

Newsletter

MAXIMIZING THE INTEGRATION OF ARTIFICIAL INTELLIGENCE IN TUBERCULOSIS CONTROL INTERVENTIONS TO REDUCE HEALTH DISPARITIES IN LOW-RESOURCE SETTINGS

By Dr. Yamin Kyaw Thu, Hubert H. Humphrey Fellow

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Tuberculosis remains a major public health concern in low- and middle-income countries (LMICs) and one of the leading causes of death from a single infectious agent globally. According to the World Health Organization's Global Tuberculosis Report 2024, 37 national tuberculosis prevalence surveys were conducted across 32 countries in Africa and Asia between 2007 and August 2024, and indicate a significant decline in TB transmission and a remarkable decrease in incidence of TB cases. However, these surveys also show that TB prevalence to notification ratio remains high, suggesting substantial underreporting and underdiagnosis of people with TB disease. Several factors contribute to this gap, most of which are context-specific, including poor health infrastructure, limited resources, and sociopolitical instability. To overcome these barriers in LMICs and interrupt community transmission, locally effective strategies must be implemented rapidly to increase TB case detection and reduce the number of missed cases. Achieving the End TB Strategy 2035 targets will require innovative approaches that address both operational and resource challenges in

these countries. One promising avenue is the integration of Artificial Intelligence (AI) in TB prevention and control strategies, particularly in LMICs where the burden is highest, to reduce health inequities.

AI tools can help minimize gaps that lead to significant health disparities due to the imbalanced health resources allocation between urban and rural areas. This is one of the biggest challenges of the National TB Programs (NTPs) in LMICs in achieving TB elimination and eradication goals. To fill this gap, AI tools can be utilized to strengthen the rural TB surveillance systems. For instance, traditional accelerated TB case finding activities should be strengthened by installation of AI-driven digital chest X-ray (CXR) machines which provide computer-aided diagnostic interpretations in remote primary health centers with shortage of radiologists or medical doctors, as exemplified in a project led by **TRAC-affiliated researchers in the Philippines**. These AI driven CXR machines can help presumptive TB patients receive diagnoses in regions where quality laboratory centers are not available, and the AI interpretation can also bolster routine CXR TB screening and aid in predicting TB treatment outcomes.

Another potential application of AI is within Directly Observed Treatment Short Course (DOTS) programs, where it can support monitoring of drug adherence and reduce instances of incomplete or unsuccessful TB treatment which is a major barrier in anti-TB treatment. Although the DOTS strategy is highly effective, it places substantial demands on health professionals, particularly in settings facing severe human resource shortages. To alleviate the burden on health professionals and reduce the chance of missing doses, thereby preventing the emergence of acquired drug-resistant TB cases, the use of AI-driven smartphone applications could be advanced to monitor real-time patient drug adherence remotely, assuming the smartphones are readily accessible to the TB patients.

A range of collaborative studies have been undertaken by TRAC-affiliated investigators to understand the potential of AI and digital adherence technologies (DATs), for example; **1) University of Georgia investigators and Ugandan collaborators** have used different deep learning models to analyze the most effective video observed treatment in limited resource settings, **2) Emory and Ethiopian collaborators** have investigated the cost-effectiveness of AI and the effectiveness of using digital medication reminders and monitoring devices compared to traditional DOTS, and **3) Emory researcher Anne Spaulding and Maria Tarcela Gler** (De La Salle Medical and Health Sciences Institute, Philippines) contributed to a meta-analysis that found real-time monitoring of medication adherence using DATs helps health care workers to identify patients who need greater

levels of adherence support.

AI-assisted tools have the potential to become the cornerstone of TB control and response interventions, contributing significantly to achieving a TB-free world by 2035. To realize this potential, it is crucial to scale up the rapid deployment of context-specific and effective AI-integrated TB control strategies into the NTPs' programmatic management of all forms of TB in LMICs - the epicenters of TB infection responsible for 80% of global TB cases - ensuring that no person with TB infection is left behind. To implement sustainable digital AI-assisted TB interventions, NTPs should map the digital health ecosystem, **as Emory and Ethiopian collaborators have done for African Countries**, to identify infrastructure needs, and determine the most cost-effective AI approaches.

Currently, the operational use of AI in TB interventions is still in its infancy in low-resource settings. There is an urgent need for more robust operational research to evaluate the cost effectiveness of implementing AI-based interventions into national TB prevention and control interventions, and to generate evidence on their effectiveness in real-world contexts. Additionally, advocacy targeting national governments is critical to secure investment in AI-driven TB control and response activities. Strengthening human resource capacity in digital health technologies for front-line TB professionals, and research training such as TRAC Clinical and Population Science Core Co-Director **Christopher Whalen's** Fogarty International Center-funded training grant titled '*Digital Mobile Technologies to study Tuberculosis: A Multi-disciplinary Program*' should also be a priority. NTPs can then integrate AI-based TB interventions into programmatic management of all forms of TB in their countries through step-wise national scale-up.

About the author: Dr. Yamin Kyaw Thu is a Hubert H. Humphrey Fellow Alumna at the Rollins School of Public Health, Emory University. As a former Assistant Director of the Subnational TB Unit in Chin State, Burma (Myanmar), her leadership included successfully organizing mobile TB case-finding across over 100 hard-to-reach villages in highly mountainous Chin State in a two year time frame, resulting in the screening of more than 7,000 persons suspected to have TB, despite poor infrastructure.



Acknowledgment: I would like to express my heartfelt gratitude to Dr. Kenneth Castro, Co-Director of TRAC at Emory University, and Dr. Lisa Sharling, TRAC Program Director, for the opportunity to contribute this article.

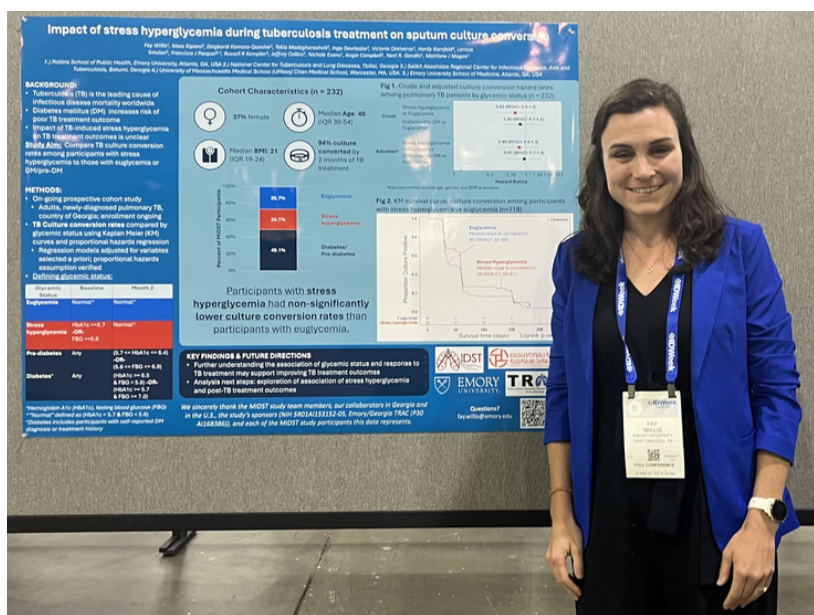
IDWeek in Atlanta



IDWeek 2025 was held at the Georgia World Congress Center in Atlanta October 19-22. **Russell Kempker, MD, MSc** co-presented the ‘Challenging Management of Tuberculosis’ session with Janice Louie, MD, MPH, Medical Director of the San Francisco Department of Public Health’s TB Prevention and Control Program. Their presentation of challenging TB cases in the United States was

highlighted in the IDweek daily news article [“When Shorter isn’t Simpler: Navigating TB Drug Resistance”](#).

University of Georgia TRAC members also took the opportunity to host Ugandan collaborator **Noah Kiwanuka, MBChB, MPH, PhD** from Makerere University from October 23-27, while he was visiting Atlanta to attend IDWeek. Dr. Kiwanuka’s visit focused on publication preparation from collaborative studies and planning for future NIH grant submissions.



Emory Data Manager **Fay Willis, MPH**, presented findings from the ‘Immunometabolic impact of stress hyperglycemia on tuberculosis treatment outcomes and risk of diabetes mellitus’ (MIDST) study with a poster titled ‘**Impact of stress hyperglycemia during tuberculosis treatment on sputum culture conversion.**’ Among TRAC-affiliated attendees was recent Emory MPH Grad **Victoria Ontiveros, MPH** who

presented findings from her summer practicum project with the Georgian National Center for Tuberculosis and Lung Disease.

Halloween at the Emory Vaccine Center

Rachel Kinsella, Prashant Bajpai, Jyothi Rengarajan, Terra Riddick, Ayana Paul, Kit

Dkhar and Kalpana Patel got into the spirit of Halloween for the EVC Halloween Parade. Spooky!



TRAColades

A very well deserved congratulations to **Henry Blumberg, MD**, for being one of 8 national recipients of the **2025 Elizabeth Hurlock Beckman Award**. Dr. Blumberg was nominated by long-time mentee and collaborator Nestani Tukvadze, MD, and a recognition ceremony was held in Atlanta on November 8, 2025. The award, funded by the Elizabeth Hurlock Beckman Award Trust, recognizes educators who have inspired a former student to “create an organization which has demonstrably conferred a benefit on the community at large” or “establish on a lasting basis a concept, procedure, or movement of comparable benefit to the community at large.”





Congrats!

Congratulations to **Cheryl Day, PhD, Russell Kempker, MD, MSc, and Jessica Fairley, MD, MPH** on their promotions to

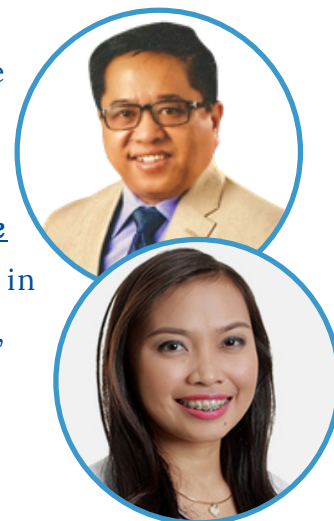
Professor, a huge career milestone. They were honored at the Emory School of Medicine's Celebration of Faculty Eminence Ceremony on October 28.

Publication Highlights



Congratulations to **Peter Cegielski, MD** and collaborators on their highly collaborative paper titled “**Knowledge gaps and research priorities for understanding the transmission of *Mycobacterium tuberculosis* and other airborne infections**”. The study team included Emory early-stage investigators **Mike Marll, MD** (Pulmonary and Critical Care Research Fellow), **Emily Evans, MD** (Infectious Diseases fellow), and **Collin Dubick, MD** (Pediatric Infectious Diseases fellow). The international group conducted an extensive literature review and interviewed 12 experts who are actively engaged in the airborne transmission science field to understand knowledge gaps in the field and to update the 2017 Roadmap for TB Transmission Science. The study concluded that six topics that impede prevention and control efforts and require more research: 1) fundamental elements of aerobiology, 2) detecting and measuring infectious respiratory particles directly in the air, 3) the infectiousness of asymptomatic TB, 4) the infectiousness of calm tidal breathing, 5) the role of ‘superspreading’ in disease incidence, and 6) the duration of infectiousness of highly drug-resistant TB treated with the newest, all-oral short-course regimen. Additionally recent systematic reviews note relatively low quality published research in this area and support a need for more high-quality research to provide evidence-based recommendations for incorporation into guidelines and regulations.

Congrats to **Drs. Melchor V.G. Frias IV** and **Dessa J.O. Casalme** at the University of the Philippines and De La Salle Health Sciences Institute (Philippines) respectively, and their collaborators in South Africa, India, Australia and the U.S. on their article titled **“Acceptability of 100-mg moxifloxacin in children with rifampicin-resistant TB in three high-burden countries”**. Treatment of rifampicin-resistant TB (RR-TB) in children is challenging and associated with long-term adverse effects, although recently available shorter, injectable-free regimens are now recommended by World Health Organization (WHO). There is also increasing awareness that the acceptability of medication may be influenced by its taste, smell, size, and texture, and may affect children’s and caregivers’ treatment experience, adherence and treatment success. Moxifloxacin is recommended by the WHO for the treatment of RR-TB and until recently, oral moxifloxacin was only available as a 400mg tablet. The 400mg tablet must be split and/or crushed for younger children who require lower doses and it is difficult to mask the bitter taste. Their study leveraged the ACTG global clinical trials network and its Clinical Trial Units and found 100mg dispersible moxifloxacin to be more acceptable than the 400mg moxifloxacin for young children and their caregivers, and for older children because of its relative ease of preparation, but not due to improved palatability.



We are excited to highlight the work of **Peter Cegielski, MD** on nutritional status as both a risk factor for TB infection and as a driver of the TB epidemic. The recent article titled **“Tuberculosis and undernutrition: improving estimates to reinforce the policy imperative”** (Lancet Infectious Diseases) argues that the revised relative risk (RR) estimates used by World Health Organization (WHO) in 2024 to amend

undernutrition’s estimated population attributable fraction (PAF) - the number of TB disease episodes attributable to undernutrition - will significantly underestimate the population-level importance of undernutrition as a driver for the global TB epidemic. Consequently, policy decisions and allocation of resources might be redirected, leading to missed opportunities and diminished funding for nutritional interventions that could prevent tuberculosis disease and save lives. To ensure more accurate estimates moving forward, the authors propose that WHO PAF calculations for undernutrition account for the dose-response relationship between BMI and tuberculosis disease (see TRAC Newsletter Vol. 31) and the underlying distribution of BMI in different populations.

Upcoming Events

TB WORKS IN PROGRESS SEMINAR: NOVEL GENETIC LOCUS ASSOCIATED WITH RESISTANCE TO M. TUBERCULOSIS INFECTION: A GENOME-WIDE ASSOCIATION STUDY



**Friday December 5th, 2025, 9–10 am
CNR Room 3001 and Zoom [Flyer]**



Matheus Fernandes Gyorfy, MPH is a doctoral student in the Department of Epidemiology, Emory Rollins School of Public Health. He attended Colorado State University, where he graduated with a B.S. in Biological Sciences and a B.A. in Languages, Literatures, and Cultures. He completed his MPH degree at Emory University and now applies his genetic and molecular expertise to study the intersection between multi-

omics and infectious diseases and the role of genomic factors involved in the resistance to tuberculosis infections, the bidirectional relationship between tuberculosis and diabetes mellitus, and DNA methylation patterns in individuals with latent tuberculosis.

SYSTEMS BIOLOGY VIRTUAL & IN-PERSON OFFICE HOURS



**4th Thursday of the month Aug-Oct & Dec 11
10–11am ET, RRR 205 & Zoom**



Jeffrey Collins, MD, MS



Xin Hu, PhD



Boris Minasenko, MS



Ashish Sharma, PhD

Drop in to receive one-on-one support from informaticists with 'omics' study design and data analysis for tuberculosis research - including bulk and single cell transcriptomics, metabolomics and lipidomics. For more information please contact: jeffrey.michael.collins@emory.edu



DECEMBER

Bulletin Board



University Research Committee

Emory's **University Research Council (URC)** recently announced their **Request for Proposals (RFP)** for funding to be used during the 2026-2027 cycle. The RFP is released with support from the Office of the Provost, the Office of the Senior Vice President for Research, and in collaboration with the Halle Institute for Global Research and Learning, and the Fox Center for Humanistic Inquiry.

Regular, continuing full-time faculty of Emory University are eligible to apply. Award maximums are \$30,000 and most URC awards are single PI projects. Interdisciplinary proposals are an exception, with awards up to \$40,000.

Applications are being accepted through 11:59 p.m. Jan. 17, 2026.



NIH Notices and Updates



- **Updated NIH Policy on Foreign Subawards**, NOT-OD-25-104, May 1, 2025
- **New Application Structure for NIH-Funded International Collaborations**, NOT-OD-25-155, September 12, 2025
 - **FAQs for Foreign Subawards** (applications with foreign subawards will be withdrawn for due dates on or after September 25, 2025).
- **Updated NH Processes for No-Cost Extensions**, NOT-OD-25-110, May 7, 2025
- **Update: No-Cost Extension Functionality in eRA**, NOT-OD-25-142, August 7, 2025
- **Early Stage Investigator (ESI) Eligibility Extension and Reinstatement**. NIH has granted automatic extension of ESI eligibility for those impacted by delays in grant application submissions, peer review, or award processing timelines between January 1 - May 1, 2025. See **FAQs**
- **Supporting Fairness and Originality in NIH Research Applications**, NOT-OF-25-132, July 15, 2025
 - NIH will only accept six new, renewal or revision applications from a PD/PI for all council rounds in a calendar year. See updated **FAQs**.
- **NIH Will Stop Posting Notices of Funding Opportunities in the NIH Guide for Grants and Contracts in FY2026**, NOT-OD-25-143, August 14, 2015
- **NIH Director Statement: Advancing NIH's Mission Through a Unified Strategy - NIH Priorities**, August 15, 2025

October Publications

Collins JM, Tukvadze N, Kempker RR. Targeting Tryptophan Metabolism for Tuberculosis Biomarkers and Host Directed Therapy. J Infect Dis. 2025. DOI: 10.1093/infdis/jiaf510.

Fiegggen J, **Meintjes G**, Boulle A, Euvrard J. Characteristics of Individuals with Advanced HIV Disease and Risk Factors for Mortality in a Contemporary Cohort in South Africa. J Acquir Immune Defic Syndr. 2025. DOI: 10.1097/qai.0000000000003767.

Mdlenyani L, Mohamed Z, Stadler JAM, Mtwana N, **Meintjes G**, Warren R, Saunders MJ, Kuhlin J, **Wasserman S.** Treatment outcomes of bedaquiline-resistant tuberculosis: a retrospective and matched cohort study. Lancet Infect Dis. 2025;25(10):1149–58. DOI: 10.1016/s1473-3099(25)00218-x.

Mebrat B, Garcia JJ, Woldeamanuel Y, Adane K, Hicks A, Tilahun M, Neway S, Oluma L, Atnafu A, Gelfond J, Evans CA, Torrelles JB, Wang SH, **Wassie L.** Performance of the low-cost phenotypic thin-layer agar MDR/XDR-TB Colour Test (first generation, 1G, Color Plate Test) for identifying drug-resistant Mycobacterium tuberculosis isolates in a resource-limited setting. BMC Microbiol. 2025;25(1):652. DOI: 10.1186/s12866-025-04347-z.

Olotu AA, Bick JA, Medley-Lane BS, **Spaulding AC.** Infection Control in Carceral Facilities. Clin Infect Dis. 2025. DOI: 10.1093/cid/ciaf479.

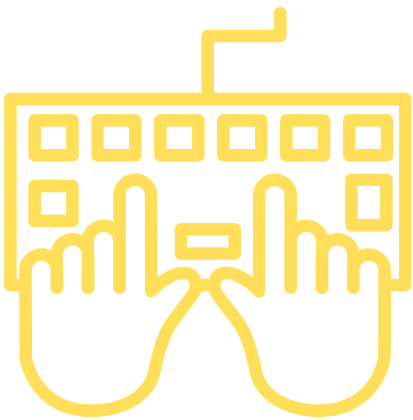
Pearson RA, Krish KN, Whatney WE, Jaoko W, Mandaliya K, Overbaugh J, Graham SM, McClelland RS, Hicks SL, Maurer J, Scharer CD, **Day CL.** Single-Cell Transcriptomics Reveals Depletion and Dysregulation of Mycobacterium tuberculosis-Specific Th1 and Th17 Cells Early After Acquisition of Human Immunodeficiency Virus. J Infect Dis. 2025;232(4):835–46. DOI: 10.1093/infdis/jiaf354.

Rossi-Smith P, Kim J, Skirlo K, Ferris T, Green JP, Stek C, Huse KK, Mortimer PM, Olona A, Wieder C, Moseki R, Silva Dos Santos M, MacRae JJ, Sriskandan S, Ebbels TMD, Wilkinson RJ, Denton AE, Matheson NJ, Anand PK, **Meintjes G**, Thomas DC, Lai RPJ. Taurine transport is a critical modulator of ionic fluxes during NLRP3 inflammasome activation. Cell Rep. 2025;44(10):116317. DOI: 10.1016/j.celrep.2025.116317.

Ryckman TS, Hopkins L, Tang L, Biché P, Mohlamonyane M, Morolo M, Nonyane BAS, Ahmed K, Martinson N, Hanrahan CF, **Omar SV**, Mathema B, Dowdy DW. Molecular Epidemiology of Mycobacterium tuberculosis Across 3 Distinct Geographic Sites in South Africa. J Infect Dis. 2025;232(4):870–81. DOI: 10.1093/infdis/jiaf326.

Saunders MJ, Sinha P, **Cegielski JP**, Clark RA, Seddon JA, Martinez L, Bhargava M, Bhargava A, White RG, Houben R, McQuaid CF. Tuberculosis and undernutrition: improving estimates to reinforce the policy imperative. Lancet Infect Dis. 2025. DOI: 10.1016/s1473-3099(25)00626-7.

Timire C, Mapuranga T, Ncube RT, Maphosa T, Dube S, Mlilo N, Chiteve C, Dar Berger S, Mugurungi O, Kavenga F, Mutasa-Apollo T, Ncube M, Gwanzura C, **Charles M**, Dlodlo RA, Ershova J. Evaluation of Tuberculosis Preventive Treatment Uptake Among People Living with HIV in PEPFAR-Supported Facilities in Zimbabwe. Trop Med Infect Dis. 2025;10(10). DOI: 10.3390/tropicalmed10100296.



*Have items to include in
a future newsletter?*

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