

Title: A Proposed Decision-Tree Workflow to Identify Tattoo Pigment on Reflectance Confocal Microscopy Imaging

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Abstract

Purpose:

Tattoos can obscure or alter lesion structure on both clinical and dermoscopic examination, complicating pattern recognition and risk stratification. When evaluating a lesion on tattooed skin, clinicians must weigh the benefits of a biopsy against the risks of damaging the tattoo to minimize the risks of both unnecessary biopsies or missed pathology.[1, 2]

Reflective confocal microscopy (RCM) may offer a superior approach to identifying benign lesions and avoiding unnecessary biopsies on tattooed skin by differentiating between endogenous structures (keratin, melanin, collagen) and exogenous tattoo pigment.[1] Therefore, we propose the following functional decision-tree workflow for distinguishing exogenous tattoo pigment from endogenous bright signals using RCM.

Methods:

The workflow was developed through a single-patient, multi-site analysis to delineate tattoo pigment from nevus and scar architecture. Dermatoscopic landmarks were used for spatial alignment with RCM to delineate bright foci. This proposed workflow builds upon the literature offering strategies for tattoo pigment recognition.[1, 3]

Results:

The proposed workflow effectively uses dermoscopy-RCM image-to-image correlation to map tattoo pigment to confocal signals and provide layer-specific algorithms to separate acellular ink from cellular elements.

Conclusion:

A formalized workflow using RCM to evaluate lesions on tattooed skin may reliably allow for identification of benign lesions by differentiating tattoo pigment from endogenous signals. Our proposed decision tree uses a layer-first, architecture-aware approach to distinguish brightness from exogenous tattoo pigment versus endogenous structures and may help reduce unnecessary biopsy or enable targeted sampling when lesions occur in tattooed skin.

Keywords:

reflectance confocal microscopy; tattoo pigment; dermoscopy; noninvasive imaging; decision tree; workflow