

# The 10-g Monofilament

## The diagnostic divining rod for the diabetic foot?

Peripheral neuropathy is the prime pathogenic ingredient in the recipe for diabetic foot ulceration (1,2). Ulceration, in turn, is the key factor that may precipitate a cascade of events leading to lower-extremity amputation (3,4). Clearly, identifying the presence of neuropathy (or more pragmatically, clinically significant loss of protective sensation) and taking action before any breach in the epithelium is of enormous import in any screening and treatment program designed to prevent amputation. Several modalities have been advocated to assist in this endeavor. They range from the practical to the impractical, from costly to free of charge.

Over the past 2 decades, the 10-g monofilament has become the most widely promoted of these tools. It has been touted as an inexpensive, practical, and easy-to-use device to detect loss of protective sensation. It consists of a plastic handle connected to a nylon monofilament, which measures clinically significant large-fiber neuropathy by buckling at 10 g of force. Several large-scale efforts, most notably the Lower Extremity Amputation Prevention campaign of the U.S. Department of Health and Human Services, have made a concerted effort to disseminate these devices by making them available to any interested practitioner. These devices are also available from a number of private vendors and pharmaceutical manufacturers.

The results from the study conducted by Booth and Young (5) indicate that not all

10-g monofilaments are created equally. Differences in manufacturer and cycles of applied stress may make these devices inaccurate, rendering them potentially hypersensitive in identifying loss of protective sensation. Furthermore, data from this study indicate that these devices tend to become less rigid with each cycle of stress and therefore may be suitable for use on a maximum of 10 patients per day before requiring a 1-day viscoelastic recovery period. Therefore, any clinic evaluating multiple patients should, if possible, have multiple 10-g monofilaments available to avoid overdiagnosing loss of protective sensation as the day wears on.

As diabetic foot care develops into a mature subspecialty, it appears that (as is so often the case) additional information added to the cache of current knowledge and practice makes things a bit more complex than initially perceived. The recent study by Booth and Young typifies such an underestimation. We can no longer afford to look at any tool, even one as useful and important as the monofilament, as an infallible diagnostic divining rod. Nor can we afford to promote it as such. My mentor, Lawrence Harkless, once told me when we were speaking of our endeavors in the diabetic foot that we must educate not only the high-risk patient, but also the high-risk doctor. To effectively do so, we must constantly question and critique our techniques and the tools that help drive those techniques. Only then can we most effectively and efficiently

reduce the needless number of diabetes-related lower-extremity amputations in both the developed and developing worlds.

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### References

1. Reiber GE, Vileikyte L, Boyko EJ, del Aguila M, Smith DG, Lavery LA, Boulton AJ: Causal pathways for incident lower-extremity ulcers in patients with diabetes from two settings. *Diabetes Care* 22:157-162, 1999
2. Lavery LA, Armstrong DG, Vela SA, Quebedeaux TL, Fleischli JG: Practical criteria for screening patients at high risk for diabetic foot ulceration. *Arch Intern Med* 158:157-162, 1998
3. Pecoraro RE, Reiber GE, Burgess EM: Pathways to diabetic limb amputation: basis for prevention. *Diabetes Care* 13:513-521, 1990
4. Caputo GM, Cavanaugh PR, Ulbrecht JS, Gibbons GW, Karchmer AW: Assessment and management of foot disease in patients with diabetes. *N Engl J Med* 332:854-860, 1995
5. Booth J, Young MJ: Differences in performance of commercially available 10-g monofilaments. *Diabetes Care* 23:984-988, 2000