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Medical Engineering-Stuttering

Iranian researcher in medical engineering has worked out a project examining impacts of medical treatment on patients suffering from expression difficulty, stuttering. He managed to design a computer model upon the brain function to monitor the impacts of the medical treatment.

Stuttering is the one of the most common communication disorders that is characterized by disruptions in the production of speech sounds.

Stuttering is a disorder in the rhythm of speech, in which the individual knows precisely what he wishes to say but at the time is unable to say it and in which pronunciation of the first letter or syllable of a word is repeated involuntarily.

Stuttering is a universal disorder of speech fluency, present in all cultures and languages and affects about one percent of the general population and five percent of children.

The mechanisms behind the stuttering are still not clear and scientists have introduced variety of reasons for it but a major line of research over at least three decades has investigated the possibility of a speech motor control disorder as at least one component that this is influenced by emotional states and environmental factors.

There are strong indications that the basal ganglia-thalamo cortical motor circuit, through the putamen to the supplementary motor area, plays an important role in the pathophysiology of stuttering.

Also the influence of emotional states on stuttering is well compatible with the suggestion of stuttering as a basal ganglia disorder.

Hence, the core dysfunction in stuttering is the impaired ability of the basal ganglia to produce timing signals because of the unregulated value of dopamine receptor density in it.

Although scientists showed the relation between the basal ganglia and stuttering, but yet there is not appropriate computational model to show this relation quantitatively.

In this study, we propose a computational model that explains the role of basal ganglia in stuttering.

Different parts of the brain involved in stuttering are all considered in our model. Our computational model has considered the involved parts of the brain in a fairly accurate way, explaining the behavior and mechanism of the disorder according to physiological information.

Using this model, we can predict the effect of changes in dopamine and other basal ganglia neurotransmitters in different situation such as emotional states.

Also, we can predict the effects of different drugs on the stutterers.