Short Review

The New "New Age" of Magic Mushrooms

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For as long as humans have had consciousness, we have been trying to find ways to alter it. In fact, the use of psychedelic compounds is older than any written historical account, with evidence of mushrooms from the Psilocybe genus, now commonly known as "magic mushrooms," being used in indigenous rituals in Mexico for millennia [1]. Numerous people have heard of—or experienced firsthand—the purported hallucinatory and euphoric effects of these fungi. However, many of the underlying consequences on our neurobiology have only recently been revealed, in large part due to a loosening of federal policy on research into psilocybin, the main psychoactive component of the drug [2].

When psilocybin is ingested into the body, it spreads throughout the bloodstream and is dephosphorylated into psilocin in the liver, which reaches its maximum blood concentration approximately 80 minutes post ingestion [3]. Psilocin is the chemical directly responsible for the mind-altering effects of magic mushrooms, due to its ability to cross the blood-brain barrier, bind at particular serotonin receptors, and excite the corresponding neurons [3]. In addition to acting as a serotonin receptor agonist, psilocin has been shown to have some minor effects on dopamine receptors. By deactivating the sodium-dependent serotonin transporter, psilocin also delays serotonin reuptake from the synaptic cleft, further increasing the postsynaptic excitability of serotonergic neurons [3].

This increased activation of serotonin receptors, particularly 5-HT2A, is believed to be what leads to the visual hallucinations experienced by so many people under the influence of psilocybin. 5-HT2A is widely expressed throughout the visual cortex, and its expression is heavily dependent on retinal input, indicating that this receptor plays a role in optical processing [4]. Likewise, increases of 5-HT2A in the temporal and motor cortices are associated with visual hallucinations in Parkinson's patients [5]. One potential theory for the basis of psilocybin-induced hallucinations postulates that increased excitability in the visual cortex leads to an increase in the "random" firing of neurons, which humans experience as constantly changing geometric shapes and designs [6], though this does not provide an explanation for the effects on downstream visual processing that lead to more complex visions of faces, animals, and people.

We are only just beginning to understand how psilocybin acts on the human brain, but even now policy changes are starting to reflect shifts in public opinion. Thanks to a recently passed ballot measure in Oregon [7] and more moderate decriminalization policies in cities across the United States [8], over the next few years further research will be conducted on the efficacy of this drug for treating psychiatric and neurological illnesses. Despite there currently only being a few studies with small sample sizes, the use of psilocybin in conjunction with traditional therapies has already yielded promising results in the treatment of depression [9], anxiety [10], and substance use disorders [11] [12]. Nonetheless, only time will tell the role that magic mushrooms will play in medicine and society at large. One can only hope that the loosening of restrictions on new research will allow us to further our understanding of how these psychedelic fungi can have beautiful, therapeutic, and potentially life-changing effects on our minds.

References

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