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D. Galanaud, D. Dormont, S. Haïk, J. Chiras, J.P. Brandel and J.P. Ranjeva

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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 al[1] 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, and 1000 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.

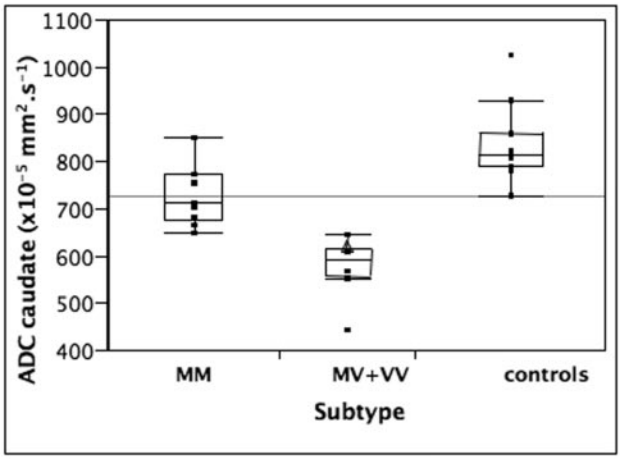

Fig 1. ADC values measured on the head of the caudate nuclei in patients with CJD with the MM ($n = 8$), MV ($n = 6$), and VV ($n = 1$, same column as MV, *triangle*) phenotypes and controls ($n = 10$). There is a statistical difference between all 3 groups ($P < 10^{-4}$) and a clear-cut separation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

References

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D. Galanaud
D. Dormont
Department of Neuroradiology
CNRS UPR 640 LENA
S. Haïk
Department of Pathology
J. Chiras
Department of Neuroradiology
Cellule de référence des maladies à prions
INSERM, Avenir Team-Human Prion Diseases
J.P. Brandel
Cellule de référence des maladies à prions
INSERM, Avenir Team-Human Prion Diseases
Pitié Salpêtrière Hospital
Paris, France
J.P. Ranjeva
CRMBM-CEMEREM
Faculté de Médecine La Timone
Marseille, France

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