedical research centre in the sub-region.

Prof. Yeboah-Manu expressed her appreciation to the Ambassador for his decision to visit the Institute early on in his tenure, indicating that it portrays the significance he has placed on the relationship between NMIMR and Japan.

She further highlighted that the Ghana-Japan relationship has gone a long way to expose many Ghanaian scientists to further their studies in the various fields of sciences particularly scientists from the Institute adding that "through our collaboration with Japan, majority of our scientists have received capacity building in diverse areas of their specialties. More than 10 young scientists have been trained in Japan with one currently pursuing a doctoral fellowship in Japan".



Ambassador Hisanobu recalled the strong relationship which existed between Prof. Easmon and Prof. Honda leading to the establishment of the Institute, and he assured the Institute of his commitment to strengthening the existing relationship between NMIMR and Japan.

The Ambassador acknowledged the Institute's role as an African center for research in communicable and non-communicable diseases and pledged his Embassy's readiness to assist the Institute expand its research capacity.

This is the Ambassador's second assignment to Ghana after almost 10 years and the Institute looks forward to a successful working relationship with him and the Embassy of Japan in Ghana.



# DIRECTOR OF AFRICA CDC VISITS NOGUCHI

**D**r. John Nkengasong, Director of Africa Centres for Disease Control and Prevention (Africa CDC), on Friday March 18, 2022, visited the Institute to interact with the Director and staff of the Institute. He used the opportunity to congratulate Prof. Dorothy Yeboah-Manu on her appointment as the first female Director of NMIMR and to staff for the hard work, timely interventions, and innovative contributions towards the fight against the pandemic.

"Noguchi has played a central role in the response not just for Ghana but for the sub-region. The fact that we are here today means that there is hope and I will always promote Noguchi wherever I go" he added.

Dr. Nkengasong indicated that the use of science to address public health threats has been phenomenal over the past years. Adding that "I continue to believe that we will overcome this pandemic with good science and the new generation of vaccines will even be better than this first generation of vaccines.



According to Dr. Nkengasong, there is a lot of potential for the future which will help for further research activities. "I do not think we have explored enough the potential of Noguchi in terms of diagnostics. There should be the ability to use science to unlock the potential to fight pandemics in the areas of diagnostics and vaccine manufacturing. Good science is courage. You cannot be innovative if you cannot fail. Innovation means you are ready to take risks". He further explained that through the power of strong institutional and national collaborations between the Institute and Africa CDC, there will be a collective resilience agenda where individual institutions will have the ability to take initiatives and not necessarily wait on instructions from the top to act.



# EVENTS

## IN PICTURES

Collaborative Meeting between Senior Members of the Medical Research Council Unit, The Gambia at London School of Hygiene and Tropical Medicine (MRCG@LSHTM) and NMIMR, March, 2022



NMIMR Women's Day Celebrations, March, 2022



World TB Day Celebrations, March, 2022



Malaria Day Celebrations at Ajumako, April, 2022



5th Industry-Academia Interaction Series and Exhibition, April, 2022





Mr. MIHARA Asahiko, JICA Special Advisor paid a courtesy call on the Director to discuss existing cooperation between the Institute and JICA as well as opportunities for future collaborations, May, 2022



Send-off Ceremony for Ms. Maki Ozawa, May, 2022



The Skin Health Africa Research Programme (SHARP) Development Workshop, May, 2022



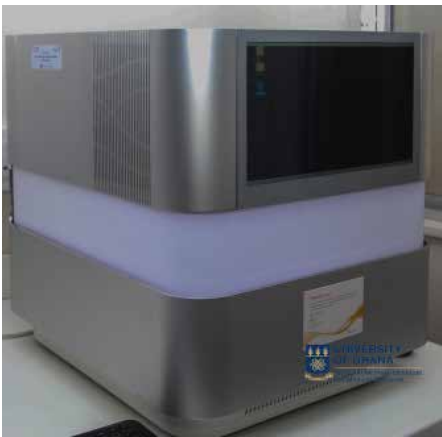
NMIMR partners with World Health Organization (WHO) to organize a 5-day Workshop on ‘Whole Genome Sequencing and Surveillance of Antimicrobial Resistance in Bacteria’ to build capacity for genomic AMR surveillance, June, 2022



# DONATIONS

The Africa Centres for Disease Control and Prevention (Africa CDC) through the Pathogen Genomics Initiative (PGI), on Wednesday, 6th April, 2022 donated Genomic Sequencing Equipment and Reagents to the Institute. This is to support the adaption and implementation of the integration of pathogen genomics and bioinformatics into public health surveillance, outbreak detection, investigations to improve disease control and prevention in the African sub-region.

These equipment are very crucial for and will enhance the mandate of the Institute



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## 2022 ANNUAL RESEARCH MEETING ANNOUNCEMENT AND CALL FOR ABSTRACTS

The Noguchi Memorial Institute for Medical Research (NMIMR) of the University of Ghana is organising a 2-Day Annual Research Meeting (ARM) on November 17-18, 2022. The theme of the research meeting is “Epidemics, Pandemics and Diseases of Public Health Importance: Bridging the Research Policy Divide”

The world has experienced many challenges during epidemics and pandemics, and the control of endemics infectious and non-communicable diseases of public health importance in recent years.

The ARM will provide a forum for researchers, health policymakers and practitioners, including governmental and non-governmental organizations, and community health partners to address the research and policy divide. The forum will also offer the opportunity for NMIMR to receive feedback from stakeholders to improve the focus and outputs of its research activities.

The Organising Committee invites you to submit an abstract/abstracts of your research papers, present your work, and actively participate in this 2-day meeting. We welcome submissions addressing a broad range of health sciences in the areas of communicable and non-communicable diseases. We encourage submissions on both basic and applied sciences, health systems and implementation research as well interventional studies.

Please visit [www.noguchimedres.org](http://www.noguchimedres.org) or click on the link <https://forms.gle/2PXYba56fDgPtLx6> to register and submit an abstract. Indicate the research area (s) of your abstract and your preference for either an oral or a poster presentation.

The closing date for submission of abstracts is **15th September, 2022**. Authors will be informed of the status of their submissions by **7th October, 2022**.

For further enquiries, contact the organizing secretariat via email: [NoguchiARM2022@noguchi.ug.edu.gh](mailto:NoguchiARM2022@noguchi.ug.edu.gh)



Noguchi Memorial Institute for Medical Research



# ANNUAL RESEARCH MEETING 2022

Theme:

Epidemics, Pandemics and Diseases of Public Health Importance: Bridging the Research-Policy Divide

### Keynote Speakers:

**Dr. Anarfi Asamoah-Baah**  
Presidential Coordinator,  
COVID-19 Response Programme

**Professor John Gyapong**  
Former Vice Chancellor,  
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**9:00 am Each Day**

**17 & 18 November, 2022**

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9:00 AM Each Day

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