Therapeutic Potential of Everolimus on Core Autism Symptoms and Increasing Serum Ceruloplasmin and Transferrin Levels in a Pubescent Boy with Tuberous Sclerosis

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Received date: June 05, 2017, **Accepted date**: June 19, 2017, **Published date**: June 26, 2017

Abstract

Background: The neuropsychiatric clinical manifestations of tuberous sclerosis complex (TSC) include social and behavioral impairment, similar to the core symptoms of autism spectrum disorder (ASD), as well as subependymal giant cell astrocytomas (SEGAs) and renal angiomyolipomas (AMLs).

Case report: The present study examined the clinical effects of 24 weeks of therapy with the mTOR inhibitor everolimus on the social and behavioral symptoms that are similar to the core ASD symptoms and neurobiological mechanisms underlying the effects of everolimus in an 11-year-old boy with TSC. After the initial physical and psychological screening and Magnetic resonance imaging (MRI) examinations, the patient received 4.4 mg/day everolimus for 24 weeks. To study neurobiological mechanism, we examined the relationship between the efficacy of everolimus and serum levels of superoxide dismutase (SOD) and the copper- and iron-binding antioxidants ceruloplasmin (Cp) and transferrin (Tf). Results MRI results revealed a Subependymal giant cell astrocytoma (SEGA) located at the foramen of Monro and a renal angiomyolipoma (AML) on the patient's kidney. Everolimus remarkably improved the patient's social and behavioral impairments over the course of the 24-week treatment without apparent reduction in the size of the SEGA and AML. Serum Cp and Tf levels were gradually increased in response to the improvement in symptoms.

Conclusion: As everolimus increased antioxidant capacity and elevated serum VEGF levels, this study firstly revealed that increased antioxidant activity related to copper and iron may contribute to the remarkable improvement in the core social and behavioral ASD symptoms caused by 24-week everolimus treatment.

Keywords: @

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Introduction

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MRI

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Biochemical measurement

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