

Scientists show hallucinogen in mushrooms creates universal 'mystical' experience

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Using unusually rigorous scientific conditions and measures, Johns Hopkins researchers have shown that the active agent in "sacred mushrooms" can induce mystical/spiritual experiences descriptively identical to spontaneous ones people have reported for centuries.

The resulting experiences apparently prompt positive changes in behavior and attitude that last several months, at least.

The agent, a plant alkaloid called psilocybin, mimics the effect of serotonin on brain receptors-as do some other hallucinogens-but precisely where in the brain and in what manner are unknown.

An account of the study, accompanied by an editorial and four experts' commentaries, appears online today in the journal *Psychopharmacology*.

Cited as "landmark" in the commentary by former National Institute on Drug Abuse (NIDA) director, Charles Schuster, the research marks a new systematic approach to studying certain hallucinogenic compounds that, in the 1950s, showed signs of therapeutic potential or value in research into the nature of consciousness and sensory perception.

"Human consciousness...is a function of the ebb and flow of neural impulses in various regions of the brain-the very substrate that drugs such as psilocybin act upon," Schuster says. "Understanding what mediates these effects is clearly within the realm of neuroscience and deserves investigation."

"A vast gap exists between what we know of these drugs-mostly from descriptive anthropology-and what we believe we can understand using modern clinical pharmacology techniques," says study leader Roland Griffiths, Ph.D., a professor with Hopkins' departments of Neuroscience and Psychiatry and Behavioral Biology. "That gap is large because, as a reaction to the excesses of the 1960s, human research with hallucinogens has been basically frozen in time these last forty years."

All of the study's authors caution about substantial risks of taking psilocybin under conditions not appropriately supervised. "Even in this study, where we greatly controlled conditions to minimize adverse effects, about a third of subjects reported significant fear, with some also reporting transient feelings of paranoia," says Griffiths. "Under unmonitored conditions, it's not hard to imagine those emotions escalating to panic and dangerous behavior."

The researchers' message isn't just that psilocybin can produce mystical experiences. "I had a healthy skepticism going into this," says Griffiths, "and that finding alone was a surprise." But, as important, he says, "is that, under very defined conditions, with careful preparation, you can safely and fairly reliably occasion what's called a primary mystical experience that may lead to positive changes in a person. It's an early step in what we hope will be a large body of scientific work that will ultimately help people."

The authors acknowledge the unusual nature of the work, treading, as it does, a fine line between neuroscience and areas most would consider outside science's realm. "But establishing the basic science here is necessary," says Griffiths, "to take advantage of the possible benefits psilocybin can bring to our understanding of how thought, emotion, and ultimately behavior are grounded in biology."

Griffiths is quick to emphasize the scientific intent of the study. "We're

just measuring what can be observed," he says; "We're not entering into 'Does God exist or not exist.' This work can't and won't go there."

In the study, more than 60 percent of subjects described the effects of psilocybin in ways that met criteria for a "full mystical experience" as measured by established psychological scales. One third said the experience was the single most spiritually significant of their lifetimes; and more than two-thirds rated it among their five most meaningful and spiritually significant. Griffiths says subjects liken it to the importance of the birth of their first child or the death of a parent.

Two months later, 79 percent of subjects reported moderately or greatly increased well-being or life satisfaction compared with those given a placebo at the same test session. A majority said their mood, attitudes and behaviors had changed for the better. Structured interviews with family members, friends and co-workers generally confirmed the subjects' remarks. Results of a year-long followup are being readied for publication.

Psychological tests and subjects' own reports showed no harm to study participants, though some admitted extreme anxiety or other unpleasant effects in the hours following the psilocybin capsule. The drug has not been observed to be addictive or physically toxic in animal studies or human populations. "In this regard," says Griffiths, a psychopharmacologist, "it contrasts with MDMA (ecstasy), amphetamines or alcohol."

The study isn't the first with psilocybin, the researchers say, though some of the earlier ones, done elsewhere, had notably less rigorous design, were less thorough in measuring outcomes or lacked longer-term follow-up.

In the present work, 36 healthy, well-educated volunteers-most of them

middle-aged-with no family history of psychosis or bipolar disorder were selected. All had active spiritual practices. "We thought a familiarity with spiritual practice would give them a framework for interpreting their experiences and that they'd be less likely to be confused or troubled by them," Griffiths says. All gave informed consent to the study approved by Hopkins' institutional review board.

Each of thirty of the subjects attended two separate 8-hour drug sessions, at two month intervals. On one they received psilocybin, on another, methylphenidate (Ritalin), the active placebo.

In designing the study, researchers had to overcome or at least, greatly minimize two hurdles: the risk of adverse side-effects and the likelihood that the expectations of getting the test drug or the placebo would influence subjects' perceptions.

To lessen the former, each subject met several times, before drug sessions began, with a reassuring "monitor," a medical professional experienced in observing drug study participants. Monitors stayed with them during the capsule-taking sessions. Actual trials took place in a room outfitted like a comfortable, slightly upscale living room, with soft music and indirect, non-laboratory lighting. Heart rate and blood pressure were measured throughout.

The researchers countered "expectancy" by having both monitors and subjects "blinded" to what substance would be given. For ethical reasons, subjects were told about hallucinogens' possible effects, but also learned they could, instead, get other substances-weak or strong-that might change perception or consciousness. Most important, a third "red herring" group of six subjects had two blinded placebo sessions, then were told they'd receive psilocybin at a third. This tactic-questionnaires later verified-kept participants and monitors in the dark at the first two sessions about each capsule's contents.

Nine established questionnaires and a new, specially created followup survey were used to rate experiences at appropriate times in the study. They included those that differentiate effects of psychoactive drugs, that detect altered states of consciousness, that rate mystical experiences and assess changes in outlook.

The study, Griffiths adds, has advanced understanding of hallucinogen abuse.

As for where the work could lead, the team is planning a trial of patients suffering from advanced cancer-related depression or anxiety, following up suggestive research several decades ago. They're also designing studies to test a role for psilocybin in treating drug dependence.

Source: Johns Hopkins Medical Institutions

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