# Bipolar Disorder: Symptoms, neuroanatomical and neurotransmitter changes

Bipolar disorder is a type of mood disorder that is associated with alternative episodes of mania and depression. The regulation of moods within the brains occurs in two distinct neurotransmitter circuits namely the limbic-striatal-pallidal-cortical circuit and the limbic-thalamic-cortical circuit, with the first circuit being involved in mood regulation and the second circuit being involved in working memory (Blond, Fredericks & Blumberga, 2012). In this respect, any form of dysfunction in any of these neurotransmitter circuits has the effect of causing a moods dysfunction that results into a mood disorder (Semeniken & Dudás, 2011).

The dysfunction of the neuroanatomical changes that causes the bipolar disorder occurs in the neurotransmitter circuits of the prefrontal and the anterior cortex portions of the brain, the basal ganglia, as well as the limbic system that encompasses the striatum and thalamus, occasioning the brain to respond through mania and depressing alternating episodes (Baumann & Bogerts, 2001). The increased limbic activity increases the aberrant emotional processing, which in turn leads to the brain receiving and transmitting signals of highly passionate and mania moods to the body system. On the other hand, the neurophysiological abnormalities that occurs in the prefrontal cortex of the brain creates an impaired executive functioning of the neurotransmitter circuits, resulting in the brain transmitting the signals of depressing moods to the rest of the body (Semeniken & Dudás, 2011).

The prefrontal cortex and the limbic systems works to create the alternating moods of patients with bipolar disorder through the alteration of various fundamental neuroanatomical brain functionalities. The prefrontal cortex and the limbic system alternates in affecting the regional cerebral blood flows, while also affecting the volume and numbers of the glial cells in these regions (Semeniken & Dudás, 2011). The outcome is that once the prefrontal cortex occasions the decrease of the volume and numbers of he glial cells, accompanied by a reduction in blood flow in the region, a depression mood kicks in for the patient. On the other hand, once the limbic system stimulates the blood flow increase in the region while increasing the glial cells volume and numbers increases the brains processing of the aberrant emotions, resulting in mania moods (Baumann & Bogerts, 2001).

The location and nature of the neuroanatomical dysfunction by the neurotransmitter circuits occasioned by the changes in the limbic and prefrontal cortex of the brain has the impact of creating correlating symptoms in the patients (Semeniken & Dudás, 2011). One of the symptomatic characteristic of the bipolar disorder is its attention impairment in the patients suffering from this condition. The attention impairment characteristic of the patient suffering from the bipolar disorder can be explained by the dysfunction of the neurotransmitter circuits in the prefrontal cortex and the hippocampus, which impairs the ability of the individual to pay sustained attention towards anything (Blond, Fredericks & Blumberga, 2012). These occurrences also account for the symptomatic characteristics of the inability to think and indecisiveness often identifiable with the bipolar disorder patients.

Further, the reduction in the glial volume and density in the prefrontal cortex of the brain is a major cause of the cell loss commonly identifiable with bipolar patients, which occasions the symptomatic characteristics of fatigue and loss of energy, excessive sleep or insomnia, and slowed behavior (Semeniken & Dudás, 2011). Additionally, the impairment in the neurotransmitter circuitry of the prefrontal cortex is also responsible for the memory impairment and memory loss symptoms often identifiable with the patients suffering from this condition.

The dysfunction of the neurotransmitter circuits in the ventral-limbic is on the other hand responsible for the causation of the overexcited facial expressions that are symptomatic of the mania moods episodes of the bipolar patients (Blond, Fredericks & Blumberga, 2012). The outcome is that under those circumstances, the bipolar patients will exhibit the overexcited moods symptoms such as increased energy or agitation, talkativeness, reduced sleep and high self-confidence. Further, the decreased dorsal brain structures activity in the prefrontal cortex of the brain is responsible for the reduced reaction and response to stimuli often seen with bipolar patients (Semeniken & Dudás, 2011). Additionally, the imbalance arising from the dorsal brain structures and the ventral-limbic networks accounts for the overall reduced amygdala in the brain. The reduction in the volume of amygdala then causes the dysregulation of the emotional balance of the bipolar patients, resulting in the observable shifting of emotional episodes of mania and depression (Baumann & Bogerts, 2001).

The anatomical changes in patients with the bipolar disorder advances with time, as the dysfunction of the neurotransmitters continue to exacerbate. The outcome is that the reduction in the white matter and the amygdala in the brain continues to increase as the bipolar patient ages (Semeniken & Dudás, 2011). Therefore, the severity of the moods alterations for the patients increases as the patients grow older, often with the outcome of reduced amygdala and the hippocampus of the brain.

In summary, the bipolar disorder is a mood disorder occurring as a result of the dysfunction of the neurotransmitters in the prefrontal cortex of the brain and the limbic systems. Although the mood stability dysfunctions maybe existing in patients with bipolar disorder at the early stages, the manifestation of the moods instability increases with aging.

## References

Baumann, B. &, Bogerts, B. (2001). Neuroanatomical studies on bipolar disorder. Br J Psychiatry 178, 142-147.

Blond, N. Fredericks, C. & Blumberga, H. (2012). Functional neuroanatomy of bipolar disorder: structure, function, and connectivity in an amygdala–anterior paralimbic neural system. *Bipolar Disord.,*14(4), 10.1111/j.1399-5618.2012.01015.x.

Semeniken, K. & Dudás, B. (2011). Bipolar Disorder: Diagnosis, Neuroanatomical and Biochemical Background. *Psychopathology 38*,167-180.