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Letter to the Editor

Role of defective mirror neurons in causing autism spectrum disorder and the effectiveness of current treatment strategies for autism

Sir,

The presence of mirror neurons (MN) in the premotor cortex, and parietal regions of the brain, has always been an area of interest to neurophysiologists, because unlike most neurons, they are activated, not only while an individual is performing an action, but also when one witnesses another experiencing a sentiment, and hence, is compelled to do the same. This phenomenon, helps develop empathy, as well as an individual's social behavior.[1] Autism spectrum disorder (ASD) is defined as a socially isolating disease, and has been hypothesised to be caused by defective MNs. According to the World Health Organization (WHO), about 1 out of every 100 children suffer from ASD. Although many studies have proven that the impaired MN system is the underlying cause of the cognitive function defects seen in these individuals, the exact role it plays in causing the disease is still unclear.[2]

MNs play a vital role in the field of language and emotions. Although there is not enough research to establish a definitive connection, several existing studies have proven that MNs which are responsible for imitation, perception, empathy, and developing social skills are almost always impaired in patients with ASD.[3] In another study conducted by Wadsworth et al it was revealed that even though both, individuals diagnosed with ASD, and those considered normal, performed the given tasks equally well, functional magnetic resonance imaging of the brain showed no MN activity in the frontal gyrus of autistic children.[4]

Furthermore, a study conducted by Rizzolatti et al states that the MN system is responsible for developing compassion and advancing emotional skills in patients. Another recent clinical trial by Dapretto et al concluded that defective MNs are the main cause of the social difficulties faced by individuals afflicted with ASD.[5] One more possible underlying reason for ASD is the disabled theory of mind (ToM), which is the ability of an individual to understand and interpret emotions and behavior of other people. According to a study by Andreou et al the broken MNs are responsible for impaired ToM which leads to most of the social and emotional shortcomings seen in autistic individuals.[6] In conclusion, it is quite evident that broken MN system is one of the factors which lead to ASD.

The efficiency of MNs is generally determined by measuring Mu suppression, which is a type of rhythm detected in an EEG test in response to activity conducted in the motor cortex. The effectiveness of this method is still under question, however, according to recent studies, a clear pattern of aberrant Mu suppression is indicated in patients afflicted with decreased attention span, as seen in individuals with ASD as well.[7]

The most popular available treatment for children afflicted with ASD is the early start Denver model (ESDM), which is a behavioral therapy for children aged 12-48 months, which aims to help them to develop social and communication skills. This treatment has proven to create a positive impact on children's social lives.[8]

However, more awareness regarding the drawbacks of this treatment needs to be created. A professor of child and adolescent psychiatry at the university of Manchester has recently expressed concern regarding the effectiveness of ESDM over other treatment methods, as it does not improve intelligence quotients or adaptive behavior more than other, less demanding ones.[9] Furthermore, the precise role of MNs play in developing ASD remains unclear, making it crucial for researchers to further investigate it. Thus, it is pertinent to come up with more effective and efficient treatment plans, including brain and drug therapies, to help enhance the communication skills of patients with ASD, and overall improve their quality of life.

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