Prefrontal cortex the very front of the brain psychology essay

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The Prefrontal Cortex is the very front of the brain, located right beneath the forehead and is the anterior region of the frontal lobe. The prefrontal cortex is a very important area in the brain and is the most susceptible to injury. The prefrontal cortex is responsible for the functions of decision making, whether right or wrong, working memory, personality expression and cognitive behaviors. The prefrontal cortex has major neurotransmitters that are involved directly in its proper functioning for example, glutamate and dopamine. The prefrontal cortex can be affected by diseases for example, Parkinson’s disease and Schizophrenia. The prefrontal cortex is among the last regions of the brain to develop therefore its functions and disorders are still being researched.

The prefrontal lobe is connected to the anterior region of the frontal lobe. The prefrontal lobe volume increases slowly until the age of eight, then a prefrontal growth spurt increases in between the ages of eight and fourteen years. In contrast with other brain areas the prefrontal cortex is one of the last region to development therefore the functions and disorders are not immediately apparent (Kanemura 195).

As studied in an experiment called the Somatic Marker Hypothesis one can infer some of the prefrontal cortex functions. Although these experiments have been performed the results do not apply to the entire prefrontal cortex. A prefrontal cortex function in the human brain is decision making and human reasoning. Some of the decision making depends on consciousness and overt cognition where as others do not. Those processes that depend on conscious and cognition are dependent on the sensory images that are directly coordinated to the early activity of cortices. All of the dependent

processes of consciousness and cognition regardless of the imagery are dependent on support processes for example, attention and working memory. Further studies demonstrate that damage to the prefrontal cortex prohibits the use of the somatic signals necessary for guiding decision making in an advantageous direction (Bechara 428).

In addition to decision making being a main function working memory is equally an important function. These functions have been assessed and results demonstrate that their functions come from different and distinct areas of the prefrontal cortex. While decision making processes occur in the ventromedial prefrontal cortex, working memory processes occur in the dorsolateral prefrontal cortex. Short-term memory is the type of working memory in relationship to prefrontal cortex (Humana Press 204)

Prefrontal Cortex Neurotransmitters

A neurotransmitter is a chemical substance released by neurons that send nerve impulses from one cell to the next in the nervous system. A major neurotransmitter in the prefrontal cortex is Glutamate. Glutamate is an excitatory neurotransmitter in the brain and is the most abundant amino acid in the diet. In the prefrontal cortex glutamate is associated with cognitive function. In schizophrenic patients abnormal levels of glutamate impair cognitive function. Another major neurotransmitter involved in the function of the prefrontal cortex is dopamine. Dopamine is commonly associated with parts of the brain that stimulate pleasure, which provide enjoyment and reinforcement to enforce a person proactively to perform

certain activities. Reduced levels of dopamine impair working memory in the prefrontal cortex (Damasio 1413).

Diseases that affect the Prefrontal Cortex

Parkinson’s disease and schizophrenia are two diseases that affect the prefrontal cortex. In both of the disorders the reduction of dopamine to the prefrontal cortex impairs working memory. Conversely, increasing dopamine levels in patients with these diseases improves their performance of test that utilizes their working memory. Parkinson’s disease has been considered a paradigm of degenerative diseases of the nervous system characterized by motor impairment due to malfunction and loss of dopaminergic neurons of the substantia nigra pars compacta. Recent clinical data shows modifications in behavior, personalilty changes, and cognitive impairment that lead to dementia. (Ferrer 89) Schizophrenia is a mental disorder that is characterized by abnormalities in the perception or expression of reality. In Schizophrenia working memory and cognitive deficits are in association with prefrontal cortex dysfunction. (Manoach 285)

Conclusion

In conclusion, the prefrontal cortex is an important region of the frontal lobe that functions in decision making, cognitive behaviors, working memory, and personality expression. The prefrontal lobe has major neurotransmitters that assist in the communication of impulses from cell to cell throughout the nervous system. The reduction of those neurotransmitters in the prefrontal cortex may lead to diseases that affect the important functions of the cortex. The prefrontal lobe is one of the last regions of the brain to develop

therefore leaving scientist with many research questions about its functions and possible disorders it may cause.