



## Word from the Director

Dear Reader,

On behalf of the Makerere University Lung Institute (MLI) I am delighted to introduce to you the first issue of our quarterly newsletter. The MLI Newsletter will be published quarterly to disseminate events and activities that take place at MLI. These activities are usually covered in a detailed quarterly reports but these reports are usually technical and detailed making them suitable for those who would like to know the nitty gritty of what we do. The newsletter will pick news and lighter components of the MLI activities and provide it in reader friendly fashion.

The lung Institute was founded in November 2015 to be a center for lung health research within the College of Health Sciences. Since its inception, the Lung Institute has built capacity in lung health research for both communicable and non-communicable respiratory diseases covering

several research paradigms. Collaborative research is vital for this process and MLI is involved in several collaborative projects including, but not limited to multi-centre, multi-national studies spanning multiple continents. MLI also recognized that there is a need for specialised respiratory health care services and mid this year, we officially opened a clinic that provides specialist diagnostic and respiratory services to the public. Looking towards the future, MLI hopes to consolidate the gains made so far in lung health research, training and care to shape policy and guide prevention and treatment strategies of respiratory diseases.

I wish you a nice and enjoyable read.

Science for healthy lungs, as we build for the future



Dr. Bruce J Kirenga  
Director, MLI

## Makerere University Lung Institute unveils first-of-its-kind pulmonary function assessment equipment

Story on P.2



The MLI building at the Makerere University College of Health Sciences (MakCHS)

## Word from the Editors

We are excited to bring to our readers this first issue of the MLI newsletter. This issue focuses on landmark events happening at MLI in the last quarter. We discuss cutting edge diagnostics introduced at MLI in a way that is relevant to patients, researchers, students, clinicians and other lung health professionals. These services will be available through the MLI clinic that provides consultation services for lung health.

MLI has grown over the past year as evidenced by an increase in the number of active projects at the institute. Publications by researchers at MLI are also presented in this issue.

We hope you find this issue insightful and a pleasant read. You can reach out to the editorial team with your feedback, comments and questions. We hope to hear from you!

## INSIDE THIS ISSUE

- Pulmonary function assessment – all you need to know about the test
- MLI clinic
- Data management in research
- Active projects
- Recent publications



*Date: Second Wednesday of every month*

*Time: 3:00 -5:00pm*

*Venue: MakCHS Boardroom*

### Editorial team



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## MLI unveils new equipment



**IN ATTENDANCE:** From left to right Prof Charles Ibingira (MakCHS principal), Mr. Simon Mugambe, Dr. Wincey Katagira, Mr. Simon Onanyang, Dr. Rebecca Nantanda, Dr. Bruce Kirenga (MLI Director) and Mr. Rogers Sekibira

If you take a moment to think about it, we all know someone who suffers from a chronic respiratory ailment and has been in and out of hospitals in search of a remedy to ameliorate their symptoms.

It is estimated that about one in every five Ugandans experience difficulty breathing and this proportion, alongside severity of disease, increases with age. Proper diagnosis is a key step in managing chronic respiratory illnesses such that appropriate treatment can be instituted.

Ugandans will soon have a reason to smile as the first full pulmonary function assessment equipment was unveiled on the 31<sup>st</sup> August 2018 at the Makerere University Lung Institute located at the College of Health Sciences, Mulago. The function was graced by the College Principal, Prof. Charles Ibingira who noted that the equipment would 'improve lung science teaching, care and research.'

The equipment was donated by MLI collaborators in the UK through the efforts of the institute's Co-Director Dr. Rupert Jones of the University of Plymouth. The institute

received a full set of pulmonary function assessment equipment able to conduct full spirometry, lung volume tests by the nitrogen wash out method and lung diffusion tests by determining the diffusing capacity of the lungs for carbon monoxide (DLCO, also known as transfer factor for carbon monoxide).

Also included was an assortment of pulmonary function test consumables. Dr. Bruce Kirenga, MLI's Director, who was present at the unveiling was 'excited to receive this equipment and the Lung Institute is going to be one of the very few centres to offer these services in sub-Saharan Africa.' He also noted that the equipment would be critical for the complete assessment of patients with unexplained shortness of breath, a common group of patients in the Ugandan setting.

Although some centres in Uganda can appropriately diagnose patients with asthma or chronic obstructive pulmonary disease, this equipment will be vital for assessing patients with persistent shortness of breath for whom no diagnosis has been made. This is in line with the MLI's mission of conducting high quality lung health research that integrates disease prevention, clinical care and training in sub-Saharan Africa.

Pulmonary assessment services are open to the public on referral and appointment basis at the Lung Institute clinic on weekdays from 8:00am to 5:00pm.

By Dr. Jasper Nidoi

## Makerere University Lung Institute Clinic

The MLI clinic was opened in June 2018 and it aims to be a center of excellence for pulmonary clinical services. The clinic offers strictly outpatient care and patient follow up, primarily on physician referral basis. Patients are also seen on self-referral. The clinic runs from Monday to Friday, 8 am – 5pm and has four fulltime staff; a Clinic manager/Medical Officer, Clinic administrator, Respiratory technician and a Nurse who work alongside 7 physicians and 2 paediatricians. Consultations are provided on appointment and walk-in basis for conditions including but not limited to asthma, chronic obstructive pulmonary disease, obstructive sleep apnoea, interstitial lung disease and smoking cessation.



Diagnostic services: We avail pulmonary function tests, which include spirometry and Fraction of Expired Nitric Oxide (FeNO). The clinic recently received equipment to perform Diffusing capacity of the Lung for Carbon Monoxide which is anticipated to start before the end of the year. Additionally, sleep tests (polysomnography) for obstructive sleep apnoea are expected to start in the near future. Allergen testing (skin prick testing) and pulmonary rehabilitation services are offered on appointment.

The clinic has experienced a steadily increasing number of clients since its opening and this number is expected to continue rising as awareness on the need and availability of specialist pulmonary care grows.

By Dr. Joseph Makoba

## Active projects at MLI

Since its inception in 2015, MLI has attracted several research grants in line with its mission of conducting high quality lung health research. This issue lists the active projects at the institute. Look out for a detailed description of these projects in subsequent issues.

### ASAP (GSK)

African Severe Asthma Program

### FRESHAIR H2020 (EU)

Free Respiratory Evaluation and Smoke-exposure reduction by primary Health Care Integrated Groups

### GECO (MRC UK)

Global Excellence for COPD

### TB PCS Project (WHO & CUAAM)

Tuberculosis Patients' Costs Catastrophic Survey

### Luli Project (LSTM)

Lung Life

### MakNCD Training Programme (NIH)

Makerere University Non-Communicable Disease Training Programme

### STREAM Trial (USAID)

The Standardised Treatment Regimen of Anti-TB Drugs for Patients with MDR-TB

### STREAM HE (LSTM)

Health Economics Project

### IMPALA Project (LSTM)

International Multi-Disciplinary Programme to Address Lung Health and TB in Africa

### EXIT TB (EDCTP)

Translation research into policy and practice: Scaling up Evidence Based Multiple focus Integrated Intensified TB Screening to End TB (EXIT-TB) in the East African region

### LMCB (GSK)

Investigation of the association between Lung Microbiome and HIV-associated Chronic Obstructive Pulmonary Disease (COPD) in rural Uganda

### COPA (GSK)

Chronic Obstructive Pulmonary Disease (COPD) Attack Study

### ACACIA (NIHR UK)

Achieving Control Of Asthma Among Children In School Project

### Rehab Centre

(Crowdfunder UK)

### GLOBAL RECHARGE

(NIHR UK)

### PED MDR TMC207-C11

(Jansen)

## Data management in research

Collecting quality data is a very important aspect of research as it is a source of information that can be used to support a hypothesis, answer research questions and eventually guide policy makers to improve health.

Because of this, data is one of the most important elements handled at Makerere University Lung Institute (MLI). At the institute, the following principles are used while collecting data;

#### 1. Get the right data.

Collect data which is relevant to the specific research questions. To answer a research question on

gender disparity, one should collect data from both males and females.

2. **Get the data right.** Collect data with precise definitions and appropriate methods of measurement. Professional standards and guidelines should be an important reference point while designing data collection tools.

3. **Get the data right away.** Get current and timely data from a well-defined study population relevant to the research question.

4. **Get the data the right way.** Get data through a rigorous process which can guarantee data quality and ensure consistency. Instructions about methods



Member of the MLI data team

and data standards must be explained clearly. The people involved in data collection should be trained.

#### 5. Get the right data management.

Collect reliable data which is guaranteed by

good quality control conducted by relevant stakeholders.

At MLI data managers are involved in research at all stages, right from generating research ideas to the eventual dissemination of research findings. The involvement of data managers in the formative stages of a research proposal not only fosters a complete understanding of the researcher's interest but also creates a sense of vested interests among the data managers to ensure its success. This unique attribute of MLI has contributed to its production of high quality data.

By Rogers Sekibira

## Recent publications

1.Morgan BW, Siddharthan T, Grigsby MR, et al. Asthma and Allergic Disorders in Uganda: A Population-Based Study Across Urban and Rural Settings. *J Allergy Clin Immunol Pract.* 2018;6(5):1580-1587.e2. doi:10.1016/J.JAIP.2017.11.032.

2.Siddharthan T, Grigsby MR, Goodman D, et al. Association between household air pollution exposure and chronic obstructive pulmonary disease outcomes in 13 low- and middle-income country settings. *Am J Respir Crit Care Med.* 2018;197(5):611-620. doi:10.1164/rccm.201709-1861OC.

3.Lunyera J, Kirenga B, Stanifer JW, et al. Geographic differences in the prevalence of hypertension in Uganda: Results of a national epidemiological study. *Etyang AO, ed. PLoS One.* 2018;13(8):e0201001. doi:10.1371/journal.pone.0201001.

4.Kirenga BJ, Mugenyi L, de Jong C, et al. The impact of HIV on the prevalence of asthma in Uganda: a general

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population survey. *Respir Res.* 2018;19(1):184. doi:10.1186/s12931-018-0898-5.

5. Muttamba W, Ssenooba W, Sekibira R, Kirenga B, Katamba A, Joloba M. Accuracy of different Xpert MTB/Rif implementation strategies in programmatic settings at the regional referral hospitals in Uganda: Evidence for country wide roll out. *Hasnain SE, ed. PLoS One.* 2018;13(3):e0194741. doi:10.1371/journal.pone.0194741.

6. Kirenga BJ, Jong C de, Mugenyi L, et al. Rates of asthma exacerbations and mortality and associated factors in Uganda: a 2-year prospective cohort study. *Thorax.* 2018;73(10):983-985. doi:10.1136/THORAXJNL-2017-211157.

## The pulmonary diagnostic system

The Makerere University Lung Institute (MLI) received a pulmonary diagnostic system from CareFusion which meets all requirements in the field of modern lung function diagnostics. It complies with the relevant standards especially the European Respiratory Society (ERS) and the very strict American Thoracic Society (ATS) criteria. Some of the tests the system can perform include;

### **DLCO - Diffusing capacity of the lungs for carbon monoxide**

DLCO or TLCO is the extent to which oxygen passes from the air sacs of the lungs into the blood. The DLCO measures the ability of the lungs to transfer gas from inhaled air to the red blood cells in pulmonary capillaries. The DLCO test is convenient and easy for the patient to perform. The ten seconds of breath holding required for the DLCO manoeuvre is easier for most patients to perform than the forced exhalation required for spirometry. Because carbon monoxide binds quite readily to haemoglobin, the fewer red blood cells in the blood, the less carbon monoxide will be taken up. The patient takes a full inspiration of a gas mixture containing 0.3 % carbon monoxide and 10 % helium (the dilution of which provides an index of lung or "alveolar" volume).

### **Causes of abnormal DLCO**

Some of the causes of low (below normal) DLCO include anaemia, chronic obstructive pulmonary disease with emphysema, Interstitial Lung Disease, and pulmonary vascular diseases. On the other hand, Asthma, obesity, and less commonly polycythaemia, congestive heart failure, pregnancy, atrial septal defect, and haemoptysis or pulmonary haemorrhage can increase DLCO above the normal range.

### **Spirometry**

Spirometry is one of the pulmonary function tests used to assess how well your lungs work by measuring how much air you inhale and exhale, and how fast you exhale air from the lungs. It is used to diagnose and monitor treatment for a number of lung diseases that affect these two components of breathing (volume and flow of air from the lungs), for example asthma, COPD, pulmonary fibrosis and other conditions that affect breathing. Spirometry can also be part of a bronchial challenge test, used to determine bronchial hyperresponsiveness to either rigorous exercise, inhalation of cold/dry air, or with a pharmaceutical agent such as methacholine or mannitol. Sometimes, to assess the reversibility of a particular condition, a bronchodilator is administered before performing another round of tests for comparison. This is commonly referred to as a reversibility test, or a bronchodilator challenge test (BD challenge), and is an important part in distinguishing asthma from COPD.

### **How it is done**

In a spirometry test, while you are sitting, you breathe into a mouth piece that is connected to an instrument called a spirometer, with a nose clip to avoid breathing out some air through the nose. The entire test usually takes less than 10 minutes if instructions are followed correctly.

### **Potential complications**

Spirometry is considered to be very safe and it rarely results in complications for subjects. It can occasionally cause effects

in some individuals, such as dizziness, faintness, shakiness, nausea and fatigue, but these are typically short-lived and resolve shortly after the test.

### **Lung Plethysmography**

Lung Plethysmography is also called pulmonary or body plethysmography. This procedure is used to measure how much air you can hold in your lungs. It allows an analysis of the complete pulmonary breathing mechanics. It includes the measurement of the airway resistance and the intrathoracic gas volume.

Spirometry is the standard method for measuring most relative lung volumes; however, it is incapable of providing information about absolute volumes of air in the lung. Thus a different approach is required to measure residual volume, functional residual capacity, and total lung capacity. Two of the most common methods of obtaining information about these volumes are gas dilution tests and body plethysmography.

In body plethysmography, the patient sits inside an airtight box, inhales or exhales to a particular volume (usually FRC), and then a shutter drops across their breathing tube. The subject makes respiratory efforts against the closed shutter (this looks, and feels, like panting), causing their chest volume to expand and decompressing the air in their lungs. The increase in their chest volume slightly reduces the box volume (the non-person volume of the box) and thus slightly increases the pressure in the box.

In addition, all important parameters of the slow spirometry and the forced spirometry can be done for the first time using this test.

Other tests done by the pulmonary diagnostic system include; impulse oscillometry, functional Residual Capacity, resting and stress ECG, rhinomanometry, respiratory drive and respiratory muscle strength.

By Dr. Esther Nalwoga Namazi & Dr. Wincey Katagira