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| <b>13. SUPPLEMENTARY NOTES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         |                                |                                   |                                                     |                                                   |
| <b>14. ABSTRACT</b><br>The mission of USAMRU-K is to develop and test improved means for predicting, preventing and treating worldwide infectious disease threats to deployed U.S. military personnel. USAMRU-K is heavily involved in global surveillance, training, research in drug and vaccine development, and response to emerging infectious disease threats. These activities are undertaken in research laboratories and field stations in locations where Malaria, HIV/AIDS, leishmaniasis, Rift Valley Fever virus, Chikungunya virus, enteric pathogens, and other military-relevant infectious diseases are prevalent and their transmission rates are high. Malaria drug and vaccine trials executed at the Kombewa field site to provide valuable information to inform protective strategies for the warfighter. During this 2 year extension to the Cooperative Agreement, USAMRU-K's ability to successfully execute clinical studies has been enhanced by the utilization of new state-of-the-art laboratories. The co-location of these modern clinical research facilities within high disease endemicity areas has positioned USAMRU-K as a preferred site for future vaccine, drug, and other interventional trials. |                         |                                |                                   |                                                     |                                                   |
| <b>15. SUBJECT TERMS</b><br>Malaria, HIV, AIDS, cohort, vaccine, Plasmodium falciparum, Rift Valley Fever, arbovirus, leishmaniasis, immunology, entomology, surveillance, vector, microscopy, diagnostics, Western Kenya, Kisumu, sand fly, control, clinical trials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                                |                                   |                                                     |                                                   |
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**Military-Relevant Infectious Diseases Endemic to Kenya: Epidemiology,  
Immunology, Pathophysiology, Treatment, and Prevention**

**Addendum to Final Report Covering the Period March 2005 to February 2007**

**US ARMY MEDICAL RESEARCH UNIT – KENYA**

The mission of the United States Army Medical Research Unit-Kenya (USAMRU-K), a special foreign activity of the Walter Reed Army Institute of Research (WRAIR), is to develop and test improved means for predicting, preventing and treating worldwide infectious disease threats to deployed U.S. military personnel. USAMRU-K is heavily involved in global surveillance, training, research in drug and vaccine development, and response to emerging infectious disease threats.

**PERSONNEL**

**Personnel Present or Arriving during the Report Period**

COL Samuel Martin, MC, Commander  
COL Douglas Walsh, MC, Malaria Clinical Trials  
LTC Mark Polhemus, MC, Clinical Trials  
MAJ Jean Muderhwa, MS, KDOD PEPFAR Program  
MAJ Jason Richardson, MS, Vector Studies  
CPT Kurt Martin, MS, Clinical Laboratory Officer  
CPT David Schnabel, MC GEIS Coordinator  
Dr. Douglas Shaffer, MD, MPH, HIV/AIDS Vaccine Trials, PEPFAR  
Norman Peterson, Ph.D, GS-11 Administrator  
John Waitumbi, DVM, Ph.D, KEMRI  
Bernhards Ogutu, MD, Ph.D, KEMRI

**Personnel Departing During the Report Period**

LTC(P) Mark Withers, MC, Malaria Clinical Trials  
LTC Van Sherwood, MS, Vector Studies  
LTC Gina Marie Foglia, MC, HIV/AIDS  
MAJ(P) Shon Remich, MC, Malaria Drug Development  
CPT(P) Cheryl Bedno, MC, GEIS Coordinator

## **PROGRAMS**

### **KISUMU FIELD STATION**

#### **Malaria Clinical Trials - Clinical Trials Support (CTS)**

COL Mark Withers, COL Doug Walsh, LTC Mark Polhemus, MAJ Shon Remich,

Background:

Malaria drug and malaria vaccine clinical research teams were consolidated into a single section in 2006, called CTS. CTS is comprised of MDs, PhDs, PAs, nurses, lab techs, pharmacists, receptionists, records clerks, drivers, field workers, counselors, IT and custodial staff, about 60 in all.

To help define this new section, the **mission statement** read as follows: “To pursue with compassion and scientific rigor, the execution of regulated clinical trials and basic laboratory and pathogenesis research for the development of vaccines, drugs, and diagnostic platforms for the diseases of Africa and the world.”

Accomplishments:

The main clinical study sites were Kombewa CRC and newly added Ward 8, NNPGH, adjacent to WRP-Kisumu HQ. Satellite sites were established in hospitals and clinics throughout West Kenya for surveillance-type, sample collection work.

A clinical research coordinator (CRC) training program was started, culminating in the establishment of an East African chapter of the ACRP, managed by Walter Reed staff, the 1<sup>st</sup> in East Africa. Three Kenyan CRCs were subsequently “certified” by examination as C-CRCs, a first for East Africa.

A clinical investigator training program for Kenyan investigators was started. Two Kenyan MDs completed the training program and went on to serve as PIs on regulated trials.

The number of human use studies conducted in this 2 year period by CTS was remarkable, shown in the Table below.

| <b>Year</b> | <b>Trial (short title)</b>                                                  | <b># Volunteers</b> | <b>Sponsor</b> | <b>Licensure</b> |
|-------------|-----------------------------------------------------------------------------|---------------------|----------------|------------------|
| 2005-07     | Malaria Epi and Correlates of Protection (Maseno)<br><b>PI – Dr. Remich</b> | 240 adults          | WRAIR          | No               |
| 2005-2006   | MSP-1 42 3D7 phase IIb (mal 36)<br><b>PI – Dr. Bernhards Ogutu</b>          | 400 children        | MVI/<br>WRAIR  | Yes              |
| 2005-2006   | RTS,S phase IIb (mal 44)<br><b>PI – Dr. Mark Polhemus</b>                   | 255 adults          | WRAIR/GSK      | Yes              |
| 2006        | Severe Malaria Epi<br><b>PI – Dr. Shon Remich</b>                           | 400 adults          | WRAIR          | No               |

| <b>Year</b> | <b>Trial (short title)</b>                                                                           | <b># Volunteers</b> | <b>Sponsor</b>     | <b>Licensure</b> |
|-------------|------------------------------------------------------------------------------------------------------|---------------------|--------------------|------------------|
| 2006        | IV Artesunate phase II<br><b>PI-Dr. Shon Remich</b>                                                  | 30 adults           | WRAIR              | Yes              |
| 2007        | Paediatric Coartem phase II<br><b>PI – Dr. Bernhards Ogutu</b>                                       | 30 children         | MMV                | No               |
| 2007        | AZ/CQ Phase III (multi-center)<br><b>Dr. Bernhards Ogutu</b>                                         | 50                  | Pfizer             | Yes              |
| 2006-2007   | Complement & Severe Malaria<br><b>PI – Dr. John Waitumbi</b>                                         | 120                 | Ellison Foundation | No               |
| 2007        | Collection of Multiple Pathogens for Diagnostics Development (DxBx)<br><b>PI – Dr. John Waitumbi</b> | 200                 | PATH               | Yes              |
| 2002-2007   | Epi of Malaria and Drug Sensitivity (MDR)<br><b>PI – Drs. Coldren, Walsh, others</b>                 | Rolling enrollment  | GEIS               | No               |

Selected papers:

1. Polhemus ME, Magill AJ, Cummings JF, Kester KE, Ockenhouse CF, Lanar DE, Dutta S, Barbosa A, Soisson L, Diggs CL, Robinson SA, Stewart VA, Ware LA, Brando C, Krzych U, Bowden RA, Cohen JD, Dubois M, Opokua O, De-Kock E, Ballou WR, Heppner DG. Phase I dose escalation safety and immunogenicity trial of Plasmodium falciparum apical membrane protein (AMA-1) FMP2.1, adjuvanted with AS02A, in malaria-naïve adults at the Walter Reed Army Institute of Research. Vaccine 2007 May 22; 25 (21):4203-12

2. Heppner DG Jr, Kester KE, Ockenhouse CF, Tornieporth N, Ofori O, Lyon JA, Stewart VA, Dubois P, Lanar DE, Krzych U, Moris P, Angov E, Cummings JF, Leach A, Hall BT, Dutta S, Schwenk R, Hillier C, Barbosa A, Ware LA, Nair L, Darko CA, Withers MR, Ogutu B, Polhemus ME, Fukuda M, Pichyangkul S, Gettyacamin M, Diggs C, Soisson L, Milman J, Dubois MC, Garcon N, Tucker K, Wittes J, Plowe CV, Thera MA, Duombo OK, Pau MG, Goudsmit J, Ballou WR, Cohen J. Towards an RTS,S-based, multi-stage, multi-antigen vaccine against falciparum malaria: progress at the Walter Reed Army Institute of Research. Vaccine 2005 Mar 18; 23 (17-18):2243-50

### **Center of Excellence for Malaria Microscopy (CoE)**

CPT Kurt Martin, MAJ Ellis King

Background: The purpose of the Center of Excellence is to conduct malaria microscopy training courses and related studies. The CoE was developed in 2003 as a GEIS project and through the efforts of COL Colin Ohrt. The 1<sup>st</sup> class was in 2004. Since then, training demands have been increasing and clinical studies have been added to the center's activities.

Accomplishments:

1. By Feb 2007, the CoE had conducted more than 15 three week courses, training over 280 students from more than 10 countries, including those from the African (most), European and Asian continents.
2. An article was published in the Malaria Journal, 12 June 2007, describing CoE activities.
3. Organizations that interacted with CoE included PMI (via USAID, CDC), Malaria Clinical Trials Alliance (Ghana), Kenyan Ministry of Health, Centers for Disease Control (CDC), World Health Organization, clinical research groups throughout Africa, GlaxoSmithKline (GSK), and Pfizer.

Future activities and goals include relocation to a dedicated facility, 0.5 km from HQ, PMI-supported training, achieving formal certification, evaluation of rapid diagnostic tests (RDT), GCLP training and assisting in setting up other CoEs (e.g., Ghana). A major effort is to expand the CoE to a “Center for Malaria Control”, including an entomology component, and a malaria diagnostic teaching center that includes ELISA and RDT assays, in addition to microscopy. This may be possible through increased GEIS funding and funds from the President’s Malaria Initiative (PMI). Challenges remain for the future including marketing, funding, and adequate staffing to provide continuous training.

Two minimal risk human use studies received approval that complemented the mission of the CoE:

1. “Human Blood Collection for Evaluation and Creation of Standardized Diagnostic Sets for Training and Maintenance of Quality Diagnostics in Clinical and Research Settings” WRAIR Protocol 1306, KEMRI SSC 1111
2. “Establishment of a specimen Bank for evaluation of rapid diagnostic tests (RDTs) for Malaria diagnosis at KEMRI” WRAIR 1323, KEMRI SSC 1114 (WHO sponsored)

### **Basic Science**

#### **Dr. John Waitumbi**

In the period 1 March 2005 thru 28 Feb 2007, the research capabilities of the lab experienced tremendous growth in terms of the number of: 1) projects executed, 2) international collaborations established, 3) grants awarded and 4) students trained. During this period the lab transitioned from being just a provider of lab support to clinical studies to a self sustaining research program. The leadership has focused on how to develop quality lab infrastructure, funding and capacity building.

#### **Laboratory infrastructure:**

Through team work with the Clinical Trial program, the laboratory acquired a state of the art real time PCR machine that has allowed us undertake studies requiring quantitative gene expression and allelic discrimination. The lab also upgraded the FACScan from three to five color capability. Set aside money to purchase a “Luminex”

machine, which will allow the lab to compete for studies requiring multiplex serological and molecular diagnoses.

**Funding:**

Annual funding has steadily increased from 126K in years 2005 to 240K in 2006/2007 as shown below.

|         |                                                                                                                                                                              |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2003-05 | US Army Internal Grant entitled: Apoptosis in malaria: a non-immune mechanism for regulating parasite growth. Annual funding: \$56,000.00                                    |
| 2004-07 | Ellison Medical Foundation Research grant entitled: Investigation of Mechanisms Leading to Anemia at Low Parasite Burden in Children with Malaria. Annual funds: \$70,000.00 |
| 2006-07 | PATH: Collection of samples for multiple pathogen diagnostics development: Identification of pathogens that could cause fever in children in western Kenya: \$114,000.00     |

**Collaborations:**

Developed new and or maintained existing international research partnerships as shown below:

- 1) Joint grant from Ellison Medical Research Foundation with University of Virginia to study mechanisms leading to anemia at low parasite burden in children with malaria.
- 2) Obtained a grant from PATH for collection of samples for multiple pathogen diagnostics development

During this period, we also conducted the following assays in support of malaria vaccine program: 1) Flow cytometric assessment of antigen specific T-cell responses before and after immunization 2) Analysis of MSP-1<sub>19</sub> alleles of malaria parasites in children immunized with MSP-1<sub>42</sub> malaria vaccine candidate antigen 3) Antibody ELISA in children immunized with MSP-1<sub>42</sub> experimental vaccine 4) Determination of RBC polymorphisms that may confound interpretation of immunity data generated by malaria vaccines.

**Accomplishments:**

- 1) Flow cytometric assessment of antigen specific T-cell responses in cohorts participating in the RTS,S/AS02A, and RTS,S/AS01B malaria vaccines study
- 2) Determination of antigenic diversity within the Th2R and Th3R immunological determinant site of CS protein in samples collected from cohorts receiving RTS,S/AS02A, and RTS,S/AS01B by DNA sequence analysis
- 3) Determination of effects of the RTS,S/AS02A and RTS,S/AS01B vaccines on the multiplicity of infection (MOI) by examining the polymorphic *msp1* and *msp2* genes of *P. falciparum* isolates

4) Analysis of MSP-119 allelic variants of malaria parasites in children immunized with MSP-142 malaria vaccine candidate antigen

5) Antibody ELISA in children immunized with MSP-142 experimental vaccine

6) Evaluation of the usefulness of HRP2 and pLDH in quantification malaria parasite biomass

7) Determination of RBC polymorphisms that may confound interpretation of immunity data generated by malaria vaccines

8) Analysis of molecules expressed on RBCs and B-cells in children with malaria

### **Student supervision/capacity building:**

**Amos Kungu** was a PhD student studying the dynamics of *P. falciparum* MSP-1 alleles following vaccination with MSP-1 antigen

**Sammy Anyona** was a PhD student analyzing the antigenic diversity within the immunological determinant site of CS protein in samples collected in cohorts receiving CSP malaria candidate vaccine

**Carol Kifude** was a masters student studying the prevalence of sickle cell and  $\alpha$ -thalassaemia traits in children enrolled in a malaria vaccine clinical trial, in Kombewa, Western Kenya

**Carol Hunja** was a MSc student studying the frequencies of glucose-6-phosphate dehydrogenase deficiency in children enrolled in a malaria vaccine clinical trial, in Kombewa, western Kenya

**Beth Mutai** is a MSc student studying whether malaria parasites uses apoptosis to auto-regulate parasite density

**Nancy Nyakoe** is a MSc student studying complement utilization in children at various stages of malaria

**Jackson Cheruiyot** is studying the expression level of CD21 on B-lymphocytes in children at various stages of malaria

**Joseph Nganga** was a postdoc fellow investigating the basis of genetic immunity to malaria

### **Publications:**

Kifude CM., Polhemus ME, Heppner DG, Withers MR., Ogutu BR., and Waitumbi JN. Hemoglobin Kenya Among Luo Adults and Young Children in Malaria Holoendemic Western Kenya: Screened by High Performance Liquid Chromatography and Confirmed by Polymerase Chain Reaction. Hemoglobin. 2007, 31(4): 1-8.

Pawluczko wycz AW, Lindorfer MA, Waitumbi JN, Taylor RP. Hematin promotes complement alternative pathway-mediated deposition of C3 activation fragments on human erythrocytes: potential implications for the pathogenesis of anemia in malaria. J Immunol

Waitumbi JN, Kifude CM, Withers MR, Polhemus ME, Heppner DG Jr, Ogutu BR. Hb G-Philadelphia or Stanleyville II? When the phenotype and genotype do not agree. *Eur J Haematol.* 2007 Aug;79(2):177-8.

Withers MR, McKinney D, Ogutu BR, Waitumbi JN, Milman JB, Apollo OJ, Allen OG, Tucker K, Soisson LA, Diggs C, Leach A, Wittes J, Dubovsky F, Stewart VA, Remich SA, Cohen J, Ballou WR, Holland CA, Lyon JA, Angov E, Stoute JA, Martin SK, Heppner DG. Safety and Reactogenicity of an MSP-1 Malaria Vaccine Candidate: A Randomized Phase Ib Dose-Escalation Trial in Kenyan Children. *PLoS Clin Trials.* 2006 Nov 24;1(7):e32

Anyona SA, Schrier LS., Gichuki CW., Waitumbi JN. Pitting of malaria parasites and spherocyte formation. *Malar J.* 2006 Jul 31;5:64.

Craig ML, Waitumbi J. N. and Taylor R.P. Processing of C3b-Opsonized immune complexes bound to non-CR1 sites on red cells: Phagocytosis, transfer and associations with CR11. *J. Immunol.* 2005. 174:3059-66.

### **Entomology and Vector Biology - Kisian** **MAJ Jason Richardson**

#### **Background:**

During the period 1 March 2005 thru 28 Feb 2007, the Entomology program at USAMRU-Kenya transitioned from a support program to a stand alone research program. This coincided with a relocation of the main laboratory facility and personnel to the Kisian location from Nairobi in 2005. LTC Van Sherwood was replaced by MAJ Jason Richardson in August of 2005. Although the majority of the Department moved to the KEMRI facility at Kisian, the sand fly surveillance and control team remained in Nairobi. This team also served as a liaison team on arbovirus surveillance and outbreak response in coordination with the GEIS coordinator. During this period the Department focused on two areas of ongoing research (sand fly control and arbovirus surveillance) while the leadership dedicated itself to long term planning, funding, and building collaborative relationships.

#### **Funding:**

Funding had been a significant issue up until the beginning of FY05. Annual funding from FY02-FY04 averaged 23K per year. This grew to 177K in FY05 and 374K in FY06. A portion of this funding was used to replace an old 4WD vehicle and build a sand fly study enclosure. Other significant improvements included resourcing a basic molecular biology laboratory and a small mosquito insectary. This increase reflects efforts to diversify and build credibility to attract funded collaborators including: MIDRP, GEIS, CDC, USAMRIID, USDA, Michigan State University, Wageningen University

**Collaborations:**

Developed research partnerships with 3 different USDA laboratories:

- (1) the Arthropod-Borne Animal Diseases Research Laboratory (ABADRL) in Laramie, Wyoming. Focus is on Rift Valley fever virus vectors.
- (2) the Center for Medical and Veterinary Entomology (CMAVE) in Gainesville, FL. Focus is on product evaluation for mosquito and sand fly surveillance and control. We are negotiating a 5 year cooperative agreement.
- (3) the National Wildlife Research Center in Fort Collins, Colorado. Focus is on rodent-borne disease surveillance.

This period showed major progress in our collaboration with GEIS in both routine arbovirus surveillance and in vector-borne disease outbreak investigations as well as a new program to conduct surveillance for zoonotic pathogens in small mammal reservoirs.

**Accomplishments:**

**1. (2005-2007) Characterization of malaria transmission in Western Kenya continues.** Started as a multi-year project in mid-2002 in support of a new vaccine study site when the malaria vaccine program moved to a new study site in the vicinity of Kombewa to establish the relative importance of *An. gambiae* and *An. funestus*, determine biting pressure and malaria infectivity of the vector, and study the dry season ecology of *An. gambiae*. The field data collection ended in Oct 2005 and data was analyzed and presented to the malaria research team in Kombewa in July 2007. The entomology team mapped the MAL 44 volunteer houses and produced GIS map products for both MAL 36 and MAL 44. This team also digitized and began analysis of 5 years of Anopheles field data collected by previous investigators. The combined vector, environmental, and map database are now being used to address questions about malaria transmission focality. Further spatial analysis is on-going with the goal to publish in 2008.

**2. (2006 - 2007) Rift Valley Fever outbreak response.** The Department lead the entomology response to the 2006-2007 Rift Valley fever outbreak. Personnel planned and executed all entomological investigations and response efforts including organizing a task force comprised of 24 personnel from 2 Kenyan government, 5 U.S. government, and 2 international agencies. The Department implemented vector surveillance in Garissa district prior to the first sign of RVF cases and collected approximately 200,000 mosquitoes and sand flies and isolated 30 RVFV isolates. Efforts also resulted in implication of mosquitoes species not previously found infected with RVFV in Kenya and detection of mosquitoes infected with a virus only known to occur in Southern Africa. The outbreak response paper is in revision two and will be published in 2008.

**3. (2006) *Aedes mcintoshi* population genetics study.** Dr. Kristine Bennett from the USDA lab in Wyoming (ABADRL) completed two trips to various sites around Kenya to collect RVFV vector mosquitoes as part of a phylogeny/gene flow study of *Aedes mcintoshi*. Samples have been collected at approximately 100 sites on 2 transects: (1)

from the Garissa south to Kilifi and (2) from Kilifi through Nairobi to Busia on the Ugandan border.

**4. (2007) Mosquito taxonomy training course.** The Department organized and hosted a two week training course to address the lacking expertise in mosquito identification in Africa. Instructors from the Walter Reed Biosystematics unit spent two weeks training personnel from East Africa in the Walter Reed Center of Excellence in Microscopy training facility in Kisumu. The course was funded by GEIS.

**5. (2005 - 2006) Nairobi malaria transmission study.** The Department conducted a thorough QA review of the data set collected in 2002-2004 and converted it to a new excel database.

**6. (2005 – 2007) Sand fly control studies. Integrated control methods for sand flies—MIDRP U0059-05-WR, KEMRI #969. Background/Summary:** This was a 3 year, multilab study coordinated by WRAIR. It involved CRADAs with two bed net manufactures. The study involved 1 year of vector surveillance to establish the baseline density of sand fly populations followed by 2 years of control method testing. Control methods evaluated included: various insecticide treated bed nets (ITNs), insecticide treated tents, residual insecticide treatment of larval habitat, barrier insecticide spraying. The primary objective was to test and improve control methods for sand flies with the aim of developing an integrated sand fly control system. In 2007 Dr. Gaby Zollner from WRAIR completed her last Kenya TDY to supervise the final phase of the three year study. Data is being analyzed and multiple publications are planned. The study was conducted in Marigat, Baringo District and was a tremendous success. The Department plans to continue the study of sand fly control and leishmaniasis transmission in the area. In 2007 a Deployed Warfighter Protection Program grant enabled the renovation of lab space in Marigat for a field sand fly insectary. This facility is collocated with the Department's sand fly field station and 200m<sup>2</sup> sand fly study enclosure.

**7. (2005 – present) Field evaluation of PCR assays for arboviruses—MIDRP U0094-06-RD.** Dr. John Lee and LTC Monica O'Guinn traveled to Kenya numerous times during this period to conduct field testing of their real-time RT-PCR arbovirus assays. These trips have resulted in great improvements of the assay platforms and procedures as well as the isolation of multiple arbovirus isolates from the region. This has resulted in one publication (Turell et al., 2007) and will likely translate into many others.

**8. (2005 – present) GEIS Arbovirus surveillance (WRAIR # 1134, KEMRI #824).** In 2005 four sites were selected to serve as routine mosquito and tick surveillance sites in Kenya. In 2007 the number of sites was increased to ten. This work is conducted in conjunction with the study above. The fact that the Department had been conducting routine mosquito surveillance translated into a rapid and effective response effort to the RVFV outbreak.

**9. 2006 – present) Small mammal virus surveillance.** Dr. Jeff Root from the USDA, National Wildlife Research Center and Dr. Darin Carroll from CDC, Atlanta completed

an initial field collection of small mammals in 2007. They performed serological screening for hantaviruses while in Kenya. Samples have been approved for export to the CDC Atlanta for PCR/RT-PCR and virus isolation. Based on promising preliminary data, the Department submitted a GEIS FY08 proposal to expand this work. The proposal was funded.

**10. (Ongoing)** Field evaluation of novel arthropod repellents and repellent formulations. Following the repellent trials conducted in 2004, the Department wrote a new protocol and submitted it to KEMRI in order to execute a new study in FY06/07. This was deemed unethical by the KEMRI IRB and the study has been on hold while members of the Department attempt to convince the IRB of the importance of the study.

#### **Publications:**

Turell MJ, Lee JS, Richardson JH, Sang RC, Kioko EN, Agawo MO, Pecor J, and O'Guinn ML. 2007. Vector competence of selected Kenyan mosquito (Diptera: Culicidae) species for Rift Valley fever virus. *J Am Mosq Control Assoc.* 23(4):378-382.

Centers for Disease Control and Prevention (CDC). 2007. Rift Valley fever outbreak--Kenya, November 2006-January 2007. *MMWR Morb Mortal Wkly Rep.* 2;56(4):73-6.

Salazar MI, Richardson JH, Sanchez-Vargas I, Olson KE, Beaty BJ. 2007. Dengue virus type 2: replication and tropisms in orally infected *Aedes aegypti* mosquitoes. *BMC Microbiol.* 30;7(1):9

Richardson JH, Molina-Cruz A, Salazar MA, and Black WC IV. 2006. Quantitative analysis of dengue-2 virus RNA during the extrinsic incubation period in individual *Aedes aegypti*. *Am J Trop Med and Hygiene* 74: 132-141.

#### **Presentations:**

Sept 2006 - 2<sup>nd</sup> Leishmania Exo-Antigen Meeting, Mombasa, Kenya: "Sand Fly Control Research at USAMRU-K"

Feb 2007 - DoD Pest Management Conference, Jacksonville, FL:

- (1) Entomological Investigations of a Rift Valley fever virus outbreak in Kenya -- December 2006 – February 2007,
- (2) Development of Sand Fly Control Methods in Kenya.

April 2007 - American Mosquito Control Association Annual Meeting, Orlando, FL:

- (1) RVFV Outbreak in Kenya,
- (2) Development of Sand Fly Control Methods in Kenya.

## **KERICHO FIELD STATION**

### **HIV/AIDS**

**Dr. Douglas Shaffer**

## DESCRIPTION

The Division of Retrovirology, Walter Reed Army Institute of Research funds and supports HIV research activities executed by the United States Army Medical Research Unit (USAMRU-K) as part of its global network of partners known as the U.S. Military HIV Research Program (USMHRP). The USAMRU-K HIV Program is located in the southern Rift Valley Province in the town of Kericho at the Kenya Medical Research Institute (KEMRI)/Walter Reed Project (WRP) Clinical Research Center. The USAMRU-K HIV program's primary mission is contributing to the development of a globally effective HIV-1 vaccine to protect US military service members, allied forces, and the world community through evaluating HIV vaccine candidates in clinical trials. The USAMRU-K HIV program is divided into two components: comprehensive HIV clinical research (including vaccine, therapeutics, and observational/cohort) and HIV prevention, care, and treatment under the President's Emergency Plan for AIDS Relief (PEPFAR) as one of the US Government agencies implementing PEPFAR in Kenya.

For HIV vaccine research as part of the USMHRP mission, the current goal is to develop a globally effective HIV-1 vaccine based upon genetic subtypes or clades of HIV-1 prevalent in different regions of the world. The USMHRP has already advanced a prime-boost, circulating recombinant form (CRF)01\_AE / clade B vaccine strategy to efficacy testing in Thailand, where CRF01\_AE is most prevalent. A similar strategy is ongoing in East Africa where clades A, C, and D are contributing in varying proportions to the HIV epidemic in the region. The USAMRU-K's first HIV vaccine study opened in April of 2006 and by the end of this reporting period had fully enrolled and was in final follow-up. Sponsored by the Vaccine Research Center of the Division of AIDS/National Institutes of Health, U.S.A., this Phase I/II clinical trial was designed to evaluate the safety and immunogenicity of a multiclade HIV-1 DNA plasmid vaccine boosted by a multiclade HIV-1 recombinant adenovirus-5 (rAd5) vector vaccine in HIV uninfected adult volunteers in East Africa. Finally, by the end of this reporting period, plans were ongoing with protocol development for a test-of-concept Phase IIb follow-on study to the Phase I/II DNA-rAd5 and a cohort study evaluating HIV prevalence, incidence, cohort retention, and host genetics and viral diversity in high risk persons as part of a larger USMHRP network study in Kenya, Uganda, Tanzania, and Thailand.

In addition to vaccine research supporting the primary program mission, the HIV Program in Kericho also conducts therapeutic, operational, and economic research complimenting the primary mission and as part of a larger comprehensive research/care and treatment portfolio. Under a grant held by Boston University, The KEMRI/WRP HIV program continued its >4 year collaboration with Boston University and KEMRI to conduct economic and health outcomes research. Also during this period, the program began therapeutics research sponsored by the NIH/NIAID/Division of AIDS.

## ACCOMPLISHMENTS

1. The only WRAIR supported research site outside of the United States conducting concurrent observational cohort, Phase I/II vaccine, and Phase III therapeutics studies while offering comprehensive care and treatment services.
2. The first and largest HIV vaccine study (Phase I and II) in Kenya to occur outside of Nairobi (the 3<sup>rd</sup> HIV study in Kenya's history) was ongoing.
  - A. Completed both Phase I (n=48) and II (n=72) enrollments in 4 months (3 months ahead of schedule)
  - B. 98.3% retention (2 withdrawn from study); 0.4% out-of-window visits
  - C. PPD monitoring results excellent with no major protocol violations
3. The foundation HIV cohort study completed final, 36 month follow-up in December 2006 with study analyses ongoing.
  - A. Largest prospective HIV cohort study in Kenya to date
  - B. Only prospective HIV cohort study in East Africa with 36 months of follow-up with ~ 82% retention
  - C. Several peer-reviewed manuscripts published with more in preparation
4. The NIH Sponsored Phase III therapeutics study (Optimal Combination After Nevirapine Exposure, OCTANE) opened with site recognized for exemplary Success.
  - A. Kericho 4<sup>th</sup> to open of 10 African sites (others already NIH established sites)
  - B. Fastest enrolling site to date
  - C. PPD monitoring with excellent results with strict adherence to GCP
5. The Boston University-KEMRI-WRP collaboration extends breadth and depth of research after demonstrating the impact of HIV on labor productivity to include:
  - A. impact of ART on labor productivity
  - B. impact of ART on health economic outcomes in persons receiving ART in Ministry of Health and Mission HIV clinics
6. More than 20 abstracts have been presented at international meetings with more than 7 oral presentations.
7. The KEMRI/WRP Clinical Research Center received certification in both the Research Pharmacy and Laboratory to conduct NIH/NIAID/Division of AIDS sponsored research, the only such site in East Africa.
8. As part of ongoing quality assurance and preparation for College of American Pathologist (CAP) inspection, the KEMRI/WRP Clinical Research Center enrolled in a series of external quality assurance programs.
9. Seven HIV Program Kenyan staff have either completed or in the process of completing advanced education and training in areas including Biostatistics, Public Health/Administration, Health Systems Management, Community Health/Development, Information Technology, and Business Administration.
10. Twelve medical students, residents, and fellows from DOD affiliated training programs have completed clinical rotations in the HIV program.
11. The HIV Program Deputy Director for HIV Research and Treatment was presented by the CG USMRMC a performance award in recognition of outstanding

dedication and exemplary leadership to the Kenya Medical Research Institute/Walter Reed Project HIV Program.

## **Publications**

Foglia G, Sateren WB, Renzullo PO, Bautista CT, Langat L, Wasunna MK, Singer DE, Scott PT, Robb ML, Birx DL. High prevalence of HIV infection among rural tea plantation residents in Kericho, Kenya. *Epidemiol Infect.* 2007 Jun 29;:1-9.

Sateren W, Foglia G, Renzullo P, Elson L, Wasunna M, Bautista C, Birx D. Epidemiology of HIV-1 Infection in Agricultural Plantation Residents in Kericho, Kenya: Preparation for Vaccine Feasibility Studies. *J Acquir Immune Defic Syndr* 2006;43:102-106.

## **Summary**

The mission of the United States Army Medical Research Unit-Kenya (USAMRU-K), a special foreign activity of the Walter Reed Army Institute of Research (WRAIR), is to develop and test improved means for predicting, preventing and treating worldwide infectious disease threats to deployed U.S. military personnel. USAMRU-K is heavily involved in global surveillance, training, research in drug and vaccine development, and response to emerging infectious disease threats. These activities are undertaken in research laboratories and field stations in locations in Kenya where malaria, HIV/AIDS, leishmaniasis, Rift Valley fever, enteric pathogens, and other military-relevant infectious diseases are prevalent and their transmission rates are high. USAMRU-K also plays a role in the execution of the President's Emergency Plan for AIDS Relief. Our HIV research programs established in the South Rift Valley have served as base for PEPFAR to provide prevention, care and treatment programs to thousands of HIV/AIDS victims in Kenya. Malaria drug and vaccine trials executed in Kombewa and Kondele provide valuable information that will influence protective strategies for the war fighter. During this two-year extension to the Cooperative Agreement with Kenya Medical Research Institute, USAMRU-K's ability to successfully execute clinical studies has been enhanced by the utilization of over 57,000 sq ft of newly constructed space housing state-of-the-art laboratories, a clinical trials center and support activities. The co-location of these modern facilities near existing Government hospitals within areas of high disease endemicity has positioned USAMRU-K as a preferred site and partner for future vaccine, drug, and other interventional trials.

## Appendix 1 - Contract and KEMRI Seconded Personnel

| No.                            | MR Grade | P/No  | Employee Name            | Designation                   | Grant   |
|--------------------------------|----------|-------|--------------------------|-------------------------------|---------|
| <b>Administration-Ksm</b>      |          |       |                          |                               |         |
| 1                              | 11       | 80057 | Fred Kiddy Onyango       | Chief Lab Technologist        | Adm-Ksm |
| 2                              | 10       | 80647 | Peter Odundo             | Accountant I                  | Adm-Ksm |
| 3                              | 9        | 80231 | Raphael Pundo Omondi     | Senior Computer Programmer    | Adm-Ksm |
| 4                              | 4        | 80050 | Consolata Onyango        | senior Auxilliary Staff       | Adm-Ksm |
| 5                              | 4        | 80562 | Victor Otieno Opondo     | Clerical Officer              | Adm-Ksm |
| 6                              | 3        | 80274 | Jeconia O.Bunde          | Auxilliary Staff I            | Adm-Ksm |
| 7                              | 3        | 80389 | Julius M Muhanji         | Senior Auxilliary Staff II    | Adm-Ksm |
| 8                              | 3        | 80575 | Pamella Adhiambo Onyango | Auxilliary Staff I            | Adm-Ksm |
| 9                              | 3        | 80568 | Samson Onyango Owiti     | Auxilliary Staff I            | Adm-Ksm |
| 10                             | 3        | 80594 | Deborah Kusa Ndengu      | Auxilliary Staff I            | Adm-Ksm |
| 11                             | 3        | 80603 | George Otieno Ojanja     | Auxilliary Staff I            | Adm-Ksm |
| <b>Administration-Nrb</b>      |          |       |                          |                               |         |
| 1                              | 11       | 80182 | Kadenge Kidiga           | Principal Accountant          | Adm Nrb |
| 2                              | 9        | 80079 | Joyce Mburu              | Senior Personal Secretary     | Adm Nrb |
| 3                              | 9        | 80134 | Lucy Lodenyi             | Senior Computer Programmer    | Adm Nrb |
| 4                              | 9        | 80304 | Caroline C. Tungwony     | Principal Computer Programmer | Adm Nrb |
| 5                              | 7        | 20486 | Nahashon G. Ngugi        | Administrative Officer III    | Adm Nrb |
| 6                              | 7        | 80432 | Paul S Moriase           | Supplies Assistant I          | Adm Nrb |
| 7                              | 7        | 80403 | Pamela A Pande           | Lab Technologist III          | Adm Nrb |
| 8                              | 6        | 80550 | Eileen Akinyi Ongeso     | Copy Typist I                 | Adm Nrb |
| 9                              | 6        | 80035 | Agnes Nganga             | Computer Operator II          | Adm Nrb |
| 10                             | 5        | 80206 | John G. Kamau            | Senior Driver Grade II        | Adm Nrb |
| 11                             | 5        | 80421 | Charles O Morande        | Telephone Operator I          | Adm Nrb |
| 12                             | 5        | 80460 | Chepkwony, Wilfred K     | High clerical officer         | Adm Nrb |
| 13                             | 4        | 80207 | Edwin C. Mbwabi          | Artisan Grade I               | Adm Nrb |
| 14                             | 4        | 80534 | Samuel Macharia          | Artisan II                    | Adm Nrb |
| 15                             | 4        | 80547 | Enock L Makokha          | Clerical Officer              | Adm Nrb |
| 16                             | 4        | 80565 | Stella Ngarizu Airo      | Clerical Officer              | Adm Nrb |
| 17                             | 4        | 80670 | Amos N Mwaura            | Driver Grade II               | Adm Nrb |
| 18                             | 4        | 80671 | Lordvick A Bukhala       | Senior Auxiliary Staff II     | Adm Nrb |
| 19                             | 4        | 80672 | Maurine K Sore           | Senior Auxiliary Staff II     | Adm Nrb |
| 20                             | 3        | 80666 | Emmanuel M Amalemba      | Auxilliary Staff I            | Adm Nrb |
| <b>Clinical Trials Support</b> |          |       |                          |                               |         |
| 1                              | 13       | 80241 | Dr. John Njenga Waitumbi | Principal Research Officer    | CTS     |
| 2                              | 11       | 80068 | Joseph Koros             | Principal Lab. Technologist   | CTS     |
| 3                              | 11       | 80246 | Joram Ogola Siagla       | Senior Research Officer       | CTS     |
| 4                              | 11       | 21308 | Ragama B Ogutu Dr.       | Senior Research Officer       | CTS     |
| 5                              | 11       | 80645 | Dr. Ruth O. Wasuna       | Research Officer              | CTS     |
| 6                              | 11       | 20174 | Agnes N. Kariuki         | Principal Nursing Officer     | CTS     |
| 7                              | 10       | 21851 | Agnes A O Awiti          | Senior Nursing Officer        | CTS     |
| 8                              | 10       | 21545 | Otieno Godfrey A. Dr.    | Assistant Research Officer    | CTS     |
| 9                              | 10       | 21763 | Dr. Lucas Otieno Tina    | Assistant Research Officer    | CTS     |
| 10                             | 10       | 80646 | Dr. Nekeyo N Otsyula     | Assistant Research Officer    | CTS     |

|    |   |       |                          |                                 |     |
|----|---|-------|--------------------------|---------------------------------|-----|
| 11 | 9 | 80309 | Achola N. Onyango        | Administrative Officer I        | CTS |
| 12 | 9 | 80273 | Willis Okoth             | Assistant Research Officer      | CTS |
| 13 | 9 | 80539 | Jacob Odika Omwar Apollo | Clinical Officer I              | CTS |
| 14 | 9 | 80566 | Stella Kenyanya Apollo   | Nursing Officer I               | CTS |
| 15 | 9 | 80479 | Apolo Duncan O           | Assistant Research Officer      | CTS |
| 16 | 9 | 80652 | Margaret C. Koech        | Nursing Officer                 | CTS |
| 17 | 9 | 80653 | Loice A. Magaria         | Nursing Officer I               | CTS |
| 18 | 8 | 80391 | Fredrick M. Mucheru      | Senior Engineering Technician   | CTS |
| 19 | 8 | 21847 | Dorothy C Mabunde        | Enrolled Community Nurse II     | CTS |
| 20 | 8 | 21852 | Solomon O Otieno         | Enrolled Community Nurse II     | CTS |
| 21 | 7 | 21943 | Ondu Priscah A           | Enrolled Community Nurse II     | CTS |
| 22 | 7 | 80377 | Stacy M Okalo            | Clinical Officer                | CTS |
| 23 | 7 | 80232 | Gordon M. Hongo          | Lab Technologist III            | CTS |
| 24 | 7 | 80386 | Imelda A Adongo          | Enrolled Nurse II               | CTS |
| 25 | 7 | 80475 | Owino Lilian Were        | Clinical officer III            | CTS |
| 26 | 7 | 80476 | Okoth George F. O        | Clinical officer III            | CTS |
| 27 | 7 | 80478 | Owira Victorine A        | Clinical officer III            | CTS |
| 28 | 7 | 80468 | Okeyo Immaculate A       | Short Hand Typist I             | CTS |
| 29 | 7 | 80522 | Linnet Nyanchera Ongeta  | Nursing Officer II              | CTS |
| 30 | 7 | 80552 | Duke Mogaka Omariba      | Nursing Officer II              | CTS |
| 31 | 7 | 80531 | Robert Njuguna Maina     | Laboratory Technologist III     | CTS |
| 32 | 7 | 80546 | Francis Kuria Ndungu     | Laboratory Technologist III     | CTS |
| 33 | 7 | 80593 | David Onyango            | Laboratory Technologist III     | CTS |
| 34 | 7 | 80542 | George Odhiambo Odongo   | Laboratory Technologist III     | CTS |
| 35 | 7 | 80655 | Eunice A. owiti          | Clinical Officer III            | CTS |
| 36 | 7 | 80657 | Gladys N. Khaemba        | Laboratory Technologist III     | CTS |
| 37 | 7 | 80658 | Eric O. Sedah            | Pharmaceutial Technologist III  | CTS |
| 38 | 7 | 80659 | Reuben O Oriko           | Computer Programmer III         | CTS |
| 39 | 7 | 80660 | Millicent A. Madara      | Computer Programmer III         | CTS |
| 40 | 7 | 80472 | Omondi Mary A            | Enrolled Community Nurse II     | CTS |
| 41 | 7 | 80480 | Onyango Susan W A        | Enrolled Community Nurse II     | CTS |
| 42 | 6 | 80244 | James Gitonga            | Laboratory Technician III       | CTS |
| 43 | 6 | 80042 | Samwel Odour Wangowe     | Junior Lab. Technician          | CTS |
| 44 | 6 | 80371 | Kennedy J Obonyo         | Lab Technitian III              | CTS |
| 45 | 6 | 80381 | Peter R Mariga           | Senior Driver                   | CTS |
| 46 | 6 | 80168 | Abdi Ayub                | Driver Grade I                  | CTS |
| 47 | 6 | 80368 | James S Odera            | Lab Technitian III              | CTS |
| 48 | 6 | 80584 | Lillian Ogola Otieno     | Pharmaceutial Technician III    | CTS |
| 49 | 6 | 80527 | Peter Benvolio Obare     | Laboratory Technician III       | CTS |
| 50 | 6 | 80524 | Nancy Awour Sande        | Enrolled Comm. Health Nurse III | CTS |
| 51 | 6 | 80544 | Fredrick Ouma Ogot       | Enrolled Comm. Health Nurse III | CTS |
| 52 | 6 | 80540 | Jackline Akinyi Juma     | Laboratory Technician III       | CTS |
| 53 | 6 | 80553 | Cornel O. Arima          | Laboratory Techncian III        | CTS |
| 54 | 6 | 80662 | Rose A Adeny             | Enrolled Community Nurse III    | CTS |
| 55 | 6 | 80663 | Celestine A Onyango      | Enrolled Community Nurse III    | CTS |
| 56 | 6 | 80664 | Consolata A Apindi       | Enrolled Community Nurse III    | CTS |
| 57 | 5 | 80374 | Mary A Amondi            | Computer Operator III           | CTS |
| 58 | 5 | 80467 | Pundo, Dennis O.         | Computer programmer III         | CTS |
| 59 | 5 | 80545 | Francis Onyango Ooro     | Driver Grade I                  | CTS |
| 60 | 5 | 80466 | Oyugi, Mary A.           | Computer programmer III         | CTS |

|    |   |       |                        |                         |     |
|----|---|-------|------------------------|-------------------------|-----|
| 61 | 4 | 80354 | Beatrice O Akinyi      | Clerical Officer        | CTS |
| 62 | 4 | 80361 | Moses D Olweny         | Clerical Officer        | CTS |
| 63 | 4 | 80364 | Elizabeth B Akinyi     | Clerical Officer        | CTS |
| 64 | 4 | 80045 | Joram Osumo            | senior Auxilliary Staff | CTS |
| 65 | 4 | 80054 | Cyrus Ongonga Onguka   | Senior Auxiliary Staff  | CTS |
| 66 | 4 | 80367 | Jacob N Jagongo        | Clerical Officer        | CTS |
| 67 | 4 | 80373 | Linnah A Ooro          | Clerical Officer        | CTS |
| 68 | 4 | 80376 | Wycliff H Odhiambo     | Clerical Officer        | CTS |
| 69 | 4 | 80585 | Ludia Owino Badhi      | Clerical Officer        | CTS |
| 70 | 4 | 80576 | Nereah Onyango Omondi  | Clerical Officer        | CTS |
| 71 | 4 | 80595 | Dorothy Adhiambo Odera | Clerical officer        | CTS |
| 72 | 4 | 80601 | Fredrick Athero Ayayo  | Clerical Officer        | CTS |
| 73 | 4 | 80538 | Yuniah Adhiambo Oluoch | Clerical officer        | CTS |
| 74 | 4 | 80665 | Shenaz M Yusuf         | Clerical Officer        | CTS |
| 75 | 3 | 80355 | Caroline A Onoka       | Auxilliary Staff I      | CTS |
| 76 | 3 | 80573 | Phelecia O. Omondi     | Auxillary Staff I       | CTS |
| 77 | 3 | 80599 | Elly Owuor Akoyo       | Auxillary Staff I       | CTS |
| 78 | 3 | 80563 | Thomas Omaset Omedo    | Auxillary Staff I       | CTS |
| 79 | 3 | 80564 | Teresa Ongego Odundo   | Auxillary Staff I       | CTS |
| 80 | 3 | 80586 | Michael Ochieng Oleche | Auxilliary Staff I      | CTS |
| 81 | 3 | 80592 | Charles Osuo           | Auxilliary Staff I      | CTS |
| 82 | 3 | 80486 | Masingu Mackinus       | Driver Grade III        | CTS |
| 83 | 3 | 80487 | Gwada Francis R        | Driver Grade III        | CTS |

#### Severe Malaria

|   |    |       |                    |                             |      |
|---|----|-------|--------------------|-----------------------------|------|
| 1 | 11 | 80372 | Lilian A Ogonda    | Senior Research Officer     | HMJF |
| 2 | 11 | 80388 | Dr.Walter Otieno   | Senior Research Officer     | HMJF |
| 3 | 9  | 80307 | Colins O. Odhiambo | Assistant Research Officer  | HMJF |
| 4 | 9  | 80308 | Michael M. Odera   | Assistant Research Officer  | HMJF |
| 5 | 7  | 80310 | Titus o. Apindi    | Laboratory Technologist III | HMJF |

#### Centre of Excellence

|   |    |       |                      |                            |     |
|---|----|-------|----------------------|----------------------------|-----|
| 1 | 11 | 80420 | Adhiambo Christine G | Principal Lab.Technologist | COE |
| 2 | 4  | 80490 | Obadha Caroline A    | Copy Typist II             | COE |

#### RETROVIROLOGY

|    |    |       |                        |                            |       |
|----|----|-------|------------------------|----------------------------|-------|
| 1  | 11 | 80044 | David Kiplangat Chumo  | Chief Lab Technologist     | RETRO |
| 2  | 11 | 20260 | Kibaya Rukia M         | Principal Lab.Technologist | RETRO |
| 3  | 11 | 21346 | Kipmutai Robert L Dr.  | Research Officer           | RETRO |
| 4  | 11 | 21886 | Dr. Peter K. Shikuku   | Research Officer           | RETRO |
| 5  | 10 | 80528 | Dr. Rasvinder K Chadha | Assistant Research Officer | RETRO |
| 6  | 10 | 80691 | Lazarus M. Momanyi     | Assistant Research Officer | RETRO |
| 7  | 9  | 80406 | Koech Hillary K        | Senior Accountant          | RETRO |
| 8  | 9  | 80281 | Wilfred Langat         | Public Health Officer      | RETRO |
| 9  | 9  | 80397 | Ignatius Kipnge'etich  | Senior Computer Programmer | RETRO |
| 10 | 9  | 80398 | Rachael K Kamau        | Assistant Research Officer | RETRO |
| 11 | 9  | 80428 | Imbuki K Osotsi        | Assistant Research Officer | RETRO |
| 12 | 9  | 80431 | Ngeno Weldon K         | Assistant Research Officer | RETRO |
| 13 | 9  | 80450 | Mokaya John N          | Assistant Research Officer | RETRO |
| 14 | 9  | 80451 | Kimeto Mary L          | Assistant Research Officer | RETRO |

|    |   |       |                          |                              |       |
|----|---|-------|--------------------------|------------------------------|-------|
| 15 | 9 | 80456 | Yegon Peter K            | Computer Programmer I        | RETRO |
| 16 | 9 | 80459 | Katharane Mary N         | Assistant Research Officer   | RETRO |
| 17 | 9 | 80485 | Leonida N. Mongare       | Assistant Research Officer   | RETRO |
| 18 | 9 | 80549 | Elizabeth Ngetich        | Nursing Officer I            | RETRO |
| 19 | 9 | 80582 | Leonard Ngetich          | Accountant II                | RETRO |
| 20 | 9 | 80556 | Rebecca Chebore Boen     | Assistant Research Officer   | RETRO |
| 21 | 9 | 80569 | Ruth Jeruto              | Assistant Research Officer   | RETRO |
| 22 | 9 | 80328 | Roselidah Oyunga Oyunga  | Clerical Officer             | RETRO |
| 23 | 9 | 80620 | Diana J. Kimengich       | Nursing Officer I            | RETRO |
| 24 | 9 | 80654 | Romeo W Kithuka          | Laboratory Technologist II   | RETRO |
| 25 | 8 | 80436 | Odhambo Hulda A          | Administrator/Counsellor     | RETRO |
| 26 | 8 | 80535 | Samuel Chirchir          | Nursing Officer II           | RETRO |
| 27 | 7 | 80392 | Loice C Cheruiyot        | Lab Technologist III         | RETRO |
| 28 | 7 | 80330 | Roseline Bosibori Vicky  | Lab Technologist III         | RETRO |
| 29 | 7 | 80396 | Eric K Rono              | Lab Technologist III         | RETRO |
| 30 | 7 | 80325 | Judy Chebet Bosuben      | Community Field Worker       | RETRO |
| 31 | 7 | 80322 | Dennis Ouma Otieno       | Community Field Worker       | RETRO |
| 32 | 7 | 80435 | Langat Henry Kipngetich  | Administrator/Counsellor     | RETRO |
| 33 | 7 | 80442 | Airo Alice Makungu       | Short hand typist            | RETRO |
| 34 | 7 | 80443 | Kimani Thomas            | Community Field Worker       | RETRO |
| 35 | 7 | 80446 | Engoke Grace Induti      | Library Assistant            | RETRO |
| 36 | 7 | 80454 | Rono Bernard K           | Clinical Officer III         | RETRO |
| 37 | 7 | 80463 | Koskei Peter K           | Clerical Officer III         | RETRO |
| 38 | 7 | 80483 | Argwings O. Miruka       | Clinical Officer             | RETRO |
| 39 | 7 | 80482 | Henry M Sabwengi         | Laboratory Technologist III  | RETRO |
| 40 | 7 | 80501 | Sigei Lucy C             | Laboratory Technologist III  | RETRO |
| 41 | 7 | 80557 | Bernard Bett Too         | Engineering Technologist III | RETRO |
| 42 | 7 | 80543 | Geoffrey Kiplangat Lelgo | Supplies Assistant I         | RETRO |
| 43 | 7 | 80607 | Isaac Mugo               | Lab Technologist III         | RETRO |
| 44 | 7 | 80610 | Janet Nyambura           | Lab Technologist III         | RETRO |
| 45 | 7 | 80533 | Roselyne Chelangat Sang  | Computer programmer III      | RETRO |
| 46 | 7 | 80624 | Silpher Achieng          | Assistant Supplies officer   | RETRO |
| 47 | 7 | 80626 | Margaret C. Ruto         | Nursing Officer III          | RETRO |
| 48 | 7 | 80627 | Margaret C. Biomdo       | Nursing Officer III          | RETRO |
| 49 | 7 | 80629 | Gladys C. Rop            | Nursing Officer III          | RETRO |
| 50 | 7 | 80630 | Beatrice M. Korir        | Nursing Officer III          | RETRO |
| 51 | 7 | 80631 | Rael C. Bor              | Clinical Officer III         | RETRO |
| 52 | 7 | 80636 | Geoffrey K. Koskei       | Clinical Officer III         | RETRO |
| 53 | 7 | 80656 | Everline K Amunavi       | Nursing Officer II           | RETRO |
| 54 | 7 | 21047 | David K Bii              | Engineering Tech             | RETRO |
| 55 | 6 | 80257 | Michael O. Obonyo        | Enrolled Nurse III           | RETRO |
| 56 | 6 | 80393 | Anthony A Keya           | Assistant Cateress           | RETRO |
| 57 | 6 | 80285 | Fredrick Ouma Waga       | Lab Technologist III         | RETRO |
| 58 | 6 | 80284 | Francis Ochieng Opiyo    | Lab Technologist III         | RETRO |
| 58 | 6 | 80591 | Charles Kilel            | Public Health Technician     | RETRO |
| 59 | 6 | 80554 | Charles Kiptoo Rotich    | Laboratory technician III    | RETRO |
| 60 | 6 | 80572 | Richard Rono             | Community Field Worker       | RETRO |
| 61 | 5 | 21628 | Florence C Mitei         | Data Machine Operator        | RETRO |
| 62 | 5 | 80323 | Everlyn Ngetich          | Higher Clerical Officer      | RETRO |
| 63 | 5 | 80457 | Wambua Winfred           | Copy Typist II               | RETRO |

|    |   |       |                         |                        |       |
|----|---|-------|-------------------------|------------------------|-------|
| 64 | 5 | 80484 | Daniel Cheruiyot        | Assistant cateress II  | RETRO |
| 65 | 5 | 80541 | Irene Chebet Metet      | Computer Operator III  | RETRO |
| 66 | 5 | 80518 | Josphat Rotich          | Assistant Cateress III | RETRO |
| 67 | 5 | 80520 | Leonard Kipkirui Ronoh  | Assistant Cateress III | RETRO |
| 68 | 5 | 80537 | Teresa J. Koech         | Assistant Cateress III | RETRO |
| 69 | 4 | 80316 | David Kamadi Onyino     | Clerical Officer       | RETRO |
| 70 | 4 | 80315 | Johnson Ndungu Shiyai   | Clerical Officer       | RETRO |
| 71 | 4 | 80314 | Jude Kitur              | Driver Grade II        | RETRO |
| 72 | 4 | 80423 | Martim Josphine C       | Clerical Officer       | RETRO |
| 73 | 4 | 80424 | Ondego Joyce Ageyo      | Clerical Officer       | RETRO |
| 74 | 4 | 80425 | Obiero Emelda Akinyi    | Clerical Officer       | RETRO |
| 75 | 4 | 80439 | Ariba Nixon Olungati    | Clerical Officer       | RETRO |
| 76 | 4 | 80453 | Bett Justice K          | Driver Grade II        | RETRO |
| 77 | 4 | 80500 | Mwangi Geoffrey k       | Clerical Officer       | RETRO |
| 78 | 4 | 80602 | Geoffrey K Mutai        | Driver Grade II        | RETRO |
| 79 | 4 | 80517 | Joel Langat             | Driver Grade II        | RETRO |
| 80 | 4 | 80634 | Geoffrey K. Ngeno       | Clerical Officer       | RETRO |
| 81 | 4 | 21743 | Florence C Bonge        | Clerical Officer       | RETRO |
| 82 | 3 | 80324 | James Obino             | Auxilliary Staff I     | RETRO |
| 83 | 3 | 80331 | Samwel Obino            | Auxilliary Staff I     | RETRO |
| 84 | 3 | 80394 | Edna C Mutai            | Auxilliary Staff I     | RETRO |
| 85 | 3 | 80437 | Kiromboto Rose k        | Auxilliary Staff I     | RETRO |
| 86 | 3 | 80438 | Rugut Eric              | Driver Grade III       | RETRO |
| 87 | 3 | 80445 | Rono Paul Cheruyuit     | Auxilliary Staff I     | RETRO |
| 88 | 3 | 80481 | Agnes Chepngetich       | Auxilliary Staff I     | RETRO |
| 89 | 3 | 80497 | Okello Eunice A.        | Auxilliary Staff I     | RETRO |
| 90 | 3 | 80498 | Mogere Lukas M          | Auxilliary Staff I     | RETRO |
| 91 | 3 | 80606 | Henry Kiplangat Ngetich | Driver Grade III       | RETRO |
| 92 | 3 | 80609 | Jane Jeruto             | Auxilliary Staff I     | RETRO |
| 93 | 3 | 80611 | John K Ronoh            | Driver Grade III       | RETRO |
| 94 | 3 | 80577 | Nehemiah Kipkemai Mutai | Driver Grade III       | RETRO |
| 95 | 3 | 80574 | Patrick Watakila M      | Driver Grade III       | RETRO |

#### BU

|   |   |       |                  |                         |    |
|---|---|-------|------------------|-------------------------|----|
| 1 | 7 | 80694 | Gladys Chepkoech | Computer Programmer III | BU |
|---|---|-------|------------------|-------------------------|----|

#### Vector Studies-Entomology

|    |   |       |                       |                              |      |
|----|---|-------|-----------------------|------------------------------|------|
| 1  | 9 | 80548 | Elizabeth N. Kioko    | Assistant Research Officer   | ENTO |
| 2  | 9 | 80605 | Helen Koka            | Assistant Research Officer   | ENTO |
| 3  | 9 | 80648 | Gladys Chepngetich    | Assistant Research Officer   | ENTO |
| 4  | 7 | 80039 | John Kamanza          | Senior Laboratory Technician | ENTO |
| 5  | 7 | 20441 | Reuben M. Lugalia     | Laboratory Technician        | ENTO |
| 6  | 4 | 80252 | Maurice Otieno Agawo  | senior Auxilliary Staff      | ENTO |
| 7  | 4 | 80350 | Daniel O Ngonga       | Clerical Officer             | ENTO |
| 8  | 4 | 80336 | Francis Gare Ngere    | Clerical Officer             | ENTO |
| 9  | 4 | 80337 | Nicholas O Odemba     | Clerical Officer             | ENTO |
| 10 | 4 | 80561 | Vitalis Omondi Opondo | Driver Grade II              | ENTO |
| 11 | 3 | 80390 | Kizito Amuhaya        | Auxilliary Staff I           | ENTO |

| <b>GEIS Support</b> |    |       |                      |                               |      |
|---------------------|----|-------|----------------------|-------------------------------|------|
| 1                   | 12 | 21078 | Dr. Jane Mbui        | Senior Research Officer       | GEIS |
| 2                   | 11 | 20419 | Gitonga Charles M    | Principal Lab Technologist    | GEIS |
| 3                   | 10 | 80271 | Alexander W. Onyango | Principal Computer Programmer | GEIS |
| 4                   | 9  | 80305 | Shirley C. Segecha   | Assistant Research Officer    | GEIS |
| 5                   | 9  | 80259 | Alfred Olweny Odindo | Clinical Officer I            | HMJF |
| 6                   | 7  | 80408 | Jeremiah K Kambi     | Clinical Officer III          | GEIS |
| 7                   | 6  | 80407 | Ruth Sarah Mupa      | Lab Technitian III            | GEIS |
| 8                   | 6  | 80263 | Charles Otieno Adega | Lab Technician III            | HMJF |
| 9                   | 5  | 80074 | Jecinta Wanjiru      | senior Auxilliary Staff       | GEIS |
| 10                  | 4  | 80519 | Justus Odhiambo Gaya | Artisan II                    | GEIS |

| <b>ENTERICS</b> |    |       |                    |                            |      |
|-----------------|----|-------|--------------------|----------------------------|------|
| 1               | 13 | 20277 | William K Sang     | Principal Research officer | GEIS |
| 2               | 9  | 80418 | Bonventure W. Juma | Assistant Research Officer | GEIS |
| 3               | 7  | 80230 | Valerie A . Oundo  | Laboratory Technologist II | GEIS |
| 4               | 6  | 21423 | Finley Osuna       | Laboratory Technician III  | GEIS |

| <b>MDR</b> |    |       |                         |                            |      |
|------------|----|-------|-------------------------|----------------------------|------|
| 1          | 12 | 20405 | Maurice Adoyo Adoyo     | Senior Research Officer    | GEIS |
| 2          | 9  | 80317 | Freddrick Lunyagi Eyase | Assistant Research Officer | GEIS |
| 3          | 9  | 80333 | Hoseah Miima Akala      | Assistant Research Officer | GEIS |

| <b>ARBOVIROLOGY</b> |    |       |                     |                            |      |
|---------------------|----|-------|---------------------|----------------------------|------|
| 1                   | 13 | 20393 | Sang Rosemary Dr.   | Principal Research officer | GEIS |
| 2                   | 10 | 21560 | Konongoi Samson Dr. | Assistant Research Officer | GEIS |
| 3                   | 7  | 20957 | John M Gachoya      | Lab technitian II          | GEIS |
| 4                   | 7  | 21280 | Ernest Mabinda      | Lab technitian II          | GEIS |
| 5                   | 3  | 20183 | Dustone Beti        | Driver Grade III           | GEIS |

| <b>FLU</b> |    |       |                        |                              |      |
|------------|----|-------|------------------------|------------------------------|------|
| 1          | 13 | 80613 | Dr. Wallace D Bullimo  | Senior Research Officer      | GEIS |
| 2          | 11 | 80278 | Rachael Anyango Achila | Research Officer             | GEIS |
| 3          | 9  | 80461 | Wadegu Meshack         | Assistant Research Officer   | GEIS |
| 4          | 9  | 80622 | Evangeline Kinya       | Supplies Officer II          | GEIS |
| 5          | 9  | 80649 | Dennis M. Misigo       | Assistant Research Officer   | GEIS |
| 6          | 9  | 80650 | Janet M Majanja        | Assistant Research Officer   | GEIS |
| 7          | 9  | 80651 | Caroline A Ochieng     | Assistant Research Officer   | GEIS |
| 8          | 8  | 80066 | Josphat Mwangi Kabui   | Senior Laboartory Technician | GEIS |
| 9          | 8  | 80306 | Julia Wangui Mwangi    | Laboratory Technologist I    | GEIS |
| 10         | 8  | 30081 | Victor Otieno Ofula    | Laboratory Technologist I    | GEIS |
| 11         | 7  | 80661 | James O Njiri          | Computer Programmer II       | GEIS |
| 12         | 9  | 80464 | Rosemary M Nzunza      | Assistant Research Officer   | GEIS |

| <b>PEPFAR</b> |    |       |                   |                            |        |
|---------------|----|-------|-------------------|----------------------------|--------|
| 1             | 12 | 21919 | Dr. Charles Sigei | Senior Research Officer    | PEPFAR |
| 2             | 11 | 80583 | Leonard Soo       | Research Officer           | PEPFAR |
| 3             | 10 | 80619 | Jemutai Tarus     | Assistant Research Officer | PEPFAR |
| 4             | 9  | 80597 | Hellen Mutai      | Assistant Research Officer | PEPFAR |
| 5             | 9  | 80515 | James Ambani      | Accountant II              | PEPFAR |

|    |   |       |                          |                               |        |
|----|---|-------|--------------------------|-------------------------------|--------|
| 6  | 9 | 80516 | Janeth Nyigei            | Administrative Officer II     | PEPFAR |
| 7  | 9 | 80588 | William Lonana Shena     | Accountant II                 | PEPFAR |
| 8  | 9 | 80523 | Martin ocholla           | Accountant II                 | PEPFAR |
| 9  | 9 | 80587 | Millicent Wachira        | Assistant Research Officer    | PEPFAR |
| 10 | 9 | 80580 | William Kimaru Sugut     | Nursing Officer I             | PEPFAR |
| 11 | 9 | 80621 | Winnie C. Langat         | Assistant Research Officer    | PEPFAR |
| 12 | 9 | 80623 | Wycliffe K. Obwiri       | Administrative Officer II     | PEPFAR |
| 13 | 9 | 80692 | Jane Muli Mumbi          | Nursing Officer I             | PEPFAR |
| 14 | 9 | 80693 | James W Mukabane         | Nursing Officer I             | PEPFAR |
| 15 | 8 | 80529 | Raphael Kipkurgat Langat | Laboratory Technologist II    | PEPFAR |
| 16 | 7 | 80558 | Aaron Kipnetich Ngeno    | Laboratory Technologist III   | PEPFAR |
| 17 | 7 | 80590 | Josphat K Bett           | Clinical Office III           | PEPFAR |
| 18 | 6 | 80567 | Simon Kipyegon           | Pharmaceutical Technician III | PEPFAR |
| 19 | 6 | 80536 | Sofia Chebet Cherorot    | Nutrition Field Worker        | PEPFAR |
| 20 | 4 | 80600 | Erick K Langat           | Driver Grade II               | PEPFAR |
| 21 | 4 | 80440 | Chepkwony Geoffrey       | Driver Grade II               | PEPFAR |
| 22 | 3 | 80526 | Paul Akava Kibisu        | Auxilliary Staff I            | PEPFAR |

#### OCTANE

|    |    |       |                          |                            |        |
|----|----|-------|--------------------------|----------------------------|--------|
| 1  | 13 | 21770 | Dr. Fredrick K Sawe      | Principal Research Officer | Octane |
| 2  | 10 | 80525 | Tarus Noah Kiprop        | Assistant Research Officer | Octane |
| 3  | 9  | 80415 | Rono C Hellen            | Assistant Research Officer | Octane |
| 4  | 9  | 80429 | Langat Jayme C           | Assistant Research Officer | Octane |
| 5  | 9  | 80598 | Kipkeu Chemutai          | Assistant Research Officer | Octane |
| 6  | 9  | 80400 | Bornes C.Korir           | Assistant Research Officer | Octane |
| 7  | 7  | 80589 | Abraham Cheruiyot Langat | Clinical Officer III       | Octane |
| 8  | 7  | 80426 | Mburu Jacinta Wambui     | Nursing Officer III        | Octane |
| 9  | 7  | 80625 | Langat C. Rither         | Nursing Officer III        | Octane |
| 10 | 7  | 80628 | Linnet K. Kisato         | Nursing Officer III        | Octane |
| 11 | 5  | 80633 | Jasminder Cherotich      | Computer Operator I        | Octane |
| 12 | 3  | 80637 | Hellen Chepkemoi         | Auxilliary Staff I         | Octane |

#### HRP/2- Dr. Waitumbi

|   |   |       |                   |                            |       |
|---|---|-------|-------------------|----------------------------|-------|
| 1 | 9 | 80581 | Kifude M Carolyne | Assistant research officer | HRP/2 |
|---|---|-------|-------------------|----------------------------|-------|