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Novel wound assessment using *in vitro* wound models with mass spectrometry imaging

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Aim: The normal wound healing process is a highly ordered and structured process involving overlapping four main phases: haemostasis, inflammation, proliferation and remodelling. Damage to the skin's integrity, which is caused trauma or injury initiates the wound healing process. Infections are known to disrupt the normal wound healing and have a detrimental effect on this process, which has shown to induce chronic wound formation. The western world is currently facing a public health crisis due to the increasing number of people suffering from chronic wounds. Identifying biomarkers associated with the wound healing process may aid early detection of a wound developing into an infected or chronic wound. The use of Labskin, a living skin equivalent model to imitate non-infected and infected wounds will provide the opportunity to assess wound healing process in-depth. Combining Labskin with Mass Spectrometry Imaging (MSI) would allow simultaneous multi-analyte detection *in situ* to help identify specific markers linked to wound healing.

Methods& Results: Labskin was wounded with scalpel blade, which was either non-infected or immediately infected with S. aureus and left for up to 4 days. Samples were snapped frozen, sectioned at wound site, coated in MALDI matrix and analysed for lipids (mass range: 400-1200 m/z) whereas, histology samples were stained with haematoxylin and eosin. Principal component analysis (PCA) was performed on regions of interest (dermis, epidermis and wound site/infection). MS/MS profiling and database search was able to putatively identify ions of interest in the non-infected sample where a glycosylceramide was shown to be present in the epidermis across the wound site.

Conclusions: The wounded Labskin model with MSI was able to putatively identify a glycosylceramide within the wound site and epidermis, which may be used a biomarker associated with the wound healing process.