The Cannabis-Psychosis-Schizophrenia Connection

Marijuana is popular because it alters perceptions. Psychosis revolves around misperceptions.

by Erik Messamore, MD, PhD

What is Psychosis?
Psychosis is a neurological symptom involving unusual experiences or beliefs. It happens when the conscious mind tries to make sense of the misperceptions that can happen when the brain becomes inefficient at processing information.

What is Schizophrenia?
Schizophrenia is a form of long-term psychosis that can’t be explained by other medical conditions. It often involves changes in important brain chemicals like dopamine, glutamate, anandamide, or serotonin.

The Chemical Effects of Cannabis resemble the Biochemistry of Psychosis.

<table>
<thead>
<tr>
<th>DOPAMINE</th>
<th>GLUTAMATE</th>
<th>ANANDAMIDE</th>
<th>SEROTONIN</th>
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<tbody>
<tr>
<td><img src="image" alt="Dopamine Structure" /></td>
<td><img src="image" alt="Glutamate Structure" /></td>
<td><img src="image" alt="Anandamide Structure" /></td>
<td><img src="image" alt="Serotonin Structure" /></td>
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<td>Dopamine is a chemical signal for significance. Misperceiving significance can lead to psychosis.</td>
<td>Glutamate is the brain’s most abundant neurotransmitter. It’s especially important in the networks that form perceptions. Other drugs that reduce glutamate signals (like ketamine or PCP) can produce psychosis.</td>
<td>Named after the Sanskrit word for bliss, anandamide reduces brain inflammation and protects the brain against schizophrenia.</td>
<td>Serotonin is part of the brain circuits that create perception. Drugs like LSD or psilocybin produce their hallucinations by turning on the 5A-type of serotonin receptor.</td>
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<td>Cannabis triggers dopamine release.</td>
<td>Cannabis reduces glutamate release.</td>
<td>Cannabis reduces the level of protective anandamide.</td>
<td>Frequent exposure makes the hallucination-producing 2A-type of serotonin receptor more sensitive.</td>
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<td>Most people with psychosis or schizophrenia release too much dopamine.</td>
<td>Many people with psychosis or schizophrenia have weak glutamate signals.</td>
<td>Low anandamide levels correspond to more severe symptoms of psychosis in people with schizophrenia.</td>
<td>Many people with schizophrenia have abnormal 2A-type serotonin receptors.</td>
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</tbody>
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Sources:
2. Sánchez-Bizáñez, P., Rodríguez-Murillo, M. & Garzón, J. The cannabinoid receptor 1 associates with NMDA receptors to produce glutamatergic hypofunction: implications in psychosis and schizophrenia. Front Pharmacol 4, 169 (2014).

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Links between marijuana and psychosis have been known for more than 150 years. Cannabis was widely used as a medicine during the 19th century. And medical textbooks from that era described a number of side effects, including psychosis.

A 1996 survey in New Zealand revealed that about 15% of people who have used marijuana experienced a side effect of psychosis. Modern studies also find higher rates of schizophrenia among cannabis consumers, with higher risk among more frequent consumers.

The chemical effects of marijuana resemble the biochemical changes seen in psychosis or schizophrenia. The main active ingredient of marijuana is THC, and giving THC to rats creates a brain information processing abnormality usually seen in psychosis or schizophrenia. And healthy human volunteers will experience symptoms of psychosis when given THC or cannabis extracts under laboratory conditions.

As more and more states create medical marijuana programs, it’s important to remember that all medications have side effects and that marijuana is not the right medicine for everyone.

Sources: