Sensitivity Analysis Applied To the Saccadic Movements Model and Comparison with Ataxic Patients' Registry

Camilo Mora Batista 1 Rafael M. Avila Avila 2 Sergio J Torralbas Fitz 3 Claudia Torralbas 4
1Universidad Autónoma de Guerrero. Lázaro Cárdenas 88, CP 39086 Chilpancingo de los Bravo, Gro.
2University of Holguín "Oscar Lucero Moya" Ave XX Aniversario, Via Guardalavaca, Piedra Blanca, Holguin, Cuba.
3Baptist Health South Florida. Biomedical Engineering. 8800 N Kendall Dr, Miami, FL 33176 torralbasfitz@gmail.com.
4Claudia Torralbas Miami Cancer Institute. 8800 N Kendall Dr., Miami, FL 33176 claudia122487@yahoo.com

Extended Abstract
Spinocerebellar ataxias are a group of diseases characterized by cerebellar syndrome associated with progressive slowing of saccadic eye movements, peripheral neuropathy, sleep disorders, and manifestations of parkinsonism. 1 Assessment of saccadic eye movement could provide objective values to help to understand the symptoms of neurodegenerative disorders. 2 A.T. Bahill studied such movements in healthy persons and proposed a model of six differential equations to describe these. 3 In this paper, and considering that model, the saccadic movements are simulated considering as inputs data of healthy persons and sick patients with the mentioned disease. The principal objective consists of contrasting the behavior of saccadic magnitudes according to the model with the observed behavior according to experimental data extracted from the electrooculographic records and, consequently, performing a sensitivity analysis of the obtained solution. 4 5 The search required the SIMULINK application incorporated into the mathematical assistant MATLAB. This tool allows observing the simulations resulting from the model by varying the parameter from 20% to 200%. From the research is concluded that the inputs of pulse-step shape allow getting similar results to those obtained by Bahill. 6 However, there is no correspondence between these and others of experimental character, excluding the forms of inputs above referred. The system shows sensitivity in front of parameters like pulse width and pulse height.

References