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Burn wound healing by infrared spectroscopy imaging: a Pilot study

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Aim: Burns are one of the major causes of morbidity and the most costly traumatic injuries worldwide1. The traditional techniques used to assess the biochemical events related to wound repair are laborious, time-consuming and require multiple staining. Thus, the present study aims to evaluate the feasibility of Fourier transform infrared (FTIR) spectroscopy in order to monitor the progress and healing status of burn wounds. Methods : Third-degree burn injuries were induced on Wistar rats by water vapor exposure. Afterwards, biopsies specimen was extracted for further histopathological examination and IR imaging evaluation at 7 days. The spectral imaging was performed using a micro-FTIR equipment in transflection mode (MirrIR, Kevley Technologies), with a 32 x 32 FPA of 5.5 µm pixel size. All spectra data were baseline corrected and vector normalized. The preprocessing and image comparison was performed using Cytospec software (Cytospec, version 2.00.5)2.
Results : The pairwise analysis was evaluated in the wavenumber region maps of 1200-1300 cm-1. The biomolecule band associated to collagen content (1200 – 1300 cm-1) was most prominent3 on the 7th day image in the post-burn that in healthy group.
Conclusions : Therefore, our pairwise comparison revealed that metabolic activity induced by thermal injury increases the chemical activity associated to the healing progresses. Our findings show that FTIR spectroscopy has potential to identify the biochemical signatures induced by burn injury.

References:

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[3] Talari, A.C.S. et al. 2016. Appl. Spectrosc. Rev. 52(5): 456-506.