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Opinion
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Symptoms with Decreasing amount of Dopamine in Schizophrenia

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Abstract

This article is devoted to the dopamine pathways in the brain and the symptoms caused by dopamine depletion rather than dopamine overload and the effects of antipsychotics on dopamine pathways.

Keywords: DA pathways; Mesocortical; Nigrostrial; Tuberoinfundibular; Mesolimbic pathways; Antipsychotics

Introduction

Schizophrenia is a group of related disorders that is similar to organic brain syndromes and manic-depressive illness. However, unlike organic brain syndromes, the causes of schizophrenia likely involve changes at the cellular level in the brain, rather than larger structural changes. The exact mechanisms that lead to schizophrenia are not yet fully understood, but may involve changes in neurotransmitters, neuroreceptors, connections between brain cells, or the structure and function of small organelles within brain cells. Studies of families and identical twins suggest that genetics plays a significant role in the development of schizophrenia, but the specific genes involved are likely to be many and complex. The lifetime risk of developing schizophrenia is about 0.5% across all populations studied. Schizophrenia is a disorder of thinking that causes fragmentation of mental function. It impairs the brain's ability to organize concepts and assemble information into coherent ideas, affecting all aspects of information processing. This includes cognition, emotional reactions, sensory information, and behavior, resulting in a fragmented and bizarre presentation of self in everyday life. The patient's narrative is difficult to understand and may contain fragments of opposite ideas without explanation. Psychotic symptoms such as hallucinations and delusions also exhibit fragmentation and make little logical or emotional sense [1]. When interacting with a person with schizophrenia, it is important to be specific, organized, and patient. People with anxiety disorders typically have a worried or anxious feeling and may have a slightly to moderately low mood. They often have trouble sleeping and may change their behavior or attitudes to avoid certain things. Today, the symptoms of schizophrenia are exacerbated caused by the lack of theory, especially regarding dopamine pathways and receptors and the misuse of antipsychotics [2].

There are four types of DA pathways in the brain. First, mesolimbic pathway arises from the ventral tegmental area, projects to the nucleus accumbens [3]. Positive symptoms in schizophrenia include delusions, hallucinations, disorganized thoughts, and disorganized speech. These symptoms, which are not typically experienced by people without schizophrenia, are considered manifestations of psychosis. Hallucinations, which occur in 80% of people with schizophrenia, are most commonly auditory but can also involve other senses [4]. Delusions are often bizarre or persecutory in nature. Distortions of self-experience, such as feeling as if one's thoughts or feelings are not their own, or believing that thoughts are being inserted into one's mind, are also common. Positive symptoms generally respond well to medication and tend to decrease over time, possibly due to a decline in dopamine activity. Positive symptoms in schizophrenia have been associated to increased dopamine activity in this pathway. Therefore, the use of antipsychotics is beneficial to reduce positive symptoms such as delusions and hallucinations, disorganized speech, disorganized behavior [5]. The next dopamine pathway is the mesocortical pathway, which is linked to the cortex from the VTA. In schizophrenia, negative symptoms such as loss of motivation and social withdrawal occur due to a decrease for DA. That is why, in this case, antipsychotics cannot be effective because of their DA-lowering properties and negative symptoms of patients are exacerbated. In most cases, schizophrenia is interpreted disease caused by a decrease for DA and misunderstandings arise. Therefore, this pathway deserves attention because of this property [6]. The next nigrostrial pathway arises from the substantia nigra, projects to the striatum and it is part of extrapyramidal nervous system and controls motor function. Deficiency of dopamine in this pathway can lead to dystonia and parkinsonian symptoms during treatment with antipsychotics, while excess of dopamine can lead to hyperkinetic symptoms such as tics and dyskinesias. That is why, treatment with antipsychotics is also ineffective in this pathway. The last pathway is the tuberoinfundibular pathway, which is linked to the pituitary gland from the hypothalamus. In this pathway, dopamine controls prolactin secretion, specifically it inhibits prolactin release as a result milk production, sexual desire and immune resistance. The decrease amount of dopamine in this pathway by antipsychotics causes an increase in prolactin, resulting in amenorrhea and galactorrhea, gynecomastia. These dopamine pathways are more significant for treatment of schizophrenia [7].

There are two types of antipsychotics. First type is typical antipsychotics, which block D2-receptors in all areas of the brain. Typical antipsychotics consist of haloperidol, fluphenazine, and prochlorperazine. Effects of these drugs on mesolimbic pathway is to decrease positive symptoms and it is beneficial for us. While their influences on mesocortical pathway is to worsen negative symptoms [8]. Like this, typical antipsychotics effects on nigrostrial pathway negatively, they may cause Parkinson's disease. Finally, their influence on tuberoinfundibular pathway is negative and can lead to galactorrhea and gynecomastia.

Second type of antipsychotics are atypical drugs that are most

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effective to treatment of schizophrenia. However, like typical antipsychotics, they have enough side effects. This group of drugs consist of aripiprazole, clozapine, lurasidone, olanzapine that block both D2 receptors and 5-HT2A receptors in the brain as a result serotonin receptors may increase dopamine levels in brain areas that need it. This modest D2 receptor blockade combination with serotonin receptor blockade is thought significantly lower the incidence of extrapyramidal side effects as well as reduce negative symptoms [9]. Atypical drugs can also bind too many other targets including other subtypes of serotonin receptors as well as histamine, muscarinic and alpha-adrenergic receptors. This may lead to increase more side effects such as weight gain and hyperlipidemia caused by blockade the subtypes of serotonin receptors. In addition, other atypical antipsychotics such as clozapine and olanzapine may lead to contribute weight gain and sedation due to blind H1 receptors. Agents that have significant affinity for alpha-adrenergic receptors may cause orthostatic hypotension. One atypical agent clozapine can cause condition that are more serious called agranulocytosis that occurs when bone narrow does not produce enough white blood cells to blood.

Conclusion

Dopamine pathways are more important for treatment of schizophrenia, because there may be various symptoms in patients. The most significant thing is overdosage of antipsychotics may cause increase of all symptoms that is why we should choose the most appropriate drugs to treat with drugs more successfully in schizophrenia.

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