

STANDARD DEVIATIONS: Magic or Medicine?

Greetings,

The bioactivity of fungal metabolites has been known for at least 12 centuries and, based on contemporary research, has led to the development of some of the most important drugs of the 21st century.

In 1928 Alexander Fleming, a physician working at St Mary's hospital in London, observed the effect of penicillin, produced by a fungus, *Penicillium notatum*, which was a contaminant growing on a Staphylococcus containing Petri dish.

In 1948, Italian scientist Giuseppe Brotzu isolated *Cephalosporium* from a sewer off the coast of Sardinia. Cephalosporin analogues of this fungal compound are vital beta-lactam antibiotics.

Ergotamine is a fungal vasoconstricting alkaloid used to treat migraine that has been used for centuries.

Cyclosporin A and Mycophenolic acid are immunosuppressive drugs from fungus that represent billions of dollars in prescriptions.

The first statins discovered were found in fungus. And statins are *the* most successful medicines in history (by revenue and usage).

Shitake mushrooms are cultivated worldwide for their health benefits. The derived polysaccharide, lentinan, enhances immunity, is antimicrobial, antiviral, and lowers cholesterol.

And now, **psilocybin**, a naturally occurring psychedelic prodrug compound produced by more than 200 species of fungi, is poised to join the parade.



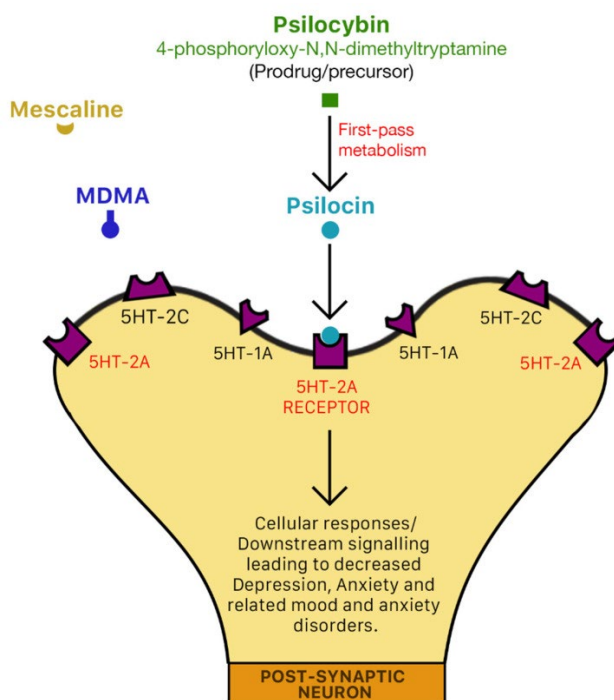
{Magic mushrooms, genus *Psilocybe*.}



In 2016, Johns Hopkins Medicine researchers first reported that treatment with psilocybin under psychologically supported conditions significantly relieved existential anxiety and depression.

Once psilocybin is ingested, it is converted into psilocin. Psilocin is interesting because it is structurally similar to serotonin and can bind many of the same receptors. Its effects are thought to come from its agonist activity at 5-HT_{2A} serotonin receptors in the prefrontal cortex.

The mechanism of action appears similar to that of the SRRI (Serotonin Reuptake Receptor Inhibitors) already used in treatment. Psilocybin has an advantage in efficacy in that it is much faster acting, there is virtually no direct lethality associated, and virtually no withdrawal syndrome when chronic use of this drug is ceased.



{Serotonin receptors are dense in areas of the brain responsible for mediation of mood and anxiety, such as the pre-frontal cortex.}

Researchers are working to understand the cognitive and therapeutic mechanics of psychedelics. They have found that psilocybin (also DMT and other psychoactive chemicals) can help people feel more tolerance, understanding and empathy. They also induce neuroplasticity, the brain's ability to change and reorganize thought patterns, enabling people with psychological disorders to find new ways to process anxiety, depression or deeply embedded trauma.

Throughout history, medicinal plants and their mystical healing powers have been revered. Shamans, medicine-men, witch doctors, and even witches have been respected mediators of the unknown and curing the infirm with natural plant-based knowledge. We are constantly solving



these mysteries through scientific discovery and research. Our inventory of medicines derived from fungus alone has saved countless human lives.

Psilocybin produces visual and auditory hallucinations and profound changes in consciousness. These psychoactive properties have given the mushroom its “magic”. We are learning the secrets behind the magic are biochemical and, used properly, have significant benefit in human health. *We live in a sliver of time where reverence is replaced with revulsion.* Psilocybin may become a significant contribution to our pharmacy (like penicillin) if we can overcome the current social stigma and place our faith in science.

Have a great week and be safe,

Bryan

