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The years 2017 to 2018 marked 20 years since KCCR was established. It was set up as a joint venture between the Kwame Nkrumah University of Science and Technology, the Ministry of Health of the Republic of Ghana and the Bernhard Nocht Institute for Tropical Medicine of the Republic of Germany to be a Centre of Excellence for Research, Training and Multidisciplinary Collaboration with Local and International partners. This is indeed a time for reflection. Although KCCR started as a rudimentary structure, it has evolved into a state-of-the-art modern laboratory that includes a separate cold house. The facility was sponsored by the Volkswagen Foundation Germany.

It still contributes significantly to research and capacity development into Poverty Related Diseases like Tuberculosis, Malaria, HBV/AIDS, Meningitis, Salmonella infection as well as the Neglected (Buruli ulcer, Leprosy, Yaws, Onchocerciasis, Lympathic Filariasis) and Emerging Infectious Diseases (Encephalitis & Respiratory disease-causing viruses, Hepatitis causing viruses, Cryptosporidiosis). Its portfolio in non-communicable diseases (NCD) is gradually expanding. Collaborations have been established with at least 65 institutions locally and internationally.

20 PhDs and 40 Masters have already been trained in Parasitology, Bacteriology, Immunology, Virology, Entomology, Wild life and Range Management and are working in critical aspects of the local economy. Its Scientists have excelled beyond the boundaries of Ghana. During the year undergraduate and postgraduate internships and attachments were hosted for acquisition of relevant skills. Workshops were held all year round in health-related areas.

The Advisory Board owes many thanks to the Honorable Minister of Health, Hon. Kwaku Agyeman Manu and his predecessors for their support and positive contribution to moving the Centre forward. We also owe much gratitude to the Vice Chancellor of the KNUST Prof. Kwasi Obiri-Danso and his predecessors for their encouragement and support. We are also most grateful to Prof Egbert Tannich and the BNITM for their continual support and kindness. Not least, we say thank you to all the Chairpersons that have kept the vision and directed KCCR with passion.

Once again, the Advisory Board owes all staff, Management team and brilliant Scientists gratitude for their hardwork and loyalty throughout the years. Members of the Advisory Board and the Management team that have served since its inception are duly acknowledged on the next page.

This report particularly highlights key research findings for 2017-2018.

Long Live KCCR!

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Malaria

Malaria is one of the most prevalent infectious diseases across the world with the majority of cases and deaths reported from sub-Saharan Africa.

In many countries, malaria is the major cause of morbidity and mortality in children and pregnant women. In Ghana, malaria account for 17.6% of outpatient attendance, 13.7% of admissions and 3.4% of maternal deaths. According to the World Health Organization (WHO) report, cases and deaths have been reduced in the WHO African region, nonetheless, malaria still remains a major health challenge. One situation accounting for this, is coinfection of malaria and other parasitic/viral/bacteria disease. Common infections which are frequently associated with malaria includes HIV, urinary tract infections, gastrointestinal infections, invasive bloodstream infections due to Salmonella infection and helminth infection.
Malaria Co-Infections in Febrile Pediatric Inpatients

The epidemiology of pediatric febrile illness is shifting in sub-Saharan Africa, but malaria remains a major cause of childhood morbidity and mortality. For this reason, we determined the burden of malaria co-infections and their association with parasite densities in more than 1000 hospitalized children from the Ashanti Region. Almost ¾ of children (99%) in this study were diagnosed with Plasmodium parasitemia. Other diseases diagnosed were lower respiratory infections (34%) mainly caused by Streptococcus pneumoniae, urinary tract infections with Escherichia coli as the main causing agent, gastrointestinal infections (17%) due to rotavirus infection and invasive bloodstream infections as a result of Salmonella infection. Interestingly we found that in Plasmodium infected children the probability to contract one of the mentioned co-infections increased with lower parasite densities. Hence, parasite densities provide important information as an indicator for the probability of co-infection, in particular to guide antimicrobial medication.

Use of malaria rapid diagnostic test (mRDT) enhances patient management and reduces costs associated with the inappropriate use of antimalarials. Despite its proven clinical effectiveness, mRDT is not readily available at licensed chemical shops in Ghana. We performed interviews in the Kintampo area to assess the willingness of patients to pay for and licensed chemical operators to sell mRDT. The majority of customers were willing to pay for mRDT if the price ranges between 1.1-2.1 GH Cedis. All licensed chemical operators were willing to sell for a price range of 1-2 GH Cedis. It is likely that the current high prices prevent the widespread use of mRDT indicating the clear need to find system-compatible ways to subsidize the use of mRDT via National Health Insurance scheme.

mHealth: Feasibility of Electronic Health Information and Surveillance System (EHISS) for Disease Symptom Monitoring in a Clinical and Rural Setting

The current surge of mobile phone use in many African countries creates the opportunity to provide caregivers with limited access to the health care system with vital health recommendations. At the same time such communication system can be utilised to collect tempero-spatial data on disease symptoms. We have designed an algorithm to guide guardians in providing appropriate care to sick children. The algorithm reliably detected the symptoms and provided treatment recommendations. The system was tested first in clinical environment and after in a rural community in Ghana showing the practicality of using mobile phones for assessing childhood disease symptoms and encouraging caregivers to seek early treatment for their children if needed. The strategy to use mobile phones in disease surveillance and treatment support is a promising strategy especially for areas with limited access to the health care system.

Sub-Saharan Africa has made much progress against HIV, cutting the rate of new infections by almost 30% in the past years in contrast to the global average of 18%. This success can be attributed to the tremendous scale up in HIV public health education and access to antiretroviral treatment (ART). Nonetheless, HIV still remains a significant public health concern as HIV-related morbidity and mortality are still high. This can be attributed to late diagnosis, treatment, lack of access to adequate health care, antimicrobial resistance and emergence of several coinfections such TB/HIV and Malaria/HIV. These drawbacks affect the attainment of the “90–90–90 targets” of UNAIDS which aims to eliminate the AIDS epidemic by 2030 by ensuring 90% of HIV-positive persons having knowledge of their HIV status; 90% positive patients being on treatment and 90% of those on medication attaining viral suppression. On the subsequent pages are various researches undertaken at KCCR to help the reduction of the HIV burden in Ghana.
Improving HIV Care in Ghana

HIV still remains a major public health concern in West and Central Africa as HIV-related morbidity and mortality are high. One phenomenon leading to this situation is the incidence of coinfection with other diseases and yet only few reports are available from our hospitals. As such this study determined opportunistic diseases associated with HIV infections and mortality rate of HIV-infected patients admitted at the Komfo Anokye Teaching Hospital (KATH), Kumasi. The most common opportunistic disease among HIV infected persons were pulmonary tuberculosis (TB) while patients presenting with neurological symptoms were at higher risk of death. To be able to curb these occurrences in HIV infected persons enhanced outpatient screening is needed for early diagnosis and prompt highly active antiretroviral therapy (HAART) initiation. Increased access to diagnostic tests and treatment for HIV-positive patients is highly desirable.

Drug Resistance Profiles in HIV Patients on Treatment

Antimicrobial resistance among HIV patients is a major challenge hindering the success of antiretroviral treatment (ART). The patients with resistance strains whilst receiving long-term ART in sub-Saharan Africa have been poorly described. We used a sensitive method for assessing the resistance patterns associated with long-term tenofovir-based ART. Several resistance profiles were seen in this particular treatment regimen. We showed that long term antiretroviral therapy (ART) lead to complex resistance patterns with implications for continued drug activity and risk of onward transmission.

Renal Health after Long-Term Exposure to Tenofovir in HIV/HBV Positive Patients

Tenofovir (TDF) is a nucleotide reverse transcriptase inhibitor active against both HIV and HBV. It however carries the risk of proximal tubular dysfunction and decline in renal function. We assessed potent markers, which can be used to determine kidney health in HIV/HBV co-infected patients receiving tenofovir (TDF) as part of their antiretroviral therapy. Urine parameters were measured after four years of TDF treatment while kidney function was measured before and during TDF therapy.

Both parameters indicated a decline of the kidney function after prolonged TDF exposure. Further other comorbidities as hypertension, diabetes and liver stiffness were associated with long-term TDF therapy. Therefore a careful management of these parameters is necessary for TDF patients.

Tuberculosis

Tuberculosis (TB) caused by *Mycobacterium Tuberculosis* is a major health problem worldwide.

Ghana is still listed as a country with high burden of TB and coinfection with HIV. The incidence of TB in 2016 was 156 (75-265) per 100,000 of our population – one of the highest in the Africa region.

Mortality rate in these patients is high at 36 (32-56) per 100,000-half (20 per 100,000) of which is in those co-infected with HIV.
Treatment of Latent Tuberculosis

The treatment of latent infection with *Mycobacterium tuberculosis* is important in children because of their vulnerability to life-threatening forms of tuberculosis disease. The current 9-month regimen of isoniazid can prevent active tuberculosis in persons with latent tuberculosis infection. However, the regimen has been associated with poor adherence rates and with toxic effects. For this reason a shorter treatment regimen is desirable. We found that a 4-month treatment with rifampin had comparable results to the longer treatment with isoniazid to prevent active tuberculosis but showed a higher rate of treatment completion in children and adults.

Impaired IL-7 Response Caused by Dysregulated IL-7 Receptor Expression and Genetic Polymorphisms affect Tuberculosis Susceptibility

The central role of IL-7 for T-cell function is indicated by strict regulation of the IL-7 receptor on multiple levels and immune pathological effects of genetic variants. We identified impaired IL-7 receptor regulation of T cells from tuberculosis patients and novel genetic variants, which altered susceptibility to development of tuberculosis. Deficient T-cell proliferation as well as impaired generation of memory hamper protection against acute tuberculosis and, probably, the risk to develop recurrent disease.

How inflammation and immune suppression affects the T-cell response during active tuberculosis

T cells are crucial for immune protection against *Mycobacterium tuberculosis* infection. Inflammatory as well as inhibitory cytokines may impair T-cell immunity and progression to active tuberculosis disease. We identified constitutive STAT3 phosphorylation of T cells from tuberculosis patients as a marker of impaired T-cell response in tuberculosis patients. As a consequence, T cells from tuberculosis patients were impaired in proliferation, and showed a polarized cytokine profile in response to *M. tuberculosis* in vitro stimulation.

These results provide insight into novel mechanisms important for T-cell failure to protect against tuberculosis disease.

Neglected Tropical Diseases

Neglected Tropical diseases (NTDs) are often referred to as “diseases of the poor” as these illnesses affect the poor individuals residing in remote areas of third world countries. It is estimated that over 1.4 billion individuals in 149 countries are affected with an additional 2 billion plus people at risk. Although most NTDs are not fatal, close to 500 million deaths are recorded every year globally. The socioeconomic impact of NTDs on both individual, relatives and countries is enormous.

The WHO list 17 NTDs which require immediate attention to ensure effective control by 2020 and a possible elimination by 2030. To achieve these goals, WHO recommends an integrated approach through several interventions. Research is pivotal in overcoming the global impact of these diseases and as such KCCR is engaged in research activities into several NTDs to reduce their impact and burden on affected populations.
Vaccine Prospects for Buruli Ulcer

Buruli ulcer is a disease of the skin and soft tissues caused by infection with a slow growing pathogen, *Mycobacterium ulcerans*. A vaccine for this disease is not available but treatment can be done with Rifampicin and streptomycin or Clarithromycin. *M. ulcerans* possesses a gene for the production of a unique lipid toxin called mycolactone. We have studied the immunogenicity of enzymatic domains in humans with *M. ulcerans* disease, their healthy contacts, as well as non-endemic areas controls. The major response to antigen stimulation was an activation of the immune system by IFN-γ. The strongest responses were observed in healthy contacts of patients living in areas endemic for Buruli ulcer. Patients elicited lower responses than healthy contacts, possibly due to the immunosuppressive effect of mycolactone, but the responses were enhanced after antibiotic treatment. A vaccine made up of the most immunogenic mycolactone domains warrants further investigation.

Optimisation in Buruli Ulcer Treatment

Buruli ulcer caused by *Mycobacterium ulcerans* is effectively treated with rifampicin and streptomycin or clarithromycin for 8 weeks but some lesions take several months to heal. We have shown previously that some slowly healing lesions contain mycolactone suggesting continuing infection after antibiotic therapy. We have investigated parameters involved in the healing of Buruli ulcer and have found that current antibiotic treatment is highly successful in most patients but it may be possible to abbreviate treatment to 4 weeks in patients with a low initial bacterial load.

Slow healing in patients is associated with a high bacterial load at baseline and persistent infection. Some of these may need antibiotic treatment extended beyond 8 weeks.

Immune Markers as Potential Indicators for Disease Progression in Buruli Ulcer

Buruli ulcer disease caused by *Mycobacterium ulcerans*, is the third most common mycobacterial disease after tuberculosis and leprosy. This necrotic skin disease is a significant health care problem in affected countries where many infected persons are left with various forms of disabilities. As in other mycobacterial infections, T cell mediated immune responses by the human body are important for protection and recovery during treatment, but detailed knowledge about these immune responses is scarce.

Hence, we studied *M. ulcerans*-specific CD4+ T cell responses in Buruli ulcer patients and analyzed specific cytokine-producing T cells. We found *M. ulcerans*-specific CD4+ T cell responses associated with lesion size and healing rate. Further studies are required to investigate, if our findings has the potential to be used as biomarker for diagnosis, severity and/or progression of disease.

Mansonella Perstans in the Middle Belt of Ghana

Mansonellosis was first reported in Ghana by Awadzi in the 1990s but its relevance was not documented until recently when we found its association with *Mycobacterium ulcerans* in Buruli ulcer endemic communities in the Asante Akim North District. No study has assessed the exact prevalence of this disease in a larger study population. Hence this study sort to found out the prevalence of *M. perstans* infection in three districts in Ghana and to determine the various kinds of insects (*Culicoides*) that could be potential vectors for transmission in endemic communities. We recorded an overall prevalence of 32%, although up to 75% prevalence was demonstrated in some of the communities. We found a wide spectrum of insects (*Culicoides* spp.) associated with the disease. However, *Culicoides inornatipennis* is likely to be the main species responsible for transmission of infection but formal proof is yet to be obtained.

Debrah LB Parasit Vectors. 2017 Jan 7;10(1):1545
Diagnostic tools for the detection of infection with *Onchocerca volvulus* are presently limited to microfilaria detection in skin biopsies and serological assessment with limited sensitivity. For this reason we have investigated the diagnostic performance of a peptide enzyme-linked immunosorbent assay (ELISA) based on immunodominant linear epitopes previously discovered. The combination of a rapid test and the peptide ELISA led to a sensitivity of 97.3% for the detection of *O. volvulus* infection, without compromising specificity and with minimal impact on cross-reactivity. The available results open the opportunity for a “clinical utility use case” discussion for improved *O. volvulus* epidemiological mapping.

Antimicrobial Resistance

The last few decades has seen a rapid rise in antimicrobial resistance (AMR) among disease causing microbes raising a serious threat to global healthcare and security. It’s been estimated that AMR accounts for more than 700,000 deaths per year globally and by 2050, ten million lives will be affected with a corresponding increase in the cost of treating of AMR to US$100 trillion per year. Ghana has its own story to share as reports of AMR have been on the increase in human and animal population. This scare poses a major challenge to the successful treatment of infectious disease and requires the attention of major stakeholders.
Antibiotic use in animal husbandry has raised concerns on the spread of drug resistant bacteria. Currently animal products are traded globally with unprecedented ease, which has been challenging the control of antimicrobial resistance. Bacteria, which produce extended-spectrum beta-lactamase (ESBL) are resistant to certain drugs and thus cause a challenge in treatment. We have looked for two common ESBL producing bacteria, *E. coli* and *K. pneumonia*, on imported and locally produced poultry products sold in Kumasi (Ghana). From 200 meat samples 36% revealed ESBL producing bacteria. Roughly ¼ of the local poultry and 1/3 of the imported products was contaminated. High numbers of ESBL-producing bacteria, particularly on local but also imported poultry meat, represent a potential source for human colonization and infection as well as spread within the community. Surveillance along the poultry production-food-consumer chain would be a valuable tool to identify sources of emerging multidrug resistant pathogens in Ghana.

Nasal Carriage and Antibiotic Susceptibility in Staphylococcus Aureus

Nasal carriage with Staphylococcus aureus is a common risk factor for invasive infections, indicating the necessity to monitor prevalent strains, particularly in the vulnerable paediatric population. We did a surveillance study with the aim to identify the carrier rates, subtypes, antimicrobial resistance and virulence markers of S.aureus isolates from children in the Ashanti region. The carrier rates in our study population (22%), was comparable to global carrier rates but varied with age, sex and seasonality. We detected low rates of the difficult to treat methillin-resistant S.aureus (MRSA) but a high prevalence of Panton-Valentine leukocidin (PVL) producing isolates. PVL is associated with an increased virulence of S.aureus and the cause of necrotic lesions in skin or mucosa. The majority of MRSA bacteria produce PVL and high PVL rates serve not only as a source for severe invasive infections but may also transfer genes, leading to highly virulent MRSA clones.

National Drug-Resistance Tuberculosis Surveillance Program

Since its inception, KCCR has been involved in Tuberculosis (TB) research in collaboration with the national TB program (NTP) and is part of the national drug-resistance TB surveillance program since 2015. Since then we have provided several hundred diagnoses to the population and provide standard primary TB diagnosis by using modern molecular methods, in combination with advanced culture and drug-resistant recognition for an optimized treatment. Together with the health care facilities we monitor patients with drug-resistant TB and patients on the brink to develop resistance. The continuous monitoring of the treatment success and follow up on contact persons help to diminish the transmission of drug-resistant TB within the country.
Over the past decades more than 30 new infectious diseases have emerged and re-emerged among human population, most of which are animal related (zoonotic) disease. The occurrence of this phenomenon has led to serious social, political and economic losses. Factors relating to human behavior, poverty, environment changes, pathogen evolution and human-animal interactions contribute to the outbreaks of EIDs. A reasonable public health response towards addressing the menace posed by EID is by addressing the fundamental factors which enables the occurrence and the persistence of these diseases as well as embarking on effective control measure. As such WHO advocates researches efforts to promote awareness of these diseases, provide diagnostic and treatment options of EIDs. KCCR is particularly involved in the research of defining “Disease X” which stands for any unknown future disease with epidemic potential.
Non-typhoidal Salmonella (NTS) cause the majority of bloodstream infections in Ghana, however the mode of transmission and source of invasive NTS are poorly understood. We compared NTS from water sources and invasive bloodstream infections in rural communities. Blood from hospitalized, febrile children and samples from drinking water sources were analyzed for Salmonella spp. Strains were serotyped to trace possible epidemiological links between human and water-derived isolates. We detected different NTS in blood samples from children of which more than half were multidrug resistant. We also detected NTS in the tested water samples however these were different serovars than those isolated from blood. Water analyses demonstrated that common drinking water sources were contaminated posing a potential risk for transmission. However, a link between serovars from water sources and patients could not be established, questioning the ability of water-derived serovars to cause invasive bloodstream infections.

Due to the introduction of newer, more efficacious treatment options, there is a pressing need for policy makers and public health officials to develop or adapt national hepatitis C virus (HCV) control strategies to the changing epidemiological landscape. To do so, detailed, country-specific data are needed to characterize the burden of chronic HCV infection. In this study of 17 countries, a literature review of published and unpublished data on HCV prevalence, viraemia, genotype, age and gender distribution, liver transplants and diagnosis and treatment rates was conducted, and inputs were validated by expert consensus in each country including Ghana. Addressing data gaps will be critical for the development of future strategies to manage and minimize the disease burden of HCV.

In another study, pooled and individual dried plasma spots were tested for HCV. We showed that pooled plasma spots are a cost and labor effective method for the testing and sequencing of HCV in blood samples and allows easy transportation of samples.

Human Parechovirus including Novel Types in Stool Samples from Ghanaian Children

Human parechoviruses (HPeV) are associated with mild gastrointestinal or respiratory illnesses and are a frequent cause of infection in children. For Ghana, prevalence has not been determined yet, so we tested stool samples from a pediatric case-control study on causes of diarrhea for the presence of the virus. A high prevalence and genetic diversity of HPeV including novel types was found, but HPeV infection was not associated with diarrheal disease in this pediatric population. We also could not see varying concentrations in cases and controls, nor observe a seasonal pattern.

Influenza surveillance data from Africa indicate a substantial disease burden with high mortality. However, local influenza data from district hospitals with limited laboratory facilities are still scarce. We identified the frequency and seasonal distribution of influenza among hospitalized febrile children in a rural hospital in Ashanti region and described differential diagnoses to other severe febrile infections. Of 1063 children 271 (21%) were classified as severe acute respiratory infection (SARI) and 47 (4%) were positive for influenza. We detected influenza B, influenza A (H1N1)pdm09 and H3N2 as circulating strains in the population during the study period. We further showed Influenza contributes substantially to the burden of hospitalized febrile children in Ghana being strongly dependent on age and corresponds with the major rainy season during the first half-year.

Rickettsias are an underrecognized cause of febrile illness in sub-Saharan Africa. Infection of human usually results from cat-flea faeces getting in contact via scratches or broken skin causing fever, headache, myalgia and rash. Its abundance is associated with the wide distribution of its vector, the cat flea but other arthropod might play a role in the transmission cycle. We evaluated the epidemiology and clinical features of rickettsial disease in pediatric patients presenting with fever to an outpatient department in Ashanti Region. *Rickettsia felis* was detected in 7/470 (1.5%) blood samples and co-infection with *Plasmodium falciparum* was detected in 3/7 samples. Symptoms were fever (7/7), cough (6/7) and vomiting (4/7) but no rash was reported. We characterized the immune profile of *R.felis* infection and found different patterns of immune parameters in mono and co-infection with *Plasmodium*, suggesting a complex interplay. Our studies were the first, which reported *R.felis* in Ghana and adds to the growing evidence for its widespread occurrence with and without malaria co-infection in sub-Saharan Africa.

KCCR receives patient diagnostic samples from at least 7 regions in Ghana – Upper East), Upper West, Eastern, Central, Brong Ahafo, Western and Ashanti. A reporting system is developed and implemented based on EPI info to collect and report our TB results as well as to enable Geocoding and statistics with the data.

In 2018, 149 samples including follow-ups for TB drug resistance were processed. Although most of the samples had already undergone Rifampicin resistance testing at the district hospitals we tested first and second line drug resistance via DST and Line Probe Assay (LPA).

Of 23 GenXpert tests, 22 were rifampicin (RIF) resistant.

Of 122 TB cultures 74 were positive for *M. tuberculosis*, 37 were negative and 11 were Non-Tuberculous Mycobacterium (NTM).

Of 63 Drug Sensitivity Tests (DST), 29 samples showed resistance to at least one additional antibiotic other than RIF.

44 samples were tested via LPA for first line drugs and 55 for second line drugs.
Buruli Ulcer Diagnostic Service

KCCR processed samples from 436 suspected Buruli ulcer patients of which 399 were ulcers and 37 non-ulcer forms.

Of the 436 samples 263 came from Brong Ahafo Region, 97 from Ashanti Region, 24 from Western Region and 52 from Central Region.

Buruli ulcer was confirmed in 107 (24%) by *M. ulcerans* insertion sequence PCR.

Additional 115 samples received from Liberia in West Africa were also processed. In Liberia, a Buruli diagnostic lab was set up and Staff in the National Public Health Reference Laboratory (NPHRL) trained (an AIM NGO initiative).
KCCR earns a place on the Excell Researcher Excellence and Leadership Programme

African research institutions committed to developing research talent to the highest level were invited to respond to the call launched by African Research Excellence Fund (AREF) on 18 December 2017. This new Excell Researcher & leadership development programme is to enable 20 rising stars from up to six African institutions, competitively selected, to enhance their potential to build strong research careers, empower excellent teams, win funding and collaborate internationally. Four brilliant KNUST scientists Drs. Augustina Sylverken, Michael Owusu, Linda Debrah and Kingsley Badu nominated by KCCR and their research lead Prof Alexander Debrah were selected to participate in this programme. They are collaborating with the Office of Grants (OGR) and Research as well as Quality Assurance and Planning Unit (QAPU) at KNUST to develop new research communication guidance for researchers at KNUST.

Reference: https://www.africaresearchexcellencefund.org.uk/for-african-researchers/funding-opportunities/the-excell-programme/
Filariasis research receive a major boost in funding

Prof. Alex Debrah who leads the Filariasis research group at KCCR and external partners received €2.8M funding to carry out trials aimed at reducing the burden of Filariasis. The LEDOXY trial funded by the United States Agency for International Development (USAID) and TAKeOFF trial funded by the German Federal Ministry of Education and Research (BMBF) are looking for new treatments for lymphatic filariasis (LF) and podoconiosis respectively. Prof. Alex Debrah’s group at KCCR and Achim Hoerauf’s group in Bonn are pivotal to the success of these projects. This multi-centered project comparing the efficacy of doxycycline for improving filarial lymphedema and podoconiosis has the objective to establish clinical trial platforms of international standards and harmonize the performance of clinical trials across the participating countries: Ghana, Cameroon, Tanzania, India, Sri Lanka and Mali.

Reference
https://kccr-ghana.org/
Dr. Alexander Kwarteng

First African Scientist to join the Canadian Institute for Advanced Research (CIFAR) as a Global Scholar

The CIFAR Azrieli Global Scholars programme benefits early-career investigators by providing mentorship, funding, career development training, and access to a global network of scientists. CIFAR brings together nearly 400 researchers from all over the world who drive scientific innovations and make contributions to society. Since its establishment in the year 1982 Dr. Kwarteng was the first African to join these elite scientists as a Global Scholar in the Human and Microbiome program. He was captured in the December issue of Nature as a shining light for emerging Global talent.

Reference

https://www.cifar.ca/research/global-scholars
Attention to Global Health in Africa

During the period KCCR made significant strides in establishing a Global health and Infectious Disease Group led by Dr. John Amuasi with a 3-year award funded by the Bernhard Nocht Institute for Tropical Medicine (BNITM). Through these efforts a series of courses captured as ‘Skills for Excellence In Science Series (SEXISS)’ took off. The series is designed to equip participants with the fundamental principles and technical know-how to improve their scientific output in research, academia, or career in any health or biomedical field. Recent courses covered Scientific Writing “Basic Epidemiology with STATA” (BASES). The next series for 2019 will be advertised shortly.

John’s group is currently investigating topics of relevance in the sub-region such as Snake bite and meningitis outbreaks. The group is currently part of the ALERRT consortium, an EDCTP sponsored initiative aiming to reduce the impact of disease outbreaks in Africa.

Reference
https://kccr-ghana.org/

Dr. Amuasi (left)
New Tool for Buruli ulcer diagnostics

Current diagnostic methods to detect *M. ulcerans* suffer from delayed time-to-results in most endemic countries as a result of prolonged time for storage and shipment of samples to a distant, centralized laboratory for PCR testing. Dr. Michael Frimpong received an EDCTP capacity development fellowship to carrying out a project titled ‘Rapid detection of *Mycobacterium ulcerans* by recombinase polymerase amplification (Mu-RPA)’ aimed at developing a new diagnostic assay. He has developed a mobile suitcase laboratory applying novel DNA extraction (Genolyse) and Mu-RPA methods and evaluated for the diagnosis of Buruli ulcer in two treatment centres in Ghana. It has sensitivity of 86% (95% CI, 64-97) obtained within an average time of 45 minutes from sample collection to results. He collaborates with external partners from the George August University in Goettingen, Germany.
Dr. Oumou Maiga-Ascofare, Post-Doctoral Scientist

Building expertise for malaria elimination in sub-Saharan Africa.

Dr. Oumou Maiga-Ascofare is a Post-Doctoral Scientist who received a Fellowship on The Developing Excellence in Leadership and Genetics Training for Malaria Elimination in sub-Saharan Africa (DELGEME) Programme. DELGEME is sponsored by the Wellcome Trust Developing Excellence in Leadership, Training and Science Africa (DELTAS Africa) initiative in partnership with the Department of International Development (DFID) and the Alliance for Accelerating Excellence in Science in Africa (AESA). She is part of a pool of African Scientists working in African institutions with relevant expertise particularly for the exploitation of genetics and genomics data for malaria elimination in sub-Saharan Africa. She is collaborating with MalariaGEN (www.malariagen.net) and the Plasmodium Diversity Network Africa (PDNA, http://www.cggh.org/collaborations/plasmodium-diversity-network-africa).
KCCR performed diagnostic tests for respiratory (Influenza A and B, Coronavirus, Rhinovirus, Adenovirus and Parainfluenza virus 1-3) and encephalitic viruses (Herpes Simplex Virus, Varicella Zoster Virus, Enterovirus and Rabies virus) as well as dengue fever virus and Hepatitis E virus. 197 samples were processed during outbreaks of avian and human influenza and from hospitals within the Ashanti region.

<table>
<thead>
<tr>
<th>Virus</th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Influenza A (human)</td>
<td>23</td>
<td>24</td>
<td>47</td>
</tr>
<tr>
<td>Influenza A (Avian)</td>
<td>11</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Influenza A subtype H1N1</td>
<td>20</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>Influenza A subtype H3</td>
<td>0</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Dengue</td>
<td>0</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Enterovirus</td>
<td>0</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Varicella Zoster Virus</td>
<td>0</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Herpes Simplex Virus</td>
<td>3</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Rabies</td>
<td>1</td>
<td>6</td>
<td>7</td>
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<tr>
<td><strong>TOTALS</strong></td>
<td><strong>58</strong></td>
<td><strong>139</strong></td>
<td><strong>197</strong></td>
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## Facts and Figures

### Staff

<table>
<thead>
<tr>
<th>KCCR Core Staff</th>
<th>30</th>
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<tbody>
<tr>
<td>KCCR Research Staff</td>
<td>149</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>179</strong></td>
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### Funding

<table>
<thead>
<tr>
<th>KCCR Income</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td>Own Generated Income</td>
<td>€ 116,757</td>
<td>€ 133,221</td>
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<tr>
<td>Core Funding Received from BNITM</td>
<td>€ 144,074</td>
<td>€ 93,929</td>
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<tr>
<td>BNITM Research Funding</td>
<td>€ 435,881</td>
<td>€ 282,315</td>
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<tr>
<td>Other Third Party Funding</td>
<td>€ 1,196,674</td>
<td>€ 1,528,143</td>
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### Third Party Research Funding Agencies

Canadian Institute of Health Research (CIHR), EDCTP, VW Foundation via EFINTD, ARNTO, Taskforce for Global Health, German Research Council (DFG), Medical Research Council, UK, Wellcome Trust, BAYER AG, London School of Hygiene & Tropical Medicine, BMBF, BMZ / GIZ, Erasmus Medical Centre (Netherlands), Swedish Research Council, NIH, LOYOLA University USA, CIFAR, University Hospital Hamburg, USAID, BONNFOR, UKE Hamburg, University of Liverpool, University of Pittsburgh, Royal Society, Edinburgh Napier University, Gates Foundation/IVI, ANESVAD, DZIF

## Graduates and Trainees

### Qualifications

<table>
<thead>
<tr>
<th>Category</th>
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<th>2018</th>
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<td>PhD graduates</td>
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<tr>
<td>MSc graduates</td>
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<tr>
<td>Current PhD students</td>
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<td>2019 New PhD entrants</td>
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<tr>
<td>Current MSc students</td>
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<tr>
<td>2019 New MSc entrants</td>
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### Training (Interns & Other)

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<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
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<tr>
<td>2017</td>
<td>117</td>
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<tr>
<td>2018</td>
<td>150</td>
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Publications

Publications from KCCR

Research Projects

Total Number of KCCR Research Projects (2014 - 2018)
Clinical Trials

KCCR currently hosts 5 clinical trials.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>TAKeOFF</td>
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<td>LedoXY</td>
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<td>Test and Treat</td>
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<td>BURULINOX</td>
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</tr>
</tbody>
</table>

Research Portfolio

- Zoonosis: 3%
- Hepatitis & HIV: 2%
- Malaria: 6%
- Filarisitis: 40%
- TB: 1%
- AMR: 1%
- NCD: 4%
- Global Health: 2%
- EID & Outbreak Response: 5%
- Networking & Grants Program: 9%
- Salmonella & Sepsis: 8%
- Bioinformatics: 3%
- Buruli & Skin NTDs: 16%
KCCR Organizational Chart

Advisory Board
- Prof. J.S.K Ayim (Chair), Prof. K. Obiri-Danso, Prof. D. Ansong (KNUST),
  Dr. Baffour Awuah (MOH), Prof. Dr. E. Tannich, Prof. Dr. J. May (BNITM)
- Prof. Richard Phillips

Scientific Director
- Prof. Richard Phillips

Head of Administration
- Mrs. Ingrid Sobel

KCCR Laboratories
- Dr. Tabea Binger (Head)

Project Coordination

Data Management

Field Stations

BNITM

Ministry of Health

KNUST

KSMD

Finance
- Mr. Sebastian Kankam

Logistics
- Mr. Foster Boeteng

Secretariat
- Mrs. Henrietta Addai

Guesthouses & Compound
- Mrs. Helina F. K. Amaning

Systems Admin
- Mr. Jeffrey Agyeman

Transport/Workshop

Security

97
Management
Prof. Richard Odame Phillips (Scientific Director), Ingrid Sobel (Head of Administration)

Administration
Henrietta Addai (Office Manager), Jeffrey Agyeaman (Systems Operator), Williams Karikari (Assistant Systems Manager), Sebastian Kankam (Senior Accountant), Elvis Odaruo-Adomako (Accounting Assistant), Grace Agymang Agyekum (Accounting Assistant), Foster Boating (Logistician), Emmanuel Esilitie (Assistant Logistician)

Laboratories
Dr. Tabea Binger (Head of Laboratories), Joseph Teye (Driver/Mechanic), Dr. Jubin Osei-Mensah (Research Scientist, KCCR)

KCCR Grounds & Guest House
Dr. Richard Larbi (Technical staff), Dr. Yusif Mubarik (Caretaker, Head of Laboratories), Dr. Israology D. Amponsah Fordjour (Data Entry Clerk)

KCCR
= Dr. Richard Odame Phillips (Scientific Director), Ingrid Sobel (Head of Administration)

Transport
Isaac Senyo Dompey (Transport Supervisor), Paul Marfo Bekyir (Assistant Transport Supervisor), Phillip Frimpong (Assistant Transport Supervisor), Joseph Teye (Driver/Mechanic), Robert Acheampong (Driver)

Security
Yaw Dankwa (Security Officer), Andrews Baka (Security Officer), Francis Ayerawaa (Security Officer), Fidelis Azinotha (Security Officer), Ralph Arampong (Security Officer), Harrison Tsaglit (Security Officer)

Debrah Group
Scientific staff
Prof. AlexanderYaw Debrah (Faculty of Allied Health Science), Dr. Mrs. Linda Batsa Debrah (Department of Clinical Microbiology), Dr. Stephen Gberemaa (Department of Pharmacautics, KNUST), Dr. Ayis Boateng (University Hospital, KNUST), Dr. Jubin Osei-Mensah (Post Doctoral Scientist, KCCR), Yusif Mubark (Research Scientist, KCCR), Fatima Amponsah Fordjour (Research Assistant), Eunice Kyaaakyi Kuutiero (Data Entry Clerk)

Ruth Boateng (Cool), Nafisa Dauda (Cool), Seth Wiredu (Driver), Paul Antwi (Driver), Francis Domor (Financial Administrator), Moses Tampugere (Security Guard), Stephen Adahor (Security Guard)

Doctoral and Graduate students
Derrick Adu Mensah (PhD Candidate), Abu Abdu Rahman (PhD Candidate), Vera Serwaa Opoko (PhD Candidate), Eglia Agyeiwa (PhD Candidate), Peter Akosah Gyamfi (PhD Candidate), Ernest Amunar (PhD Candidate), John Opoku (PhD Candidate)

Phillips Group
Scientific Staff
Prof. Richard Phillips (Group Leader), Dr. Michael Frimpong (Post Doctoral Scientist), Dr. Solomon Gyabaah (Clinical Scientist), Dr. Kwaku Gyasi Danso (Clinical Scientist), Dr. Dorcas Owusu (Post Doctoral Scientist), Francisca Naana Sarpong, (MPHil), Emmanuel Akosah (Research Assistant), Portia Bakari (Research Assistant), Joshua Ocansey (Research Assistant)

Doctoral and Graduate Students
Dr. Justice Buakye-Apiah (PhD Candidate, UK), Benadette Agyevor (PhD Candidate)

Jonathan Kofi Adjei (PhD Candidate), Nancy Ackam (PhD Candidate), Wellington Owusu (PhD Candidate), Aloysius Logo (PhD Candidate, UK), Venus Nana Buakyea Frimpong (MPHil Candidate), Wilfred Ansiguerey (MPHil Candidate), Minadri Difier (MPHil Candidate), Habib S. Aho (MPHil Candidate), Abigail Agyemang (MPHil Candidate), Rejoice Agyeiwa Arthur (MPHil Candidate)

May Group
Scientific Staff
Dr. Omos Maiga-Asofar (Team Coordination), Dr. Nimako Sarpong (Project Coordination), Henry Hanson (Research Assistant), Geoffrey Foli (Lab Assistant), Kwadwo Sarfo Marfo (Laboratory Technician), Felix Osei Boateng (Biostatistician)

Doctoral and Graduate Students
Matilda Akornor (PhD Candidate), Kennedy Gyau Boshen (PhD Candidate), Charity Wiafe Akenten (PhD Candidate), Ellis Kobina Paintsil (PhD Candidate)
Theses 2017/2018

PhD Theses


Sandra Baffour-Awuah ‘Assessment of contribution of Bacillus sphaericus in malaria control: a community trial in Kumasi, Ghana’ Entomology (November 2017)

Albert Dompreh ‘The impact of Helicobacter pylori infection on Immune regulation and clinical course in HIV patients in Ghana’ Immunology (November 2017)

Antwi-Berko Daniel ‘Analysis of the immune-modulatory effects of Mansonella perstans infection associated with concomitant Mycobacterium ulcerans disease and tuberculosis infection in Ghana.’ (November 2017)

Samuel Nkansah Darko ‘Molecular insight into the pathogenesis of type 2 diabetes; Implications for Non-alcoholic associated fatty liver disease.’ Molecular Medicine (June 2018)

Owusu Dorcas Ohui ‘Hepatitis C Virus (HCV) in Ghana: Risk factors, genotypes and role of T helper cells in spontaneous recovery’ Immunology (November 2018)

Aliyu Mohammed ‘A mobile phone-based electronic health information and surveillance system for Africa: concept and pilot study’ Public Health (November 2018)

MSc Theses

Henry Hanson ‘In-vivo detection of Artemisinin Resistance in Agogo, Ghana’ Parasitology (June 2017)

Fatima Amponsah Fordjour ‘Assessing the involvement of nuclear factor kappa light chain enhancer of activated B cells inhibitor alpha in filarial lymphedema development’ Clinical Microbiology (November 2017)

Jones Lamptey ‘Prevalence and risk factors associated with community-acquired MRSA among healthy individuals living in selected livestock farming communities in Ghana’ Clinical Microbiology (November 2017)

Francisca Naana Sarpong ‘Detection of protein biomarkers in healing of Buruli ulcer disease’ Biochemistry (November 2018)

Priscilla Adjei-Kusi ‘Host-Vector Interactions That Determine Transmission of Schistosomiasis In Kumasi, Ghana’ Parasitology (November 2018)

Caleb Osei-wusu Sarfo ‘An Assessment of Laboratory diagnosis of Typhoid Fever in the Kumasi Metropolis of Ghana’ Public Health (November 2018)

Richmond Yeboah ‘Prevalence and risk factors of Hepatitis E virus infection in pigs and pig handlers in Ghana’ Clinical Microbiology (November 2018)

Nancy Ackam ‘The efficacy of Rifapentine plus Moxifloxacin against Onchocerciasis’ Clinical Microbiology (November 2018)