Diffusion-Weighted Imaging and MR Spectroscopy in Adrenoleukodystrophy

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Purpose
To demonstrate the role played by diffusion-weighted imaging (DWI) and magnetic resonance spectroscopy (MRS) in the evaluation of the actively demyelinating zone in adrenoleukodystrophy (ALD).

Materials & Methods
Two biochemically proved cases of X-linked ALD were studied with routine MRI, diffusion-weighted echo planar imaging and MRS. Following the routine study (including axial T1 weighted, axial and coronal Fast Spin Echo T2-weighted, axial FLAIR, and axial and coronal T1-weighted contrast enhanced sequences), diffusion-weighted imaging was obtained using an axial echo-planar spin-echo 2D mode, single shot technique, 10,500 TR, a minimum TE, bandwidth of 62.50, 5 mm slice thickness, 2.5 mm interval, 240 x 240 mm FOV; b value of 1000, gradients in the x, y and z directions, and a composite gradient. MRS was obtained from the peritrigonal white matter using the PRESS sequence (1600 TR, 144 TE, 256 x 192 matrix/8 NEX, 220 x 220 FOV). Choline (cho), creatine, N-acetyl aspartate (NAA) and myoinositol (mI) peaks were ascertained and compared with each other.

Results
Routine series disclosed the classical findings of ALD with evidence of peritrigonal lesions and involvement of the corticospinal tracts in both the patients. Enhancement was seen at the leading edge of the peritrigonal zone of active demyelination in one of the two patients, and lack of such enhancement in the other. DWI correctly demonstrated restricted diffusion in the region of active demyelination in the one patient with active demyelination, and no restriction of diffusion in the second patient. In both patients, MRS demonstrated a decrease in the NAA peak suggesting neuronal loss, and an increase in the choline peak suggesting an increase in cell membrane turnover within the peritrigonal white matter. Marked elevation of myoinositol was seen in the same zone of active demyelination in the first patient, and not seen in the other.

Conclusion
We believe this to be the first report directly correlating diffusion-weighted imaging with the zone of active demyelination in ALD. The presence of a markedly elevated myoinositol peak at the same site is further evidence for active demyelination in ALD. These data add ALD to the list of conditions in which DWI is useful in demonstrating the region of active demyelination.

References


