

## **JOHNS HOPKINS STUDY PROBES “SACRED MUSHROOM” CHEMICAL**

**Scientists seek dosage “sweet spot,” find positive effects lasting over a year**

**Former U.S. “Drug Czar” raises policy question**

**Clinical trials now underway**

BALTIMORE, June 15 – Scientists at the Johns Hopkins University School of Medicine have zeroed in on the dose levels of the “sacred mushroom” chemical capable of yielding positive, life-changing experiences, while minimizing the chance of transient negative reactions in screened volunteers under supportive, carefully monitored conditions.

The findings, published online this week in the journal *Psychopharmacology*, come from the latest in a series of rigorous experiments done at Johns Hopkins designed to shed scientific light on psilocybin, a substance found in certain psychoactive mushrooms and used for centuries in various cultures for divinatory, healing, and religious purposes.

Looking back over a year later, most of the experiment’s 18 volunteers (94 percent) rated a psilocybin session as among the top five most or as the topmost spiritually significant experience of his or her life. Under higher doses, up to a third experienced great fear or anxiety or had delusions, yet those reactions, the researchers report, were managed with gentle reassurance from the study monitors and did not outlast the session or harm the volunteers.

Most volunteers (89 percent) also reported positive changes in their behaviors, and those reports were corroborated by family members or others, the researchers say. The behavior changes most frequently cited were improved relationships with family and others, increased physical and psychological self-care, and increased devotion to spiritual practice.

In the experiment, volunteers were given preparatory guidance and five sessions each a month apart, four with different doses of psilocybin and one with placebo (no dose). While the positive effects of psilocybin increased with increasing doses, the likelihood of fear or delusions increased sharply at the highest doses. At the second-highest dose given, two-thirds of the volunteers rated the experience as among the five most spiritually significant of their lifetime, and just 5.6 percent reported intervals of “extreme” fear or anxiety during the session. With the highest dose, the percentage of participants having a top-five experience rose modestly, from 67 percent to 78 percent, but the percentage of those having psychological struggle rose sixfold, to 33 percent.

The researchers also found that participants who received lower psilocybin doses before the higher doses were more likely to have long-lasting positive changes in attitudes, behavior, and remembered mystical-type experiences than those who received the highest dose first.

The study's lead scientist, Roland Griffiths, Ph.D., a professor of psychiatry and behavioral sciences and neuroscience at the Johns Hopkins University School of Medicine, explained that "in cultures before ours, the spiritual guide or healer had to discern how much of what type of mushroom to use for what purposes, because the strength of psychoactive mushrooms varies from species to species and even from specimen to specimen. In our laboratory, we're working with the pure chemical psilocybin, which we can measure out precisely. We wanted to take a methodical look at how its effects change with dosage. We seem to have found levels of the substance and particular conditions for its use that give a high probability of a profound and beneficial experience, a low enough probability of psychological struggle, and very little risk of any actual harm."

### **Two Practical Questions**

Commenting on the findings, Jerome Jaffe, M.D., of the University of Maryland School of Medicine, who served as the first White House "Drug Czar" and has also been a consultant to the World Health Organization on drug issues, remarked, "The Hopkins psilocybin studies clearly demonstrate that this route to the mystical is not to be walked alone. But they have also demonstrated significant and lasting benefits. That raises two questions: Could psilocybin-occasioned experiences prove therapeutically useful, for example in dealing with the psychological distress experienced by some terminal patients? And should properly-informed citizens, not in distress, be allowed to receive psilocybin for its possible spiritual benefits, as we now allow them to pursue other possibly risky activities such as cosmetic surgery and mountain-climbing?"

### **Ongoing Research**

The dose-effect findings published this week help pave the way for research into possible therapeutic uses of psilocybin. One ongoing study at Hopkins is exploring whether psilocybin-induced peak experiences can help alleviate anxiety and fear of death in cancer patients. Another study is testing whether psilocybin can help smokers quit cigarettes.

A third ongoing psilocybin experiment at Hopkins is working with healthy volunteers engaged in spiritual exploration. The research examines the outcomes of psilocybin sessions in combination with various spiritual practices such as meditation, awareness training, and dialogue with other study participants.

In its completed and current studies combined, the Hopkins research team has given more than 210 psilocybin sessions to more than 100 volunteers. Nearly all volunteers have reported that their psilocybin sessions have led to significant and lasting increases in well-being.

The report published online in *Psychopharmacology*, “Psilocybin occasioned mystical-type experiences: immediate and persisting dose-related effects,” was authored by Roland R. Griffiths, Matthew W. Johnson, Una McCann, William A. Richards, Brian D. Richards, and Robert Jesse. The research was supported by grants from the Council on Spiritual Practices, the Heffter Research Institute, the Betsy Gordon Foundation, and the National Institutes of Health.

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Source: Council on Spiritual Practices

## **SUPPLEMENTAL MATERIAL**

### **Study Design**

The latest study was conducted with 18 volunteers, ages 29 to 62, screened to include only psychologically and physically healthy individuals. Each volunteer received five carefully monitored, eight-hour sessions a month apart, four with varying amounts of psilocybin and a fifth session with placebo. As in earlier Hopkins psilocybin studies, the sessions took place in an aesthetic, living-room-like setting, and the volunteers were encouraged to recline on a couch, put on eye shades and headphones, and to turn their attention inward as a program of music played. The program, used for all sessions, consisted of classical and world music chosen to complement the arc of the psilocybin action, from onset, through the peak of the effects, and subsiding back to baseline.

The study was “blind,” meaning neither the volunteers, the monitors, nor the scientists knew how much psilocybin had been given during any session. Most of the research team was also blind to another aspect of the study, namely, that the five sessions would be conducted with either ascending or descending psilocybin amounts administered across consecutive sessions.

### **Study Results**

The new study showed an orderly relationship between the dose of psilocybin and both its transient and persisting effects. Even the lowest dose produced measurable changes during the hours of drug action. However, the effects most likely to be beneficial and long-lived occurred at the higher doses. Notably, between the second-highest and the highest doses given, the likelihood of a “complete” mystical-type experience, resembling those reported by religious mystics from diverse traditions, increased from 44 percent to 56 percent, and the likelihood of a volunteer having what he or she a month later would call “the single most spiritually significant experience of his/her life” increased from 28 percent to 44 percent.

While the second-highest dose administered was moderately less likely than the highest dose to produce a potentially life-changing experience, it was much less likely to produce fear, anxiety, or delusions during the session. At the second-highest dose, one of the 18 volunteers (5.6 percent) reported “extreme” fear or anxiety during some interval of the session. At the highest dose, that proportion increased to six out of 18 (33 percent). In all

instances, the fear or anxiety was managed with gentle reassurance from the monitors and the passage of time, and did not lead to any reported or observed negative consequences after the session.

One month after sessions, a majority of the volunteers (61 percent) considered their psilocybin experience during either or both of the two highest-dose sessions to have been the single most spiritually significant of their lives, and most (83 percent) rated it as among their top five. When asked at 14-month follow-up, that proportion increased from 83 percent to 94 percent. Additionally, 83 percent said it increased their well-being or life satisfaction moderately or very much, and 89 percent said it led to moderate, strong, or extreme improvements in their behaviors. Of the 90 total sessions conducted during the study, none were rated as having decreased well-being or life satisfaction.

Although the ascending or descending order did not alter the transient effects of a single dose, the ascending sequence overall was found to be somewhat more likely to yield long-lasting positive changes in attitudes, behavior, and remembered mystical-type experiences.

These findings reinforce previous Hopkins research showing that psilocybin, given under well-designed conditions, has a high probability of leading to mystical or spiritual experiences descriptively identical to spontaneous ones mystics have reported across cultures and throughout the ages, while not leading to drug abuse or organ toxicity. Furthermore, the research has shown that the mystical-type experience is often followed by positive changes in attitudes, mood, life satisfaction, and behavior, including altruistic behavior, that persist for more than a year, as described by the subjects and also by observers close to them.

The results do not necessarily generalize to other populations, such as people less carefully screened or those without a spiritual orientation, nor do they generalize to conditions of use other than the carefully monitored study environment.

### **From Insights to Improvements**

The behavior changes most frequently cited were improved relationships with family and others, increased physical and psychological self-care, and increased devotion to spiritual practice. Mary Cosimano, M.S.W., a lead monitor for the study in the Johns Hopkins Behavioral Pharmacology Research Unit, noted, "It's an incredible privilege to be able to witness and support our participants before, during, and after their psilocybin sessions. In a single day, deep emotions and insights often arise, and sometimes profound peace, clarity, and compassion. More than a few of our participants were able to turn such an experience into real improvements in their ongoing lives."

### **Risk Management**

Matthew Johnson, Ph.D., an assistant professor of psychiatry and behavioral sciences at Johns Hopkins and lead author of an earlier Hopkins paper on hallucinogen safety, explained that "safety with psilocybin encompasses more than its direct pharmacological effects. We know that psilocybin is remarkably non-toxic to the body's organ systems. But there are indirect risks: if someone experiences high anxiety, fear, or paranoia during a psilocybin session, it's not hard to imagine them behaving in ways harmful to themselves or others. We can also imagine the possibility that strong, transient negative emotions could leave someone thrown off course, not knowing what to make of the experience." Johnson, also an

author of the new study, continued, “Both of these risks appear to be minimized when volunteers develop a trusting relationship with a skilled monitor, who remains present with them for the duration of the substance’s primary effects, and who is available afterwards for consultation.”

Also, the scientists excluded from the study volunteers with certain types of personal or family psychiatric histories or other signs of vulnerabilities that might make psilocybin inadvisable, at least until more is known.

### **Previous Johns Hopkins Psilocybin Research**

See [www.csp.org/psilocybin](http://www.csp.org/psilocybin)

### **Volunteer Comments**

Responding to a questionnaire given at the 14-month follow-up, volunteers in the dose-effect study provided written comments about the nature of any behavior changes they attributed to either or both of the two highest dose psilocybin sessions. Here are excerpts:

- “I have an increased commitment to spiritual practices; I think my heart is more open to all interactions with other people....”
- “I have a stronger desire for devotion, have increased yoga practice and prayer.... I need less food to make me full. My alcohol use has diminished dramatically.”
- “I feel that I relate better in my marriage. There is more empathy – a greater understanding of people and understanding their difficulties and less judgment.”
- “Increased time for meditation. I think I’m even warmer towards people and more accepting. I now believe I have something important to tell people about how the universe works.”
- “Less concerned with the appearance of ‘spirituality’, while realizing more that everything is sacred. I feel more accommodating and forgiving towards both friends and strangers, and less anxious to label them or convert them to my viewpoint.”

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