Skin Microbiome Profiling in Filarial Lymphoedema: Immune Responses and Antimicrobial Strategies in Acute Adenolymphangitis Attacks

John Boateng[1,2], Linda Batsa Debrah[1,2], Ute Klarmann-Schulz[3,4], Alex Owusu-Ofori[1], Janina Kuehlwein[3,4], Caroline Wauschkuhn[3,4], Patricia Jebett Korir[3,4], Manuel Ritter[3], Achim Hoerauf[3,4] and Alexander Yaw Debrah[2,5]

[1]Department of Clinical Microbiology, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana. [2]Kumasi Centre for Collaborative Research in Tropical Medicine, KCCR, Kumasi, Ghana. [3]Institute for Medical Microbiology, Immunology and Parasitology, University Hospital Bonn, Germany. [4]German Center for Infection Research (DZIF), Bonn-Cologne, Germany. [5]Faculty of Allied Health Sciences, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana

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Introduction

Filarial lymphoedema, commonly called elephantiasis, is a long-term and disabling condition caused by parasitic worms transmitted by mosquitoes. With over 15 million people affected worldwide, it causes swelling in the legs and recurrent painful episodes called acute adenolymphangitis (ADL) attacks, characterized by fevers, chills, and lymph node inflammation. These attacks are thought to be triggered by bacterial infections entering through wounds or lesions on the legs. Current knowledge of the skin microbiome, wound infections, and immune response during acute ADL attacks is limited, yet addressing these gaps is essential to improve lower-extremity management and to strengthen the World Health Organization's Global Programme to Eliminate Lymphatic Filariasis (GPELF) strategy for reducing filariasis-related morbidity.

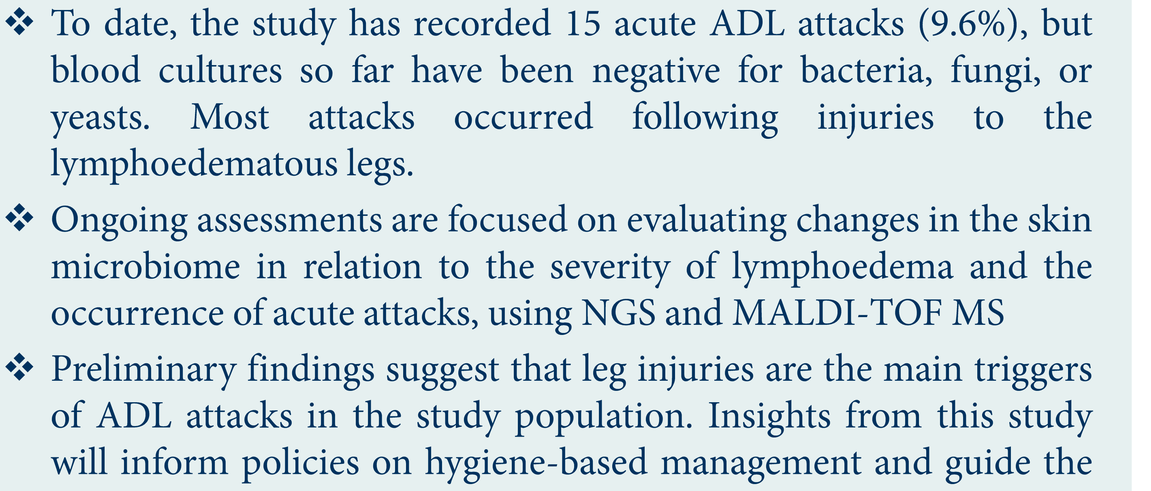
Specific Objectives

- To identify pathogens associated with acute adenolymphangitis (ADL) attack using next-generation sequencing, and testing antimicrobial sensitivity, with the aim of providing better treatment options in morbidity management.
- To investigate the changes in immunological profiles during acute ADL attacks.

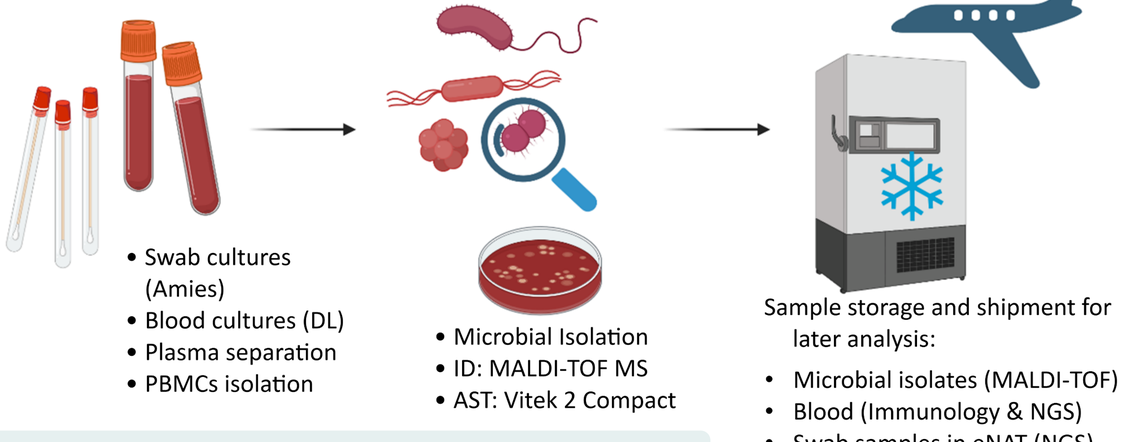
Methods (Fieldwork and Lab) / Preliminary Results

- Thus, a longitudinal case-control study is being conducted in the Upper East Region of Ghana, with 200 participants to investigate changes in the skin microbiome, detect potential pathogens in peripheral blood during ADL attacks, and characterize the corresponding immune profile.
- To date, the study has recorded 15 acute ADL attacks (9.6%), but blood cultures so far have been negative for bacteria, fungi, or yeasts. Most attacks occurred following injuries to the lymphoedematous legs.
- Ongoing assessments are focused on evaluating changes in the skin microbiome in relation to the severity of lymphoedema and the occurrence of acute attacks, using NGS and MALDI-TOF MS
- Preliminary findings suggest that leg injuries are the main triggers of ADL attacks in the study population. Insights from this study will inform policies on hygiene-based management and guide the development of targeted antimicrobial strategies, contributing significantly to improved care and antimicrobial stewardship.

Participant recruitment and sample collection

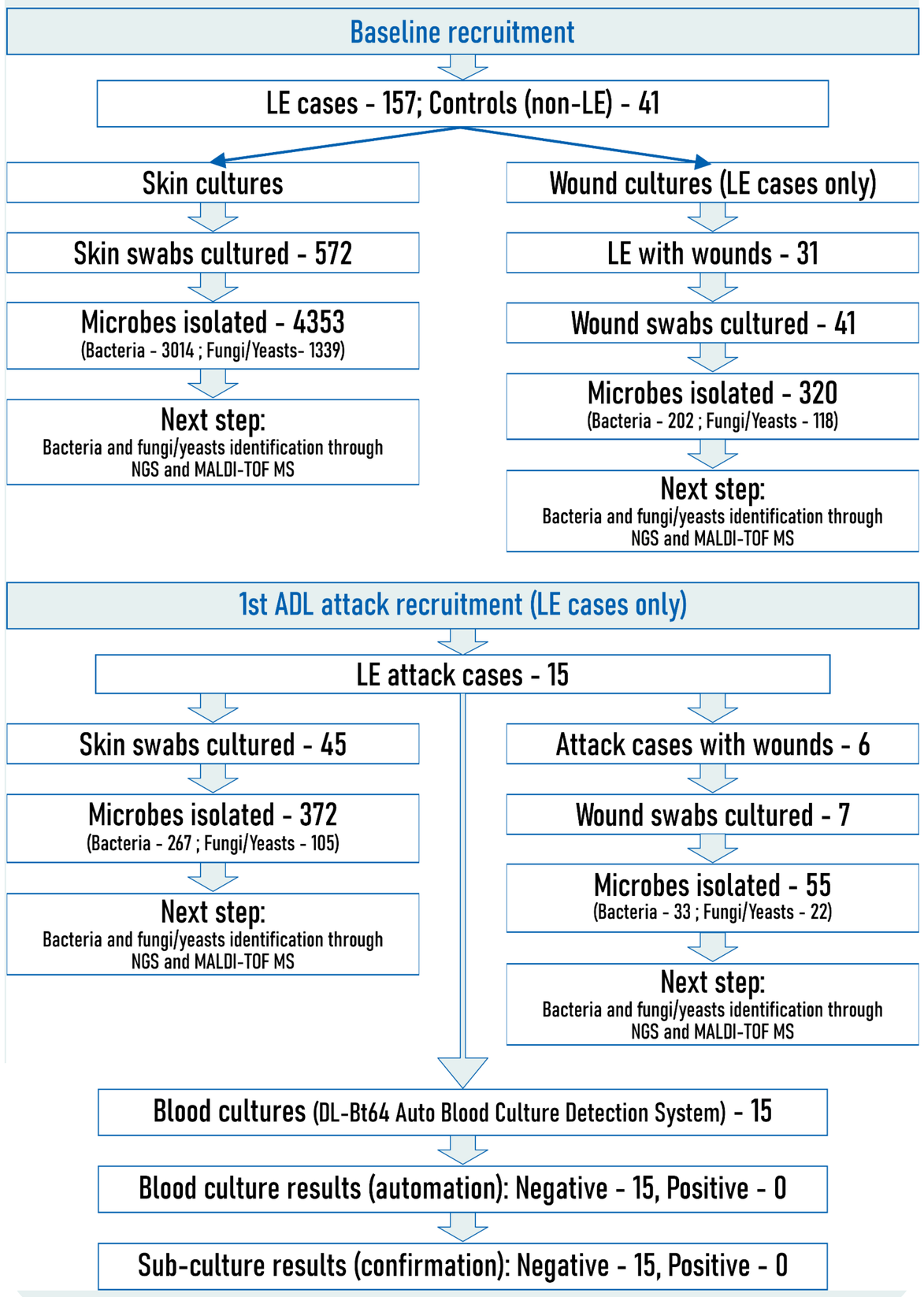


Sample processing and storage for later analysis



Clinical Study Registration: **ISRCTN57911282**

Study Progress / Preliminary Results



Way Forward

- Identification of the microbiome through NGS and MALDI-TOF MS
  - NGS protocol validation and analysis
  - MALDI-TOF MS bacteria and fungi/yeasts identification
- Antimicrobial Sensitivity Testing using Vitek 2 Compact System
- Immunological analysis

Email: jhnboat2008@gmail.com

TAKeOFF Tackling the Obstacles to Fight Filarial Infections and Podoconiosis

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