The Brain's Response to Hallucinogens

Hi, my name's Sara Bellum. Welcome to my magazine series exploring the brain's response to hallucinogens. In this issue, we'll investigate the fascinating facts about hallucinogens. Some of this information was only recently discovered by leading scientists.

Hallucinogens cause people to experience - you guessed it - hallucinations, imagined experiences that seem real. The word "hallucinate" comes from Latin words meaning, "to wander in the mind."

No wonder some people refer to hallucinating as tripping.

The "trips" caused by hallucinogens can last for hours. Parts of these trips can feel really good, and other parts can feel really terrible.

Hallucinogens powerfully affect the brain, distorting the way our five senses work and changing our impressions of time and space. People who use these drugs a lot may have a hard time concentrating, communicating, or telling the difference between reality and illusion.

Where Do Hallucinogens Come From?

Some hallucinogens can be found in plants. Mescaline comes from a cactus called peyote. And certain mushrooms, also known as magic mushrooms, are hallucinogens.

But many hallucinogens are chemicals that don't occur in nature. Some examples are:

- LSD, also called acid;
- MDA, an amphetamine, a type of drug I explore in my magazine about stimulants in more detail;
- MDMA, an amphetamine, called ecstasy;
- PCP (phencyclidine), often called angel dust.

How Hallucinogens Affect Your Senses

Your brain controls all of your perceptions -- the way you see, hear, smell, taste, and feel. How does your brain communicate with the rest of your body? Chemical messengers transmit information from nerve cell to nerve cell in the body and the brain. Messages are constantly being sent back and forth with amazing speed.

Your nerve cells are called neurons, and their chemical messengers are called neurotransmitters. When neurotransmitters attach to special places on nerve cells (called receptors), they cause changes in the nerve cells.

This communication system can be disrupted by chemicals like hallucinogens, and the results are changes in the way you sense the world around you.

A Recent Discovery

MDMA and MDA cause neurons to release a neurotransmitter called serotonin. Serotonin is important to many types of nerve cells, including cells that receive sensory information and cells that control sleeping and emotions. The released serotonin can over activate serotonin

receptors. In animals, MDMA and MDA have been shown to damage and destroy nerve fibers of neurons that contain serotonin. This can be a big problem, because serotonin neurons have a role in so many things, such as mood, sleep, and control of heart rate.

Scientists have recently found that the damaged serotonin neurons can regrow their fibers, but the fibers don't grow back normally. The fibers may regrow into brain areas where they don't normally grow, but not into other brain areas where they should be located. The new growth patterns may cause changes in mood, learning, or memory.

Actions of PCP in the Brain

PCP prevents the actions normally caused when a neurotransmitter, called glutamate, attaches to its receptor in the brain. It also disrupts the actions of other neurotransmitters.

This drug's effects are very unpredictable. For example, it may make some people hallucinate and become aggressive, while others may become drowsy and passive. It is also addictive.

LSD: The Most Commonly Used Hallucinogen

LSD causes its effects mainly by activating one type of receptor for serotonin. Because serotonin has a role in many important functions, LSD use can have many effects. These may include sleeplessness, trembling, and raised heart rate, and blood pressure. LSD users may feel several emotions at once (including extreme terror), and their senses may seem to get crossed -- giving the feeling of hearing colors and seeing sounds.

Even a tiny speck of LSD can trigger these effects. And LSD has an unusual "echo." Many users have flashbacks -- sudden repetitions of their LSD experiences -- days or months after they stop using the drug.

Have your perceptions been

Hallucinogens can change the way you see things. The experience is a little like looking at the optical illusion above.

The Search Continues

There's still a lot that scientists don't know about the effects of Hallucinogens on the brain. Maybe someday you will make the next big discovery.

Until then, join me -- Sara Bellum -- in the other magazines in my series, as we explore how drugs affect the brain and nervous system.

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