Neurotransmitters and their relation to intelligence

Running head: NEUROTRANSMITTERS Neurotransmitters and their relation to intelligence here The of the here In order to effectively examine the correlation, or the lack of the same, between the psychological concept of intelligence and essential physiological neurochemistry of the various neurotransmitters and their receptors, we must first provide a clarification of the concepts that are involved.

Intelligence has a long-standing fascination amongst researchers, as well as the general population, as it encompasses diverse components that embody the constituents of consciousness. Over the many decades, there have been many definitions concerning intelligence, and the same amount of controversies and debates over what intelligence represents. Wechsler (1944) sets the more widely accepted definition, as he describes intelligence as " the aggregate or global capacity of an individual to act purposefully, to think rationally, and to deal effectively with his environment". From a neurological perspective, the anatomical localization of the neurological processes that give rise to intelligence is generally considered to be the Wernicke's area, located in the superior temporal gyrus, an area of the brain not only related to language and speech, but also to logical and abstract thought. This was determined by research done on patients that have lost their higher intellectual functions when their Wernicke's area. Guyton claims that the prefrontal association area is also associated with intelligence, but not to a great extent.

Neurotransmitters in essence represent chemical messengers of the neural circuits and pathways, and in combination with the synapses, represent the physiological method of communication between neurons. In the synapses, the neurotransmitter is released from a pre-synaptic neuron and bonds with

receptors on the post-synaptic neuron. It should be noted that there are many types of neurotransmitters, each found in specific areas of the nervous system and therefore, each has a specific action. Researchers have also shown that neurotransmitters have a considerable influence in the development of some psychiatric illnesses, such as clinical depression, with increase of serotonin, or represent a clinical symptom of a specific illness, such as Alzheimer's and the increase of acetylcholine. (Harrison, 2008)

The abundant amount of research made on the nature of intelligence has not yielded sufficient information as to the exact physiology of intelligence (Goldman, 2008). However, many illnesses that are either from a physiological and anatomical nature have shown the many underlying principles that determine the functionality of the processes that are responsible for intelligence. As was stated previously, patients with a damaged Wernicke's area have shown decreased higher intellectual functions, and its stimulation has produced deep thinking during experiments (Guyton, 2008). It has also determined that the main neurotransmitter located in the Wernicke's area is GABA (gamma aminobytiric acid), but it also represents a main inhibitor in other various parts of the central nervous system. It should be noted that a decrease of GABA has been related to some illnesses such as stiff person syndrome and epilepsy, and both represent disorders of motor functions rather than cognitive disorders. An excess of GABA, experimentally or because of therapy has not show a significant increase of higher intellectual functions (Goldman, 2005). One should also note that a decrease in other neurotransmitters are found or are responsible for disorders that a mainly connected with motor functions, and few are connected with psychiatric

symptoms, such as depression. However, none shows a decrease in higher intellectual function (Harrison, 2008), or most likely appears because of other processes, such as demyelinization. We can conclude that intelligence, its increase or decrease, can be attributed primarily to the anatomically set pathways in the central nervous system, and the various conditions that influence them, rather the amount of neurotransmitters and receptors present.

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