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Differences of Apparent Diffusion Coefficient Values in Patients with Creutzfeldt-Jakob Disease According to the Codon 129 Genotype

We read with great interest the article by Tschampa et al¹ analyzing the patterns of lesions, mostly on cortical areas, in patients with Creutzfeldt-Jakob disease (CJD). Although this study confirmed the high sensitivity of diffusion imaging, the authors did not find any differences between the 3 subtypes (MM, MV, VV) of the disease associated with the methionine/valine polymorphism at codon 129 of the prion protein gene. In this retrospective study, only diffusion-weighted images (DWIs) were reviewed, and apparent diffusion coefficient (ADC) values were not calculated. We performed a study that showed that ADC values are of interest in CJD diagnosis, as was previously suggested.²

We prospectively studied 20 patients with CJD (6 pathology-proved and 14 probable) and 10 age-matched controls. The codon 129 genotype was available for 15 subjects, who included 1 VV, 8 MM, and 6 MV subtypes. The MR imaging protocol included both fluid-attenuated inversion recovery (FLAIR) and diffusion sequences (DWI, $b = 0, 500, 750, \text{ and } 1000 \text{ s/mm}^2$). In these patients, we found the same high frequency of lesions (15/15 on FLAIR and DWI), both on the cortex (13/15 on FLAIR, 15/15 on DWI) and on the basal ganglia (10/15 on FLAIR, 12/15 on DWI). The frequency of involvement of the striatum was similar on DWI in MM (6/8) and MV (5/6) genotypes. In addition, ADC values measured on the deep brain structures were significantly lower in patients with the MV and VV genotypes as compared with MM patients ($P < .03$ in the caudate, lenticular, and pulvinar nuclei; χ^2 test). The difference was striking in the caudate nucleus, where ADC values were significantly different between controls and MM and MV/VV patients, with a clear-cut separation between MM and MV/VV patients (Fig 1). ADC values were not significantly different between controls and MM patients in the lenticular nucleus, despite the presence of signal-intensity changes on DWIs in 75% of these patients. These findings support a combination of different pathologic processes to explain the hypersignals observed on DWI, inducing increased and/or decreased diffusibility and emphasizing the added value of ADC measures to distinguish in vivo between molecular subtypes of CJD.

References

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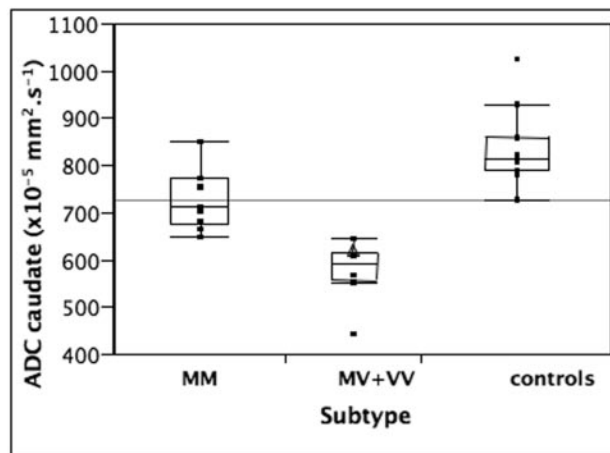


Fig 1. ADC values measured on the head of the caudate nuclei in patients with CJD with the MM ($n = 8$), MV ($n = 6$), and VV ($n = 1$, same column as MV, triangle) phenotypes and controls ($n = 10$). There is a statistical difference between all 3 groups ($P < 10^{-4}$) and a clear-cut separation between patients with the MM and MV/VV phenotypes.

2. Tschampa HJ, Murtz P, Flacke S, et al. **Thalamic involvement in sporadic Creutzfeldt-Jakob disease: a diffusion-weighted MR imaging study.** *AJNR Am J Neuroradiol* 2003;24:908-15

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