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In vivo confocal microscopy of Meissner corpuscles as a measure of sensory neuropathy

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ABSTRACT

OBJECTIVE: To assess feasibility of noninvasive in vivo reflectance confocal microscopy (RCM) of Meissner corpuscles (MCs) as a measure of sensory neuropathy (SN).

BACKGROUND: MCs are touch-pressure sensation receptors in glabrous skin. Skin biopsy studies suggest that fingertip MC density (MCs/mm²) is a sensitive measure of diabetic and idiopathic SN. In vivo RCM of skin is an emerging field, with applications including evaluation of cancer. It is painless and noninvasive.

Feasibility of in vivo RCM of MCs has not been explored.

METHODS: Fifteen adults (10 controls, 5 SN subjects) underwent in vivo RCM at the fingertip (Digit V) and thenar eminence. In vivo RCM was conducted to determine whether MCs were visible within dermal papillae and, if visible, to characterize their imaging appearance and assess MCs/mm² at each site.

RESULTS: MCs were identified in dermal papillae at all sites in controls. MCs appeared as heterogeneous bright structures within dermal papillae, which appeared as dark "pits." Mean MC density in controls was 12 +/- 5.3/mm² (Digit V) and 5.1 +/- 2.2/mm² at the thenar eminence. MC density in SN was lower than controls at Digit V (2.8 +/- 5.7/mm², p = 0.01) and the thenar eminence (1.4 +/- 1.1/mm², p = 0.004). MCs were absent in a sensory neuronopathy; milder reductions in MC density were seen among diabetic and HIV-positive subjects.

CONCLUSIONS: Meissner corpuscles (MCs) can be visualized and quantitated in controls and sensory neuropathy (SN) using in vivo reflectance confocal microscopy (RCM). In vivo RCM of MCs has potential for noninvasive detection and monitoring of SN, if subsequent studies show that with denervation or reinnervation, reliable and recognizable changes or loss can be detected using our described approaches.