Whole-Body Magnetic Resonance Neurography

TO THE EDITOR: Noninvasive selective visualization of the entire peripheral nervous system may be useful but has not been possible. Although the brain and spinal cord are well visualized with magnetic resonance (MR) imaging, peripheral nerves cannot be selectively visualized by commonly used techniques, such as T1-weighted and (fat-suppressed) T2-weighted imaging, because of the similarity in signal intensities between the peripheral nerves and surrounding structures on these images.1-2 This report describes an MR-based approach that is capable of selectively visualizing the peripheral nervous system over long trajectories in a single examination: whole-body MR neurography.

We used a 1.5-T system (Achieva, Philips Healthcare) to perform whole-body MR neurography on a healthy 23-year-old male volunteer and a 73-year-old man with clinicopathological findings (numbness in both hands and a tendency to fall) that supported the diagnosis of chronic inflammatory demyelinating polyneuropathy (CIDP). CIDP is a chronically progressive or relapsing symmetric sensorimotor disorder, with a relatively low incidence, leading to peripheral-nerve thickening.3

The applied whole-body MR neurography technique is based on the recently developed concept of diffusion-weighted whole-body imaging with background body signal suppression (DWIBS).4 This diffusion-weighted sequence depicts tissues with a relatively long T2 relaxation time and an impeded diffusion such as the brain, spinal cord, and peripheral nerves.4 Furthermore, the use of a short-inversion-time inversion recovery prepulse for robust fat suppression over an extended field of view and heavy diffusion weighting ensure the suppression of unwanted signals, like those of free fluid, fat, muscles, tendons, and blood vessels.4 Most important, this concept allows image acquisition under free breathing. As a result, the image-acquisition time is efficiently long, as compared with breath-hold and respiratory-triggered image acquisition. This, in turn, allows thin-slice acquisitions and multiple-slice excitations for three-dimensional reformating and display.4

In the healthy volunteer, normal-sized brachial and lumbosacral plexi were visualized, whereas other peripheral nerves could hardly be seen (Fig. 1A). In contrast, in the 73-year-old patient with CIDP, whole-body MR neurography showed symmetrical, widespread thickening of peripheral nerves in the entire body (Fig. 1B).

We have demonstrated the feasibility of whole-
body MR neurography with the use of a diffusion-weighted imaging sequence.

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