Automated margin assessment of thermal damaged human burn skin

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Abstract: Thermal injury is the injury caused by caused by a net flux of pathologic energy. The fully-automated method based on morphological features extracted from an optical coherence tomography (OCT) images will be helpful in detecting the margin of thermally damaged tissue. This method will become biomarker for the removal of non-viable skin.

Summary: Presently, diagnostic and therapeutic decision making of burn injuries solely depends upon the experience of clinician or doctor. Even in the case of experienced doctor, the accuracy is only 60-80%. The internal properties of skin change due to burn effect. Hence, the removal of non-viable tissue of burn victims is the primary goal of the clinician. A number of imaging modalities have been developed for the assessment of burn injuries such as color photography, indocyanine green imaging, near-infrared spectroscopy, laser Doppler imaging, laser speckle imaging, ultrasound, multispectral imaging [12], hyperspectral imaging and photo-acoustic imaging. One of the major disadvantages of the above technologies is either they have poor axial resolution or they operate in contact mode. Optical coherence tomography (OCT) is a three-dimensional high resolution imaging technique which can be potential tool for the assessment of burn skin margin. In this study, automatic classification of burned skin is performed by SVM on morphological features extracted from OCT image because of its high resolution and non-contact.

Method: Healthy and burned tissues images were recorded by the MEMS VCSEL SS-OCT system. The morphological features based on A-line & B-scan were extracted from OCT images. Using these extracted features multi-level ensemble model classifies the infected scalp from the healthy one.

Results: Due to change in structural and functional properties of **t**he burn skin thus extracted features value also changed accordingly. Further, SVM was used to classify between the healthy and burn skin with an average accuracy of 91.3 %.

Conclusion: The results indicates that the integration of A-scan and B-scan features extracted from OCT images can be powerful *in vivo* diagnostic tool for assessment of burn skin margin. It will also assist burn surgeons in preparation and execution of burn surgery. Comparing with OCT B-scan data alone, **t**he combination of morphological features improved the diagnostic accuracy. With limited number of parameters our model yields good result.

Further details of the paper will be presented later.