2025 DFACONFERENCE

ABSTRACT SUBMISSION FORM

Submissions should focus on high-quality original research in diabetes-related foot disease with relevance for clinical practice, now or in the future.

06JUL25 ABSTRACTS CLOSE **23JUL25 OUTCOMES ADVISED**

submit your form to nationaloffice@diabetesfeetaustralia.org

TITLE Characterising odour in chronic diabetic foot ulcers: A proof-of-concept study of volatile organic compounds and microbial profiles

AUTHORS Yinyin Phyo, Emma Bergamin, Saskia Schwarzer, Slade Jensen, Rayan Saleh Moussa, Meera Agar, Maiken Ueland

EMAIL yinyin.phyo@uts.edu.au **INSTITUTION** University of Technology Sydney

ABSTRACT (maximum 450 words. Please use the following or similar headings: Background/Methods/Results/Conclusions)

Background:
Chronic diabetic foot ulcers (DFUs) are a major complication of diabetes and a leading cause of non-traumatic lower limb amputations. Malodour is often associated with DFUs and considered an indicator of infection or necrosis. Standard methods to detect microbes are time consuming, and odour detection relies on large, expensive benchtop instrumentation. With recent technological advances, there has been growing interest in electronic noses (e-noses), that can identify and distinguish different types of odours through gases released as volatile organic compounds (VOCs). Applying this e-nose technology to DFUs can be beneficial in early detection of infection and assessing effectiveness of various treatment strategies. This study establishes a proof-of-concept sampling method for the chemical evaluation of wound odour and identifying key odour biomarkers, as well as, microbial species present, that are contributing to odour.

Methods:
Tissue samples and wound swabs were collected from patients with chronic DFUs, during their routine appointments at the High-Risk Foot Service in Liverpool Hospital. Malodourous wound samples were collected at two timepoints: the first visit (baseline or T0), and the second visit (T1), where there was a change in odour or at 3 months. For non-odourous wounds, control samples were collected at a single timepoint. Tissue samples were used to measure the VOCs and processed using Solid Phase Micro Extraction (SPME) for comprehensive two-dimensional gas chromatography coupled with time-of-flight mass spectrometry (GCxGC-TOFMS). Wound swabs were used for shotgun sequencing, for microbial characterisation. Further descriptive statistics were collected on REDCap.

Results:
To date, 27 patients have been recruited to the study (17 malodorous, 10 controls), consisting of 93% males, with a mean and median age of 59 years (SD +/- 12; Range 33-91). All participants except one (96%) had Type 2 diabetes, with majority (93%) having comorbidities such as peripheral vascular disease, end organ damage, cardiovascular conditions, and metabolic or endocrine conditions. Most wounds persisted between 1-3 months (48%) or 3-12 months (22%), with more than half of the wounds (56%) caused by infection or gangrene. Wounds were managed using various techniques such as chairside debridement, conservative dressings and cleansing, standard dressings, negative pressure wound therapy, antibiotics, and offloading. When malodour was present, it has been described by clinicians as foul, pungent, musty, faecal, fishy, and sickly sweet. Further, preliminary analysis of VOCs suggests distinct compound profiles between the malodourous and control groups. Microbial sequencing and analysis are underway. The full odour and microbial profiles are expected to be presented at the conference.

Conclusions:
This study explores a novel aspect of assessment for DFUs by focusing on odour. Early findings suggest there are different chemical signatures in malodorous DFUs. These findings could support future development of a portable, rapid, non-invasive tool for wound assessment and monitoring.