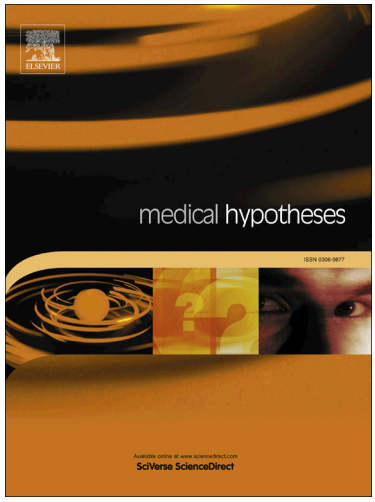

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Autoimmunity against a glycolytic enzyme as a possible cause for persistent symptoms in Lyme disease

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Abstract

Some patients with a history of *Borrelia burgdorferi* infection develop a chronic symptomatology characterized by cognitive deficits, fatigue, and pain, despite antibiotic treatment. The pathogenic mechanism that underlines this condition, referred to as post-treatment Lyme disease syndrome (PTLDS), is currently unknown. A debate exists about whether PTLDS is due to persistent infection or to post-infectious damages in the immune system and the nervous system. We present the case of a patient with evidence of exposure to *Borrelia burgdorferi* sl and a long history of debilitating fatigue, cognitive abnormalities and autonomic nervous system issues. The patient had a positive western blot for anti-basal ganglia antibodies, and the autoantigen has been identified as γ enolase, the neuron-specific isoenzyme of the glycolytic enzyme enolase. Assuming Borrelia own surface exposed enolase as the source of this autoantibody, through a mechanism of molecular mimicry, and given the absence of sera reactivity to α enolase, a bioinformatical analysis was carried out to identify a possible cross-reactive conformational B cell epitope, shared by Borrelia enolase and γ enolase, but not by α enolase. Taken that evidence, we hypothesize that this autoantibody interferes with glycolysis in neuronal cells, as the physiological basis for chronic symptoms in at least some cases of PTLDS. Studies investigating on the anti-γ enolase and anti-Borrelia enolase antibodies in PTLDS are needed to confirm our hypotheses.

Keywords: Post-treatment Lyme disease syndrome; autoimmunity; molecular mimicry; enolase; glycolysis.

Introduction

Borrelia burgdorferi (Bb), the causative agent of Lyme disease (LD), infects humans through *Ixodes* tick bites. Infection can involve several tissues, including skin, joints, heart and nervous system and can result in arthritis, carditis, and neurological symptoms (1). Involvement of nervous system, known as neuroborreliosis, may manifest as encephalopathy, myelopathy, and peripheral neuropathy, which usually respond to antibiotic treatment (2). Nevertheless, some patients with LD report only partial and transient improvements in cognitive impairment, fatigue and musculoskeletal pain with prescribed courses of antibiotics and develop a chronic condition referred to as post-treatment Lyme disease syndrome (PTLDS) (3). It is currently under debate if a partial response to antimicrobials could be due to persistent infection, damage to the brain, or to some form of