STRENGTHENING MALARIA RESEARCH CAPACITY

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EStABLISHED IN 2008, THE MALARIA CAPACITY DEVELOPMENT CONSORTIUM (MCDC) IS SUPPORTING ABLE AND MOTIVATED AFRICAN SCIENTISTS TO UNDERTAKE HIGH-QUALITY MALARIA RESEARCH THAT WILL ENHANCE THE RESEARCH CAPACITY OF THEIR HOME INSTITUTIONS.

MCDC HAS THREE MAIN OBJECTIVES

Establishing a cohort of African scientists registered for a PhD at one of five African partner universities and providing them with the skills and tools needed to undertake high quality malaria research.

Providing ongoing support for the career development of post-doctoral researchers trained initially under the auspices of the Gates Malaria Partnership.

Working with African partner institutions to identify opportunities to strengthen their PhD programmes.

PHD PROGRAMME

MCDC is supporting 18 PhD students registered at one of five African partner universities. Students have two supervisors – their primary supervisor based at their home institution and their co-supervisor based at one of the European partner institutions. PhD students have one or two additional advisors who can assist with specific aspects of their research project. The student projects are diverse but all aim to address important local and/or national questions related to the biology of malaria or its control. Topics studied are as follows:

The activities undertaken in meeting these complementary objectives have created a cohort of over 50 African malaria researchers at various stages in their careers.
KILIMANJARO CHRISTIAN MEDICAL COLLEGE (KCMC), TANZANIA

Bilali Kabula is investigating the distribution of mosquitoes of the *Anopheles gambiae* complex and their insecticide resistance profile in relation to ecological differences in Tanzania.

Jovin Kitau is using experimental huts to investigate the behavioural responses (mortality, feeding inhibition and treatment induced exit) of wild *Anopheles arabiensis* when exposed to insecticides on indoor surfaces or to insecticide impregnated materials such as blankets.

Johnson Matowo is studying mechanisms of resistance to currently used insecticides and alternative insecticides for controlling and preventing further selection of insecticide resistant malaria vectors in North Eastern Tanzania.

Jacklin Mosha is looking at whether, in a setting of moderate transmission, malaria infections are clustered into “hotspots” which can be identified by means of passive case detection and contact tracing.

COLLEGE OF MEDICINE (COM), UNIVERSITY OF MALAWI

Nyanyiwe Mbeye is studying malaria rebound in HIV exposed children after they stop cotrimoxazole prophylaxis treatment at one year of age.

Harold Ocholla is undertaking genomic analyses of *Plasmodium falciparum* isolates to map variation caused by selection pressure on the parasite population due to the multiple malaria interventions being carried out in Malawi.

Sanie Sesay is evaluating whether estimates of uptake of malaria control interventions, such as bed net use, and their corresponding impact on the burden of disease and malaria transmission can be reliably measured in easily accessible groups of the population.
Gifty Antwi is undertaking a cluster randomised, controlled trial to determine the effect of an enhanced antenatal care package for malaria and anaemia on the outcome of pregnancy in women in Ghana.

Victor Asoala is conducting a study of the dynamics of malaria transmission, relating current data to historical patterns of transmission intensity, and assessing the status of insecticide resistance of vector populations in northern Ghana.

Joseph Osarfo is conducting a randomised, non-inferiority trial of the efficacy, safety and tolerability of dihydroartemisinin-piperaquine for treatment of uncomplicated *Plasmodium falciparum* malaria in pregnancy.

Alberta Amu Quartey is comparing the ability of Rapid Diagnostic Tests (RDTs), thick and thin blood films, and seroprevalence, as determined by ELISA assays, to measure malaria transmission in southern Ghana.

MCDC PhD students are given the opportunity to spend up to one year of their training programme at another African or European institution. Most students have taken advantage of this opportunity to visit partner institutions for periods ranging from two weeks to six months during which they have engaged in a variety of activities to develop their careers. These include attending specialist taught courses and workshops in areas such as advanced statistics, genomics and vector biology, acquiring new skills in appropriate laboratory techniques (e.g. microarray and ELISA techniques), undertaking data analysis and drafting publications.
Magatte Ndiaye is investigating the impact of the drugs used for Intermittent Preventive Treatment (IPT) of malaria in infants and children on the prevalence of molecular markers of drug resistance in Plasmodium falciparum genes.

Youssoupha Ndiaye is scaling-up a programme of community case management of malaria (CCMm) at district level and assessing the implications of this approach for malaria control in rural Senegal.

Badara Samb is conducting field and laboratory studies to characterise and evaluate the role of the Anopheles funestus populations, which have recently re-colonised the Senegal River basin, in malaria transmission.

Roger Tine is assessing the feasibility and effectiveness of introducing an integrated malaria control strategy that is delivered by community health workers (CHWs) and incorporates home based malaria management combined with Seasonal Malaria Chemoprevention (SMC).

Joaniter Nankabirwa is conducting a randomised, placebo controlled trial to investigate the impact of Intermittent Preventive Treatment (IPT) on malaria morbidity and cognition among primary school children living in a high malaria transmission setting in Uganda.

Juliet Ndibazza is conducting a trial of anthelminthic treatment in mothers to determine the effect of deworming in pregnancy and in early childhood on childhood malaria.

Denise Njama-Meya is evaluating the safety of withholding antimalarial treatment in children with negative Rapid Diagnostic Test (RDT) results across sites with varying levels of malaria endemicity.

*A STUDENT’S PERSPECTIVE*

“The MCDC gives us the best of both worlds, we’re based in the southern institution that we can relate to, that’s linked to a reputable northern partner institution and this affords us to have high quality PhD training within a setting that we are accustomed to and the MCDC supports us beyond this training into a scientific position.”

Sanie Sesay, MCDC PhD Student

**COLLEGE OF HEALTH SCIENCES, MAKERERE UNIVERSITY, UGANDA**

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GRANTS PROGRAMME FOR EXISTING POST-DOCTORAL FELLOWS

MCDC Investigators are post-doctoral fellows who obtained their PhD through the Gates Malaria Partnership, www.gatesmalariapartnership.org. They are eligible to apply for funding from three awards schemes: senior fellowships (up to $300,000), re-entry grants (up to $150,000) and initiative awards (up to $40,000). Examples of each type of award are given below.

SENIOR FELLOWSHIPS:

Badara Cisse, Université Cheikh Anta Diop, Senegal
Identifying and characterising foci of malaria transmission in potential malaria elimination settings in rural Senegal
Foci of residual transmission (hot spots) are particularly relevant to malaria control programmes in countries such as Senegal with low malaria transmission intensity since their presence makes it very difficult to eliminate the infection. This study is being undertaken in central Senegal, where the prevalence of malaria is now low, to identify and characterise foci of residual transmission and to pilot methods for surveillance that could be used as part of an elimination programme. The study is determining whether malaria transmission has stopped in some areas by (a) assessing the validity of health facility records and (b) determining whether serology can be used to provide evidence that transmission of malaria has ceased. The reasons why malaria transmission is persisting in some areas are also being investigated using a case control study and other approaches.

Evelyn Ansah, Ministry of Health, Ghana
The role of RDTs for the targeting of ACTs at community level; a cluster randomised, controlled trial
This project aims to determine if training shopkeepers to use diagnostic tests can improve the management of malaria in Ghana. Following community sensitisation studies, a randomised trial which includes 23 clusters of ‘chemical’ shops has been established with rapid diagnostic tests (RDTs) being used in half of the clusters whilst the remainder continue with their usual practices. Clients to the shops are asked about the treatment that they have received and a blood film is collected to check on the diagnosis of malaria. The results of this study will help to determine ways in which Artemisinin Combination Therapies (ACTs) can be delivered effectively through the private sector.

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**RE-ENTRY GRANTS:**

Isabella Ochola-Oyier, KEMRI and University of Nairobi, Kenya
The molecular relationship between drug resistance and merozoite invasion
This project has investigated the fitness of drug resistant isolates of *Plasmodium falciparum*. In the initial phase of the project, the prevalence of Single Nucleotide Polymorphisms (SNPs) in merozoite invasion genes in about 50 isolates was determined. In the second phase of the project, SNPs in merozoite invasion genes have been studied in children admitted to hospital with malaria and in community controls. All parasites have been tested for the presence of the chloroquine resistant *Pfcrt* marker.

Anthony Mbonye, Ministry of Health, Uganda
Genotyping *Plasmodium falciparum* strains resistant to sulphadoxine-pyrimethamine among pregnant women in Uganda
The objective of this study is to investigate a new method of detecting mutations in genes associated with resistance to sulphadoxine/pyrimethamine (SP) and to investigate the impact of SP resistance on clinical outcome in HIV infected women who are receiving cotrimoxazole. A novel technique for measuring SP resistance has been transferred successfully from the University of Alberta, Canada to the Uganda Virus Research Institute (UVRI), Entebbe, Uganda. Recruitment to the trial has been completed.

**INITIATIVE AWARDS:**

15 grants have been awarded to date to provide added value to existing research projects or to act as seed funding, enabling recipients to obtain background information needed to formulate a new research proposal. The projects listed below were selected in the latest round of applications.

Themba Mzilahowa, Malaria Alert Centre, CoM, Malawi
Response of *Anopheles arabiensis* and *Anopheles funestus* to malaria control interventions under field conditions in two geographical settings in Malawi
The principal and predominant species of mosquitoes responsible for the transmission of malaria in Malawi are *Anopheles funestus sensu stricto* (Gilles) and *Anopheles arabiensis* (Patton). Differences in the larval ecology and adult behaviour of the two species determines not only their vectorial capacity and efficiency for disease transmission, but also has implications for the effectiveness of malaria control strategies. This study will generate new data on the adult biology of the two species in Malawi by investigating; feeding behaviour, susceptibility to pyrethroid insecticides and the role of each species in malaria transmission (assessed by sporozoite rates of infected mosquitoes). Data generated will inform the development of an integrated vector management (IVM) system that targets either species.

John Lusingu, National Institute for Medical Research (NIMR), Tanzania
Field based study toward development of PfEMP1 based malaria vaccine
This study will support an ongoing collaborative project between the University of Copenhagen and NIMR, Tanzania (Korowge and Tanga Centres) which seeks to develop a vaccine that can prevent malaria in pregnancy. Parasites from blood samples from pregnant women, RDT positive for malaria, will be cultured to allow parasite inhibition assays to be conducted and flow cytometry will be used to assess antibodies for the presence of specific VAR2CSA antigens which play a role in pregnancy associated malaria. Institutional capacity at Korogwe Centre will be enhanced by funding two MSc students who will be trained in laboratory and field techniques during the course of this study. They will be registered at, and co-supervised by, staff from KCMC, thereby strengthening links between the two Tanzanian Institutions.
MENTORING PROGRAMME

At the end of 2010, a formal mentoring programme was established to support the MCDC investigators with their early career development. A process of self-selection matched 29 investigators with a mentor of their choice, chosen for their experience and expertise within a similar discipline rather than geographical location.

The programme has a “light-touch” approach, with the mentors and mentees establishing their individual relationships, planning their meetings, choosing their discussion topics, jointly setting goals and making arrangements for monitoring progress. Due to the virtual nature of the programme at least one face-to-face meeting a year is encouraged.

The annual programme evaluations show that:
- all mentors and mentees have established a relationship
- most manage to have at least one face-to-face per year
- email and telephone are the main medium for the mentoring meetings
- the average number of meetings are between five and six per year

Examples of topics discussed at meetings are outlined in Figure 1.

FIGURE 1: MENTORING SUPPORT – TOPICS OF DISCUSSION

Resources to help support the mentees and mentors were developed and are available in open access publishing at: mentorship.mcdconsortium.org/

A key area for future development of the mentoring program is the identification, recruitment and training of more African mentors, who are based in Africa and can help early career researchers with their development.

- Advice and support with research-related issues
- Career development advice
- Help with decision making
- Help with advice on trouble shooting issues
- Help with identifying possible grant opportunities and job openings
PERSONAL DEVELOPMENT PLANNING (PDP) PROGRAMME

Personal Development Planning (PDP) is a structured and supported process to help individuals with their personal, professional and career development. The dynamic cycle of self assessment, action planning, implementation, reflection and evaluation helps with the development of higher-level, critical thinking skills, which are essential for effective learning and confidence building.

The PDP programme supports 18 PhD students and 27 MCDC investigators with their long-term career planning and development. Key elements of the programme include individualised support from the MCDC educational advisor and an individual budget to provide access to the resources needed to help progression of their career development. Examples of PDP activities are shown in Figure 2.

A recent feature of the programme has been the increasing opportunities for south-south learning. Whilst much of the specialist support has been provided by experts from the north, a good proportion of PDP learning is now taking place within African institutions.

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**Figure 2: PDP Activities 2010-2012**

- **Investigators: n=27**
  - Conference/research dissemination
  - Communication skills
  - Research Management skills
  - Facilitate building research labs/evaluation unit
  - Returning to Africa/Research
  - Research Leadership skills
  - Academic skills

- **Students: n=18**
  - Research skills
  - Diplomas
  - Masters degrees
  - Equipment
  - Specialist skills
  - Communication skills
  - Research techniques
INSTITUTIONAL SUPPORT

BASELINE NEEDS ASSESSMENT

In 2009, a baseline needs assessment (BNA) of the post-graduate training needs of the MCDC African partner institutions was made by a team led by Prof. Imelda Bates from the Liverpool School of Tropical Medicine. A number of barriers to effective post-graduate training in these institutions were identified. The key common findings were the need to:

- improve course documentation,
- improve access to scientific resources,
- expand and enhance supervisory skills,
- provide formal induction and research skills courses for students,
- monitor and actively manage student progression, and
- regularly review and enhance doctoral programmes.

MCDC made technical and financial support available to overcome some of these obstacles. A follow up BNA was carried out at the end of 2012 to determine the extent to which the support provided by MCDC had been effective and to identify remaining needs. A number of remaining constraints were identified, many of which will be addressed in the remainder of the project with further MCDC support.

TRAINING

MCDC has worked with a number of partners to build sustainability into its programme of institutional support, using the considerable expertise within the consortium to develop and facilitate further training activities. These activities include:

- **PhD Supervision training workshops** held at KNUST-Ghana, CoM-Malawi and KCMC-Tanzania, which have trained over 100 PhD supervisors to be able to provide better support to their students.
- **Trainer the Trainer workshops** held at UCAD – Senegal and in Uganda in conjunction with the THRiVE consortium, to help trainers design and deliver improved PhD training programmes.
- **A Mentor Training workshop** developed and delivered by staff of MCDC, CoM and the Malawi-Liverpool Wellcome Clinical Research programme (MLW), hosted in Malawi by CoM.
- **A Mentee Training workshop** for students at CoM, held in partnership with CoM, Malawi and the Southern African Consortium for Research Excellence (SACORE).
- **PDP workshops** to support the implementation of PDP for post-graduate students within their faculties.
MCDC FILMS

MCDC has made five short films highlighting the work in each of its African partner countries. The films capture the work of MCDC’s partner institutions, students and investigators and show the impact MCDC is having locally.

These films can be found on the homepage of our website: www.mcdconsortium.org
MCDC is a partnership of five African partners and four supporting European partners.

Further information can be found at: [www.mcdconsortium.org](http://www.mcdconsortium.org)

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