Serum and cerebrospinal fluid Ferroxidase activity in multiple sclerosis and in other neurological diseases

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OBJECTIVES

Multiple Sclerosis (MS) is a chronic inflammatory demyelinating and neurodegenerative disease of the Central Nervous System (CNS). Several pieces of evidence seem to indicate that oxidative stress can be a factor capable of inducing and promoting the formation of lesions typical of MS. The production of free radicals induced by the reaction of highly unstable ferrous ions (Fe2+) is in part limited by the ferroxidase (FeOx) activity of ceruloplasmin, which allows the oxidation of Fe2+ into ferric ions (Fe3+) and their subsequent incorporation into transferrin (fig. 1). In a previous pilot study [1] we found a reduced serum FeOx activity in MS patients and in patients with other inflammatory neurological diseases (OIND) compared to patients with other non-inflammatory neurological diseases (NIND). The aim of the present study was to assess FeOx activity in the serum and, for the first time, in the cerebrospinal fluid (CSF) of a large cohort of MS patients and as controls in OIND and NIND patients.

MATERIALS AND METHODS

Serum and CSF samples withdrawn for diagnostic purpose from 96 MS [2] patients (66 females, 30 males, mean age ± SD = 37.2 ± 11.1), 95 OIND (43 females, 52 males, mean age ± SD = 57.2 ± 15.5) and 79 NIND (45 females, 34 males, mean age ± SD = 58.8 ± 15.7). Serum and CSF FeOx activity was measured making some modifications to the protocol of Erel [2].

RESULTS

Serum levels of FeOx activity were lower in MS patients than in NIND (Mann-Whitney, p <0.01) without any further difference between MS patients stratified according to magnetic resonance imaging (MRI) evidence of disease activity (Fig. 2, A and B). CSF FeOx activity levels were similar between MS patients and both OIND and NIND controls, and between MS patients with and without evidence of MRI disease activity (Fig. 3, A and B).

DISCUSSION AND CONCLUSIONS

These results confirm that MS patients appear to be characterized by a reduced serum FeOx activity respect to NIND patients, however this imbalance was not found in CSF samples and did not correlate to MRI evidence of disease activity excluding a role for this mechanism in the disease activity and/or progression.

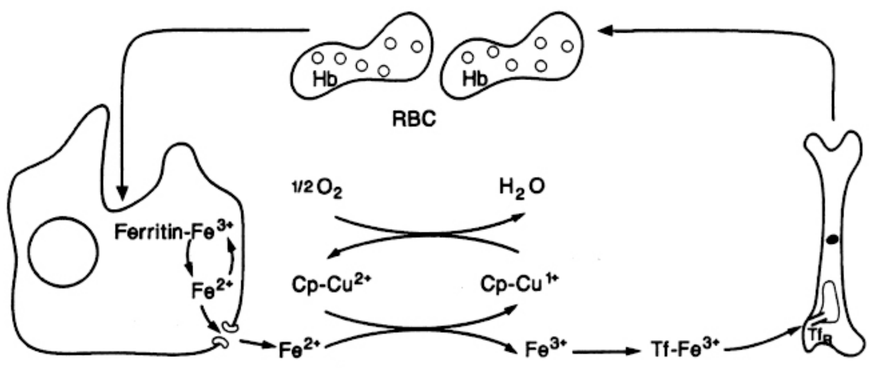

Fig. 1 Role of ceruloplasmin as a ferroxidase. (Harris et al: American Journal of Clinical Nutrition 1998.)

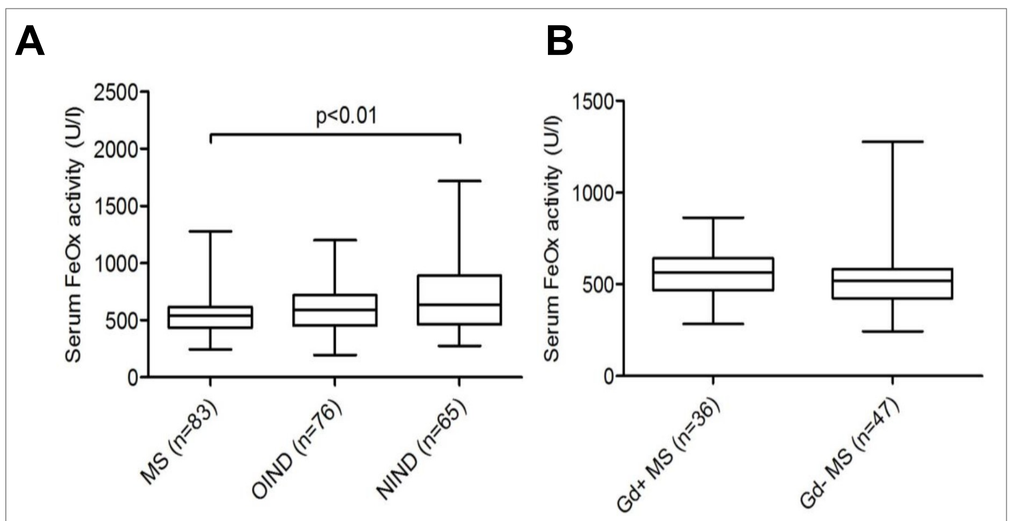

Fig. 2 Serum ferroxidase activity was significantly higher in patients with non-inflammatory neurological disorders (NIND) than in those with multiple sclerosis (MS (p<0.01) (**A**) without any further statistical differences between patients with MS grouped according to MRI evidence of disease activity (**B**).

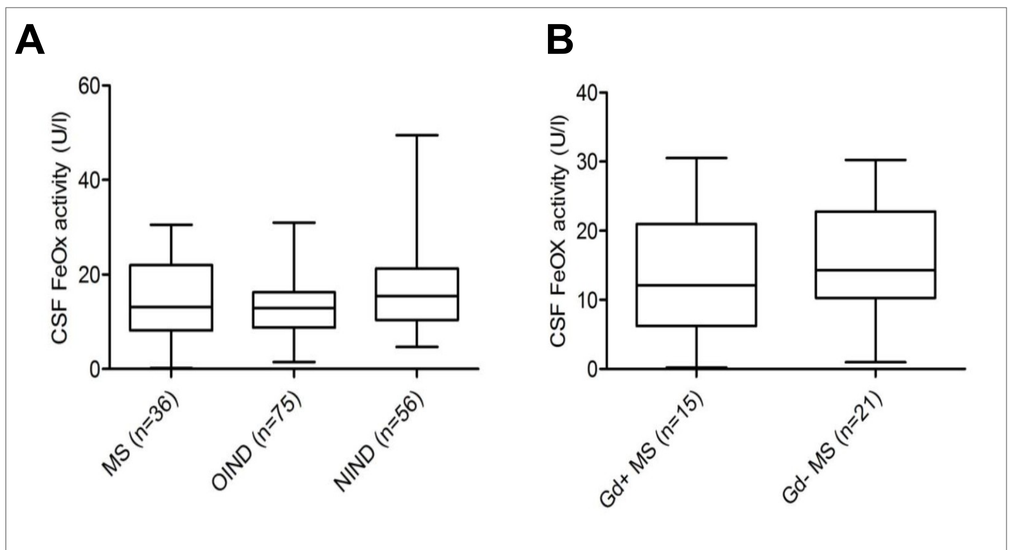

Fig. 3 CSF ferroxidase activity was not different in MS patients and controls (**A**) without any further statistical differences between MS patients grouped according to MRI evidence of disease activity (**B**).

References.
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