



Role of Prefrontal Cortex Abnormalities in Social Cognition Deficits in Idiopathic Generalized Epilepsies

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DESCRIPTION

Idiopathic Generalized Epilepsies (IGEs) are a group of epilepsy syndromes characterized by generalized seizures without a known structural or metabolic cause. These seizures typically begin in childhood or adolescence and can have a significant impact on cognitive functions, including social cognition. Social cognition refers to the mental processes involved in perceiving, interpreting, and responding to social stimuli, which are essential for effective social interactions and relationships. Understanding the social cognitive deficits in IGE and their neuroanatomical correlates is crucial for developing targeted interventions and improving the quality of life for individuals with these conditions.

Social cognition and its components

Social cognition encompasses various components, including emotion recognition, theory of mind (ToM), empathy, and social decision making. Emotion recognition involves identifying and interpreting emotional expressions in others. Understanding that others have beliefs, goals, and intentions that differ from one's own and being able to assign mental states, intents, desires, and knowledge to oneself and others is known as theory of mind. Empathy is the capacity to understand and share the feelings of another person. Social decision-making involves making choices in social contexts, often requiring an understanding of social norms and the potential consequences of one's actions.

Impact of IGEs on social cognition

Research has shown that individuals with IGEs often exhibit impairments in various aspects of social cognition. For instance, studies have reported difficulties in emotion recognition, particularly with negative emotions such as fear and anger. This impairment can lead to misunderstandings in social interactions and contribute to social anxiety or withdrawal. Theory of mind abilities is also frequently affected in individuals with IGEs.

These individuals may struggle to infer others' thoughts and feelings, leading to challenges in understanding social cues and responding appropriately in social situations. Such deficits can hinder the development of meaningful social relationships and may contribute to feelings of isolation.

Empathy, both cognitive and affective, can be compromised in individuals with IGEs. Cognitive empathy involves understanding another person's perspective, while affective empathy involves sharing their emotional experience. Deficits in empathy can result in difficulties in forming and maintaining close relationships, as individuals with IGEs may be perceived as indifferent or insensitive to the feelings of others. Social decision-making is another area that can be impacted by IGEs. Impairments in this domain can lead to poor judgment in social situations, such as making inappropriate comments or failing to adhere to social norms. These difficulties can further exacerbate social challenges and negatively impact the individual's social functioning and overall well-being.

Neuroanatomical correlates of social cognition in IGEs

The neuroanatomical basis of social cognition involves a network of brain regions, including the prefrontal cortex, temporal lobes, amygdala, and anterior cingulate cortex. Abnormalities in these regions have been implicated in the social cognitive deficits observed in individuals with IGEs.

Prefrontal cortex: The prefrontal cortex, particularly the ventromedial and dorsolateral regions, plays a critical role in social cognition. The ventromedial prefrontal cortex (vmPFC) is involved in emotion regulation, empathy, and social decision-making. The dorsolateral prefrontal cortex (dlPFC) is associated with executive functions, including working memory and cognitive flexibility, which are essential for understanding and responding to social cues. In individuals with IGEs, structural and functional abnormalities in the prefrontal cortex have been reported. These abnormalities may contribute to difficulties in

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emotion regulation, impaired empathy, and poor social decision-making observed in this population.

Temporal lobes: The temporal lobes, including the superior temporal sulcus (STS) and the fusiform gyrus, are important for emotion recognition and theory of mind. The STS is involved in processing social cues, such as facial expressions and body language, while the fusiform gyrus is critical for face recognition. Studies have shown that individuals with IGEs may have reduced volume and altered connectivity in the temporal lobes. These changes could underlie the impairments in emotion recognition and theory of mind observed in this population.

Amygdala: The amygdala is a key structure involved in processing emotional stimuli and generating appropriate emotional responses. It is also involved in the recognition of emotional expressions, particularly fear and anger. Abnormalities in the amygdala, such as reduced volume or altered connectivity, have been reported in individuals with IGEs. These abnormalities may contribute to difficulties in recognizing and interpreting emotional expressions, leading to impaired social interactions.

Anterior cingulate cortex

The Anterior Cingulate Cortex (ACC) is involved in a range of cognitive and emotional processes, including empathy and social

decision-making. It plays a role in conflict monitoring, error detection, and the regulation of emotional responses. Functional and structural abnormalities in the ACC have been observed in individuals with IGEs. These abnormalities may contribute to deficits in empathy and social decision-making, further impacting social functioning in this population.

Social cognition is a critical aspect of human functioning, enabling effective communication and the formation of meaningful relationships. Individuals with IGEs often experience significant social cognitive deficits, impacting their ability to navigate social interactions successfully. Neuroanatomical abnormalities in brain regions such as the prefrontal cortex, temporal lobes, amygdala, and anterior cingulate cortex likely underlie these impairments. Understanding the specific social cognitive deficits and their neuroanatomical correlates in IGEs is essential for developing targeted interventions. These interventions could include cognitive rehabilitation programs aimed at improving emotion recognition, theory of mind, empathy, and social decision-making skills. Additionally, pharmacological treatments targeting the underlying neuroanatomical abnormalities may also prove beneficial.