OVERVIEW OF R & D ACTIVITIES OF THE BIOMEDICAL AND PUBLIC HEALTH RESEARCH UNIT

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INTRODUCTION

MANDATE OF BMPHRU

- Conduct research into infectious diseases, non-communicable diseases and other health related problems using molecular genomics applications to significantly increase knowledge and generate evidence-based findings leading to development of technologies and treatment strategies to enhance control, management and elimination of diseases of public health importance
1) Development of technologies and treatment strategies
3) to enhance control and elimination of diseases of public health importance
Research and Development Activities: Onchocerciasis
Research Activities: Schistosomiasis
Research activities : Soil-transmitted Helminths
Research activities: Lymphatic Filariasis
<table>
<thead>
<tr>
<th>TITLE OF PROJECT</th>
<th>PROJECT AIMS</th>
<th>EXPECTED OUTPUT</th>
<th>PROJECT IMPACT</th>
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<tbody>
<tr>
<td>COUNTDOWN integrated strategy for control and elimination of schistosomiasis (SCH) and soil-transmitted helminths (STH) in Ghana</td>
<td>To demonstrate that expanded access to praziquantel (PZQ) and Albendazole (ALB) treatment is both needed and can be delivered to all age groups who are not presently targeted within the National Control programmes.</td>
<td>Improved accessibility of PZQ and ALB treatment to all age groups in high endemic areas.</td>
<td>Reduced morbidity, mortality and poverty associated with SCH/STH infections through the application of new evidence for cost effective scale-up of MDA treatment for sustained control and targeted elimination of schistosomiasis</td>
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Highly sensitive DNA-based diagnostic tools developed to support control and elimination of SCH/STH in Ghana

PhD and MPhil students trained
## CURRENT PROJECTS

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<td>COUNTDOWN Integrated Control Strategies to Eliminate Lymphatic Filariasis (LF) in Ghana</td>
<td>Identify characteristics of persistent transmission within the LF ‘hotspot’ areas and design integrated strategy to speed up the elimination and provide evidence to support rapid and sustainable scale up of complementary intervention strategies to eliminate LF in Ghana</td>
<td>Generate evidence on vector dynamics and drug compliance to improve strategy and operational plans for scale-up of LF interventions</td>
<td>Interrupted transmission of LF in hot spots areas Reduced morbidity and mortality and poverty associated with LF infection</td>
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<td>Development of molecular diagnostic markers to detect sub-optimal response (SOR) to ivermectin treatment in onchocerciasis endemic communities</td>
<td>develop simple genetic diagnostic tools to detect parasite response to ivermectin: this should be suitable to be used by onchocerciasis control programmes to characterize treatment response and monitor resistance threats.</td>
<td>Validated panel of ivermectin-associated genetic markers to detect SOR in onchocerciasis</td>
<td>Ivermectin resistance areas identified and intervention deployed to reduce resistance parasite population and prevent its spread</td>
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ACHIEVEMENTS

• Development of a more sensitive Loop Mediated Isothermal Amplification Assays for detection of *Onchocerca volvulus* in human population at low infection levels.

• Real-time PCR based diagnostic tool to discriminate between the human parasite *Onchocerca volvulus* that causes onchocerciasis and *Onchocerca ochengi* that does not cause the human disease in the blackfly vectors population.

• Development of High-resolution melt assays using real-time PCR Technology for detection of ivermectin resistance in onchocerciasis endemic communities.

• Longitudinal epidemiological surveys and monitoring of onchocerciasis transmission in endemic communities in six regions in Ghana to determine the feasibility of onchocerciasis elimination in Ghana using current interventions.
ACHIEVEMENTS

• Development of a molecular xeno-monitoring assay for surveillance of lymphatic filariasis after Mass Drug Administration

• Mapping of vector species composition in communities in the Western and Northern regions: Control strategies improved to drive towards LF elimination

• Development of hyper-sensitive DNA-based tools for disease diagnosis

• Expanded access to Praziquantel for schistosomiasis control
• The research goals and mandate is to generate knowledge and evidence-based findings leading to development of technologies and strategies to enhance the control, management and elimination of diseases of public health importance.

• From the research outputs in the coming years we expect to significantly impact on diseases of public health importance within the next 10 to 50 years, thus we expect to see:
FUTURE DIRECTION OF BMPHRU

i. Elimination of Neglected Tropical Diseases

ii. Reduction in morbidities and mortalities of other infectious and non-communicable diseases

iii. Development of gene therapy for the control and treatment of non-communicable disease

iv. Provision of treatment strategies for management of chronic diseases

v. High profile Cancer research leading to reduction in cancer related morbidities and mortalities

vi. Establishing of molecular genomics medical laboratories for diagnoses and management of genetic related diseases

vii. Establishment of research based hospital for drug development, treatment and management of cancers and non-communicable diseases

viii. BMPHRU to a Medical Research Institute
EQUIPMENT AND FACILITIES

State-of-the Art equipment
Real-Time PCR machine for DNA analysis

Class II Biosafety Cabinet and Incubator

Ultra Low Freezer (-80°C)

Gel Imager

Electrophoresis System
MOLECULAR LABORATORY
PARASITOLOGY LABORATORY
ACKNOWLEDGEMENTS

• ALL STAFF OF BIO-MEDICAL AND PUBLIC HEALTH RESEARCH UNIT
THANK YOU ALL FOR YOUR ATTENTION