

## Seventh Annual Research Meeting of the Noguchi Memorial Institute for Medical Research: Neglected Tropical Diseases

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### SUMMARY

Neglected Tropical Diseases (NTDs) are a group of 20 diseases associated with poverty that the World Health Organization aims to control or eliminate. Significant progress has been made in the past two decades with international commitments towards their control and elimination. NTDs in Africa, which account for 40% of the global burden, affect child development, pregnancy outcomes, and productivity. The seventh Annual Research Meeting (ARM) of the Noguchi Memorial Institute for Medical Research (NMIMR) at the University of Ghana featured numerous presentations on NTDs. These highlighted the NTD research landscape and elimination challenges, emphasising the need for government commitment and innovative financial mechanisms due to the extensive funding required. NTD research at NMIMR has informed local and global policies, contributing to capacity building by training students and health professionals. Novel tools and strategies are essential to address ongoing challenges and achieve NTD control and elimination targets.

**Keywords:** Neglected tropical diseases, drugs, diagnostics, snakebite, skin NTDs, xenomonitoring, Ghana

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### INTRODUCTION

Neglected Tropical Diseases (NTDs) are a group of 20 poverty-related diseases targeted by the World Health Organization for control or elimination.<sup>1</sup> These diseases represent important tracers in health disparities. However, significant progress has been made on these diseases over the last two decades, with several international commitments towards their elimination.<sup>2</sup> During the seventh annual research meeting (ARM) of the Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana, a session was devoted to NTDs. Several oral and poster presentations were made during the ARM, and below, we present a summary of the main oral presentations.

Professor John Gyapong of the University of Health and Allied Sciences gave a plenary presentation defining the NTDs research landscape and the challenges with elimination. Due to the number of diseases requiring funding for implementation of activities, implementation and operational research, drugs and diagnostics development, it is difficult to effectively track the progress of elimination, unlike the other diseases, such as malaria and tuberculosis, that are tackled individually. NTDs in Africa account for about 40% of the global NTD burden, with many affecting child development, pregnancy outcomes, and productivity, among others. The case for government commitment and funding instead of the overreliance on external donors was advocated, alongside innovative fi-

nancial mechanisms to support the NTD elimination targets. Prof. Dzedzom K. de Souza presented on the 14 NTDs in Ghana and a brief summary of ongoing work at the NMIMR. These include onchocerciasis, lymphatic filariasis, schistosomiasis, soil-transmitted helminths, Buruli ulcer, trachoma, cutaneous leishmaniasis, snake bite envenoming, Guinea worm, leprosy, yaws, human African trypanosomiasis, rabies, scabies. Of these 14 NTDs, the NMIMR is actively involved in 8 of them.

Mr. Samuel Nyarko presented on the preclinical immuno-recognition and neutralisation assessment of antivenom against ten African snake venoms. The study evaluated the preclinical efficacy of venoms from *Echis leucogaster*, *Echis ocellatus*, *Bitis arietans*, *Bitis gabonica*, *Naja haje*, *Naja melanoleuca*, *Naja nigricollis*, *Dendroaspis jamesoni*, *Dendroaspis polylepis* and *Dendroaspis viridis* against a polyvalent Snake Venom Antiserum. In-vitro results showed the antiserum to contain antibodies capable of recognising and binding the majority of protein components representative of all eight major protein families of venoms of the snake species tested. The venom antiserum was safe and exhibited high neutralisation efficacy against all the viperid and elapid snake species venoms in in-vivo studies and confirmed the manufacturer's recommended neutralisation capacity. Mr. Ernest Z. Manson also presented on the development and characterisation of Anti-*Naja ashei* three-finger toxins (3FTxs)-specific monoclonal antibodies and evaluation of their in vitro inhibition activity. *Naja ashei* is a category 1 cobra and every country is mandated to prioritise antivenoms for category 1 snakes because of their public health importance. The results demonstrated the prospects of developing toxin-specific monoclonal-based antivenoms for snakebite immunotherapy. Snakebite envenoming is a major health concern in developing countries, causing significant mortality and morbidity. Over 2.7 million cases of envenomings are reported each year, with an estimated 435,000 to 580,000 snake bites annually that need treatment in Africa.<sup>3</sup> Several antivenoms are being produced and distributed in Africa for the treatment of envenomation without preclinical efficacy studies. Further, antivenoms available on the market are snake species specific and are not directed towards snakes found in Africa, specifically in Ghana.

Mrs Yvonne Ashong presented the potential of xenomonitoring as a tool for monitoring and evaluating community-wide schistosomiasis mass drug administration in Ghana. Schistosomiasis results in morbidity in children, affecting their growth and development and can also lead to female genital schistosomiasis and cervical cancer in women of childbearing age.<sup>4</sup> In the transmission cycle of schistosomiasis, the role of freshwater snails as intermediate hosts cannot be overemphasised, and they represent

an opportunity for monitoring control activities. The authors investigated the impact of mass drug administration on the prevalence of schistosomes in freshwater snail intermediate hosts at different time points before and after community-wide praziquantel treatment. The results indicated a relative decline in the prevalence of schistosome cercariae over time, whereas that of non-schistosome cercariae increased post-MDA. These point to the potential of xenomonitoring as a tool for indirectly evaluating MDA campaigns in schistosomiasis-endemic communities.

Dr. Richard Akuffo gave a presentation on the integration of skin disease diagnosis to detect *Leishmania*, *Mycobacterium ulcerans*, *Haemophilus ducreyi*, and *Treponema Pallidum Sub species pertenue* in Oti Region, Ghana. Earlier studies have revealed cutaneous leishmaniasis (CL) in 32% of skin ulcers screened for *Leishmania* infection in the Oti Region of Ghana.<sup>5</sup> A follow-up cross-sectional study was conducted to investigate other possible causes of the undetermined skin ulcers. Of the 101 samples tested, 82.2% were positive for *Leishmania* infection and 67.3% for *Treponema pallidum sub. Sp. Pertenue*, 73.3% for *Haemophilus ducreyi* while one sample tested positive for *Mycobacterium ulcerans*. Multiple occurrences of individual skin ulcer-causing agents were also observed in the same ulcers. This study emphasizes the need to develop comprehensive guidelines integrating the screening, diagnosis and treatment of skin ulcers.<sup>6,7</sup>

NTD research done at NMIMR<sup>8,9</sup> have informed policy both locally and globally. Through its research activities, the NMIMR contributes to capacity building by training students and health professionals. To control and eliminate NTDs, novel tools and strategies are needed to address the current challenges.

## CONCLUSION

In conclusion, the NMIMR plays a crucial role in addressing NTDs in Ghana through extensive research, policy advocacy, and capacity building. The seventh ARM highlighted the diverse research initiatives at NMIMR, from evaluating the efficacy of antivenoms against African snake venoms to exploring xenomonitoring as a tool for assessing schistosomiasis mass drug administration. Presentations underscored the importance of government commitment, innovative funding mechanisms, and the development of novel tools and strategies to overcome current challenges in NTD control and elimination. NTD research at NMIMR has significantly influenced local and global policies, contributing to advancing public health interventions. By training students and health professionals, NMIMR ensures the sustainability of these ef-

forts. Continued research, innovative solutions, and robust policy support are essential to achieve the ambitious targets for NTD control and elimination.

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