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DEPARTMENT OF
POLICE

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CHIEF OF POLICE

CITY OF SACRAMENTO
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September 30, 1998

Law and Legislation Committee
Sacramento, California

Honorable Members in Session:

**SUBJECT: ADOPTION OF ORDINANCE REGULATING PUBLIC CONSUMPTION
OF MARIJUANA**

LOCATION AND COUNCIL DISTRICT: Citywide.

RECOMMENDATION:

This report recommends that the Law and Legislation Committee recommend adoption of the attached ordinance adding Chapter 37.03 to Title 37 of the Sacramento City Code relating to smoking marijuana in public. This ordinance would make it either an infraction or a misdemeanor for anyone to smoke marijuana in or within one thousand (1,000) feet of the grounds of any school, the Sacramento Zoo, Funderland or Fairytale Town. In addition the ordinance would prohibit the consumption of marijuana in or within one hundred (100) feet of any building to which the public has access, or within one hundred (100) feet of any other person (other than a primary caregiver).

CONTACT PERSON: Captain Ernie Daniels, Special Investigations
Division, 264-7500

FOR THE COMMITTEE MEETING OF: October 6, 1998

SUMMARY:

This report recommends that the Law and Legislation Committee recommend the passage of the attached ordinance adding Chapter 37.03 to Title 37 of the Sacramento City Code, relating to the public consumption and/or smoking of marijuana in public places. This ordinance restricts the

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Proposed Ordinance - "Regulating Public Consumption of Marijuana"
October 6, 1998

smoking of marijuana around schools, the Sacramento Zoo, and other public places designated by this ordinance. This ordinance clarifies section 11362.5 of the Health and Safety Code, the "Compassionate Use Act", which was created by the passage of Proposition 215.

BACKGROUND:

On November 5, 1996, the voters of California passed Proposition 215 creating section 11362.5 of the Health and Safety Code. This statute provides an affirmative defense against criminal prosecution for patients and "primary care providers" who possess or grow marijuana for medicinal purposes upon recommendation or approval of a physician. Notwithstanding the passage of Proposition 215 several acts pertaining to marijuana, e.g., sales, transportation, possession for sale, furnishing, etc. continue to be prohibited by state law. Virtually all acts involving marijuana are prohibited by federal law.

Many ambiguities in the language of the statute have spawned litigation seeking judicial interpretation of the scope and implementation of the use of marijuana under the provisions of Proposition 215. As abuses or efforts to expand the scope of the statute have surfaced, local law enforcement officers have been confronted with difficult legal and policy issues when seeking to enforce the law.

On March 24, 1998, Sacramento County added Chapter 6.87 to Title 6 of the Sacramento County Code, effectively stating that any or all public consumption of marijuana is a misdemeanor. The Sacramento City Attorney has drafted a less restrictive ordinance in order to provide a reasonable accommodation for people covered under Proposition 215.

To garner input from the community, our proposed ordinance was presented in a public meeting of the Alcohol and Drug Advisory Board on September 2, 1998. The consensus was, with a few modifications (i.e., such as training for the officers), that this ordinance was reasonable in accommodation and compassionate to seriously ill people, covered under Proposition 215. All suggestions concerning the ordinance were incorporated.

The unrestricted smoking of marijuana in public places by persons claiming the affirmative defense of Proposition 215 is one of the dilemmas that needs to be addressed by local ordinance.

Although Proposition 215, now chaptered as Health and Safety Code Section 11362.5, provides an affirmative defense against prosecution for some offenses involving marijuana by persons deemed to be patients and their "primary care providers", it does not legalize marijuana nor prevent local

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government from regulating its use by those who may qualify as patients and "primary care providers".

An incident on the K Street Mall during Thursday Night Market illustrates the need for an ordinance to prohibit the smoking of marijuana in public. During the Thursday Night Market, citizens enjoying the vendors and other activities on the mall complained to police officers about an individual smoking marijuana on the mall. The individual was contacted by officers and found to be in possession of the remnants of a marijuana cigarette he had just smoked. He was cited for possession of marijuana and the case was referred to the District Attorney for criminal prosecution. Subsequent investigation determined that the individual may have prevailed at a trial based upon the affirmative defenses of Proposition 215. No existing law prohibited the smoking of marijuana in public. Therefore, criminal charges were not filed. Irrespective of one's position on the propriety, legality or efficacy of using marijuana as a medicine, it is highly unlikely that in passing this initiative the voters intended to permit marijuana smoking in all public places without regard to others.

At a time when public health, education and law enforcement officials are attempting to inform young people about the dangers of using illegal drugs such as marijuana, the public smoking of marijuana would at best send a confusing, mixed message to our youth. Marijuana is generally believed to be a gateway drug leading to experimentation and use of other illegal drugs.

Without knowing whether or not the marijuana was being smoked for alleged medicinal purposes, children or young people would only note that someone was smoking the drug in public in apparent violation of the law and the anti-drug use teachings of school, public health and law enforcement officials. The public smoking of marijuana would also conflict with the current government and private sector sponsored media campaign attempting to dissuade people from drug use.

Virtually any use or possession of marijuana remains a violation of federal laws. To permit the smoking of marijuana, especially in public, albeit subject to the affirmative defenses of the new state law, would condone a flagrant disregard for the federal laws which are supposed to be binding on all citizens.

Issues pertaining to the hazards of second-hand marijuana smoke in public places may also provide a basis for prohibiting public smoking. Whether the person next to you on a public bench or walking beside you on a sidewalk is smoking marijuana for medicinal purposes or not, the detriments of that second-hand smoke are equally injurious.

This ordinance would make it either an infraction or a misdemeanor for anyone to smoke marijuana

in or within one thousand (1,000) feet of the grounds of any school, the Sacramento Zoo, Funderland or Fairytale Town. In addition the ordinance would prohibit the consumption of marijuana in or within one hundred (100) feet of any building to which the public has access, or within one hundred (100) feet of any other person (other than a primary caregiver). Anyone claiming entitlement to smoke marijuana under the provisions of Proposition 215 can hardly claim undue hardship if public places are available, albeit not in areas where the public or children frequent. The ingestion of any medicine, especially one that disperses smoke into the surrounding area, should be a private matter and not a public display.

FINANCIAL CONSIDERATIONS:

This proposed amendment to the City Code will not yield an increase in revenues.

ENVIRONMENTAL CONSIDERATIONS:

This report does not involve an activity which would be covered by the California Environmental Quality Act (CEQA).

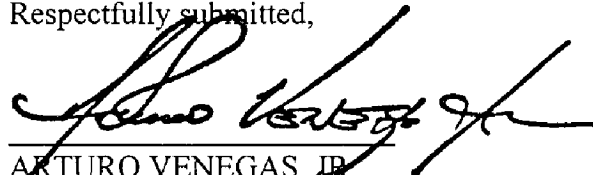
POLICY CONSIDERATIONS:

This proposed ordinance amendment is consistent with City policy in providing a safe environment for all citizens, while providing local law enforcement with clear guidelines.

MBE/WBE CONSIDERATIONS:

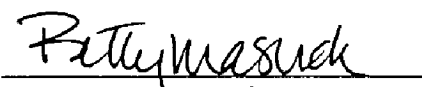
None.

Respectfully submitted,



ARTURO VENEGAS, JR.
CHIEF OF POLICE

RECOMMENDATION APPROVED:

W 
WILLIAM H. EDGAR
CITY MANAGER

Law and Legislation Committee
Proposed Ordinance - "Regulating Public Consumption of Marijuana"
October 6, 1998

Ref: 9-28

AV/ED:ag

Attachments: 1 - Health and Safety Code 11362.5
2 - Proposed Ordinance
3 - University of California at San Francisco Press Release - Synthetic Drug Study
(September 23, 1998)

11362. As used in this article "felony offense," and offense "punishable as a felony" refer to an offense for which the law prescribes imprisonment in the state prison as either an alternative or the sole penalty, regardless of the sentence the particular defendant received.

11362.5. (a) This section shall be known and may be cited as the Compassionate Use Act of 1996.

(b) (1) The people of the State of California hereby find and declare that the purposes of the Compassionate Use Act of 1996 are as follows:

(A) To ensure that seriously ill Californians have the right to obtain and use marijuana for medical purposes where that medical use is deemed appropriate and has been recommended by a physician who has determined that the person's health would benefit from the use of marijuana in the treatment of cancer, anorexia, AIDS, chronic pain, spasticity, glaucoma, arthritis, migraine, or any other illness for which marijuana provides relief.

(B) To ensure that patients and their primary caregivers who obtain and use marijuana for medical purposes upon the recommendation of a physician are not subject to criminal prosecution or sanction.

(C) To encourage the federal and state governments to implement a plan to provide for the safe and affordable distribution of marijuana to all patients in medical need of marijuana.

(2) Nothing in this section shall be construed to supersede legislation prohibiting persons from engaging in conduct that endangers others, nor to condone the diversion of marijuana for nonmedical purposes.

(c) Notwithstanding any other provision of law, no physician in this state shall be punished, or denied any right or privilege, for having recommended marijuana to a patient for medical purposes.

(d) Section 11357, relating to the possession of marijuana, and Section 11358, relating to the cultivation of marijuana, shall not apply to a patient, or to a patient's primary caregiver, who possesses or cultivates marijuana for the personal medical purposes of the patient upon the written or oral recommendation or approval of a physician.

(e) For the purposes of this section, "primary caregiver" means the individual designated by the person exempted under this section who has consistently assumed responsibility for the housing, health, or **safety** of that person.

ORDINANCE NO.

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF _____

AN ORDINANCE ADDING CHAPTER 37.03 TO TITLE 37 OF THE SACRAMENTO CITY CODE RELATING TO PUBLIC CONSUMPTION OF MARIJUANA

BE IT ENACTED BY THE COUNCIL OF THE CITY OF SACRAMENTO:

SECTION 1.

Chapter 37.03 is hereby added to Title 37 of the Sacramento City Code, to read as follows:

37.03 Public Consumption of Marijuana.

37.03.100 Findings and Purposes.

On November 5, 1996, the voters of the State of California approved Proposition 215 enacting section 11362.5 of the Health and Safety Code (the "Compassionate Use Act"). That section permits, for purposes of state law, the limited use, cultivation and possession of marijuana for specified medical purposes. However, the use, cultivation and possession of marijuana for other purposes remains illegal within this State and is presently illegal under federal laws.

While recognizing the enactment of Health and Safety Code section 11362.5, the City Council believes that the open and public use of marijuana, which might otherwise be permitted by that section, is injurious to public health in many of the same ways that tobacco consumption is injurious to public health, due to exposure to second-hand smoke. Further, the open and public consumption of marijuana is potentially harmful to youths in that it sets a deleterious example regarding the use of illicit drugs. Therefore, the City Council believes it is necessary to balance the uses of marijuana permitted by section 11362.5 with the concerns for public health and safety.

FOR CITY CLERK USE ONLY

ORDINANCE NO. _____

DATE ADOPTED: _____

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37.03.101 Places Where Consumption of Marijuana is Prohibited.

(a) Notwithstanding California Health and Safety Code section 11362.5 or any preceding provisions of this Title 37, the consumption of marijuana, by or through "smoking," as defined in section 37.01.003 (g), is prohibited at any of the following locations to which members of the public have access:

- (1) Upon or within one thousand (1,000) feet of the grounds of any school, the Sacramento Zoo, Funderland or Fairytale Land;
- (2) In or within one hundred (100) feet of any building or facility to which members of the public have access; or
- (3) Within one hundred (100) feet of any other person, other than a "primary caregiver," as that term is defined in California Health and Safety Code section 11362.5 (e).

(b) As used in this section, the following definitions shall apply:

- (1) "School" means any institution of learning for minors, whether public or private, including any special institution of education or any nursery, elementary, middle, junior high, or senior high school. This definition does not include a vocational or professional institution of higher education, including a junior or community college, college or university.
- (2) "Fairytale Town" means the fairy tale-themed children's park known and referred to as "Fairytale Town" located within William Land Park, the grounds of which extend to the fence or wall surrounding the outer boundaries of the theme park.
- (3) "Funderland" means the children's recreational park known and referred to as "Funderland" located within William Land Park, the grounds of which extend to the fence or wall surrounding the outer boundaries of the recreational park.
- (4) "The Sacramento Zoo" means the zoological park within William Land Park where live animals are kept and exhibited to the public, the grounds of which extend to the fence or wall surrounding the outer boundaries of the zoological park.

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37.03.102 Penalty.

Except as provided below, any violation of this chapter shall be a misdemeanor, punishable by a fine not to exceed one thousand dollars (\$1,000.00), imprisonment in County Jail for a term not to exceed six (6) months, or both such fine and imprisonment.

Exception: Notwithstanding the above, a violation of this chapter is an infraction when the complaint is filed charging the offense as an infraction, in which case the violation shall be subject to and punishable as provided in California Government Code section 36900 (b).

37.03.103 Non-exclusivity.

Nothing in this chapter shall limit or preclude the enforcement of other applicable laws.

DATE PASSED FOR PUBLICATION:
DATE ENACTED:
DATE EFFECTIVE:

MAYOR

ATTEST:

CITY CLERK

FOR CITY CLERK USE ONLY

ORDINANCE NO. _____

DATE ADOPTED: _____

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Mail: jobrien@itsa.ucsf.edu

EMBARGOED FOR RELEASE:
2 PM (EDT) WEDNESDAY, SEPT 23, 1998
TO COINCIDE WITH PUBLICATION IN NATURE

UCSF STUDY IN RATS SUGGESTS SYNTHETIC DRUG
MIMICKING MARIJUANA MIGHT BE USED TO TREAT PAIN

Researchers at the University of California San Francisco have shown in rats that a synthetic drug that mimics the principal active ingredient in marijuana has an effect similar to that of morphine on an area of the brain that modulates pain.

The finding, reported in the September 24 issue of Nature, raises the possibility that marijuana-like drugs could be used to treat pain, said the lead author of the study, Ian Meng, PhD, a postdoctoral fellow in the laboratory of Howard Fields, PhD, a professor of neurology and physiology and a research scientist in the W.M. Keck Foundation Center for Integrative Neuroscience at UCSF.

While opioids such as morphine provide strong analgesic effects for many types of pain, they produce side effects such as nausea and respiratory depression. In contrast, marijuana, a type of cannabinoid drug, actually increases appetite. In the future, says Meng, it may be possible to use a lower dose of opioids if they are used in combination with a cannabinoid, producing fewer side effects and increasing the pain relieving effects.

Researchers focused their study on a region of the brain known as the rostral ventromedial medulla (RVM) which modulates pain by either increasing or decreasing the amount of pain signals that pass through the spinal cord. They tested the effects of the synthetic cannabinoid, WIN55, 212-2, on this region by measuring the time it took for rats to move their tails away from a heat source.

In the first experiment, rats that were given WIN55,212-2 kept their tails on the heat source much longer than rats that were not given the drug, indicating the drug reduced pain. However, after the researchers shut down the RVM, rats that were given WIN55,212-2 no longer demonstrated insensitivity to pain, moving their tails from the heat source as quickly as the rats who had not received the drug. The test demonstrated that the RVM was critical for producing the pain-relieving effects of cannabinoids.

Since cannabinoids also produce a loss of motor coordination, the researchers had to test the hypothesis that turning off the RVM simply reversed the motor deficits and not the analgesic effects of the cannabinoid drug. To test this possibility, they gave the rats a motor coordination test called the retard treadmill, in which the rats are placed on a rod and the time that it takes for them to fall off is measured. Rats that received WIN55, 212-2 showed a severe loss of motor coordination. However, after the RVM was shut down, a condition that reversed the analgesic effects, rats continued to show a loss of motor coordination.

The experiment demonstrates that the rats given the cannabinoid did not leave their tails on the heat source simply because they

had lost their motor coordination," said Meng. "The cannabinoid is also having an analgesic effect."

In a second set of experiments, performed in anesthetized rats, the researchers examined the effect of cannabinoids on the activity of the brain cells called neurons in the RVM. Using a method called electrophysiology, which measures the electrical impulses of neurons, the researchers were able to detect the activity of single neurons in the RVM after several different drug treatments.

The researchers determined that WIN55,212-2 produced changes in the activity of neurons in the RVM that were identical to that of morphine. However, they were also able to show that these two drugs act on the RVM in different ways. A drug that blocks the effect of morphine was unable to prevent the effect of WIN55,212-2. Likewise, a drug that blocks the effect of the WIN55,212-2 was unable to prevent the changes produced by morphine.

"These results indicate that the marijuana-like drug can reduce pain by affecting the same pain modulating neurons as morphine, but through separate mechanisms," said Meng.

Other co-authors of the UCSF study were Barton H. Manning, PhD, a postdoctoral fellow in Howard Fields' lab, and William J. Martin, PhD, a postdoctoral fellow in the laboratory of Allan Basbaum, chairman of the Department of Anatomy and a research scientist with the W.M. Keck Foundation Center for Integrative Neuroscience at UCSF.

The study was funded by the National Institute of Drug Abuse, the UCSF Center for the Neurobiology of Addiction and the Canadian MRC.
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Last updated 09/23/98 comments and questions to our [web developer](#).

Marijuana-Like Drugs

Victor Gonzalez (victorg@ITSA.UCSF.EDU)

Mon, 27 Oct 1997 11:57:59 -0800

- Messages sorted by: [date] [thread] [subject] [author]
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- Previous message: [Victor Gonzalez: ""Miracle Babies" Halloween Reunion Party"](#)

Corinna Kaarlela, Interim News Director

Source: Jeffrey Norris (415) 476-2557

EMBARGOED FOR RELEASE:

11:30 AM (CST), SUNDAY, OCTOBER 26, 1997

TO COINCIDE WITH SOCIETY FOR NEUROSCIENCE PRESS CONFERENCE

MARIJUANA-LIKE DRUGS MAY BE EFFECTIVE PAINKILLERS

NEW ORLEANS -- Pain relief may be provided by marijuana-like drugs that exert their influence on brain cells in the same way as the active component of the illegal weed, according to researchers from the University of California San Francisco.

Ian Meng, PhD, and Barton Manning, PhD, both postdoctoral fellows, and Howard Fields, MD, PhD, a professor of neurology with the Keck Center for Integrative Neurosciences at UCSF, report that a synthetic marijuana-like drug called WIN 55212 enhances the brain's ability to suppress pain in rats, and probably in humans as well.

WIN 55212 dulls pain by acting on the same pain-suppressing nerve circuits as morphine and other opioid drugs, the most powerful painkillers known, the researchers say, and such drugs may one day be used in combination with opioids or other painkillers to provide better treatment for certain kinds of pain.

Meng discussed the findings today at the Society for Neuroscience annual meeting in New Orleans, during a press conference. Researchers from several universities briefed reporters on studies of the painkilling properties of cannabinoids. Cannabinoids are a class of chemicals that includes tetrahydrocannabinol (THC), the component of marijuana responsible for the "high" sought by recreational users.

The brain circuits affected include a key pain-controlling center called the rostral ventromedial medulla. Fields has studied the transmission of pain signals through this network for more than 15 years, identifying many key cellular mechanisms of pain suppression by investigating the actions of opioid drugs on this circuitry.

Now, in studies conducted on rats, Meng has determined that cannabinoids

and opioids produce similar changes within cells in the rostral ventromedial medulla. Meng also monitored pain suppression by measuring how long it took the rodents to remove their tails from an uncomfortable heat source.

He found that drugs which block the painkilling effects of morphine do not eliminate the pain relief provided by WIN 55212. Furthermore, cannabinoid-blocking chemicals do not reduce the effectiveness of morphine.

"The results indicate that the two classes of pain relievers act through different biochemical mechanisms, even though they affect the electrical transmission of pain impulses in the cells in the same way," according to Meng.

Just as the study of morphine's effects enabled Fields and other researchers to pioneer explorations of the rostral ventral medulla, the study of cannabinoids will enable scientists to gain new insights into the brain's mechanisms for suppressing or enhancing pain, Meng says.

Despite their unrivaled painkilling potency, opioids can have significant side effects. These include the development of drug tolerance, whereby a patient requires ever-higher doses to experience pain relief, and drug dependence, which causes a patient to become temporarily sick when opioid treatment is withdrawn. Other side effects may include confusion, nausea and constipation.

The cannabinoid THC, in addition to enhancing mood in some users, is believed to reduce nausea, which may offer a significant advantage over morphine. However it also impairs mental functioning in a variety of ways.

While it may not be possible to eliminate the side effects of opioids or cannabinoids used to treat pain, combining them may enhance pain relief, permitting the use of lower doses of each, and thereby alleviating the side effects, Meng suggests.

In recent years scientists have identified the natural cannabinoid receptor to which THC attaches, as well as naturally occurring cannabinoids, such as anandamide, that act on this cannabinoid receptor. These discoveries and the development of synthetic cannabinoids that act more preferentially on the receptor, such as WIN 55212, should now lead to more rapid advances in understanding the function of cannabinoids in the brain, according to Meng and Fields.

It is not clear why natural opioids, called endorphins, and their cannabinoid counterparts should act on many of the same nerve circuits. However, Fields speculates that the rostral ventromedial medulla nerve cells arose early in animal evolution, and may have properties similar to the primitive endocrine system.

The endocrine system releases hormones that promote the survival of the

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animal in specific circumstances. The hormone acts upon a certain group of nerve cells that generate behavior appropriate to the situation, a fight or a flight in response to danger, for instance.

In the same way, Fields suggests, natural brain cannabinoids might activate specific ensembles of nerve cells that produce behavior appropriate to particular situations. Suppression of pain through the rostral ventromedial medulla in response to cannabinoids may be one aspect of an overall behavior, such as feeding when hungry, he proposes.

Even though endorphins suppress pain by acting on the same nerve cells within the brain, they may be released to perform their painkilling duties under different circumstances, such as during a freezing response to fear, Fields suggests.

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- **Next message:** Victor Gonzalez: "Eye Treatments and Research"
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Cannabinoids in Marijuana Can Relieve Severe Pain, Researchers Report

MEDICAL MARIJUANA

November-December 1997

Active chemicals in marijuana can relieve serious pain, including chronic pain and arthritic inflammation, researchers reported on October 26 in New Orleans at a meeting of the Society for Neuroscience (Robert Lee Holtz, "Chemicals in Pot Cut Severe Pain, Study Says," *Los Angeles Times*, October 27, 1997, p. A1; Robert Lee Holtz, "Marijuana Chemicals can ease serious pain, animal studies show," *Houston Chronicle*, October 27, 1997, p. 2A).

The chemicals, known as cannabinoids, include delta-9-THC, the main psychoactive ingredient in marijuana. According to scientists, these chemicals work without some of the unwanted side effects of more traditional pain-relief medications -- such as opiate-based pain killers -- addiction or tolerance development. Researchers said a new class of pain medication may emerge from the studies.

The findings were based on animal studies carried out by researchers at the University of California, San Francisco (UCSF), the University of Michigan and Brown University. "Cannabinoids, at least in animal models, can reduce pain," said UCSF pharmacology expert Ian Meng. The researchers said the studies may prompt broader support of research into marijuana's medical properties.

Dr. Ian Meng - UCSF, Tel: (415) 476-4201.

In the past, the majority of evidence suggesting that cannabinoids could crush pain without causing a loss of touch was anecdotal. Some animal studies did show that cannabinoids decreased pain sensitivity in animals, but they also induced a wide variety of additional behavioral effects, such as changes in attention, deficits in movement, and cognitive impairment. It was unclear whether the animals showed a decrease in pain sensitivity because of these other behavioral effects or if the cannabinoids directly targeted the pain system.

Now careful studies are showing that the substances have a direct affect on pain signals in the central nervous system and peripheral tissues. The cannabinoids not only act as an analgesic, but also prevent the condition hyperalgesia, or an enhanced sensitivity to pain, which often accompanies tissue injury and inflammation. In addition, the new research reveals similarities and differences between cannabinoids and a group of pain killers that are used today called opioids or morphine-like drugs. Opioids are very effective but also cause many unwanted side effects. The most severe is physical dependence. The studies show that cannabinoids could be manipulated to form a new type of pain reliever.

In one new study scientists show that the active ingredient in marijuana, delta-9-THC, and another synthetic cannabinoid, WIN 55212, exhibit analgesic characteristics in monkeys. In addition, the pain relief occurs through a system that is different from opioids, according to the researchers from the University of Michigan Medical School.

In the study, the researchers measured the compounds analgesic characteristics in three rhesus monkeys with a technique that involved a warm-water bath. Monkeys will keep their tails in water kept at 50 degrees Celsius for a longer time than normal if they have received drugs with analgesic properties. "As the dose of the cannabinoids or the opioids increased, the monkeys were slower to remove their tails from the warm-water bath, revealing an analgesic action for these compounds," says Jeffrey Vivian. "It is important to note, however, that many cannabinoids produce a very rapid tolerance necessitating the use of higher doses and they aren't better at reducing pain than traditional analgesics such as opioids. "In general, opioids had a greater analgesic effect than cannabinoids.

In other findings, the scientists discovered that the administration of a drug that incapacitates the cannabinoids will block the cannabinoid effects but not the opioid effects. And a drug that solely knocks the opioids out of commission will block the opioid effects but not the cannabinoid effects. "This demonstrates the independence of the cannabinoid and opioid systems to cause pain relief," says Vivian.

Another group of researchers also found that cannabinoids and opioids relieve pain through different mechanisms. They found, however, that cannabinoids and opioids both target the same pain-modulating nerve cells or neurons.

"The results suggest that marijuana-like drugs may be useful as an adjuvant in combination with other therapies for treating certain types of pain," says Ian Meng of the University of California at San Francisco.

Meng and his co-workers studied anesthetized rats with electrophysiology, a technique that allowed the researchers to measure the electrical impulses, known as action potentials, of single brain cells in a region of the brain that modulates pain. They found that following administration of the synthetic cannabinoid, WIN55 212-2, the rats no longer moved their tails away from a heat source. This shows a sign of reduced pain. In addition, the effect of the cannabinoid was not reversed by a drug that prevents the action of the opioid, morphine, nor was the effect of morphine reversed by a drug that prevents the action of cannabinoids. "While this shows that the drugs reduce pain through different mechanisms, we also have shown that both cannabinoids and opioids produce similar changes in the activity of specific neurons that help reduce pain," says Meng.

These neurons are in the rostral ventromedial medulla, a pain-modulating center of the brain. Scientists recently discovered that under certain circumstances pain signals can be modulated by

certain brain areas. These pain-modulating centers can increase or decrease the amount of pain a person feels by influencing the number of pain signals that are allowed to pass through the spinal cord. "For example, people injured in war often do not feel pain for a long time after the injury because pain-modulating centers prevent pain information from reaching parts of the brain that are important for the conscious perception of pain," says Meng.

In the rostral ventromedial medulla region, there are two types of neurons that control pain transmission through the spinal cord. The "off-cell" neurons can inhibit the pain signals passing through the spinal cord. The "on-cell" neurons may actually increase the amount of pain signals. Previous studies have shown that morphine increases the activity of off-cell neurons and decreases the activity of on-cell neurons. "Our study shows that cannabinoids can produce the same effect as morphine on off-cell and on-cell activity in the brain," says Meng.

Other researchers studied the spinal cord and also have discovered that cannabinoids play a crucial role in pain processing. "Specifically we found that cannabinoids depress the reactions of spinal neurons that transmit pain messages back to the brain," says J. Michael Walker of Brown University. "The responses of neurons that transmit messages about non-painful stimuli, however, are unaltered."

In addition, the researchers found that cannabinoids target the brain region, nucleus A5, which is near the rostral ventromedial region and like that area, acts in the front of the pain processing loop, by sending painful messages to the spinal cord.

In the study, the scientists injected the cannabinoid WIN55 212-2 into the nucleus A5 in rats. "Injections of less than a tenth of a millionth of an ounce of the cannabinoid cause a profound loss of pain sensitivity," says Walker. This brain area appears to contribute to pain processing by using norepinephrine - a brain neurotransmitter - to send messages. The messages can block the transmission of information about painful events. Past research has shown that injections of drugs that block the action of norepinephrine also inhibit the analgesic effects of cannabinoids. "Our new research isolates the particular source of norepinephrine and makes a direct link to pain pathways in the brain," says Walker.

The findings also provides insight on the brain's natural cannabinoid, anandamide, derived from the Sanskrit word meaning "internal bliss," according to the researchers. The marijuana-like substance was discovered by the cannabinoid researchers William Devane and Raphael Mechoulam, in 1992. It produces its effects on the brain through the same chemical mechanism that is used by the main psychoactive constituent of the marijuana plant. "The new research provides insight into the functions of this newly discovered neuro-chemical system by demonstrating that the synthetic cannabinoids act on known pathways that function naturally to control the entry of pain messages into the spinal cord," says Walker.

The cannabinoids ability to target the body's natural pain system also can prevent the development of an enhanced sensitivity to pain, or hyperalgesia, according to a new study by researchers at the University of Minnesota. Pain and hyperalgesia often accompany tissue injury and inflammation. Severe hyperalgesia, which can be debilitating and often difficult to treat, also is associated with many chronic painful syndromes such as nerve disease, chronic inflammation and spinal cord injury. The condition can be so intense that warming the skin or gently touching the skin is perceived as painful.

In the new work, the researchers infused the cannabinoid WIN55 212-2 intravenously into the rats. Next, they initiated a model of hyperalgesia by injecting the rat's hind paw with capsaicin, the pungent ingredient in hot chile peppers. "The pain and hyperalgesia from capsaicin was shown to be due in part to the activation and hyperactivity of pain neurons in the spinal cord to touching or gently warming the skin," says Donald Simone. "In these studies, we determined that cannabinoids would block the pain as well as the hyperactivity of spinal neurons."

Animals that received 10 micrograms per kilogram or higher of the cannabinoid exhibited a dramatic decrease in the amount of time that they spent guarding their hind paws after the

capsaicin injections, say the researchers. Pre-treatment with the cannabinoid also decreased the amount of sensitivity observed to warmth and touch. And animals that received 100 micrograms per kilogram of the cannabinoid did not display any hyperalgesia at all. "In fact, their withdrawal responses to noxious heating were normal," says Simone. "This demonstrates that the cannabinoid did not impair the animals' capability to withdraw from the stimulus."

Another group studied a different rat model of hyperalgesia, the carrageenan model. This model of inflammation has previously been shown to be predictive of drugs which relieve pain due to arthritis. The researchers discovered that the natural cannabinoid, anandamide, produced pain relief when it was injected in the skin at the site of the perceived injury. While cannabinoids can interact with receptors or receiving areas on pain sensitive cells in the spinal cord and brain to reduce pain, they also have an opportunity to initiate side effects such as disorientation, say the researchers. "These results suggest that local administration of the cannabinoid to the site of injury may be able to both prevent pain from occurring and reduce pain which has already occurred without producing side effects," says Kenneth Hargreaves of the University of Texas who conducted the research when he was at the University of Minnesota. The researchers believe side effects are limited because the cannabinoid acts locally and does not reach the spinal cord or brain.

Hargreaves found that the cannabinoid works immediately in the peripheral tissues by reducing the amount of leakiness in nearby blood vessels and preventing the flow of pain-enhancing substances. Hyperalgesia is known to occur when blood vessels become leaky and allow compounds, some of which activate pain receptors, to flow into the injured tissue. The administration of anandamide to isolated skin could prevent the release of the pain-enhancing substances following a painful stimulus, according to the researchers.

"Collectively the research shows that the cannabinoid administered at the site of injury works locally to produce analgesia with limited side effects, says Hargreaves.