Autoantibodies to GM1 and GQ1bα are not Biological Markers of Alzheimer’s Disease

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Handling Associate Editor: Ikuo Tooyama

Accepted 14 May 2014

Abstract. A few studies have reported the association of autoantibodies to GM1 or GQ1bα with Alzheimer’s disease (AD) or vascular dementia. Here we investigated whether patients with AD or vascular dementia had high titers of the anti-ganglioside antibodies. Sera were obtained from patients with AD (n = 22), vascular dementia (n = 14), Guillain–Barré syndrome, and multifocal motor neuropathy as well as normal controls. Enzyme-linked immunosorbent assay showed titers of IgG and IgM anti-GM1, anti-GQ1bα, and anti-GT1a antibodies did not differ among AD, vascular dementia, and normal controls, and being remarkably lower than those in Guillain–Barré syndrome and multifocal motor neuropathy. The anti-ganglioside antibodies are not biological markers of AD.

Keywords: Alzheimer’s disease, anti-ganglioside antibody, biological marker, ganglioside

INTRODUCTION

Alzheimer’s disease (AD) is the most common cause of dementia, and growing evidence suggests that autoantibodies specific to distinct molecular antigens are present in sera or cerebrospinal fluids from patients with AD [1]. The antibodies could have a protective or a pathological role, and may be useful diagnostic or prognostic markers of the disease.

Gangliosides are predominantly localized in the outer layer of plasma membranes and play an important role in the development of neurons as well as in their regeneration. Gangliosides and cholesterol control the formation of amyloid-β, a pathological hallmark of AD [2]. Ganglioside GM1 binds tightly to amyloid-β peptide, and it may inhibit conformational changes from the α-helix to a pathogenic β-sheet conformation [3, 4]. Hence anti-GM1 antibodies may have a pathogenic role in AD. Actually, there have been a few reports of the elevation of serum anti-GM1 antibodies in patients with AD [5–7].

A few studies have reported the appearance of antibodies to cholinergic neurons in sera of patients suffering from AD [8, 9]. The cholinergic neuron-specific gangliosides, GQ1bα and GT1aα, were increased in a murine model of AD [10, 11], and antibodies to GQ1bα was reported to be associated with AD [12]. In contrast, IgG and IgM anti-GM1 antibodies have been established as a biomarker for...