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The usefulness of whole genome sequencing in diagnosis and clinical management of drug-resistant tuberculosis patients in Tanzania

Submission date
10/11/2023

Recruitment status
No longer recruiting

Registration date
06/03/2024

Overall study status
Completed

Last Edited
08/04/2026

Condition category
Infections and Infestations

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Drug-resistant tuberculosis (DR-TB) poses a significant challenge to global tuberculosis (TB) control efforts. Whole genome sequencing (WGS) which is based on genetic change of the TB causing bacteria (Mycobacterium tuberculosis) has been used in diagnosis and management of drug resistance TB patients in developed countries, but its incorporation into the detection of TB in developing countries is limited due to lack of expertise and financial capabilities. This study aims to determine the usefulness of WGS in detection and management of TB patients by comparing with currently used diagnostic tests such as growth of bacterial causing TB disease, GeneXpert test (currently used detection test for TB diagnosis in health centers).

Who can participate?
The participation in the study is voluntary and will involve TB patients who do not respond to treatments of at least isoniazid and rifampin, the two most potent TB drugs.

What does the study involve?
Patients receive treatments as per guidelines for the management of the disease in the country.

What are the possible benefits and risks of participating?
The study is non-invasive; hence risk is minimal based on the fact that only sputum sample on the spot is routinely required at the health centre.

Where is the study run from?
Tanzania Commission for Science and Technology in collaboration with Muhimbili University of Health and Allied Sciences and Kibong'oto Infectious Diseases Hospital, Moshi, Kilimanjaro region in the United Republic of Tanzania.

When is the study starting and how long is it expected to run for?
October 2020 to October 2024

Who is funding the study?
European and Developing Countries Clinical Trials Partnerships (EDCTP)

Who is the main contact?
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Additional identifiers

Protocol serial number
NIMR/HQ/R.8a/Vol.IX/3600

Study information

Scientific Title

Clinical application of whole genome sequencing in multidrug-resistant tuberculosis patients in Tanzania

Acronym
CWGSMDRT-TB

Study objectives
Whole genome sequencing of DR TB strains will improve the diagnosis and treatment of TB in Tanzania while providing stringent strain discrimination.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 01/10/2020, National health Research Ethics Committee (NaTHREC) (3 Baraka Obama Drive, P.O. BOX 9653, 11101, Dar es Salaam, 12101, Tanzania; +255 222121400; hq@nimr.or.tz), ref: NIMR/HQ/R.8b/Vol.I/1099, 2021-617-NA-2021/109

Primary study design
Observational

Study design
Observational cross sectional

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Application of whole genome sequencing in multidrug resistance tuberculosis patients

Interventions
This study is an observational clinical trial focusing on multidrug-resistant tuberculosis (MDRTB) patients at Kibong'oto Infectious Diseases Hospital in Moshi, Tanzania. The objective is to assess the efficacy of whole genome sequencing (WGS) in comparison to the existing diagnostic methods for detecting MDRTB in the country.

The participants in the trial will be MDRTB patients attending tuberculosis (TB) clinics, who have been initially diagnosed using Xpert MTB/RIF and subsequently confirmed through Line Probe Assays (LPA), specifically the GenoType MTBDRplus. Every second MDRTB patient seeking health services at the clinic will be included in the study.

The evaluation will involve comparing WGS with the current diagnostic tests, including culture, drug susceptibility testing, and GeneXpert. The goal is to determine the utility and effectiveness of WGS in detecting multidrug resistance in tuberculosis patients as compared to the standard diagnostic procedures currently in use.

Intervention Type
Device

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Illumina hiseq

Primary outcome(s)
The efficacy of the diagnostic tests including drug susceptibility testing (DST), line probe assay and GeneXpert measured against the Gold standard (Culture).

Key secondary outcome(s)
Whole genome diagnostic efficacy will be measured against the gold standard test (culture). The measurement will be sensitivity and specificity.

Completion date
01/11/2024

Eligibility

Key inclusion criteria
1. TB patients aged ≥18 years
2. Confirmed either as MDR-TB or non MDRTB using DST, Xpert® MTB/RIF assay GeneXpert® (Cepheid, Sunnyvale, CA, USA), GenoType MTBDRplus (Hain Life science, GmbH, Nehren)
3. Willingness to sign a written informed consent and provide sputum samples for laboratory analysis.

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
80 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
Does not meet inclusion criteria

Date of first enrolment
01/10/2021

Date of final enrolment
01/11/2024

Locations

Countries of recruitment
Tanzania

Study participating centre
Kibong'oto Infectious Diseases Hospital & Muhimbili National Hospital
Private Bag, Siha, Moshi, Kilimanjaro
Dar es Salaam
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Sponsor information

Organisation
Tanzania Commission for Science and Technology

ROR
https://ror.org/03e04g978

Funder(s)

Funder type
Government

Funder Name
European and Developing Countries Clinical Trials Partnerships

Results and Publications

Individual participant data (IPD) sharing plan
The dataset generated from the study will be stored at Tanzania Commission for Science and Technology repository and shared upon request.

IPD sharing plan summary
Available on request, Stored in non-publicly available repository

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		22/08/2024	08/04/2026	Yes	No
Study website		11/11/2025	11/11/2025	No	Yes