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brain

BRIEFINGS

The Brain's Stash

Scientists identified a substance in the brain that may have some similarities to marijuana. This does not change the fact that marijuana is a dangerous drug. It does, however, open doors for novel research. Scientists hope to mold this natural molecule into new therapies for disorders ranging from the eye disease, glaucoma, to illnesses marked by memory impairment.

When a person smokes marijuana, the active ingredient tetrahydrocannabinol (THC) doesn't haphazardly drop-kick brain cells to create side effects. It stealthily carries out its mission with the help of friends on the inside. THC embraces specific sites on cells called receptors and launches a series of reactions that lead to the drug's side effects. This realization led scientists to the discovery of one of the receptor's natural partners -- a derivative of a fatty acid, dubbed anandamide, after the Sanskrit word for bliss.

The 1988 discovery of receptors in the brain specifically designed to help marijuana carry out its tasks and the identification of one of the natural partners for these sites in 1992 is leading to:

- A better understanding of how marijuana acts in the body.
- A new way of looking at attention and memory problems.
- The development of novel ideas for treatment.

Marijuana has been surrounded by a haze of controversy for years. Proponents look past behavioral effects of the drug, including a sense of euphoria, and changes in mood, perception, memory and fine motor skills, and point to a long list of potential medical benefits. The drug is known to suppress nausea, offer relief from glaucoma, decrease muscle spasms, reduce blood pressure, alleviate anxiety, stimulate appetite, stop convulsions and kill menstruation pain. Researchers have tried to separate the positive effects of marijuana from its negative effects with little success. Scientists speculate, however, that the brain's natural anandamide system could hold the same medicinal benefits as marijuana and will be easier to decipher and harness for new treatments.

Once researchers know anandamide's function they could develop drugs that promote or stop a specific action of the molecule. Research shows large numbers of the anandamide receptors nestle in the parts of the brain responsible for short-term memory and motor control. This suggests that anandamide is involved with these two functions.

In addition, a recent study on rats demonstrates that injections of anandamide can impair short-term memory. Some scientists surmise that this preliminary evidence means memory loss, which is the symptom of many neurodegenerative diseases, may be compounded by the presence of anandamide. Future medications for the treatment of memory loss may work by stopping the union of anandamide and its receptor. Researchers have already developed compounds, called antagonists, that can carry out

this task. Many current remedies rely on this blocking method. For example, aspirin works by interfering with the synthesis of substances at the site of pain.

Scientists also are investigating the benefits of the molecule. For example, researchers created an altered form of anandamide and found that it provided rabbits with several hours of relief from internal eye pressure, which is a symptom of glaucoma. Additional studies need to be performed to confirm these results.

While investigations of anandamide may lead to promising treatments, it does not change the status of marijuana as a dangerous drug. In fact, along with alcohol and tobacco it has been called a "gateway drug" because many cocaine and heroin users smoke marijuana early in their drug taking careers.

On the positive side, researchers are searching for other anandamide-like substances in the body. During the 1970s a similar scenario unfolded. Researchers found that the brain held receptors that were home to not only opiate drugs, such as heroin, but also naturally occurring substances called opioid peptides. Further research led to the discovery of additional subtypes of the receptors and variations of the natural opioids.

Once the actions of the anandamide system are clear, scientists may be able to manipulate the molecules and create treatments for numerous illnesses ranging from eating disorders to Alzheimer's disease.

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