

SC 215
FIGHTING DRUG ADDICTION
WITH DRUGS

John Bush
April 15, 2013

ADDICTION

- A persistent, compulsive dependence on a behavior or substance
- Behavioral
 - Compulsive shopping
 - Compulsive gambling
 - Internet involvement
 - Sexual activity
 - Compulsive eating
 - Compulsive exercising
 - Football viewing
 - Pornography viewing
- Substance









Metformin HCl ER 500mg
90 Tablets

Maple Pharmacy
337979 TEL: 432-3150
MR: 9415376
VALUE: \$14.25
COPAY: \$10.00
UP TO 3
FOR NAUSEA
Mr: SANDZ
Aster After 5/28/07 KA

Brigham Young University
Health Center Pharmacy
11/21/2008
1MG TAB
TABLET DAILY AS NEEDED

(801) 816-9466
04/25/2008
TODAY,
FOR 5 DAYS,
DAILY FOR 3
WATSON
2009
morize
100 - 2 pm
16

LIBRARY
DR. EVANS, MARY
11/21/2008
AS NEEDED FOR
11/21/2008

69-6334
10-2006
TABLET BY
MIA
LAWREN, JESSICA A
10MG TAB

8448 (801) 564-2525
TABLET BY MOUTH EVERY DAY FOR

(801) 816-9466
10/02/2008
THREE
HARM



Beware! Young and Old—People in All Walks of Life!

This  may be handed you

by the friendly stranger. It contains the Killer Drug "Marihuana"—a powerful narcotic in which lurks **Murder! Insanity! Death!**



WARNING!

Dope peddlers are shrewd! They may put some of this drug in the  or in the  or in the tobacco cigarette.

WRITE FOR DETAILED INFORMATION, ENCLOSED 12 CENTS IN POSTAGE—MAILING COST

Address: **THE INTER-STATE NARCOTIC ASSOCIATION**
(Incorporated not for profit)
53 W. Jackson Blvd. Chicago, Illinois, U. S. A.

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MARIJUANA WEED FROM THE DEVIL'S GARDEN!



One MOMENT OF BLISS—A LIFETIME OF REGRET!

"Reefer MADNESS"

HUNTING A THRILL, THEY INHALED & DIED OF CONCENTRATED SIN!

WAKE UP AMERICA! HERE'S A ROADSIDE WEED THAT'S FAST BECOMING A NATIONAL HIGH-WAY!

SIN

DEGRADATION

VICE

INSANITY

DEBAUCHERY

A VICIOUS RACKET WITH ITS ARMS AROUND YOUR CHILDREN!

THE TRUTH ABOUT...

MARIJUANA

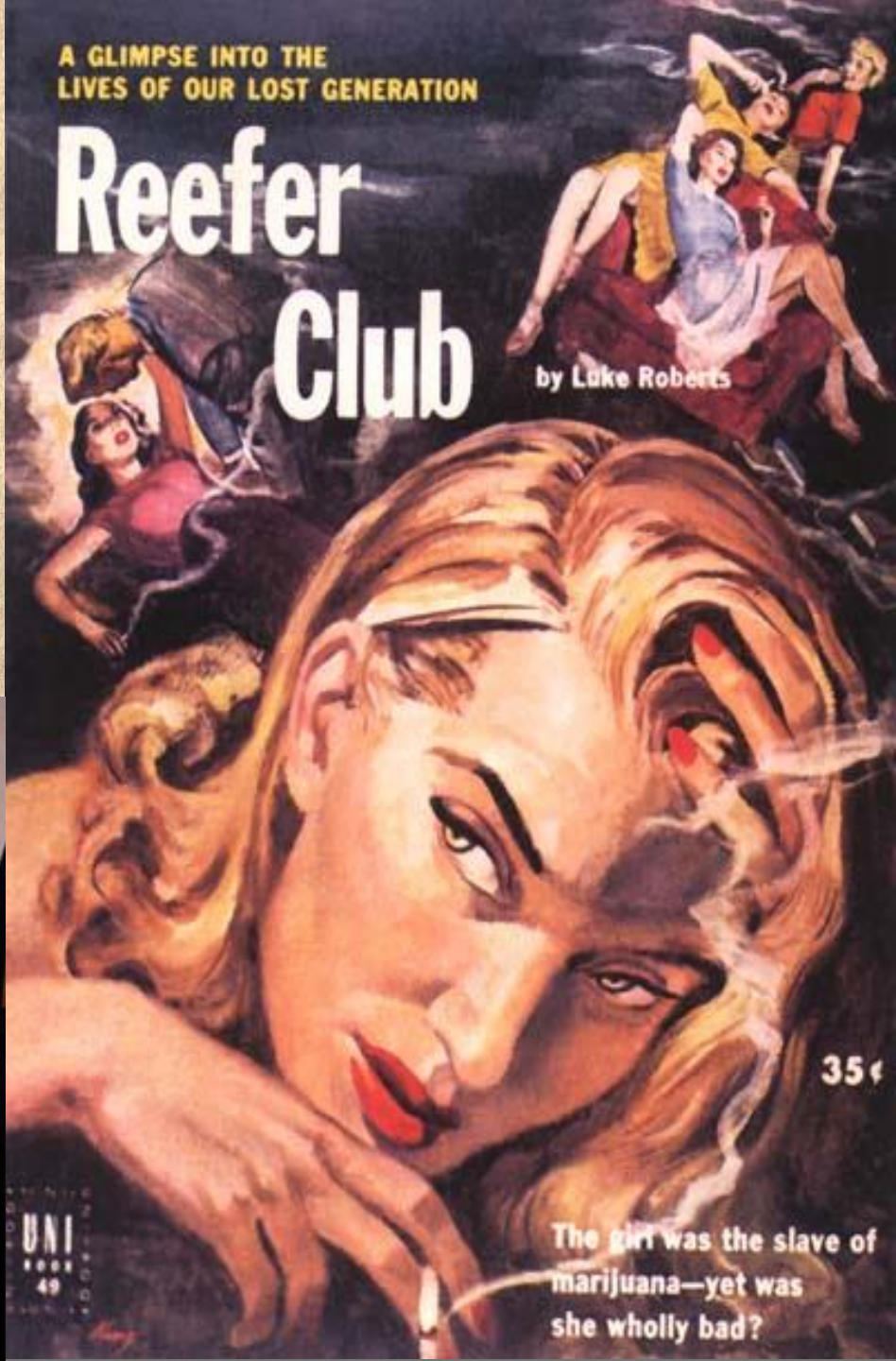
THE SMOKE OF HELL!

DEVIL'S HARVEST

A GLIMPSE INTO THE LIVES OF OUR LOST GENERATION

Reefer Club

by Luke Roberts



35¢

The girl was the slave of marijuana—yet was she wholly bad?

UNI BOOKS 49

THE NATION



CHRISTOPHER CAPOZZELLO (left) and Mark ...
...facing away, hugs Mark ...
... Newtown shooting victim.

Connecticut for signs control law

Elementary School killed 20 first-graders and six educators.

Connecticut already had gun control laws, but the new legislation is tougher. It adds more than 100 firearms to the state's assault weapons ban, including the type used by Newtown gunman Adam Lanza, and requires background checks for all weapons sales. Ammunition magazines would be limited to 10 rounds.

According to a poll released Thursday, U.S. voters strongly support universal background checks. The survey by Quinnipiac University found that 91% of respondents said they favored such checks, a majority similar to what other polls have found in recent weeks.

But the poll went on to note that 48% said they believed background checks could lead to eventual efforts by the government to confiscate weapons.

michael.muskal

A majority supports legalizing marijuana

The findings are a first among U.S. adults in four decades of polling.

BY DAVID LAUTER

WASHINGTON — A majority of Americans support legalizing marijuana, a new poll indicates, with the change driven largely by a huge shift in how the baby boom generation feels about the drug of their youth.

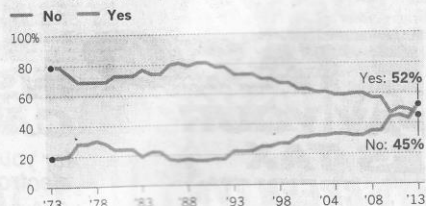
Fifty-two percent of adult Americans back legalization, compared with 45% who do not, according to the survey released Thursday by the Pew Research Center. The finding marks the first time in more than four decades of Pew's polling that a majority has taken that position. As recently as a decade ago, only about a third of American adults backed making marijuana legal.

Two big swings in opinion probably contribute to support for legalization. Most Americans no longer see marijuana as a "gateway" to more dangerous drugs, and most no longer see its use as immoral. As recently as 2006, half of respondents said in a Pew survey that marijuana use was "morally wrong." Now, only a third do, while half say marijuana use is "not a moral issue."

By an overwhelming majority, 72% to 23%, respondents said the federal government's efforts against marijuana "cost more than they are worth." Similarly, by nearly 2 to 1, respondents

Turnaround

Support for legalizing marijuana has steadily increased over the years, polling shows:



Source: Pew Research Center. Graphics reporting by JULIE SHEER

Los Angeles Times

should not enforce its anti-marijuana laws in states that allow use of the drug.

The Obama administration has been vague on what stand it will take concerning federal law enforcement in states such as Washington and Colorado that have legalized marijuana for recreational use, or in states such as California that allow medical use. Federal prosecutors in California have brought charges against some sellers of medical marijuana.

In December, Atty. Gen. Eric H. Holder Jr. acknowledged a "tension between federal law and these state laws" and said that a clarification of federal policy would come "relatively soon." That has not happened.

So far, 24 states and the District of Columbia have decriminalized personal use of marijuana, legalized it or allowed it to be used for medical purposes.

A shift in federal law may be slow. A notable political

split exists on the issue, with conservative Republicans heavily against legalization, while majorities of Democrats, Independents and liberal and moderate Republicans back it. Conservatives have strong sway among Republicans in the House.

Still, advocates of legalization cheered the latest poll results. States will almost certainly continue to move faster than Congress, said Ethan Nadelmann, executive director of the Drug Policy Alliance, which advocates legalization. "But this debate is going to open more quickly now on Capitol Hill."

On two issues, opinion is more uniform than on legalization: the belief that current enforcement efforts are not worth the cost, and acceptance of the idea that marijuana has legitimate medical uses. Poll respondents agreed on the medical marijuana issue 77% to 16%, with support cutting across partisan and generational lines.

The proportion of people

who say they have used marijuana in the last year (about 1 in 10) or at any point in their lives (about half) is virtually identical in states that have legalized some marijuana use and those that have not, suggesting that more liberal laws have simply made usage more visible, not increased it.

Younger Americans back legalization more than their elders, although the poll shows legalization gaining support among all generations. Among those age 30 to 49, parents are less likely to support legalization than nonparents. Those with children 18 or younger at home are closely divided, 50% to 47%, while those without children at home support legalization, 62% to 35%.

The effect of parenthood may also be part of the most striking shift in opinion — the change among members of the baby boom generation. During the 1970s, when baby boomers were in their teens and 20s, a plurality supported legalizing pot, with support hitting 47% in a 1978 survey. But as they aged, they changed their minds, with support for legal marijuana dropping to fewer than 1 in 5 baby boomers by 1990, when members of the generation were in their 30s and 40s. The new poll shows 50% now support legalizing the drug.

The Pew survey was conducted March 3-7 by telephone, including cellphones and land lines, among 1,500 American adults. The results have a margin of error of plus or minus 2.5 percentage points.

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RELATIVE DEGREE OF ADDICTIVENESS

FRACTION ADDICTED AFTER ONE OR MORE TRIALS

• Nicotine	32%	80%
• Heroin	23%	35%
• Cocaine	17%	22%
• Alcohol	15%	4%
• Marijuana	9%	8%

Results depend on modes of administration, demographics of users, definition of endpoint etc.

DRUG USE FROM BENEFICIAL TO ABUSIVE

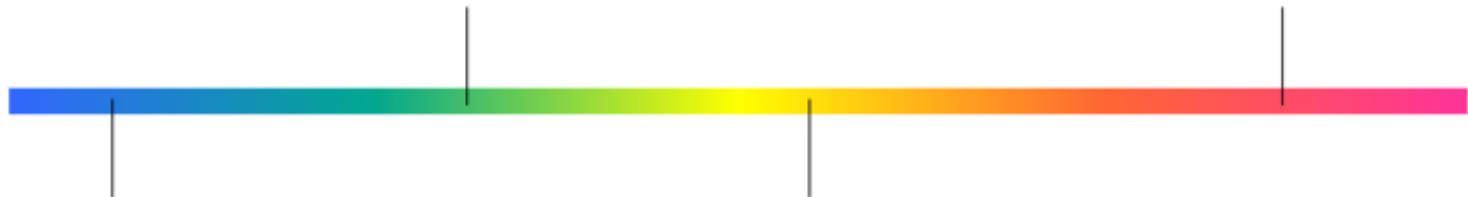
Spectrum of Psychoactive Substance Use

Casual/Non-problematic Use

- recreational, casual or other use that has negligible health or social effects

Chronic Dependence

- Use that has become habitual and compulsive despite negative health and social effects



Beneficial Use

- use that has positive health, spiritual or social impact:
- e.g. medical pharmaceuticals; coffee/tea to increase alertness; moderate consumption of red wine; sacramental use of ayahuasca or peyote

Problematic Use

- use that begins to have negative consequences for individual, friends/family, or society
- e.g. impaired driving; binge consumption; harmful routes of administration

PRINCIPLES OF EFFECTIVE TREATMENT FOR ADDICTION

- Treatment isn't limited to a user's drug abuse
- There is (currently) no universal "cure"—the approach must be tuned to the user's characteristics and environment
- Behavioral therapy is the primary treatment approach
- Medications (drugs) may be helpful
- Treatment/compliance monitoring may be lifelong and involuntary

ADDDICTION RECOVERY GROUPS

- Twelve-step groups
 - Step 3: “Made a decision to turn our will and our lives over to the care of God”
 - Alcoholics Anonymous
 - Overeaters Anonymous
 - Gamblers Anonymous
- Secular groups
 - SMART Recovery
 - Narconon

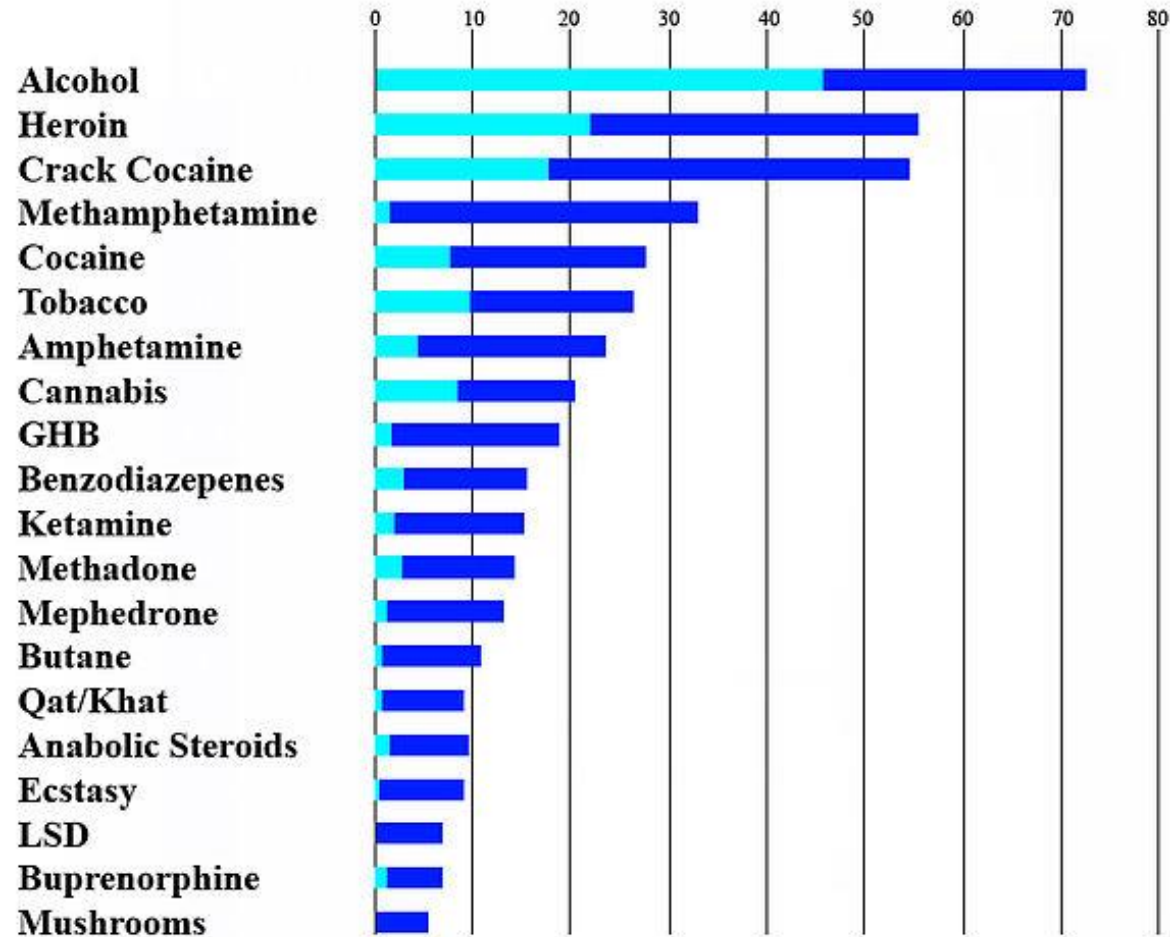
HOW MAY MEDICATIONS BE HELPFUL?

- Prevention?
- Withdrawal
 - Physical symptoms
 - Psychological symptoms
- Maintenance
 - Total abstinence
 - Non-problematic use
 - Relapse prevention

DRUG HARM TO THE USERS & OTHERS

Harm Caused by Drugs

■ Harm to others ■ Harm to users *With a maximum possible harm rating of 100



Adapted from "Drug harms in the UK: a multi-criteria decision analysis", by David Nutt, Leslie King and Lawrence Phillips, on behalf of the Independent Scientific Committee on Drugs. The Lancet.

FDA APPROVED MEDICATIONS

- Nicotine addiction
- Alcohol addiction
- Opioid addiction (eg morphine, heroin, vicodin oxycontin, fentanyl)
- Meth/cocaine-- none approved

NICOTINE ADDICTION

Withdrawal

Maintenance

- FDA Approved

nicotine

nicotine

bupropion

bupropion

varenicline

lobeline ?

- Human Trials

cytisine

rimonabant

- Animal Studies

nicotine vaccine

ALOHOL ADDICTION

	Withdrawal	Maintenance
• FDA Approved	naltrexone	disulfiram acamprosate acamprosate/naltrexone
• Human Trials	oxytocin	modafinil nalmafene quetiapine baclofen LSD
• Animal Studies		

CLINICAL TRIAL

ACAMPROSATE/NALTREXONE/COMBINATION*

	Acam	Nal	Combo
• Abstinent 12 weeks	51%	66%	68%
• Days abstinent	45	50	54 days
• First drink	27	27	37 days

*Together with cognitive behavioral therapy

OPIOID ADDICTION

	Withdrawal	Maintenance
• FDA Approved	methadone darvon heroin	methadone buprenorphine
• Human Trials	lofexidine	
• Animal Studies		heroin vaccine

COCAINE ADDICTION

Withdrawal

Maintenance

- FDA Approved

- Human Trials

doxazosin

rimonabant

plus some 100+ more

- Animal Studies

prelimbic stimulation

cocaine vaccine

MARIJUANA ADDICTION

	Withdrawal	Maintenance
• FDA Approved	marinol	
• Human Trials		rimonabant marinol/lofexidine
• Animal Studies		

AMPHETAMINES ADDICTIONS

- Drugs are used to treat withdrawal symptoms
 - Depression
 - Lethargy
 - Insomnia
 - Anxiety
- Human studies : Bupropion Varenicline Naltrexone Paliperidone Atomoxetine Lobeline Ibudilast
- Animal studies: Methamphetamine vaccine

IBUDILAST

- Used to treat asthma and stroke, mainly in Japan
- May act through the glial cells of the brain
- UCLA-2013—results with 7 meth addicts showed that ibudilast “may dampen craving and improve cognitive functioning”
- Safe in combination with meth
- Now recruiting for a larger efficacy trial

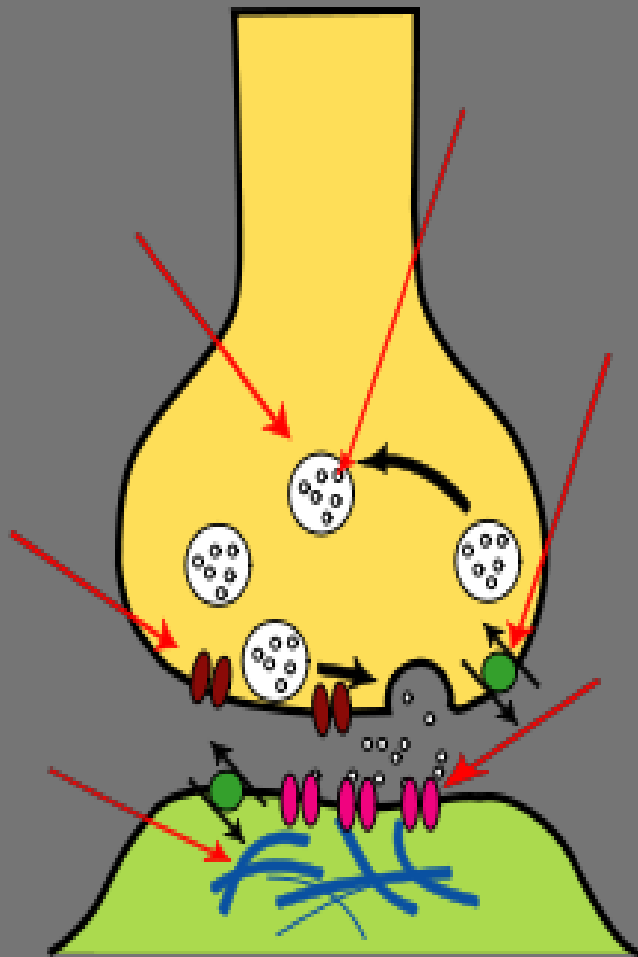
PHARMACEUTICAL RESEARCH APPROACHES

- Methods based on serendipity, analogy and receptor –drug relationships
- Methods based on understanding of brain structure and function

“Drug abuse produces long-term changes in the reward circuitry of the brain....Beyond improving understanding of the biological basis of drug addiction, the discovery of molecular alterations provides novel targets for the biochemical treatment of this disorder....Armed with insight into the biology of addiction, researchers may one day be able to design medicines to counter or compensate for the long term effects of drugs of abuse on reward regions in the brain.”

Eric J. Nestler and Robert C Malenka **Scientific American** 78-85 March 2004

SYNAPSE



AXON TERMINAL

SYNAPTIC CLEFT

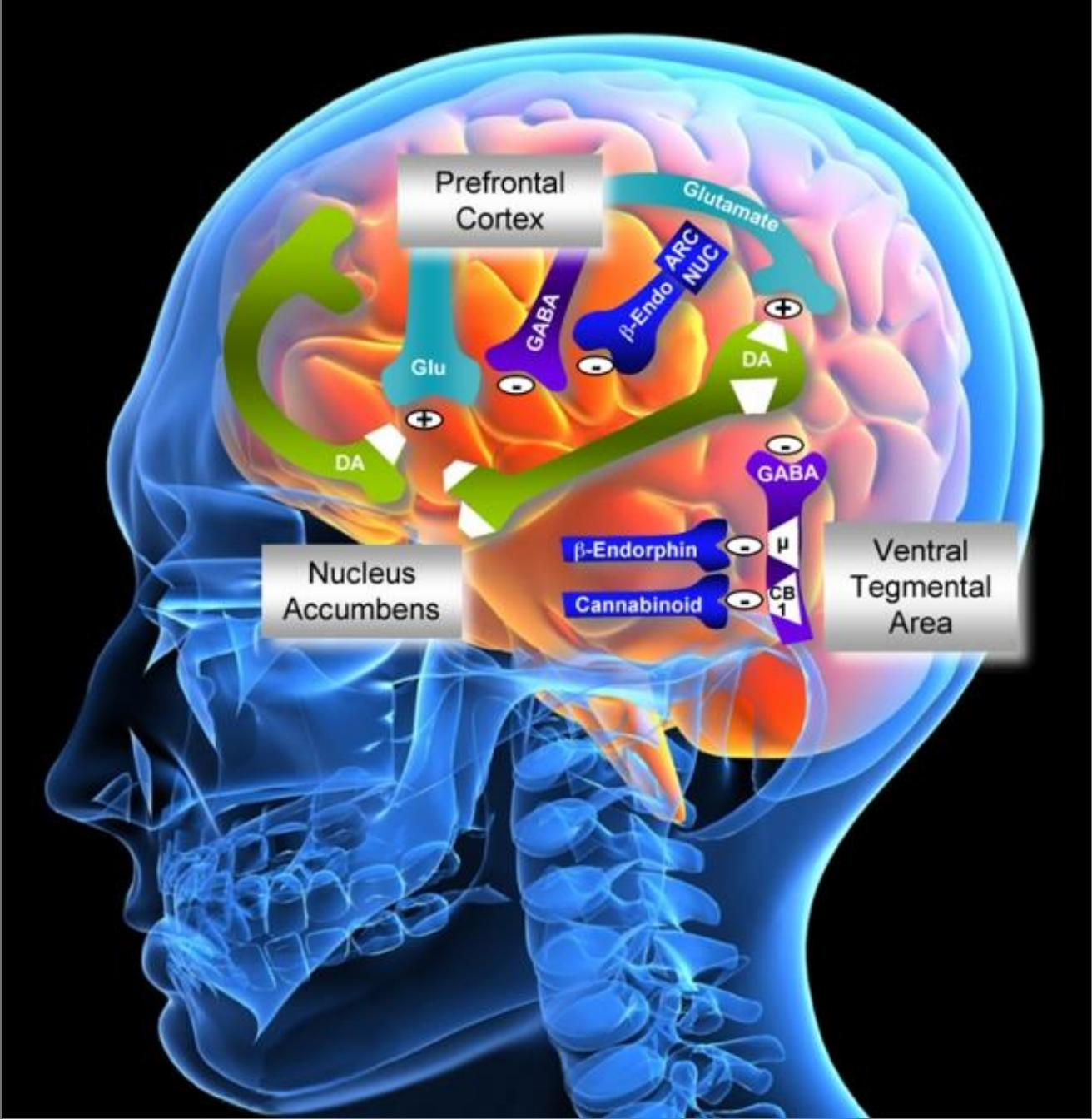
DENDRITE

NEUROTRANSMITTERS

- Chemicals produced in the body that transmit signals across a synapse
- Some principal brain neurotransmitters
 - Glutamate
 - GABA
 - Serotonin
 - Opioid
- Dopamine—the key to understanding addiction

DOPAMINE EFFECTS

- Outside the brain
 - Kidneys and heart
 - Immune system
- Inside the brain
 - Motor function
 - Pleasure
 - Decision making
 - Creative drive
 - Sociability
 - Processing of pain



“A better understanding of the main circuits affected by chronic drug use and the influence of social stressors, developmental trajectories, and genetic background on these circuits is bound to lead to a better understanding of addiction and to more effective strategies for the prevention and treatment of substance-use disorders.”

Nora D. Volkow,^{1,2} Gene-Jack Wang,³ Joanna S. Fowler,³ and Dardo Tomasi²

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Addiction Circuitry in the Human Brain Annual Review of Pharmacology and Toxicology

Vol. 52: 321-336 (2012)

STANLEY KUBRICK'S
**A CLOCKWORK
ORANGE**



Why your brain loves a new song

Study based on MRI scans points to activation of a reward system.

By PAUL GABRIELSEN
SCIENCENOW

When jazz legend John Coltrane first heard Charlie Parker play the saxophone, the music hit him “right between the eyes,” he once said. According to neuro-

scientists, Coltrane was exactly right.

When we hear music that we like, even for the first time, a part of the brain’s reward system is activated, a new study has shown. The region, called the nucleus accumbens, determines

how much we value the song – even predicting how much a person is willing to pay for the new track.

“It’s a lovely, lovely piece of research,” says music psychologist David Huron of Ohio State University, who was not involved in the study. The results will help scientists understand why humans attach so much value to abstract sequences of

sound waves.

Neuroscientist Valorie Salimpoor joined Robert Zatorre at McGill University’s Montreal Neurological Institute in Canada confirmed in 2011 that dopamine, a reward neurotransmitter, is the source of such intense experiences – the “chills”-associated with a favorite piece of music.

Salimpoor, now at the

Rotman Research Institute in Toronto, monitored how volunteers’ brains reacted to the music using MRI. Multiple brain regions activated when they discovered a new favorite song, but only activity in the nucleus accumbens was well-correlated to how much the participants were willing to pay, her team reported online Thursday in *Science*.



