Personalized Medicine as a Catalyst to a New Health Future for Ethiopia

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We are committed to a partnership with local Addis Ababa and national Ethiopian health, academic and life-science research decision-makers that aids them in their current efforts to create a more effective, more sustainable, and more community-responsive health care ecosystem in Ethiopia.

At the specific request of Addis Ababa University leadership working with the Ethiopian Ministry of Health and key stakeholders, we have committed to help develop a competent genomics and personalized medicine capability, from the ground up, that will serve as THE catalyst for a New Health Future for Ethiopia: combining education, training, technology acquisition and sustainability to empower patient and family-centered continuum of care and parallel economic development.

This partnership will be built on a foundation of collaboration and innovation. The guiding principles to this effort are:

- Autonomy
- Beneficence
- Respect
We will use real-word evidence and great science, combined with knowledge translation, training and education as the “drivers” to build this new ecosystem and foster true community-responsive innovation. Patients, their families and their communities will be active in all elements of this endeavor and new knowledge will be an integral by-product of every care experience.

We will position evidence development and its application in the Ethiopian context to foster health care that continually improves to meet the needs of Ethiopians.

Health care can be costly and challenging, yet an effective health care ecosystem is a critical quality of life factor for all society including productive workers. Successful economies require a high quality, sustainable, and responsive health care ecosystem.
Motivation

The Human Genome Project (HGP) fundamentally changed how we approach science and medicine. The HGP’s health benefits are beginning to bear fruit with personalized treatments tailored to an individual’s genetic profile. It has also been a financial success, delivering an economic dividend of $178 for every dollar invested. Yet, despite the promise for improving health and wellness, there is a profound inequality in the potential of genomic sciences – 90% of all genome sequences are derived from white European populations. Missing from this picture are genomes derived from any of the hundreds of diverse African populations.

The goal of the Ethiopian Translational Health Innovation (ETH-I) is to develop a local, stakeholder driven effort that uses genomics and data to empower innovation in healthcare and wellness in Ethiopian Universities and communities.

*In biological research, genomic diversity is a foundational principle. Now it is time to increase diversity in genomics.*
The benefits of this innovative project are manifold and include:

• Ethiopia will become a go-to resource for Pharmaceutical Companies and Drug Developers seeking to access this rich genomic dataset.
• Data will be owned by the individuals and will be a national resource to incentivize local investment and entrepreneurship.
• The project will train front-line health care workers in genomic sample collection, informed consent and in teaching the fundamentals of genomics.
• Data generated from this project will inspire training of a variety of Ethiopian Data Scientists; storage, application and software development, and informatics.
• The first Ethiopian genomic pioneers to participate will inspire the next wave of participants, innovators and educators.
Continuing the conversation: Why ETH-I, How and When?
Genomics is dominated by the ‘Global North data’ this fundamentally undermines the goals of personalized, precision medicine.

**Why:** As demonstrated in nature genetics (January 2019: 30–35) geographically appropriate datasets are needed. We further submit that local researchers need to be the driving stakeholders, “300million bp (~10%) of the genome of populations of African descent is missing from the reference genome”

**How:** By empowering AAU and affiliated scientists to apply genomic technologies.....

**When:** First step are two workshops in April/May 2019
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April 2019, on the ground, training the trainers.

Workshop 1. Pharmacogenomics and plant genomics

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<th>Day 1</th>
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<td>10am-11am: Introductory Lecture 1h Goals for the workshop</td>
<td>10am-11am: Review of Day 1</td>
<td>10am-11am: Review of Day 2</td>
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<td>11am-1pm: Review of molecular techniques Pipetting Good laboratory practices Documentation</td>
<td>11am-12noon: Saliva and plant DNA extraction Pt2</td>
<td>11am-12noon: Gel electrophoresis of P reactions</td>
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<td>12noon-1pm: Data Documentation best practices</td>
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<td>2:00-3pm: Saliva and plant DNA extraction Pt1</td>
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<td>3-4pm: Saliva and plant DNA extraction Pt2</td>
<td>3-4pm: Load Minion</td>
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<td>4-5pm: End-point PCR set-up 1</td>
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<td>Workshop 2. Small genomes and microbiome</td>
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Stakeholder Institutions

- **University of Addis Ababa**
- **The Center for innovative Drug Development** and Therapeutic Trials for Africa (CDT-Africa) is a semi-autonomous, World Bank supported center of excellence for education and research. [http://cdt-africa.org/](http://cdt-africa.org/)
- **Armauer Hansen Research Institute (AHRI)** founded in 1970 through the initiative of the Norwegian and Swedish Save the Children organizations. AHRI is a biomedical research institute and joined the Ethiopian Ministry of Health in 2004. [https://ahri.gov.et/about-ahri](https://ahri.gov.et/about-ahri)
- **Ethiopian Biotechnology Institute (EBTI)**: Mission is to provide world class research, innovation and community service to improve citizens' quality of life and to significantly contribute for the national economic development via the synergetic endeavor of biotechnology and emerging technologies [http://www.ebti.gov.et/](http://www.ebti.gov.et/)
- **MRC-ET**: An affiliate of MRC-Holland; MRC-ET provide a much-needed service to the community by providing genetic diagnostics services and state of the art genetic screening techniques to medical institutes.
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Stakeholder Contacts

Tassew Woldehanna - President of the Addis Ababa University
Dr. Mitike Molla Sisay - Vice President for Research, Technology Transfer and Community Services
Dr. Abebaw Fekadu, MD, Ph.D., MRCPsych Lead, and Faculty Director CDT
Abebe Genetu Bayih - Director General, Armauer Hansen Research Institute (AHRI) Addis Ababa, Ethiopia
Kassahun Tesfaye (Ph.D.) Director General, Ethiopian Biotechnology Institute, Ministry of Science and Technology, Ethiopia

Prof Eyasu Makonnen, Ph.D. CDT Lead, and College of Health Sciences (CHS)
Dr. Mistry Wolde - The College of Health Sciences (CHS), Addis Ababa University (AAU),
Dawit Wondimagegn MD - Chair, Department of Psychiatry Faculty of Medicine, Addis Ababa University, Ethiopia
Dr. Ephrem Engidawork - Addis Ababa University Department of Pharmacology (ex-dean of School of Pharmacy)

Teshome Nedi (BPharm, MSc, Ph.D.) --- Associate Professor of Pharmacology, Head, Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, College of Health Science
Ayene Ashenef -- Assistant Professor, Department of Pharmaceutical Chemistry and Pharmacognosy, School of Pharmacy
Tesfaye Sisay Tessema (DVM, MSc, Ph.D.), Assoc. Prof. - Director, Institute of Biotechnology, Addis Ababa University
Dr. Zewdu Terefework -- MRC-ET Advanced Laboratory · Genetics
Haile Gebrselassie is a retired Ethiopian long-distance track and road running athlete
Staff at the Ministry of Innovation and Technology (MInT), and the Ministry of Health (MOH) Ethiopia
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