H3Africa Kidney Disease Research Network
A U54 H3A Collaborative Clinical Center Award

The University of Ghana & The Noguchi Memorial Institute for Medical Research, Accra, Ghana
H3A Kidney Disease Research Network: Organizational structure

**Clinical Centers**
- Univ. of Ghana, Ghana
- KNUST, Ghana
- Addis Ababa Univ., Ethiopia
- Univ. of Nairobi, Kenya
- Univ. of Nigeria, Enugu
- Univ. of Ilorin, Nigeria
- Univ. of Ibadan, Nigeria
- Obafemi Awolowo Univ., Nigeria
- Univ. of Abuja, Nigeria

**Training & Career Dev.**
- University of Ghana
- Ruth & Bruce Rappaport Research Institute, Haifa

**Scientific & Operations Support**
- Duke University, Durham
- Loyola University, Chicago
- NIDDK, NHGRI, NCI
- Harvard University, Boston
- University of Toronto, Toronto
- Rappaport Institute, Haifa
- University of Michigan

**Bioinformatics & Data Management**
- Univ. of Western Cape, SA

**Genomics Research Laboratories**
- Noguchi MIMR, Accra, Ghana
- Univ. of Ibadan, Nigeria

**Administration & Management**
- University of Ghana, Accra
- University of Michigan

**NHGRI/NIDDK H3Africa Steering Comm.**
- Biorepository
- Bioinformatics Network
1. Enroll 4000 cases with kidney disease and 4000 controls

2. Comprehensive phenotyping of the first ever kidney disease cohort of 8000 cases and controls in four African countries (Ethiopia, Ghana, Kenya, Nigeria)

3. Conduct four genetic and translational research projects on chronic kidney disease and glomerular diseases including childhood onset nephrotic syndrome
1. Two genomic research laboratories in West Africa using sustainable, low capital-intensity laboratory technology platform (Dr. David Burke)

2. Develop mechanism for high throughput whole genomic sequencing in collaboration with overseas institutions (Dr. Rob Lyons, Dr. David Burke and Dr. Michael Boehnke)
1. Training programs in genetics and genomics science for laboratory technicians, research scientists and research coordinators in Africa (Dr. David Burke/Dr. Bamidele Tayo)

2. Genomics science training and career development program for African scientists in tandem with the Michigan Predoctoral Training Program in Genetics (Dr. John Moran) and the U-M Genome Science Training Program (Dr. Michael Boehnke)

3. System biology training through U.S. platform extension to Africa (Dr. Matthias Kretzler)
H3A Kidney Disease Research Network: Research projects

H3Africa Initiative

H3Africa Kidney Disease Research Network

- Monogenic Disease Childhood Onset NS (N=50 families)
- GWAS (N=2000)
- Renal Candidate Genes (MYH9, APOL1, etc) Studies (N=8000)
- Ancillary Studies

Ancillary Studies

H3Africa Kidney Disease Research Network
# H3A Kidney Disease Study: Recruitment goals

<table>
<thead>
<tr>
<th>Clinical Center</th>
<th>Kidney Disease</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addis Ababa University</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Kwame Nkrumah University of Science and Technology</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Obafemi Awolowo University, Ile-Ife</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>University of Abuja</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>University of Ghana</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>University of Ibadan</td>
<td>925</td>
<td>925</td>
</tr>
<tr>
<td>University of Ilorin</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>University of Nairobi</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>University of Nigeria, Enugu</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,175</strong></td>
<td><strong>5,175</strong></td>
</tr>
</tbody>
</table>
H3A Kidney Disease Study: Timeline

Phase I
Case-Control Genetic Studies
2013-2016

Recruitment

Phase II
Cohort Studies ("CRIC" & "NEPTUNE")
2014-2019

Follow up

End of Phase I
06 / 2019

05 / 2013 Commence Enrolment
04 / 2016 Complete Phase I Enrolment
04/ 2017 Complete Phase II Enrolment
End of Phase I 06 / 2019

Phase II: Not yet funded

07 / 2012 Grant Award & Protocol Dev.
01/2013 - Accra, Ghana Centralized Staff Training & Investigators Meeting
05 / 2013 Commence Enrolment
04 / 2016 Complete Phase I Enrolment
Case Report Forms (CRFs)

11 Participant CRFs (640 phenotyping variables, 3288 levels)
- 640 phenotype variables on 11 CRFs:
  - Medical History
  - Blood Pressure Form
  - Concomitant Medications
  - SF 12
  - Environmental History
  - Kansas City Questionnaire
  - Physical Assessment
  - Symptoms List
  - Medical Events Questionnaire
  - Renal Replacement Therapy – Primary Survey
  - Renal Replacement Therapy – Follow-up Survey

11 Administrative CRFs
PHYSICAL ASSESSMENT

Participant ID:  
(Example: Site 04 Participant 0001 Enter: 040001)

CRF Date:  
(dd-mm-yy)

CRF Version V1.0.20130805

RC ID:

ANTHROPOMETRY:

1. Date of measurement:  
(dd-mm-yy)

2. Time of measurement:  
(hh:mm)

A. Height and Weight:  Height and weight are measured at follow-up clinic visits only. (Baseline height and weight are measured at screening visit and recorded on the Eligibility Assessment (ELIG) case report form.)

3. Standing height: (measured in cm)  
(cm)

4. Weight: (measured in kg)  
(kg)
BIOSPECIMEN COLLECTION Adult - 57 ML

Participant ID: (Example: Site 04 Participant 0001 Enter: 040001)
CRF Date: (dd-mm-yy)

CRF Version V1.0.20130805

RC ID:

1. Type of specimen(s):
   - Blood
   - Urine
   - Both
   - Unable to collect blood or urine

2. Date of birth: (dd-mm-yy)

2a. Gender:
   - Male
   - Female

3. Does the participant have a diagnosis of diabetes mellitus?
   - Yes
   - No

3b. Is the participant on dialysis?
   - Yes
   - No

Blood Specimens:

4. Collection Date:
   (dd-mm-yy)
REDCap: Data & Computing Environment Security

- Web-based clinical research data management system
- Developed at the Vanderbilt University & used by nearly all CTSA
- Interactive tools for:
  - Participant registration
  - Data entry and verification
  - Repository of all study forms
  - Individual participant calendars
  - Cumulative site calendars for expected study activities
  - Calculator of creatinine-based e-GFR
  - Access to the National Drug Data File (NDDF) in the Medication Reference
  - Link to the Network website
  - Generate individual participant and investigator-specific reports
  - Seamless data downloads to common statistical packages (SPSS, SAS, Stata, R)
H3Africa

**Data Entry**

You may view an existing record/response by selecting it from the drop-down lists below. To create a new record/response, type a new value in the text box below and hit Tab or Enter. To quickly find a record without using the drop-downs, the text box will auto-populate with existing record names as you begin to type in it, allowing you to select it.

<table>
<thead>
<tr>
<th>Total records: <strong>0</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose an existing Participant ID: [ -- select record -- ]</td>
</tr>
<tr>
<td>Enter a new or existing Participant ID: [ ]</td>
</tr>
</tbody>
</table>

---

**Data Search**

Choose a field to search
(excludes multiple choice fields)

[ -- select search field -- ]

Search query

Begin typing to search the project data, then click an item in the list to navigate to that record.

---

**NOTICE:**

This project is currently in Development status. **Real data should NOT be entered until the project has been moved to Production status.**
Phenotyping and specimen acquisition resources

- Digital Blood Pressure Monitor – Omron HEM 907XL IntelliSense
- Blood Pressure Monitor Mounting Stand - Omron Floor stand Kit for 907XL
- Digital Floor Scale - SECA 813
- Centrifuge – BD Clay Adams Compact II Centrifuge
- Freezerworks Label Printer - Zebra GX420t
- Freezerworks Hand held barcode label scanner - Symbol 6707
- Portable EKG machine - GE Medical Systems MAC 1200
- Anthropometric Tape Measures - Gulick II Plus G7019
- Bioelectrode Body Composition Analyzer – RJL Systems Quantum II BIA Analyzer System
- Laptop - HP EliteBook 8470p Notebook PC
- Desktop Scanner - HP Scanjet N6350 networked
- Ultrasound Probe – Summit L250 Display Hand Held Doppler (Probe: SD8 8 MHz Vascular)
- Standiometer - SECA 216
## H3A Kidney Disease Study: Biospecimen collection scheme (total blood volume = 57cc/adult)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Tube</th>
<th>Overnight ship (cold pack) from CC to MDS Lancet Laboratory</th>
<th>Store in Freeze -80 at MDS Lancet Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10ml SST (Yellow Top)</td>
<td></td>
<td>(A1, A2, A3) Light sensitive aliquots</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(A4, A5, A6) Serum aliquots</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stored for future testing</td>
</tr>
<tr>
<td>B</td>
<td>5ml SST Yellow top</td>
<td>(B1) Serum aliquot-- Serum creatinine. Serum aliquots stored for Hepatitis B &amp; C, HIV antibody</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>5ml SST Yellow top</td>
<td></td>
<td>(C1, C2, C3) Serum aliquot Stored for future testing</td>
</tr>
<tr>
<td>D</td>
<td>5ml SST Yellow top</td>
<td></td>
<td>(D1) Serum Creatinine</td>
</tr>
<tr>
<td>E</td>
<td>3ml Purple (EDTA)</td>
<td>(E1) FBC</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>6.5ML DNAgard</td>
<td>(F1) DNAgard</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>10ml purple top (EDTA)</td>
<td>(G1, G2, G3, +1 Buffy Coat) DNA Plasma aliquots Stored for future testing</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>10ml purple top (EDTA)</td>
<td>(H1, H2, H3, +1 Buffy Coat) Plasma aliquots. Stored for future testing</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>4.5ml Blue top (NaCitrate)</td>
<td></td>
<td>(I1, I2, I3) Plasma aliquots Stored for future testing</td>
</tr>
<tr>
<td>S</td>
<td>DNA Mouthwash 50ml</td>
<td><strong>Per Dr. Burke’s Saliva Protocol</strong></td>
<td>S1, S2, S3</td>
</tr>
<tr>
<td>U</td>
<td>Random Spot urine 50ml</td>
<td>(U1) Urine aliquot creatinine, albumin</td>
<td>(U2, U3, U4) Urine aliquot stored for future testing</td>
</tr>
</tbody>
</table>
Freezerworks data entry interface

[Image of a software interface for data entry]
H3A Kidney Disease Research Network: Data & biospecimen processing and pathways

Clinical Center

Screening
- Outpatient clinics
- Hospital wards
- Medical Records

Study Visit
- Questionnaires
- Measurements
- Phlebotomy
- Urine samples

Specimen Processing
- Labeling & Aliquoting
- DNA Isolation
- Catalogue (Web-based)
- Packaging

Specimen Processing

On-site Storage
- -20/-70 freezer
- 2-4 days max.

Database Servers
- University of Ghana
- University of Western Cape, South Africa

Data Entry
REDCap

REDCap Licensed to
University of Ghana

H3Africa Biorepository

University of Michigan

NMIMR & MDS-Lancet
- Catalogue
- Processing and Assays
- Packaging & Storage

H3Africa Bioinformatics Network

** Transfer of assay results

CRF = Case Report Forms; DHL = DHL Express; **= Hand transfer by trained technician
Training & Career Development

Principal Investigator
Dwomoa Adu, MD
Akinlolu Ojo, MD

Training Advisory Group
Dwomoa Adu, MD
Frank Brosius, MD
3 Training Track Directors
2 External members

Training Program Administrator
(To be named)

Component Co-Leaders
Richard Cooper, MD
Babatunde Salako, MD

Track 1
Genomics focused Clinical Research and Biostatistics
Jacob Plange-Rhule, MD, PhD
Bamidele Tayo, PhD

Track 2
Advanced Clinical Research Methods
Daniel Clauw, MD
Richard Cooper, MD

Track 3
Predoctoral Training in Human Genetics & Bioinformatics
John Moran, PhD
Michael Boehnke, PhD

Track 4
Research Administration & Grant Management
IEARD

Track 5
Genomics Laboratory Methods
David Burke, PhD
Robert Lyons, PhD

Track 6
Short-Term Faculty Sabbaticals
David Burke, PhD
Nicki Tiffin, PhD
H3Africa Kidney Disease Research Network: Infrastructure/Capacity Building

1. Two genomic research laboratories in West Africa using sustainable, low capital-intensity laboratory technology platform (Dr. David Burke)

2. Develop mechanism for high throughput whole genomic sequencing in collaboration with overseas institutions (Dr. Rob Lyons, Dr. David Burke and Dr. Michael Boehnke)
Genomics Research Laboratory at the Noguchi Memorial Institute for Medical Research (NMIMR)

- Assessment of laboratory infrastructure at the NMIMR (Dr. Burke, Dr. Nyarko, Dr. Anita Ghansah, Mr Richard Oppong and Ms. Javada Appenteng)
- Protocols for sample acquisition, shipping, labeling, and processing
- Development of DNA preparation and genetic typing procedures matched to NMIMR infrastructure
- Development of genotyping reagents to provide initial assessments of clinical DNA samples
Agarose gel SNP genotyping to monitor DNA preparation quality and to assess H3Africa samples for sex. The LDR tests sex-specific genomic sequences in each sample, and size separated on a agarose gel, stained for DNA. Human male (2) and female (2) test samples are shown. The left 4 lanes show the amelogenin test. The **AmelogeninX** PCR band is specific for the X chromosomal variant, and appears, as expected, in both male and female samples. The **AmelogeninY** band is specific for the amelogenin gene Y chromosomal variant. The male samples have both peaks appear, female only one. The right 4 lanes show the SRY sequence test. The male samples have one band appear, females show no PCR product, as expecte
Additional Notes

- Submission of IRB application (7 centers)
- IRB approval (3 centers)
- Recruitment (1 center)
Acknowledgement

• H3A Kidney Disease Research Network Staff & Investigators
  • Jeffrey Struewing (NHGRI)
  • Jane Peterson (NHGRI)
  • Ebony Bookman (NHGRI)
  • Chengetai Mahomva (NHGRI)
  • Paul Kimmel (NIDDK)
  • Marva Moxey-Mims (NIDDK)
  • Rebekah Rasooly (NIDDK)
  • Mark Guyer (NHGRI)

Observational Study Monitoring Board (OSMB) Members

• David Warnock, MD (Chair), Susan Furth, MD, PhD,
• Jennifer Gassman, PhD,
• Ali Gharavi, MD,
• Maureen Kelley, PhD,
THANK YOU
EXTRA SLIDES FOR DISCUSSIONS
Specific aim 1 (N=50 families)

- Perform mutation analysis in key nephrotic syndrome/FSGS genes (*NPHS1, NPHS2, WT1, PLCE1, ACTN4, TRPC6 & INF2*) in a cohort of patients with familial NS/FSGS
- Perform genome wide linkage study (GWLS) and whole exome sequencing in a cohort of families in whom mutations in key NS/FSGS have been excluded
Specific aim 2 (N=3000 cases & 3,000 controls)

• Screen for known disease susceptible variants in *APOL1* and *MYH9* in a cohort of patients with
  - HIV associated nephropathy
  - Sickle cell disease nephropathy and controls without nephropathy and normal controls
  - HIV Nephropathy vs. HIV without nephropathy vs. controls
  - Sickle cell disease nephropathy vs. Sickle cell disease without nephropathy vs. controls
• Consent documents finalized and approved by NIH
• 7 out of 9 clinical centers submitted IRB application
• 3 out of 9 clinical centers have received IRB approval
• Revised protocol to be completed in Feb 2013
Enrollment and high level phenotypic characterization of 4,000 cases and 4,000 controls to enable genetics studies in four cohorts of patients with kidney disease:
1. Childhood/Adolescent-onset nephrotic syndrome
2. Sickle cell disease and sickle cell trait
3. HIV nephropathy
4. Chronic kidney disease of due to hypertension, diabetes mellitus and chronic glomerulonephritis
REDCap: Data & Computing Environment Security

- Duplicate servers at University of Ghana & SANBI, Cape Town, SA
- Application and database servers a on virtual machines (VM).
- The VM servers: Red Hat Enterprise Linux Server 5.5 (64-bit, 2.6.18.194.e15-smp kernel), 2 x Dual Core Intel Xeon CPU 3.06GHz with 4GB RAM, running Apache 2.2.3 (application servers) and MySQL 5.0.77 (database servers)
- Physical security for the databases:
  - Professionally managed and equipped tier-2 data center with tightly controlled access.
  - Remote data access employs SSL encryption and 2-tier Level 1 and Level 2 password challenges via LDAP authentication
  - Compliance with HIPAA security and privacy requirements
  - Compliance with the HITECH Act
  - Audit trails on user access to and modification of data
  - Clinical centers BMCE required to meet best practices established in the Federal Information Security Management Act (FISMA)
ENVIRONMENTAL HISTORY

Participant ID: (Example: Site 04 Participant 0001 Enter: 040001)

CRF Date: (dd-mm-yy)

CRF Version V1.0.20130805

RC ID:

1. During the past two weeks did you work at any time at a job or business, not counting work around the house? [INCLUDE UNPAID WORK IN THE FAMILY FARM OR BUSINESS]
   - Yes
   - No

2. Even though you did not work during those two weeks, did you have a job or business?
   - Yes
   - No

3. For whom do/did you work last in a full time job or business lasting two weeks or more?
   - Never employed?
   - Self-employed [GO TO 5]
   - Refused

   If worked, please enter name of employer

4. What kind of industry is/was this?
   - manufacturing
   - chemical
   - mining
   - public service, including teaching
   - commercial and retail
   - agricultural and farming
   - self employed professional (doctor, lawyer, accountant etc)
H3Africa Kidney Disease Research Network (U54): Training & Career Development Goals

1. Genome science training and career development program for African scientists in tandem with the Michigan Predoctoral Training Program in Genetics (Dr. John Moran) and the U-M Genome Science Training Program (Dr. Michael Boehnke)

2. System biology training and U.S. platform extension to Africa (Dr. Matthias Kretzler)
The H3Africa Kidney Disease Study
(U54 HG 006939-01)

Dwomoa Adu, MD, FRCP
Principal Investigator (Contact)
University of Ghana, Accra

Akinlolu Ojo, MD, PhD, MBA
Principal Investigator
University of Michigan, Ann Arbor, MI
Specific aim 3 (N=1,000 cases and 1,000 controls)

- Perform GWAS in a cohort of subjects with CKD of varying etiology including hypertension, diabetes mellitus, chronic glomerulonephritis
## Clinical Centers: Nine Centers in Four Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>Addis Ababa University</td>
<td>Addis Ababa</td>
</tr>
<tr>
<td>Ghana</td>
<td>University of Ghana</td>
<td>Accra</td>
</tr>
<tr>
<td></td>
<td>Kwame Nkrumah University of Science and Technology</td>
<td>Kumasi</td>
</tr>
<tr>
<td>Kenya</td>
<td>University of Nairobi</td>
<td>Nairobi</td>
</tr>
<tr>
<td>Nigeria</td>
<td>University of Abuja</td>
<td>Abuja</td>
</tr>
<tr>
<td></td>
<td>Obafemi Awolowo University</td>
<td>Ile Ife</td>
</tr>
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<td></td>
<td>University of Ibadan</td>
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</tr>
<tr>
<td></td>
<td>University of Ilorin</td>
<td>Ilorin</td>
</tr>
<tr>
<td></td>
<td>University of Nigeria</td>
<td>Enugu</td>
</tr>
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</table>
Participating Clinical Centers
## Study Subgroups

<table>
<thead>
<tr>
<th>Diagnosis-specific eligibility</th>
<th>Age</th>
<th>Cases</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steroid resistant nephrotic syndrome(^1)</td>
<td>&lt;18</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>FSGS/MCD &amp; MN</td>
<td>18-70</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>HIV nephropathy</td>
<td>18-70</td>
<td>500</td>
<td>500(^2)</td>
</tr>
<tr>
<td>Sickle cell nephropathy</td>
<td>18-70</td>
<td>500</td>
<td>500(^3)</td>
</tr>
<tr>
<td>Hypertensive non-diabetics with CKD</td>
<td>18-70</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>CKD due to diabetic nephropathy</td>
<td>18-70</td>
<td>800</td>
<td>800(^4)</td>
</tr>
<tr>
<td>CKD – Unknown etiology</td>
<td>18-70</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>4,000</td>
<td>4,000</td>
</tr>
</tbody>
</table>

\(^1\)Includes 50 families with index cases and affected family members
\(^2\)Patients with HIV and no nephropathy
\(^3\)Patients with sickle cell disease and no nephropathy
\(^4\)Patient with diabetes mellitus and no nephropathy
## Framework for the Infrastructure Enhancement for Genomics Research in the H3Africa Kidney Disease Research Network

<table>
<thead>
<tr>
<th>Project Period</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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</thead>
<tbody>
<tr>
<td><strong>Genomics Laboratory Methods</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single gene mutation analysis &amp; Genome Wide Linkage Studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole exome sequencing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNPs genotyping</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GWAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site of genomics laboratory studies</td>
<td>Israel/U.S.</td>
<td>Israel/U.S.</td>
<td>Africa, Israel &amp; U.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site of genomics data analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Africa</td>
</tr>
</tbody>
</table>
## H3A Kidney Disease Study Investigators

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>Key Personnel</th>
<th>Title</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethiopia</strong></td>
<td>Addis Ababa University</td>
<td>Y. Menghistu</td>
<td>Consultant Nephrologist/Assistant Professor</td>
<td>Center PI</td>
</tr>
<tr>
<td>Ghana</td>
<td>University of Ghana</td>
<td>Dwomoa Adu</td>
<td>Consultant Nephrologist</td>
<td>PI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charlotte Osafo</td>
<td>Lecturer in Nephrology</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alexander Nyarko</td>
<td>Director, NMIMR &amp; Professor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Michael Mate-Kole</td>
<td>Consultant Nephrologist/Professor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ivy Ekem</td>
<td>Snr. Lecturer/Consultant Hematologist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vincent Boima</td>
<td>Physician Specialist/Nephrologist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kwame Affram</td>
<td>Consultant Nephrologist/Professor</td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td>University of Science &amp; Technology</td>
<td>Jacob Plange-Rhule</td>
<td>Associate Professor</td>
<td>Center PI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benjamin Eghan</td>
<td>Senior Research Fellow</td>
<td></td>
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<td>S.O. Mc’Ligeyo</td>
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<td>James Ochanda</td>
<td>Associate Professor in Biochemistry &amp;</td>
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<td>Isabella Oyier</td>
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<td>Nicki Tiffin Junaid Gamiedien</td>
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<td>Richard Cooper, Bamidele Tayo</td>
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<td>Professor</td>
<td>PI, Stat. genetics, Genetics, Genetics, TAG, TAG</td>
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<td>University of Toronto</td>
<td>Rulan Parekh</td>
<td>Professor</td>
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Success factors for H3A the Kidney Disease Study

- Ability to rapidly establish kidney disease cohorts for:
  - Relevant major kidney disease phenotypes
  - High risk pediatric cohort
- Access to existing genomic science and bioinformatics infrastructure
- Leading experts in kidney disease on the African continent
- Catchment population of collaborating centers >350 million
- Supportive involvement of U.S. institutions with expertise in genomic science, statistical genetics & kidney disease
- Supportive involvement of African diaspora with relevant multidisciplinary expertise