

Corneal Confocal Microscopy to Assess Diabetic Neuropathy: An Eye on the Foot

Mitra Tavakoli, B.Sc. Optom., M.Sc., Ph.D., FBCLA, FAAO,

Ioannis N. Petropoulos, B.Sc. Optom., M.Sc., Ph.D., and Rayaz A. Malik, M.B.Ch.B., Ph.D., FRCP

Abstract

Accurate detection and quantification of human diabetic peripheral neuropathy are important to define at-risk patients, anticipate deterioration, and assess new therapies. Easily performed clinical techniques such as neurological examination, assessment of vibration perception or insensitivity to the 10 g monofilament only assess advanced neuropathy, i.e., the at-risk foot. Techniques that assess early neuropathy include neurophysiology (which assesses only large fibers) and quantitative sensory testing (which assesses small fibers), but they can be highly subjective while more objective techniques, such as skin biopsy for intra-epidermal nerve fiber density quantification, are invasive and not widely available. The emerging ophthalmic technique of corneal confocal microscopy allows quantification of corneal nerve morphology and enables clinicians to diagnose peripheral neuropathy in diabetes patients, quantify its severity, and potentially assess therapeutic benefit. The present review provides a detailed critique of the rationale, a practical approach to capture images, and a basis for analyzing and interpreting the images. We also critically evaluate the diagnostic ability of this new noninvasive ophthalmic test to diagnose diabetic and other peripheral neuropathies.

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Author Affiliation: Center for Endocrinology and Diabetes, Institute of Human Development, University of Manchester and Central Manchester University Hospitals National Health Service Foundation Trust, Manchester Academic Health Science Center, Manchester, United Kingdom

Abbreviations: (DN) diabetic neuropathy, (DPN) diabetic peripheral neuropathy, (IENFD) intra-epidermal nerve fiber density, (IVCCM) *in vivo* corneal confocal microscopy, (QST) quantitative sensory testing

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Corresponding Author: Rayaz A. Malik, M.B.Ch.B., Ph.D., FRCP, Center for Endocrinology and Diabetes, Institute of Human Development, University of Manchester, Core Technology Facility (3rd floor), 46 Grafton St., Manchester M13 9NT, UK; email address rayaz.a.malik@manchester.ac.uk