

Methamphetamine: The Science of Addiction

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Methamphetamine

Speed

Crystal

Crank

Ice

Crypto

chalk

Fire

Meth

Glass

Methamphetamine

“Meth”, “Speed”, “Ice”, “Glass”, “Crystal”, “Crank”

**Stimulant – potential neurotoxin associated
with long-lasting effects on the
dopamine and serotonin systems**

Who uses methamphetamine?

Tools to Monitor National Drug Trends

- **NIDA's Community Epidemiology Workgroup**
- **SAMHSA's National Survey on Drug Use & Health**
- **NIDA's Monitoring the Future**
- **SAMHSA's Drug Abuse Warning Network**
- **SAMHSA's Treatment Episode Data Set**
- **NIJ's Arrestee Drug Abuse Monitoring**

- Timely information on use patterns
- Identify emerging trends
- Identify who is actually using and vulnerable populations
- Identify risk factors

WHY MONITOR?

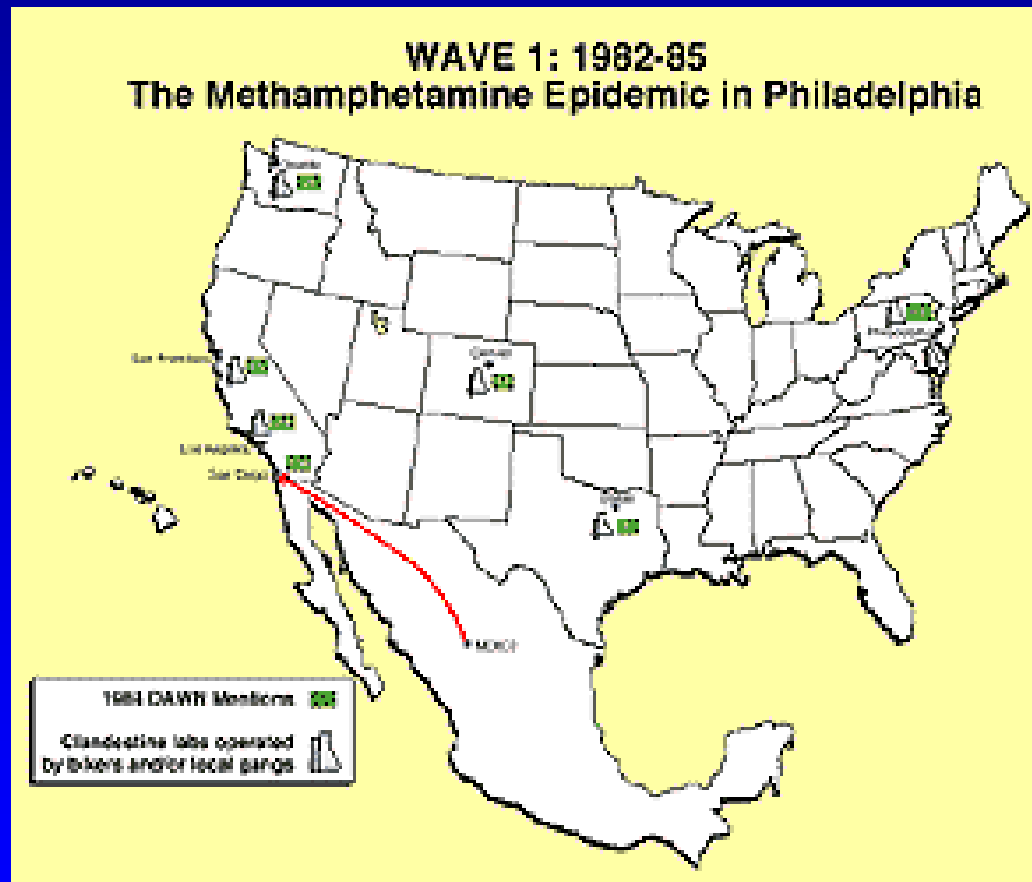
- Early 80s - outlaw biker gangs
- Use was concentrated in the West, Southwest and Hawaii in the mid and late-80's
- Early to mid-90s spread to Midwest and South
- Now at epidemic proportions in many regions of the country
- Majority of users 18-34 years old
- Use increasing in rural and suburban communities

HISTORY OF METH EPIDEMIC

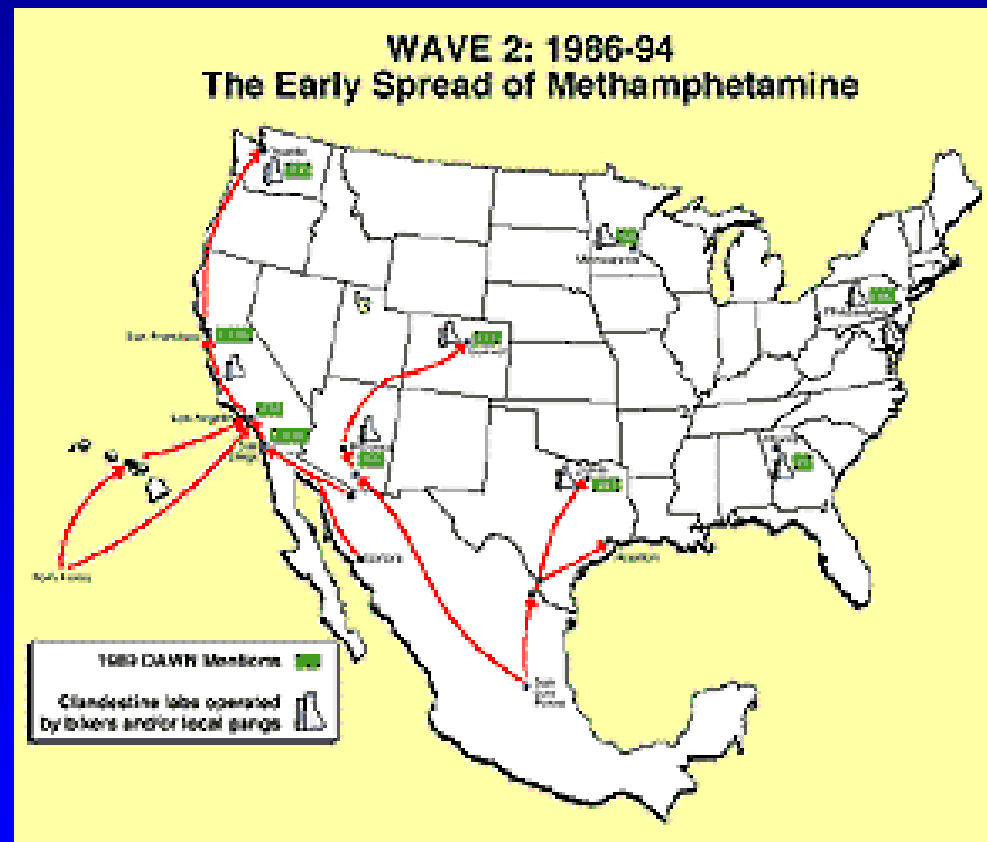
Scope of the Methamphetamine Problem Worldwide

- According to surveys and estimates by WHO and UNDCP, methamphetamine is the most widely used illicit drug in the world except for cannabis.
- World wide it is estimated there are over 42 million regular users of methamphetamine, as compared to approximately 15 million heroin users and 10 million cocaine users

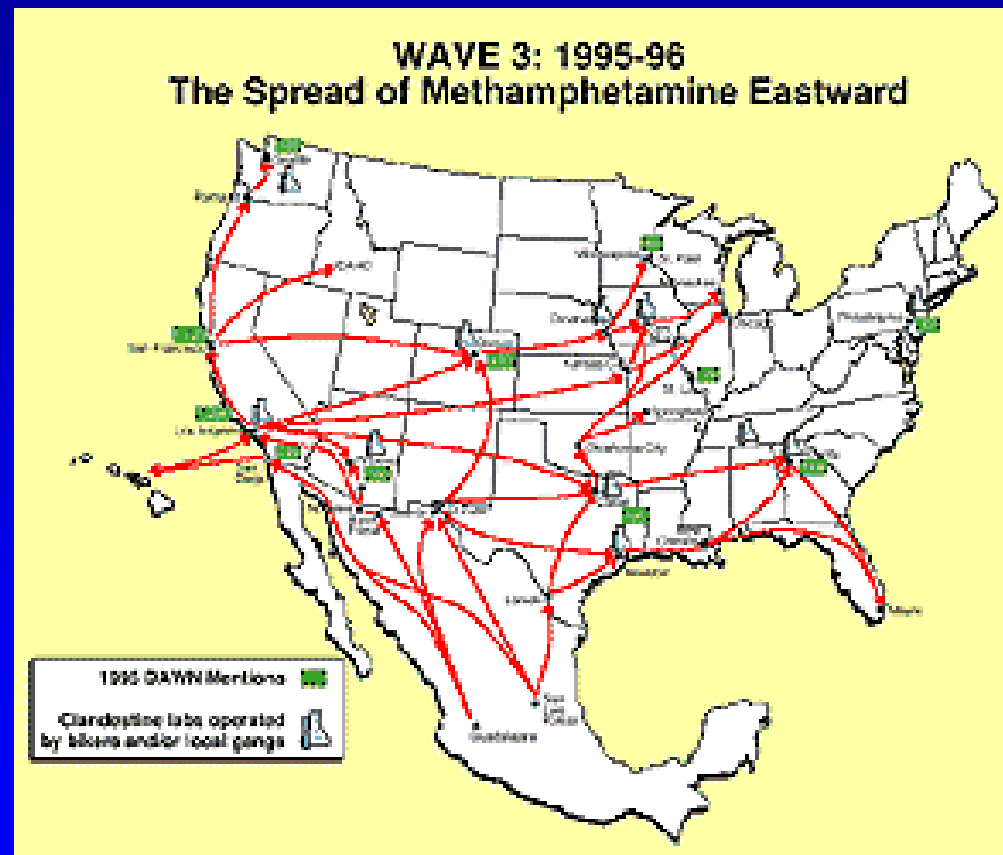
The Emerging Epidemic



The Emerging Epidemic

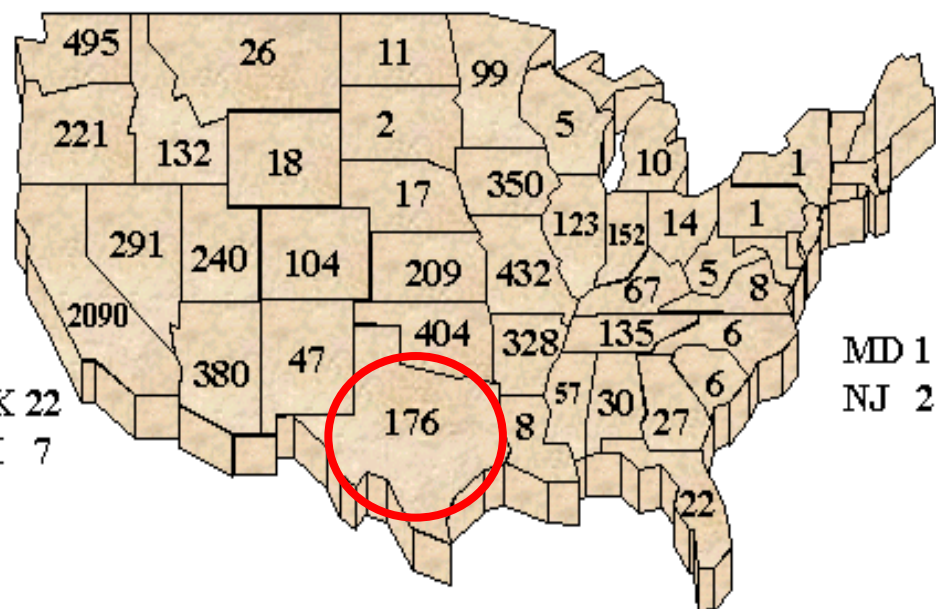


The Emerging Epidemic



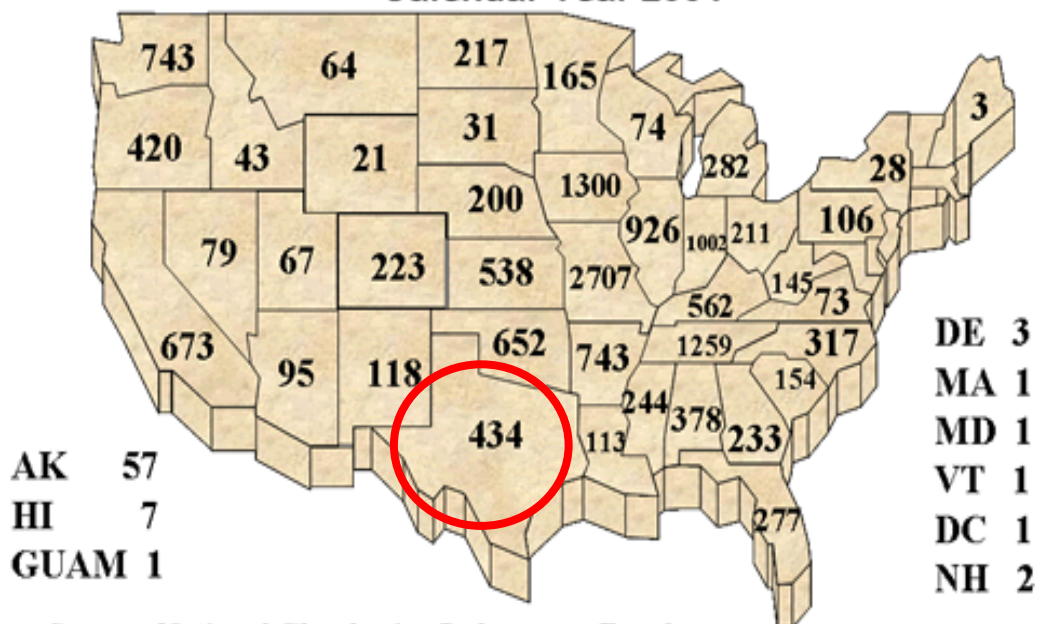
Methamphetamine Lab Seizures: 1999 and 2004

Total of All Methamphetamine Laboratories
Including Labs Only, Meth Only
Calendar Year 1999



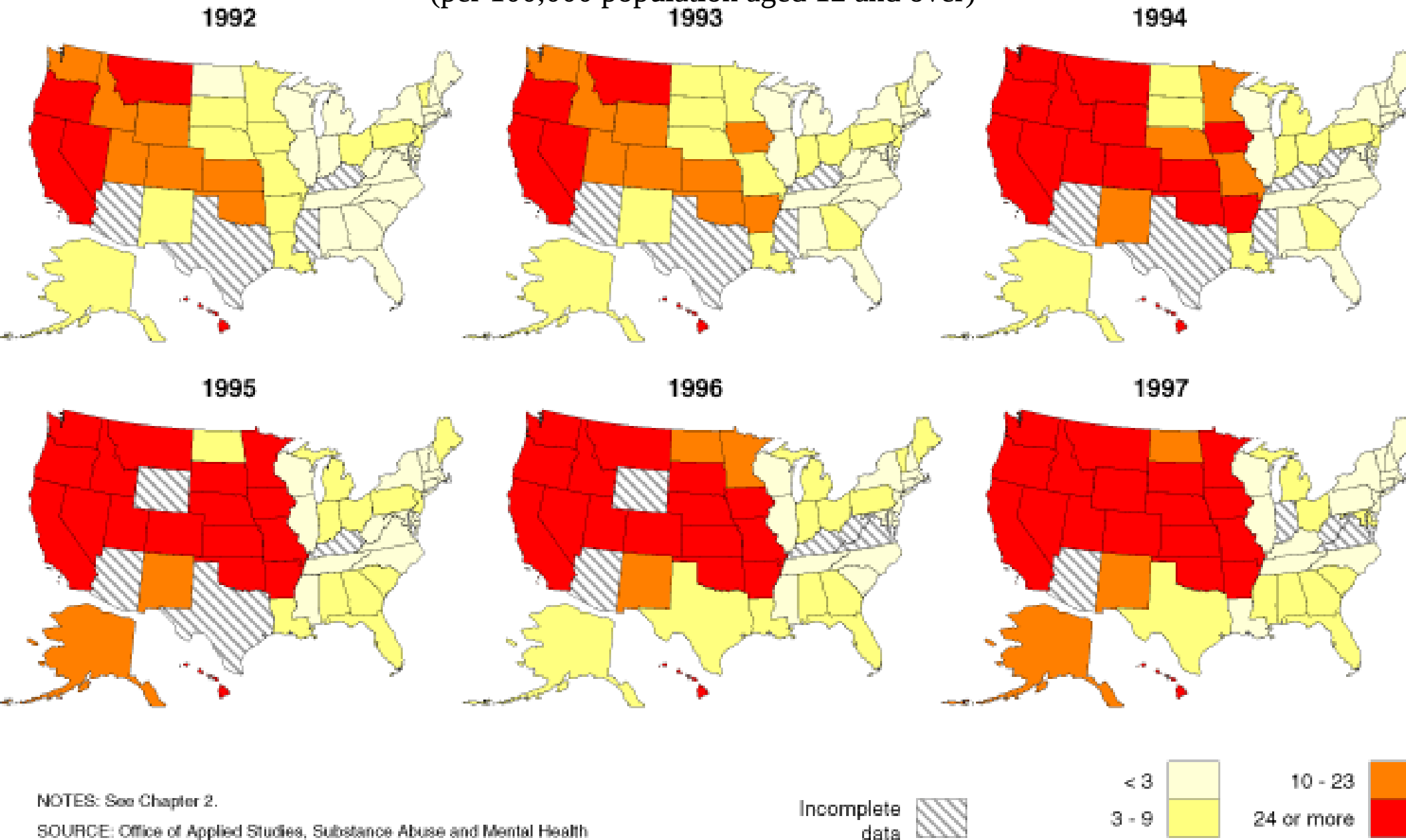
Source: National Clandestine Laboratory Database
Total: 6,781 / 43 States Reporting
Dates: 01/01/99 to 12/31/99

Total of All Meth Clandestine Laboratory Incidents
Including Labs, Dumpsites, Chem/Glass/Equipment
Calendar Year 2004

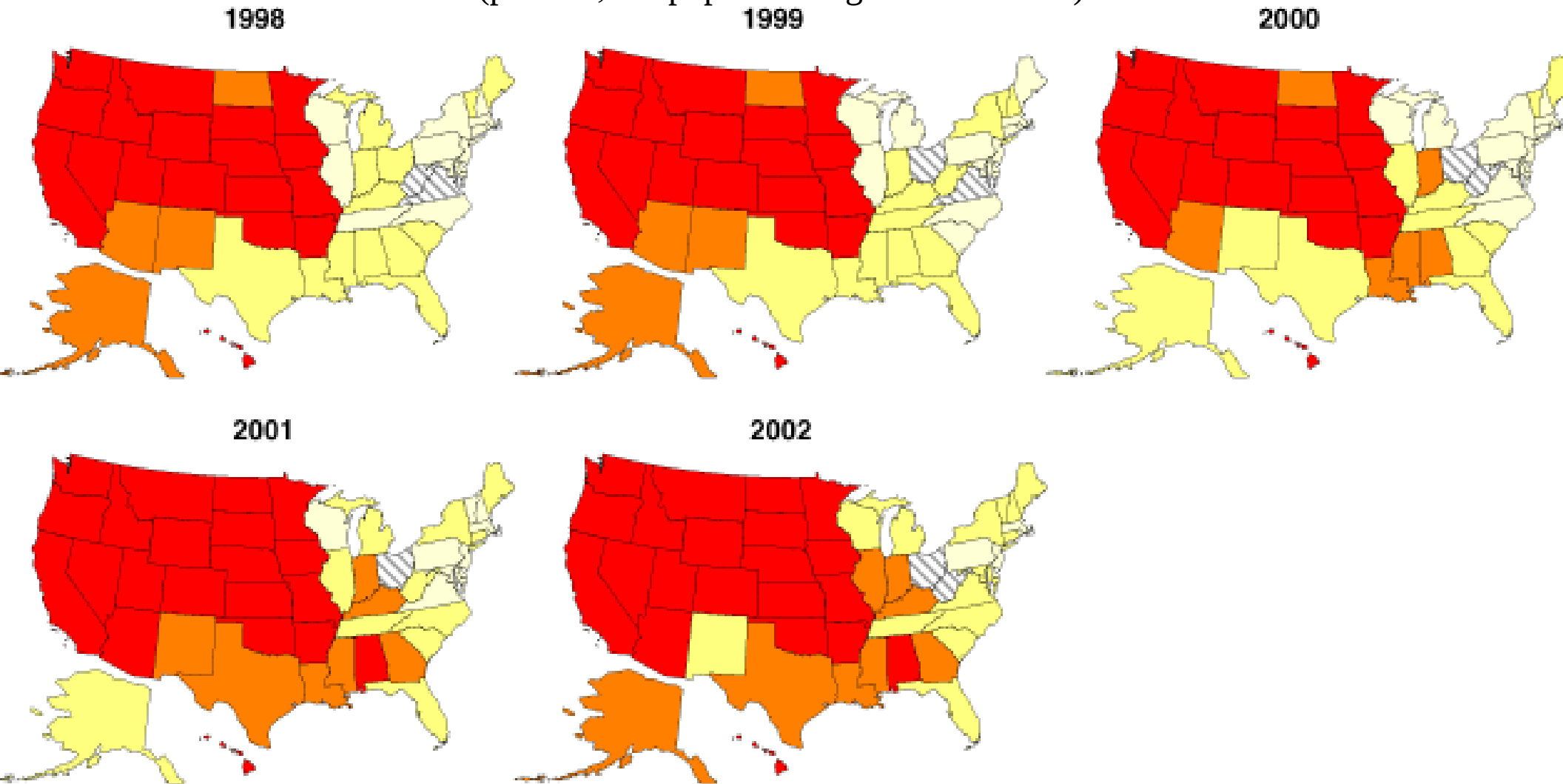


Source: National Clandestine Laboratory Database
Total: 15,994 / 49 States Reporting
Dates: 01/01/04 to 12/31/04

Primary Methamphetamine/amphetamine admission rates (per 100,000 population aged 12 and over)



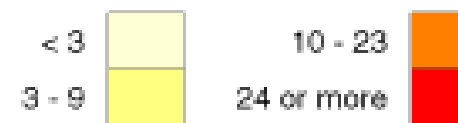
Primary Methamphetamine/amphetamine admission rates (per 100,000 population aged 12 and over)



NOTES: See Chapter 2.

SOURCE: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS) – 3.01.04.

Incomplete data



KEY YEAR: 1999

CEWG Areas



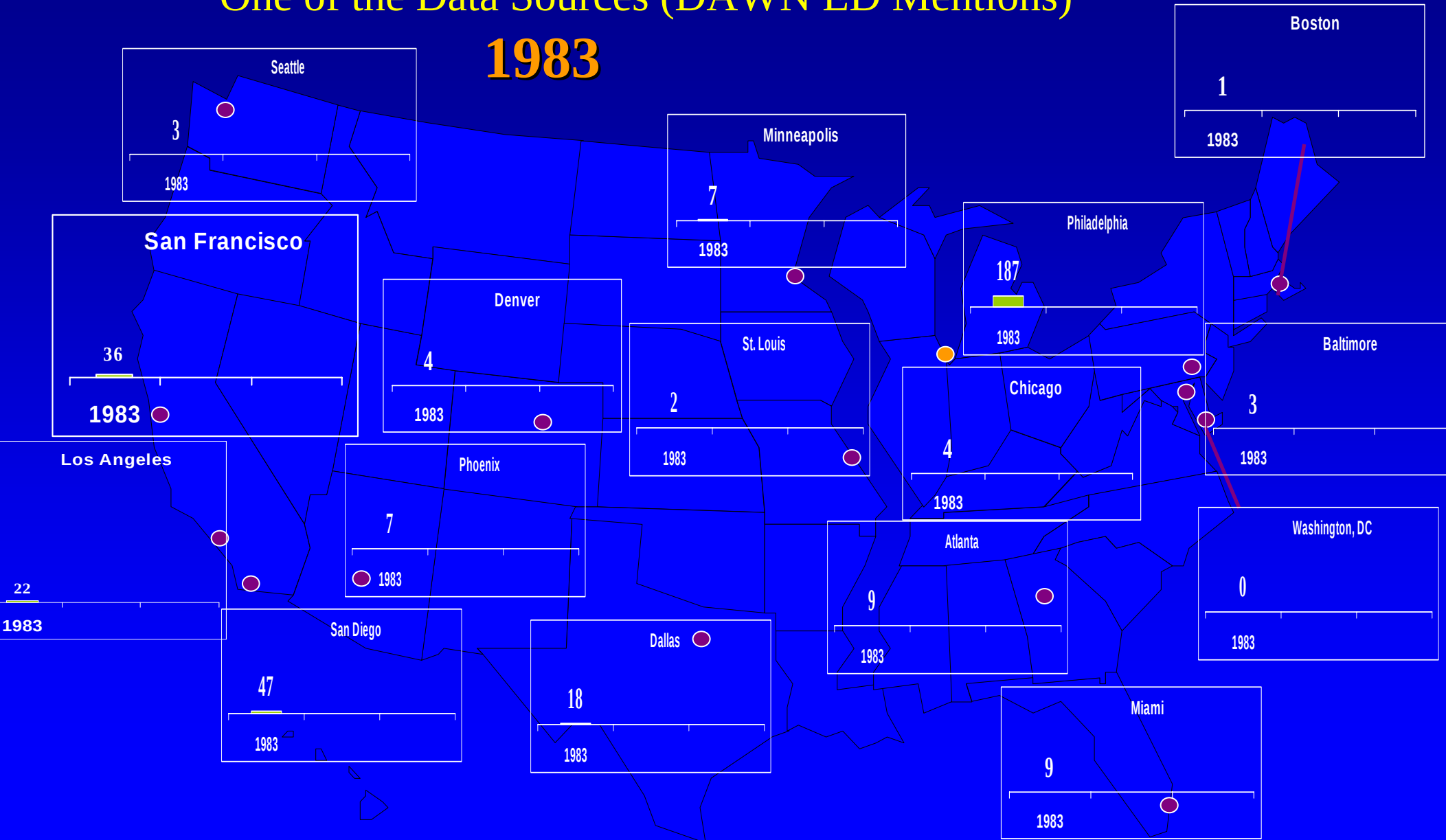
Methamphetamine abuse: June 2004 and January 2005 CEWG Meeting/Reports

- ☐ The spread (geographically and into new user groups) of methamphetamine abuse was identified as an issue of great concern by CEWG members
- ☐ Abuse indicator remain high in Hawaii, west coast and southwest areas AND, notably,
- ☐ **Methamphetamine abuse is spreading eastward**

CEWG: Monitoring Methamphetamine Abuse

One of the Data Sources (DAWN ED Mentions)

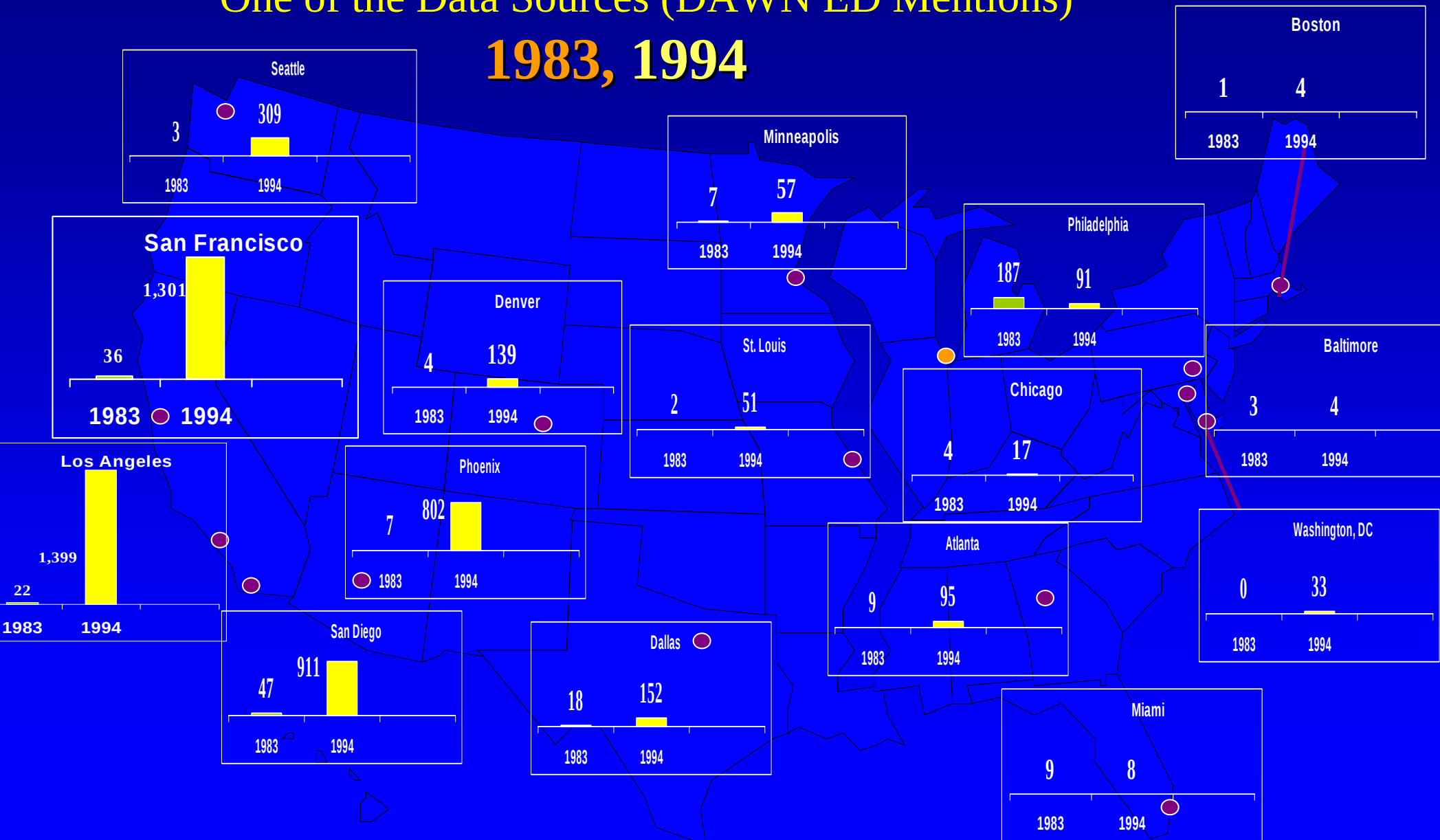
1983



CEWG: Monitoring Methamphetamine Abuse

One of the Data Sources (DAWN ED Mentions)

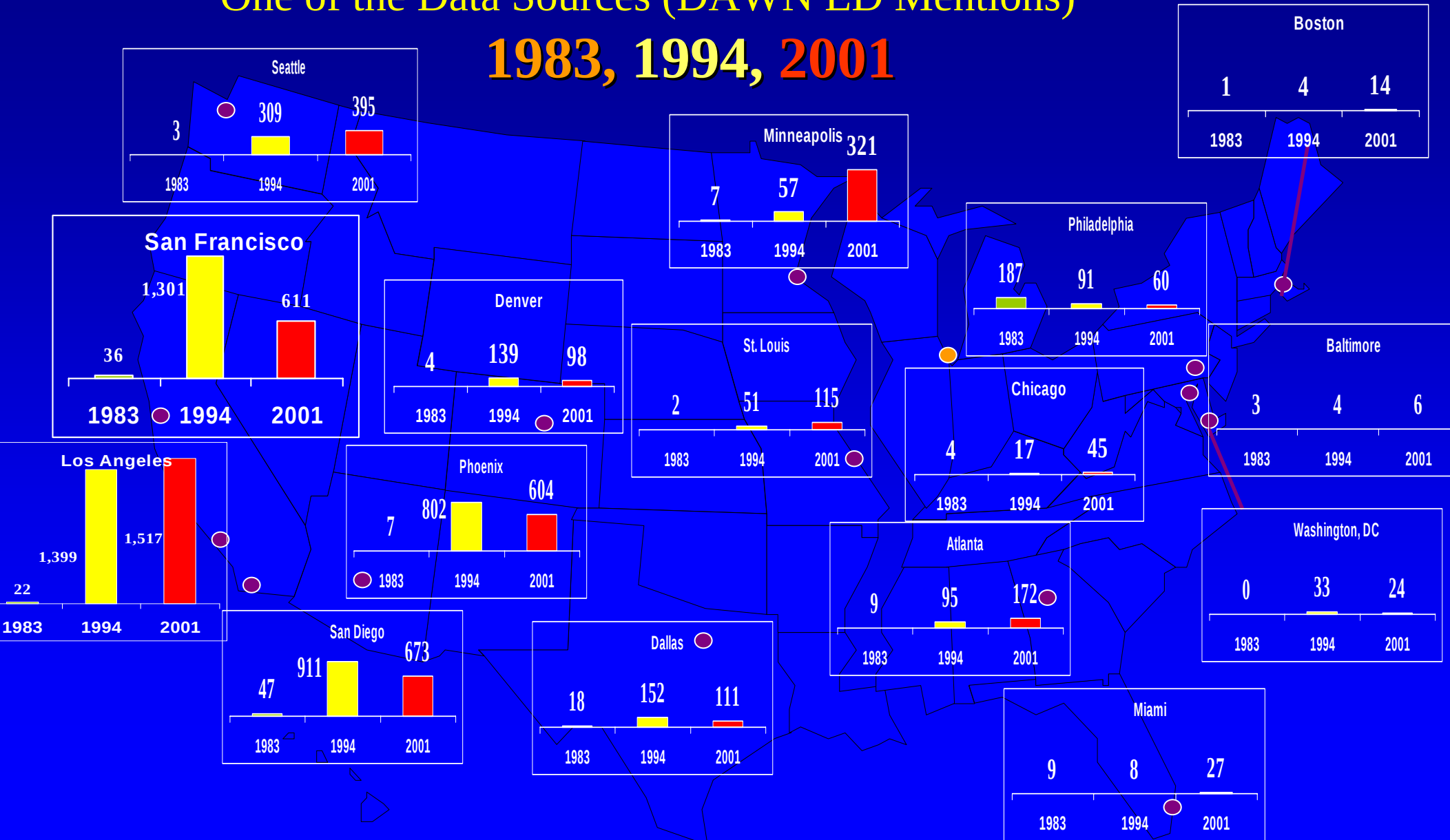
1983, 1994



CEWG: Monitoring Methamphetamine Abuse

One of the Data Sources (DAWN ED Mentions)

1983, 1994, 2001



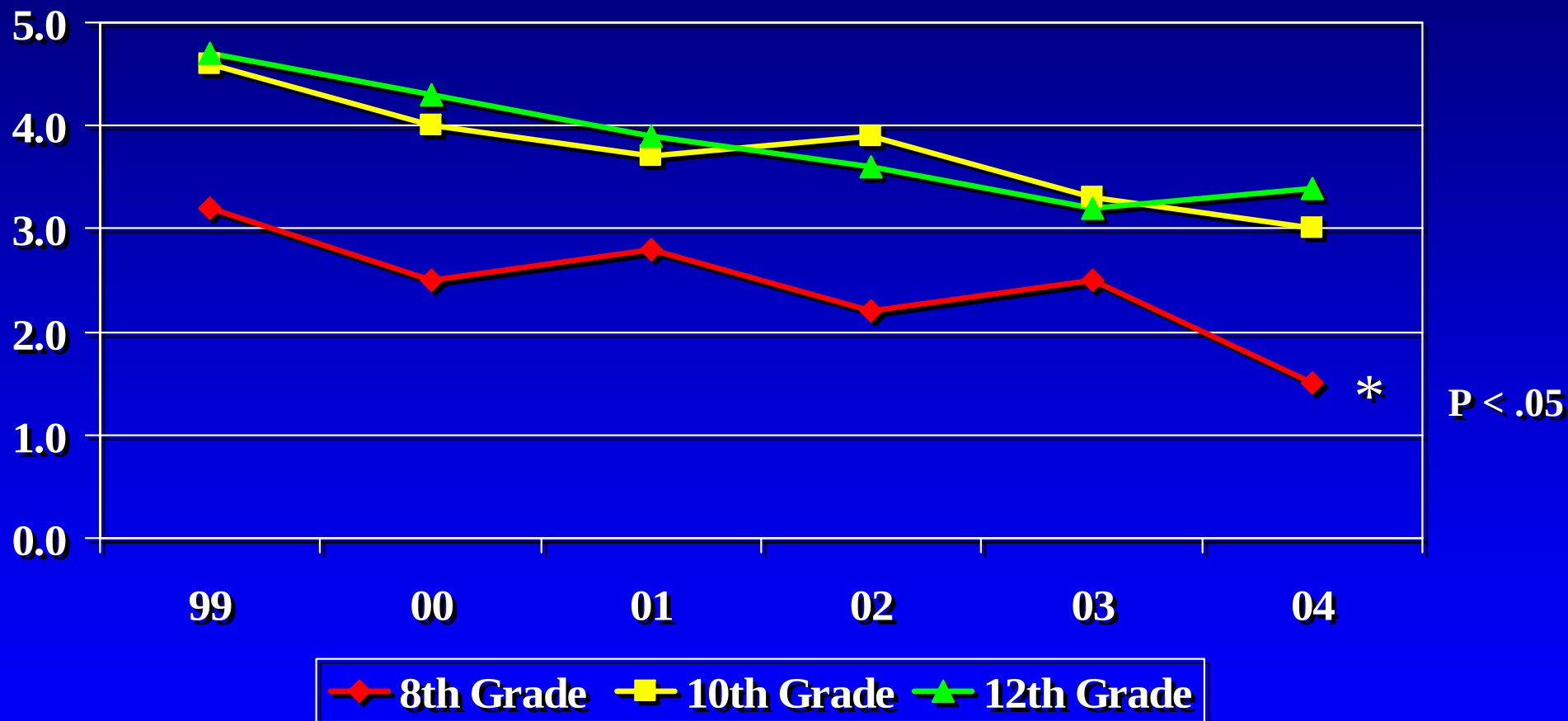
In 2003, over *12.3 million people* age 12 or older reported having used methamphetamine at least once in their lifetime

BUT

Is methamphetamine abuse increasing?

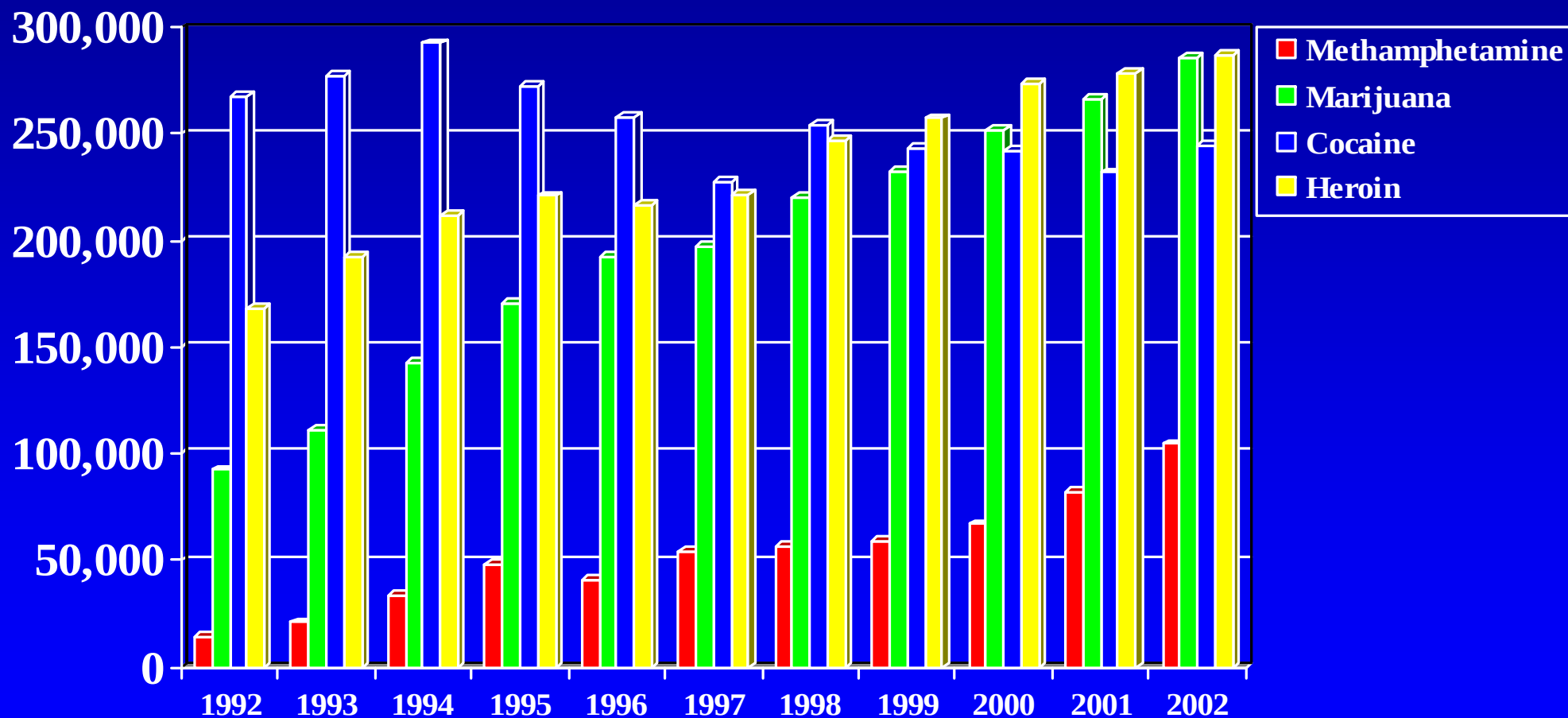
Source: 2003 NSDUH, SAMHSA

According to the Monitoring the Future Study Methamphetamine is not Increasing



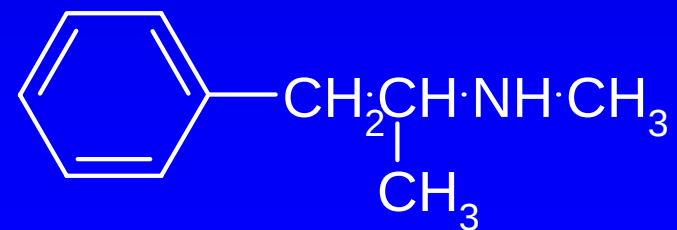
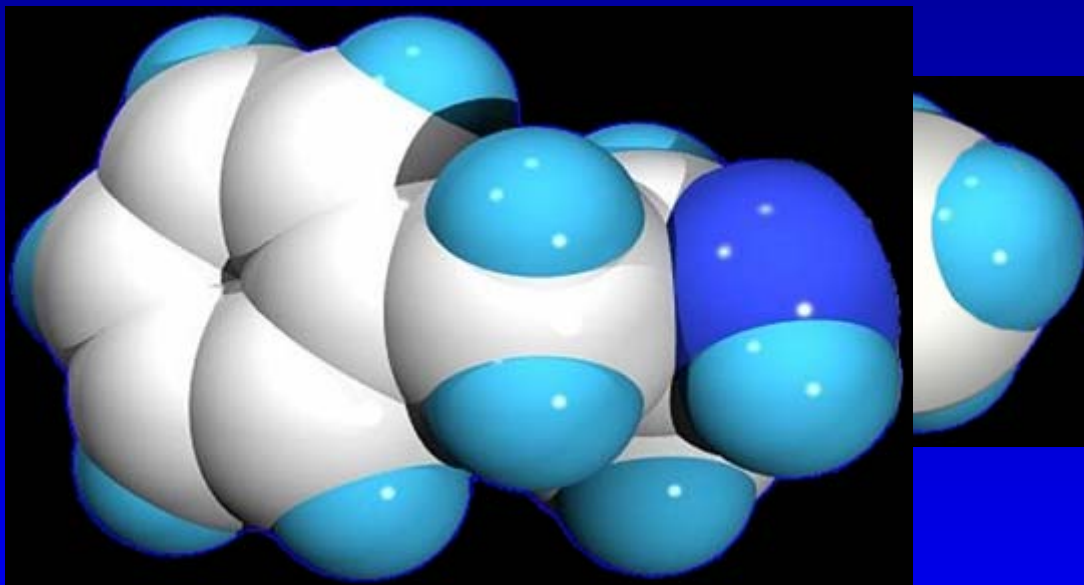
**Percent of Students Reporting Use of
Methamphetamine in Past Year, by Grade**

Primary Methamphetamine Treatment Admissions

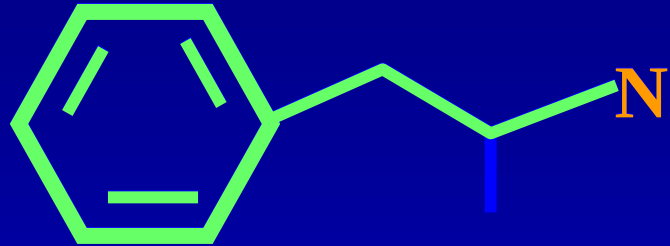


What is methamphetamine?

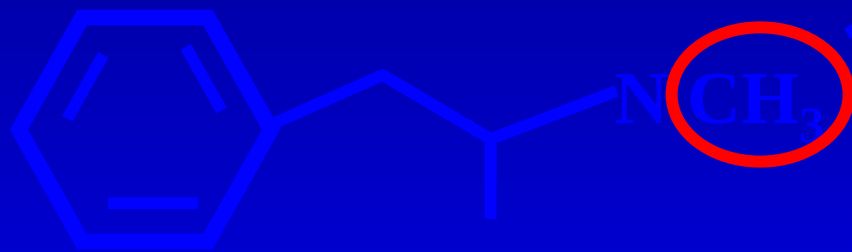
METHAMPHETAMINE



Amphetamine Drugs

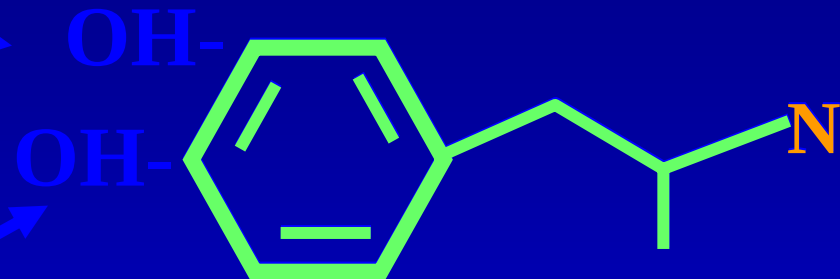


Amphetamine



Methamphetamine

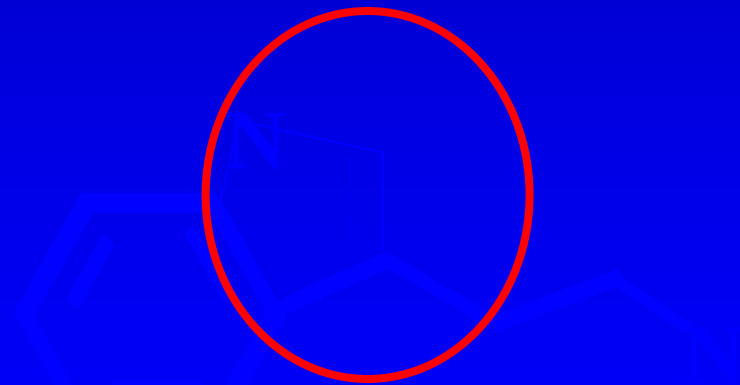
Transmitters



Dopamine



**Methylenedioxymethamphetamine
(Ecstasy, MDMA)**



Serotonin

- 
- Schedule II drug
 - High potential for abuse
 - Limited therapeutic use:
 - Narcolepsy
 - Ritalin resistant ADD
 - Extreme obesity

WHAT IS METHAMPHETAMINE?

Ice

High purity
methamphetamine
crystals or coarse powder
ranging from translucent
to white, sometimes with
a green, blue, or pink
tinge.



Speed

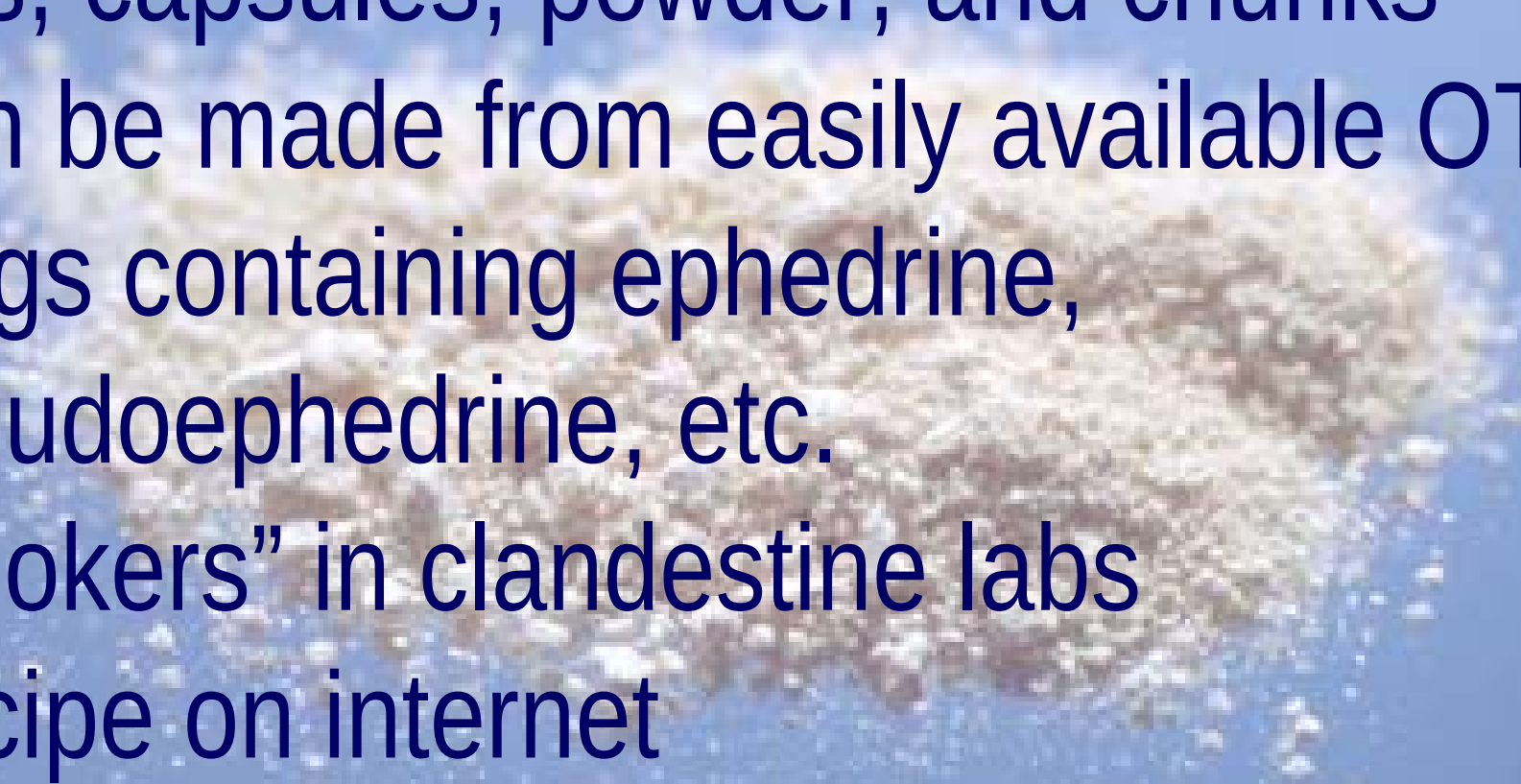
- It is methamphetamine powder ranging in color from white, yellow, orange, pink, or brown.
- Color variations are due to differences in chemicals used to produce it and the expertise of the cooker.
- Other names: shabu, crystal, crystal meth, crank, tina, yaba



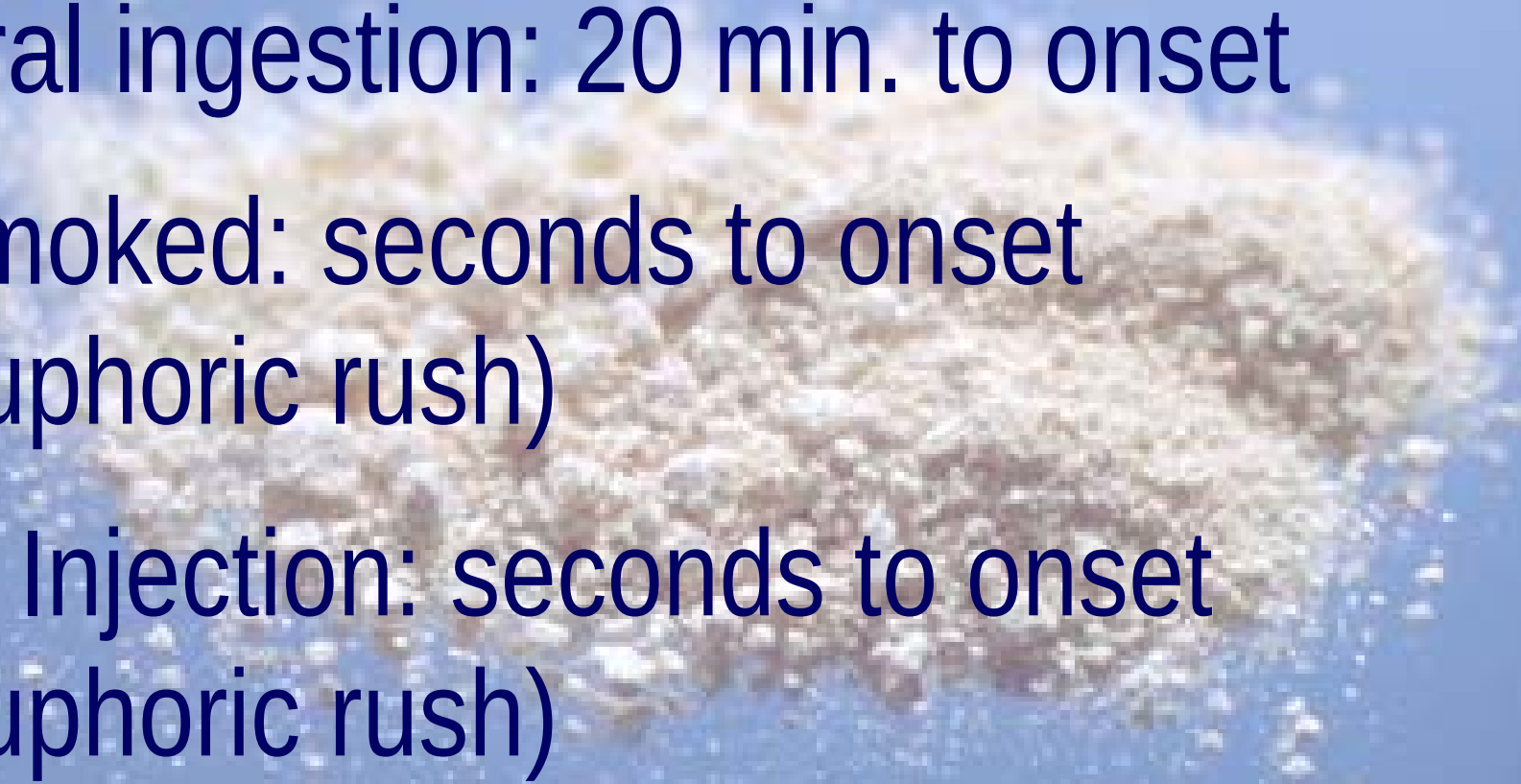
What is Yaba?



- Combination of methamphetamine and caffeine
- Means crazy medicine in Thai
- Produced in Southeast and East Asia
- Popular in Asian communities in the U.S.
- Increasingly available at raves and techno parties
- Sold as small, brightly colored green or orange-red tablets
- Sometimes flavored like candy, appealing to youth
- Sometimes heated and vapors inhaled (chasing the dragon) or crushed into powder and snorted or injected

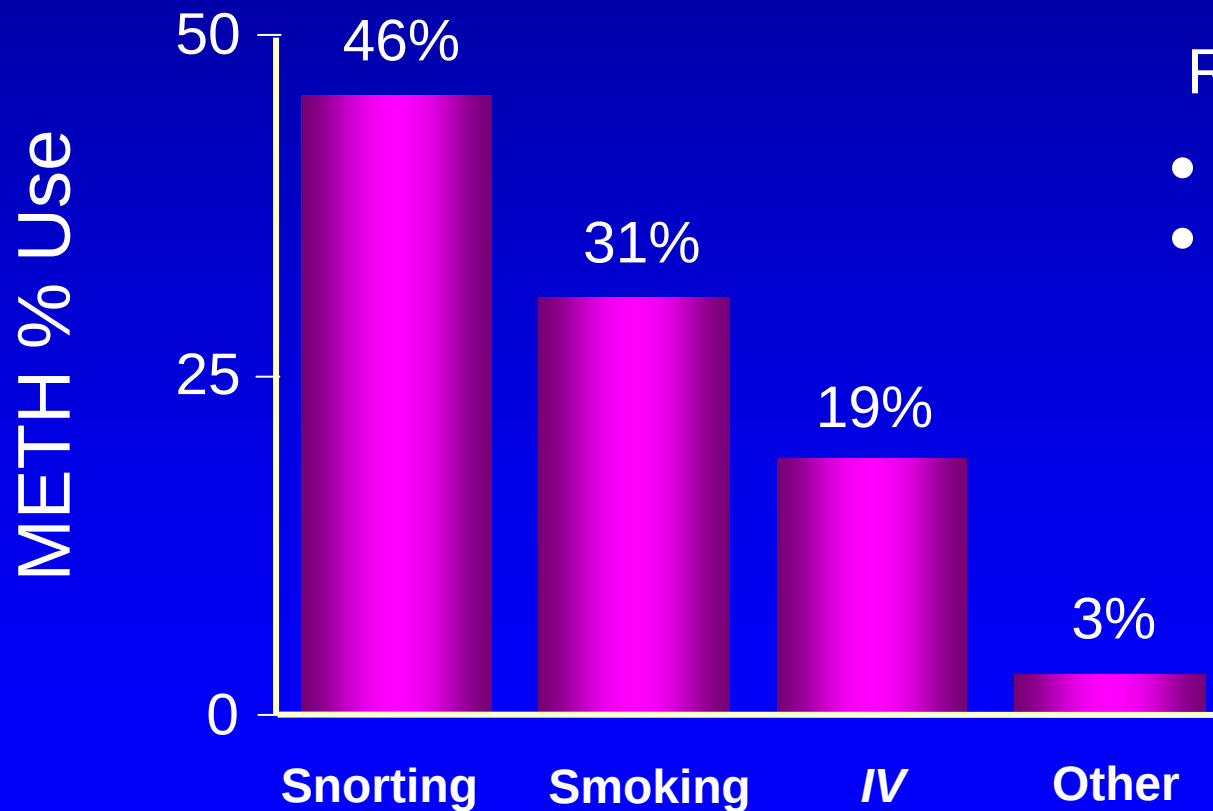
- 
- Synthetic stimulant
 - Pills, capsules, powder, and chunks
 - Can be made from easily available OTC drugs containing ephedrine, pseudoephedrine, etc.
 - “Cookers” in clandestine labs
 - Recipe on internet

HOW IS METH MANUFACTURED?

- 
- Intranasal snorting: 5 min. to onset
 - Oral ingestion: 20 min. to onset
 - Smoked: seconds to onset (euphoric rush)
 - IV Injection: seconds to onset (euphoric rush)

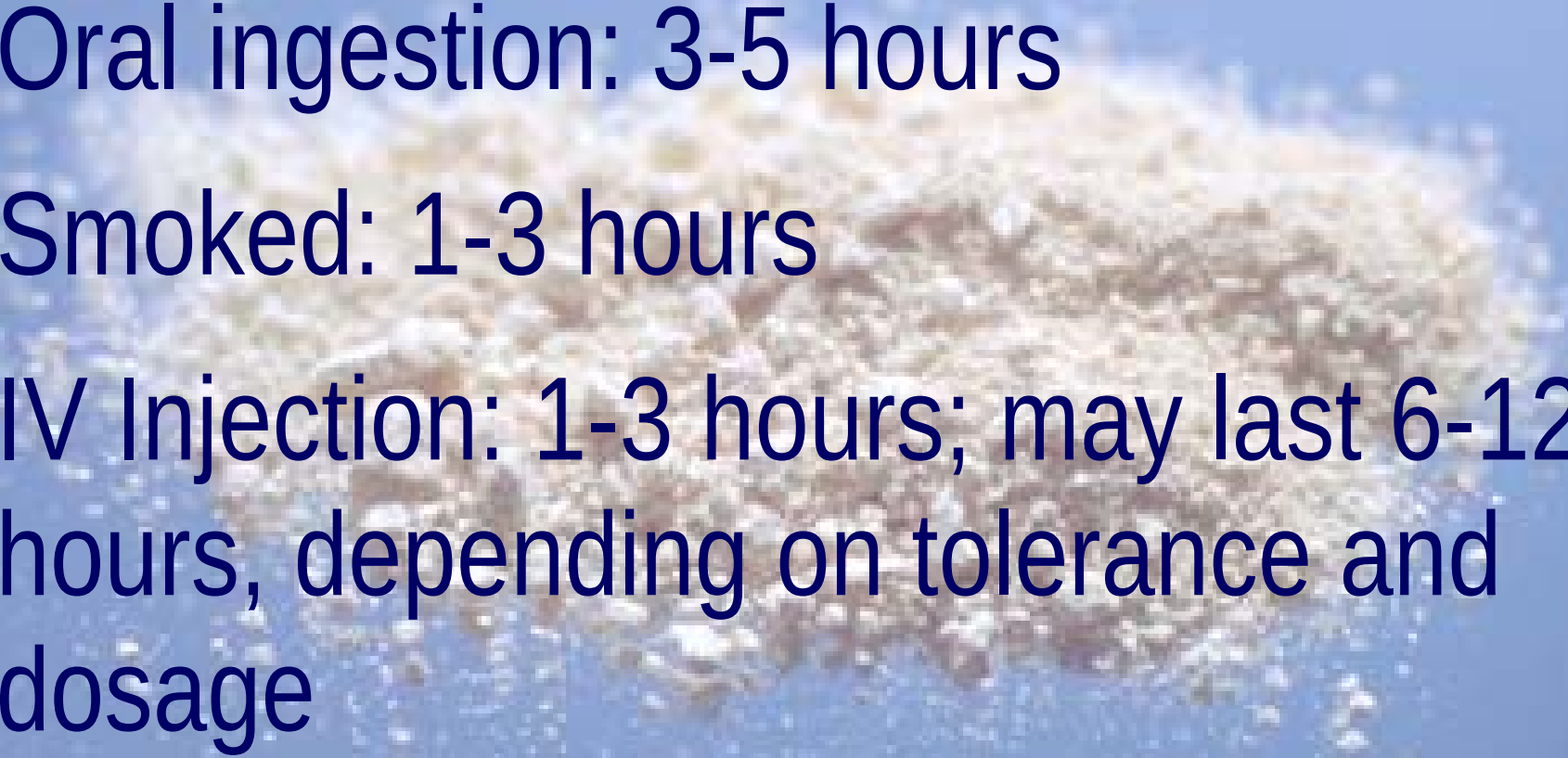
HOW IS METH ADMINISTERED?

Human METH Use



Rapid input dominates!

- Immediate euphoric “rush”
- Produces 8 to 24 hr high

- 
- Intranasal snorting: 2-4 hours
 - Oral ingestion: 3-5 hours
 - Smoked: 1-3 hours
 - IV Injection: 1-3 hours; may last 6-12 hours, depending on tolerance and dosage

HOW LONG DO THE EFFECTS LAST?

2002 Methamphetamine Price Ranges

Powdered Meth:

- \$3,000-\$13,000/pound
- \$300-\$1,700/ounce
- \$40-\$125/gram

Ice:

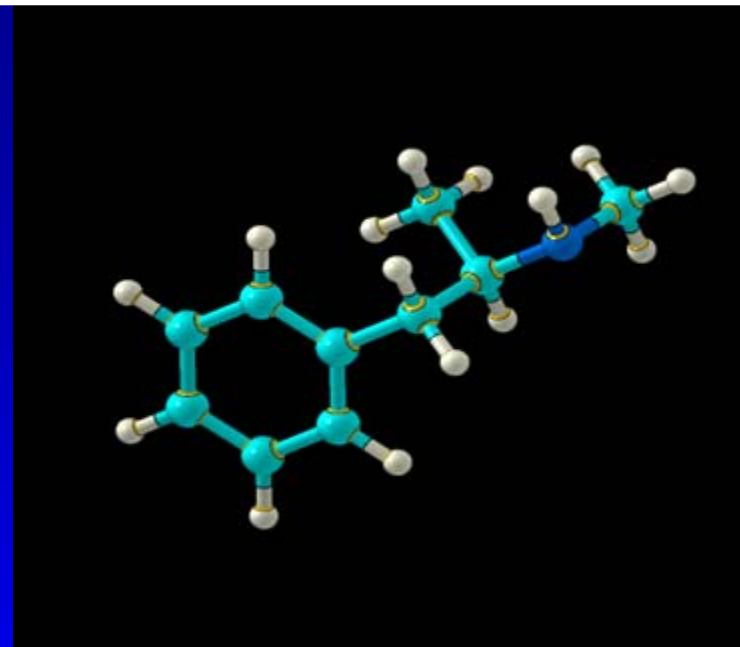
- \$1,200-\$70,000/pound
- \$350-\$2,300/ounce
- \$120-\$500/gram

HOW MUCH DOES METH COST?

**What are the effects of
methamphetamine?**

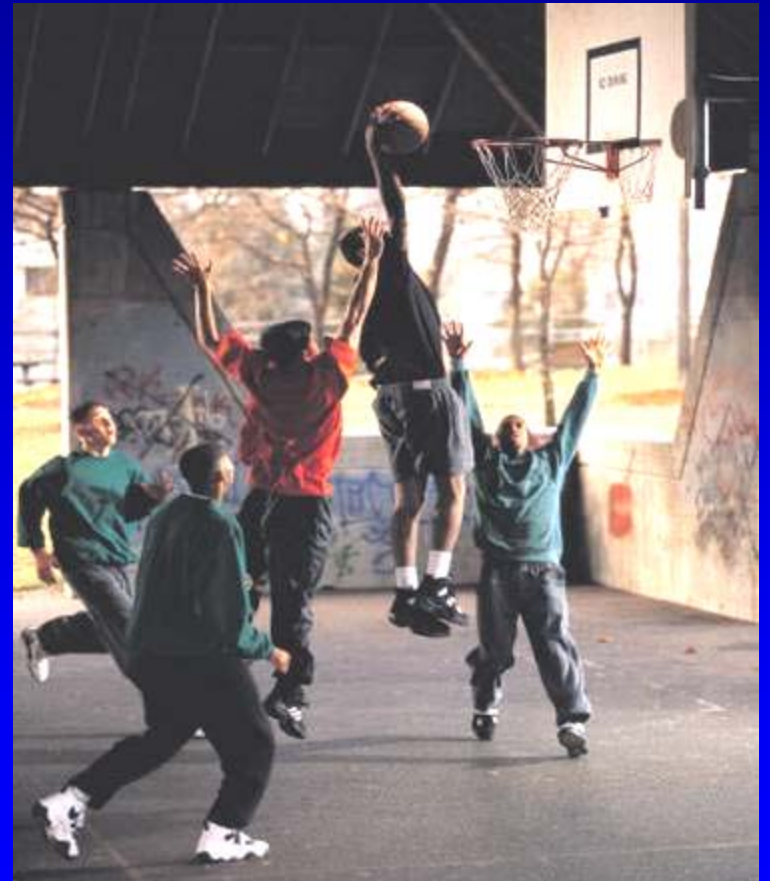
Concerns with Methamphetamine

- Neurotoxic in animal models of drug self administration
- Highly addictive
- Intoxication associated with behaviors that increase risks for infection with HIV and HCV
- Can be easily manufactured by small clandestine laboratories



Does methamphetamine affect the way you function?

- *speed and motor coordination*
- *attention and alertness*
- *cognitive function*
- *mood*
- *motivation*



- 
- Increased motor activity
 - Increased attention
 - Decreased fatigue
 - Appetite suppression
 - Euphoria/Rush
 - Increased respiration
 - Hyperthermia
 - Irregular heartbeat

ACUTE EFFECTS OF METH USE

- 
- Irritability
 - Tremors
 - Convulsions
 - Stroke
 - Brain hemorrhage
 - Shortness of breath
 - Nausea/vomiting

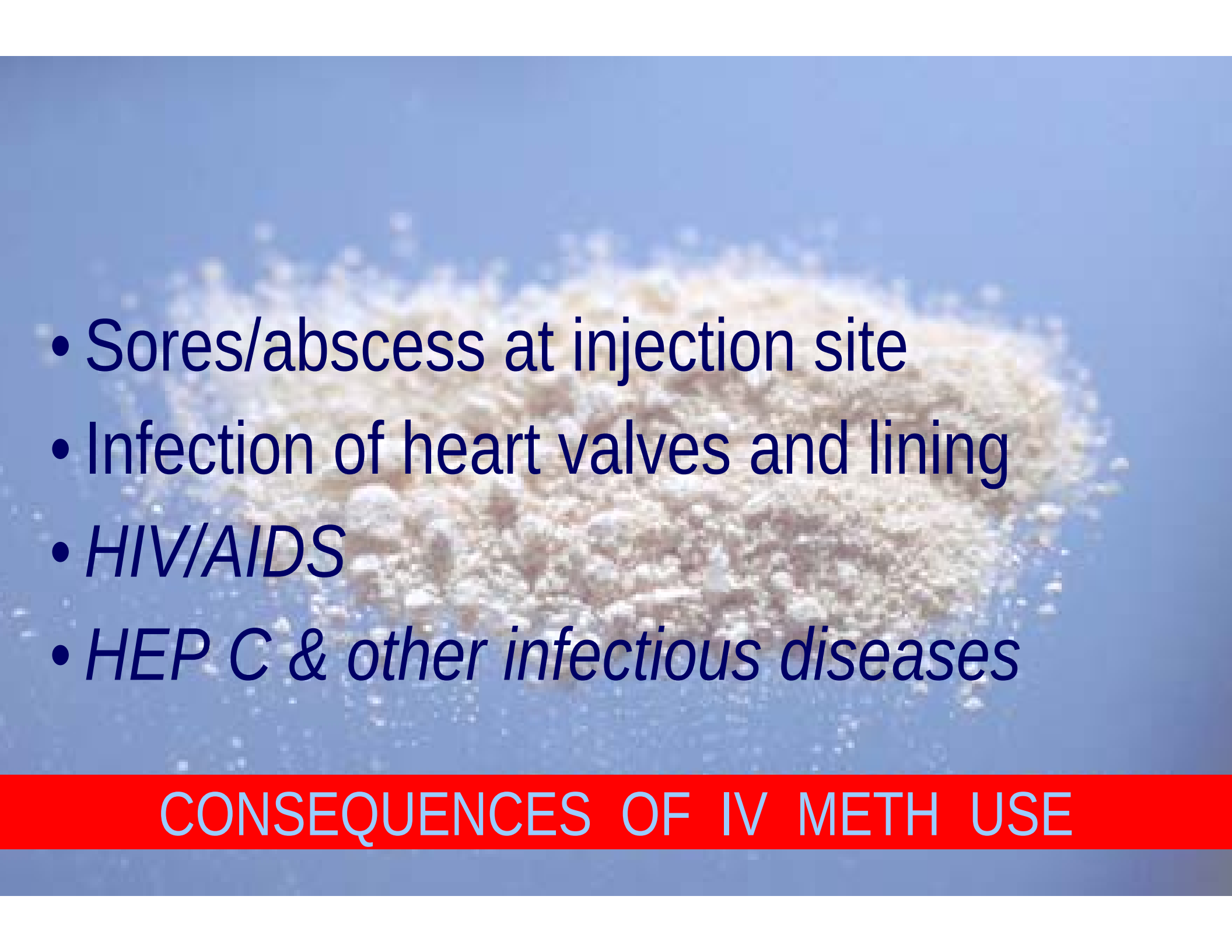
ACUTE EFFECTS OF METH USE

- 
- Addiction
 - Psychosis/paranoia
 - Hallucinations
 - Anxiety
 - Depression
 - Anorexia/malnutrition
 - Aggression/violence
 - For~~m~~ication & skin infections

LONG TERM EFFECTS OF METH USE

- 
- Drug craving
 - Depression
 - Sleep disturbances
 - Hunger

METHAMPHETAMINE WITHDRAWAL SYNDROME

- 
- Sores/abscess at injection site
 - Infection of heart valves and lining
 - *HIV/AIDS*
 - *HEP C & other infectious diseases*

CONSEQUENCES OF IV METH USE

METH Use Leads to Severe Tooth Decay

Source: Richards, JR and Brofeldt, BT, J Periodontology, August 2000.



“METH Mouth”

Source: The New York Times, June 11, 2005.

Meth and AIDS

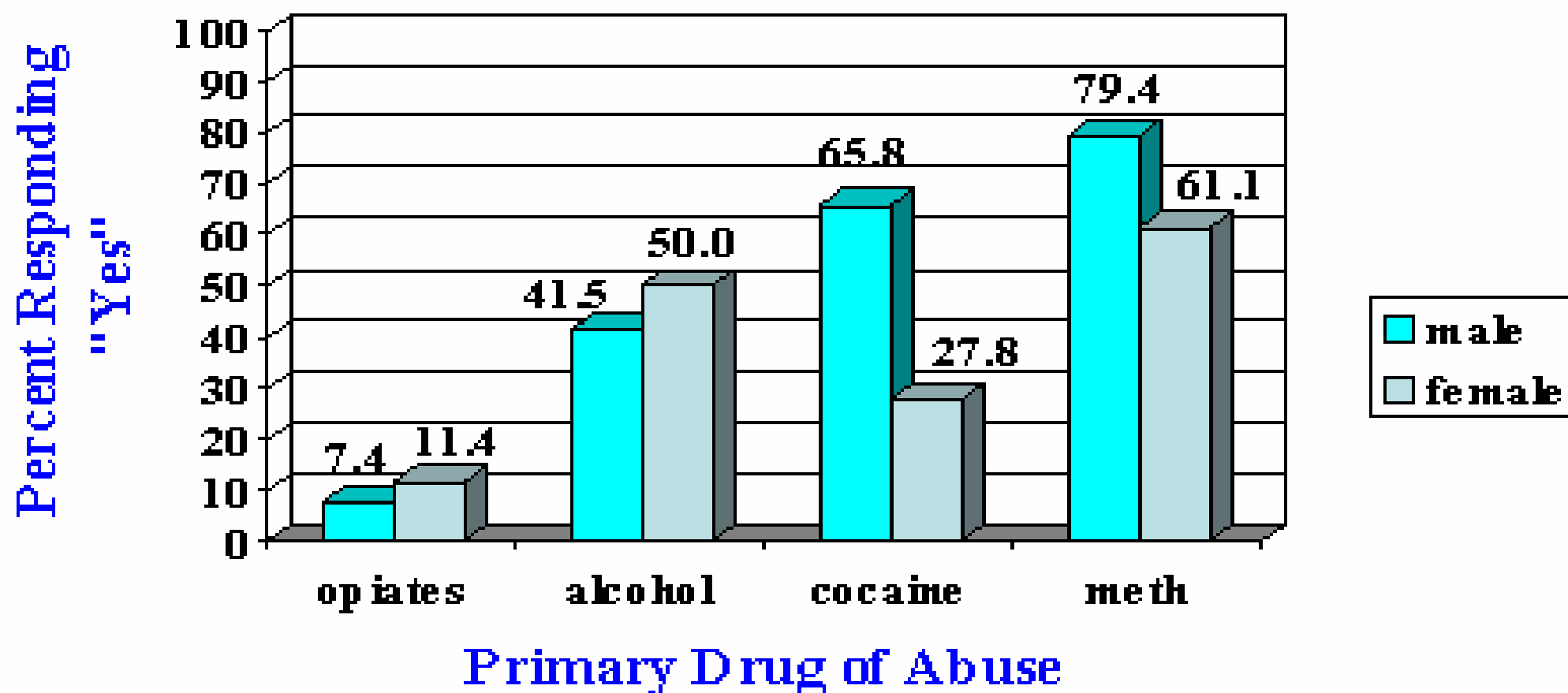


What is the Role of Methamphetamine in the HIV Epidemic?

- Does it disrupt immunological function?
- What is the neurobiology that underlies the risky sexual behavior that occurs during METH intoxication
- What physiological changes resulting from METH use may increase level of infectivity (e.g., erosion of normal protective epithelial layer)

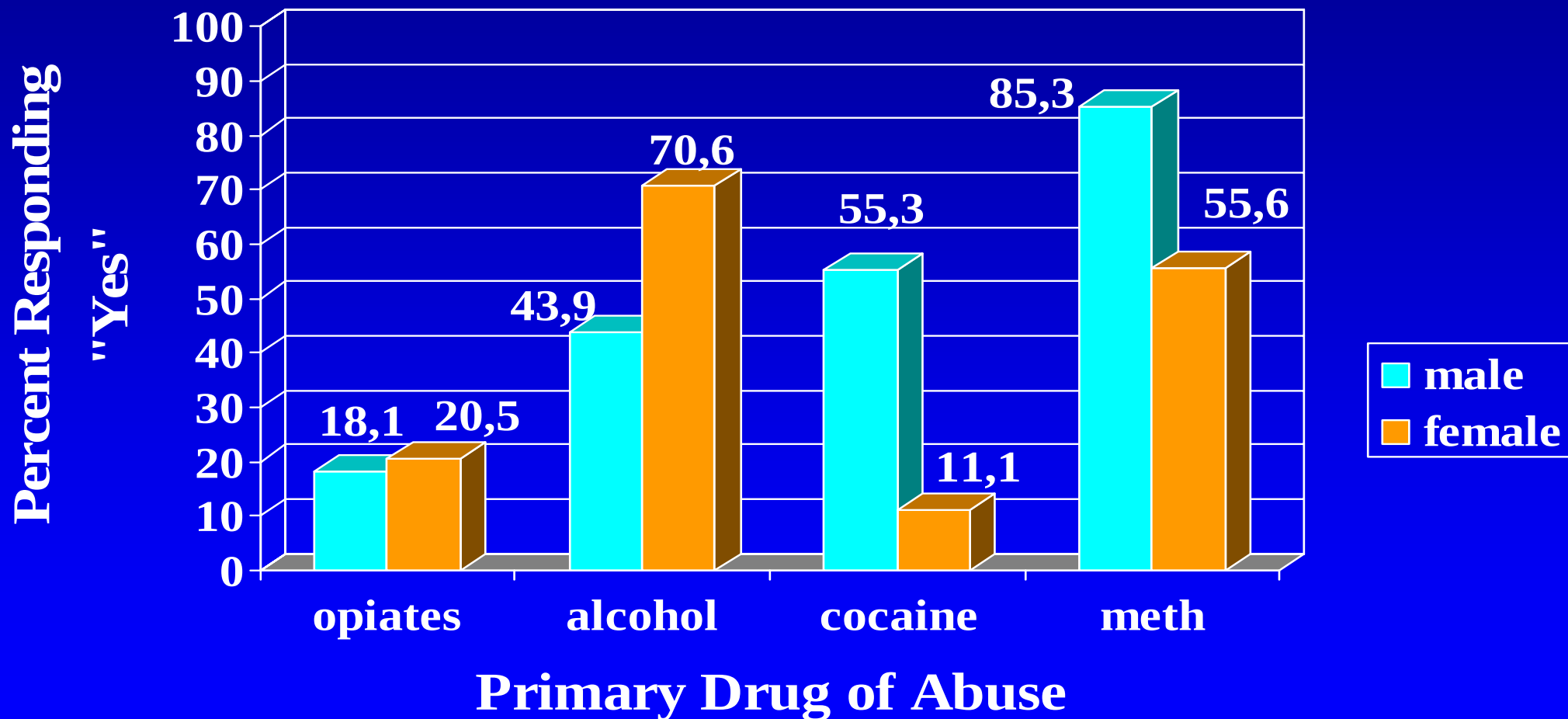
Methamphetamine and Sex

I am more likely to have sex when using ...



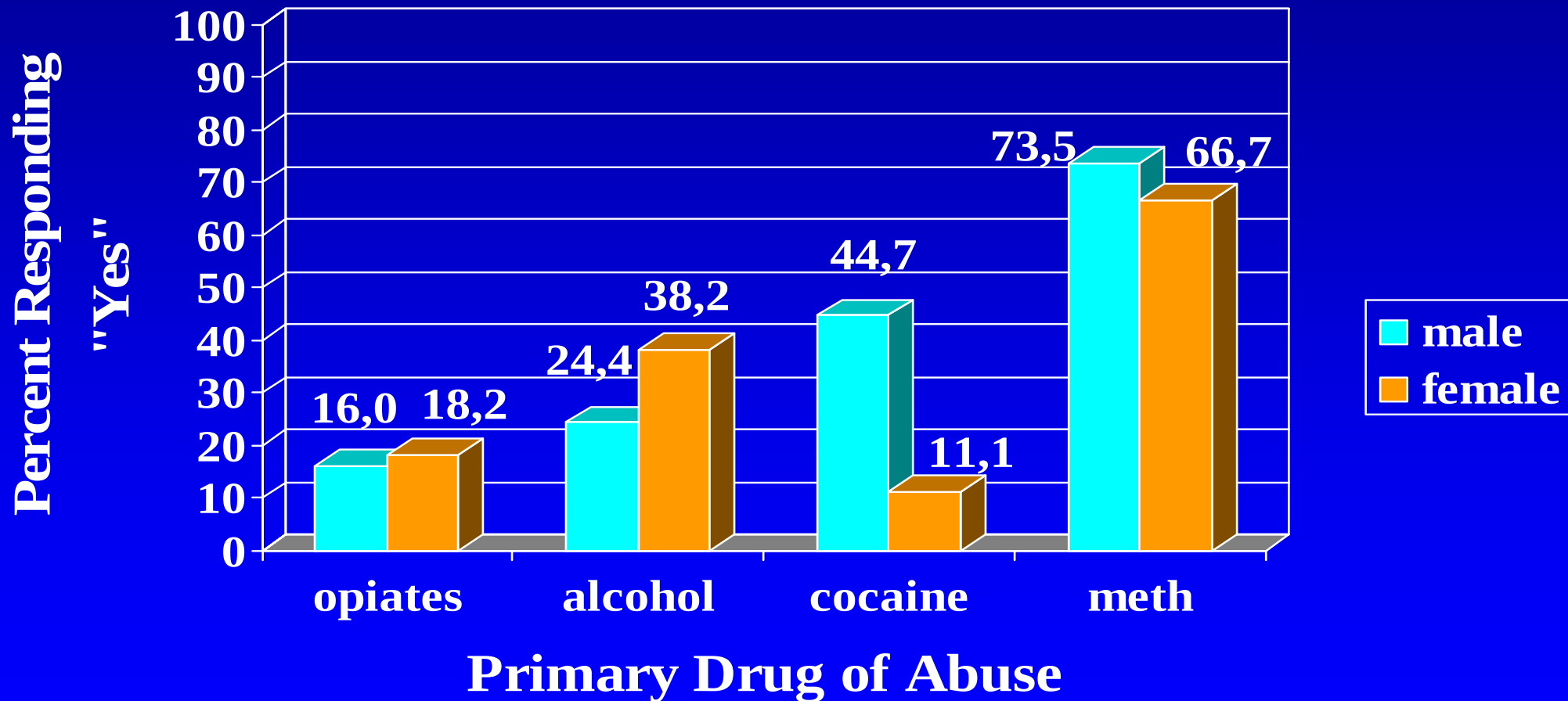
(Ranson et al., 2002)

My sexual drive is increased by the use of ...



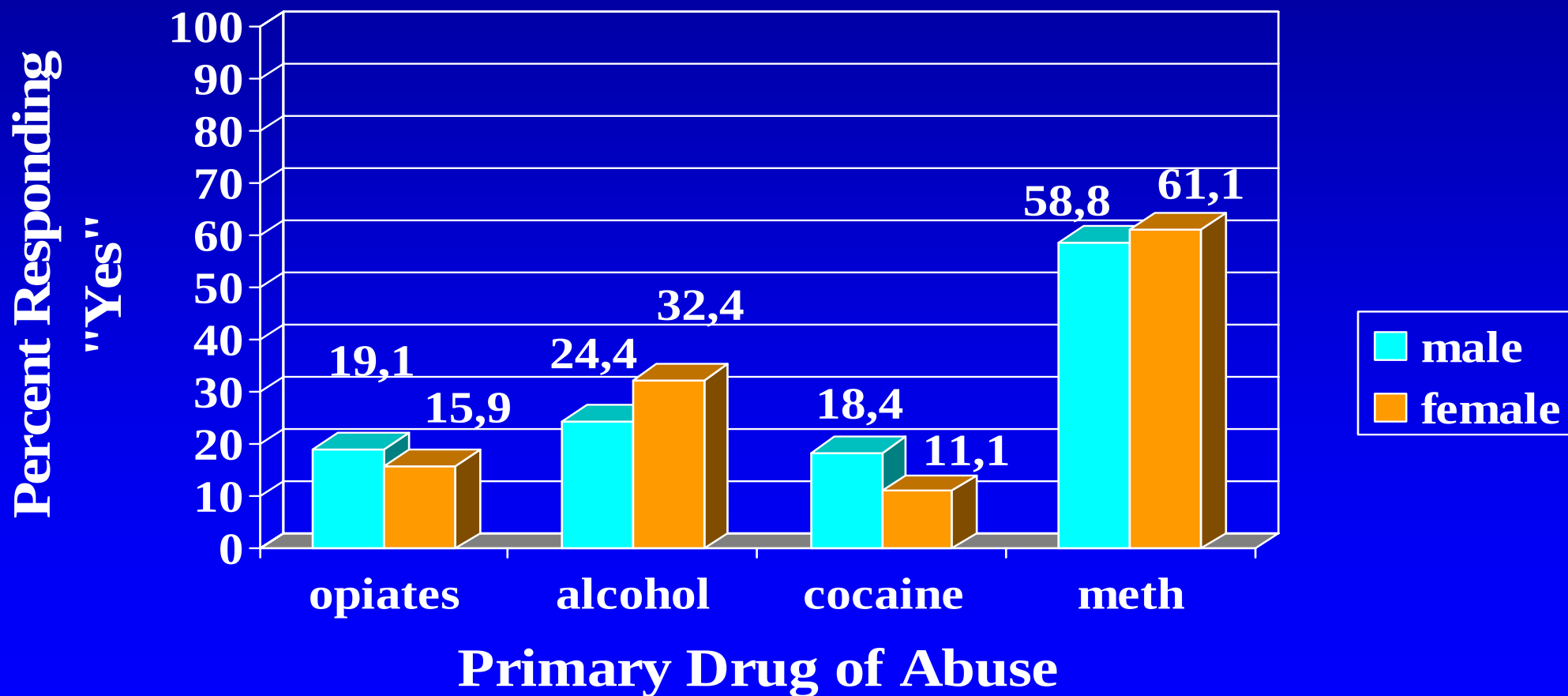
(Rawson et al., 2002)

My sexual *pleasure* is enhanced by the use of ...



(Rawson et al., 2002)

My sexual *performance* is improved by the use of ...

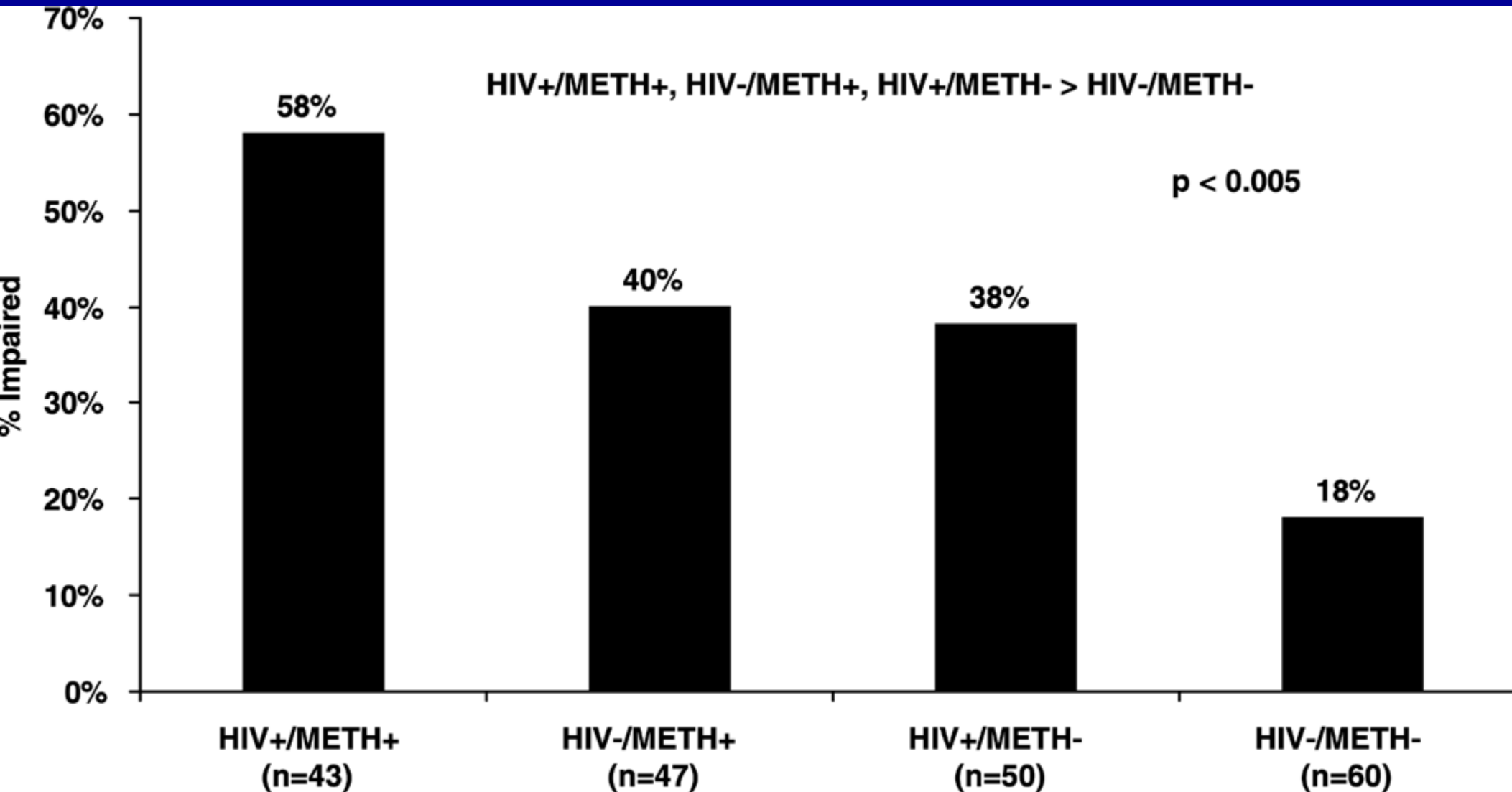


(Rawson et al., 2002)

Methamphetamine Impacts the Spread and Course of HIV/AIDS:

- Increases risky sexual behavior, especially among men who have sex with men (MSM)
- Reduces medication adherence to HAART
- Increases replication of FIV in brain cells (the feline equivalent of HIV)
- Meth dependence increases the risk of HIV-related cognitive problems

Methamphetamine Dependence Increases Risk of Neuropsychological Impairment in HIV+ Persons



**What about prenatal exposure to
methamphetamine?**

Animal Studies

- Limited studies of prenatal exposure to methamphetamine
- Variable results: Some decreases in neurotransmitters; some increases; different sites
- May result from differing dose levels, variable gestational exposure, and postnatal ages at which offspring are assessed.
- More studies needed.

Infant Development, Environment, And Lifestyle Study (IDEAL)

Multi-Site Study of Prenatal Methamphetamine

- “Hotbeds” of Methamphetamine Use
 - Iowa
 - Oklahoma
 - Southern California
 - Hawaii
- Over 13,000 deliveries screened
- Subjects: 200 Meth exposed and 200 control infants
- Three-year longitudinal study
- Preliminary data available for newborn and one month

Multi-Site Study of Prenatal Methamphetamine

- Child Outcomes
 - Arousal regulation
 - Cognition
 - Social relationships
 - Neuromotor development
 - Neuroendocrine function
 - Medical status
- Overall goal: To determine how drug effects and effects of psychosocial risk characteristics of the environment combine to affect child outcome

Fetal Effects of Methamphetamine

Preliminary evidence suggests that prenatal methamphetamine exposure is associated with subtle physical and neurobehavioral effects including:

- Lower arousal
- Poorer self-regulation
- Poorer quality of movement
- Increased central nervous system stress
- Small for gestational age
- Long-term consequences???

Clinical observations suggest that prenatal Methamphetamine exposure is associated with increased incidence of:

Short-term effects

- **Abnormal sleep patterns**
- **Poor feeding**
- **Tremors**

Delayed Effects

- **Attention deficit disorder**
- **Poor School Performance**
- **Language delays**

So...

***Why Do People Take
Methamphetamine In The First
Place?***

Why do people take drugs?

To feel good

To have novel:

Feelings

Sensations

Experiences

AND

To share them



To feel better

To lessen:

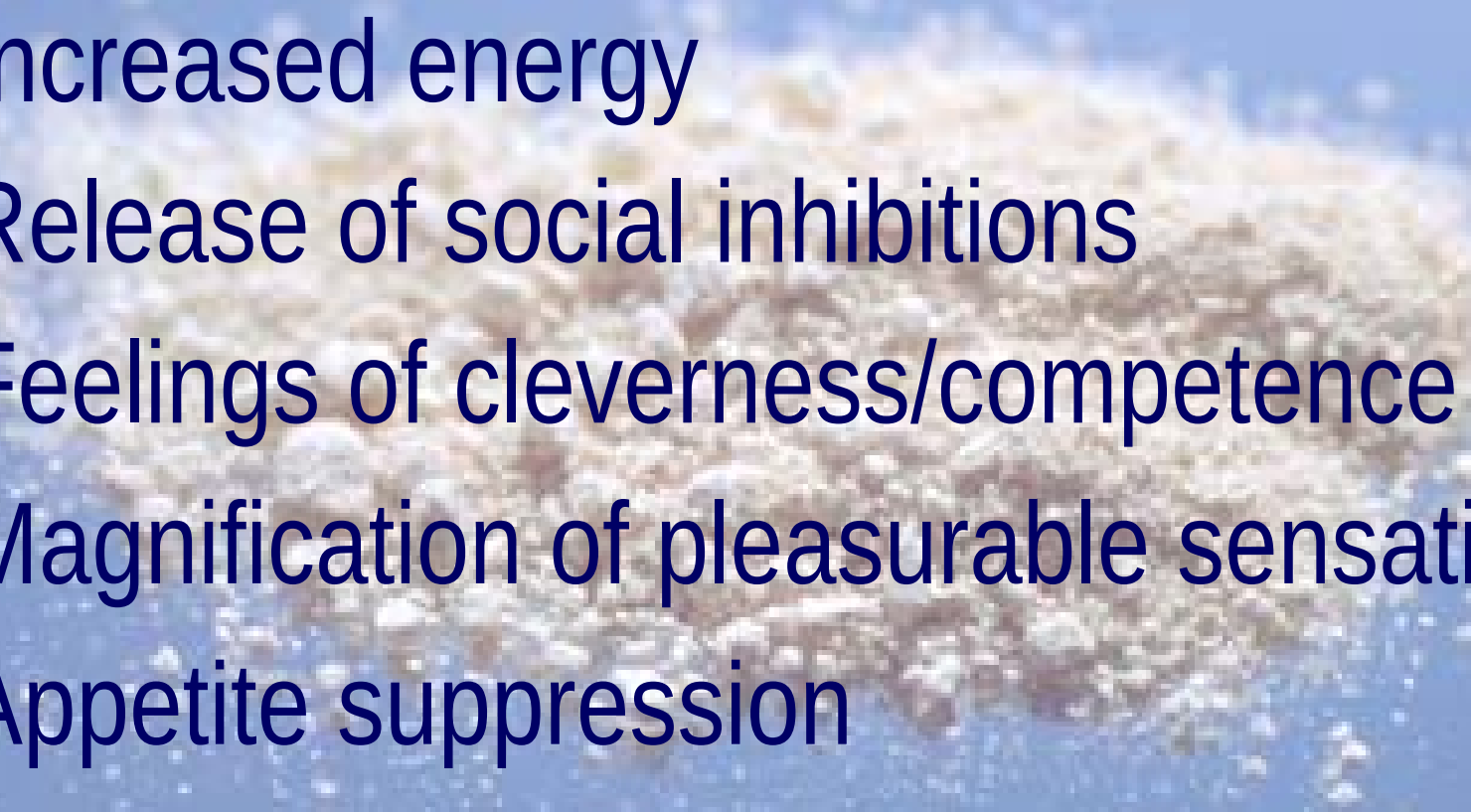
Anxiety

Worries

Fears

Depression

Hopelessness

- 
- Sense of well-being, euphoria
 - Increased energy
 - Release of social inhibitions
 - Feelings of cleverness/competence
 - Magnification of pleasurable sensations
 - Appetite suppression

WHY DO PEOPLE TAKE METH?



People Take Methamphetamine
Because They Like What
it Does to Their Brains

WHY DO PEOPLE TAKE METH?

How does Methamphetamine exert its behavioral effects?

**We Know That Despite
Their Many Differences, most
Abused Substances Enhance the
Dopamine and Serotonin Pathways**

Dopamine Pathways

Serotonin Pathways

frontal
cortex

striatum

hippocampus

substantia
nigra/VTA

nucleus
accumbens

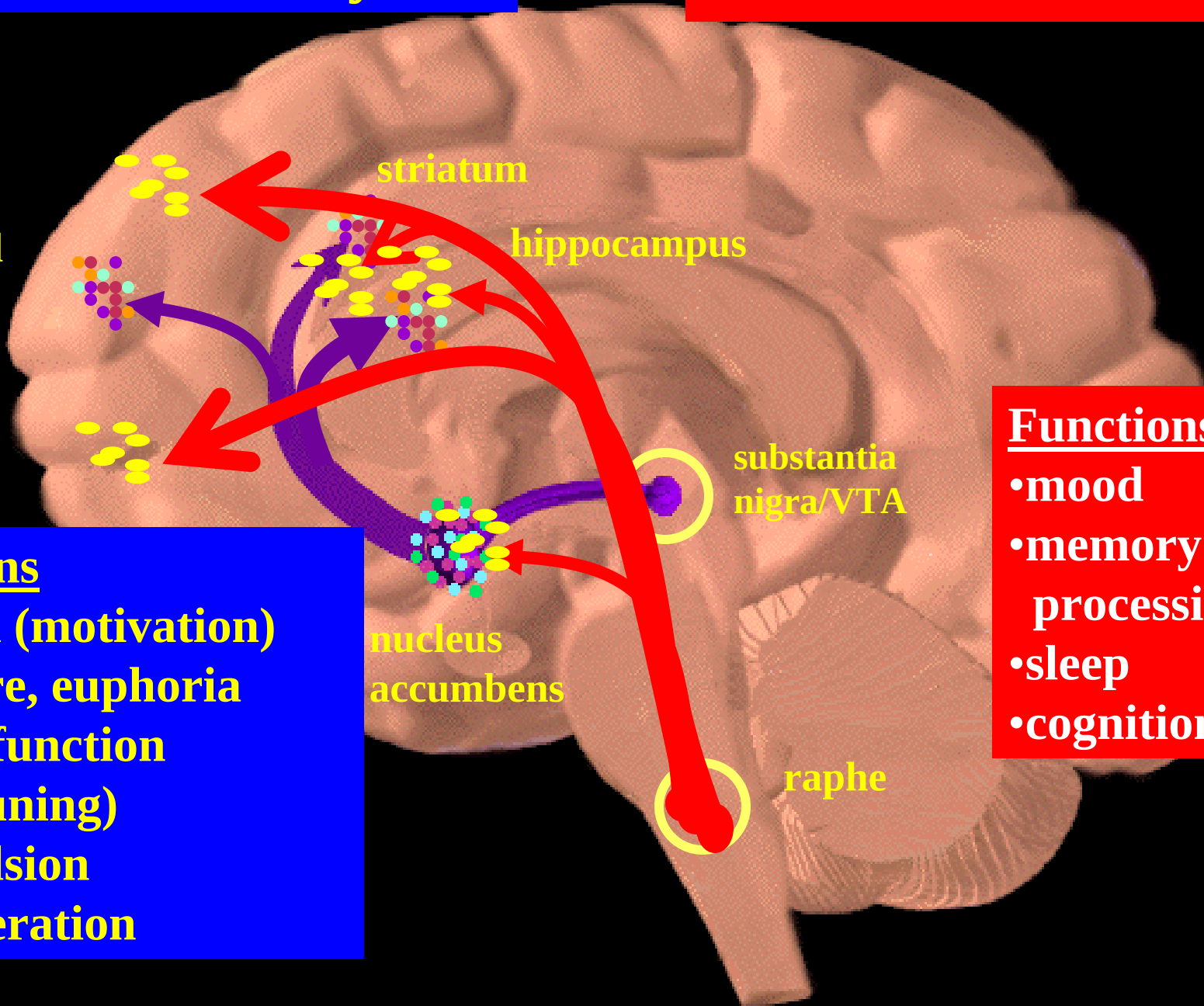
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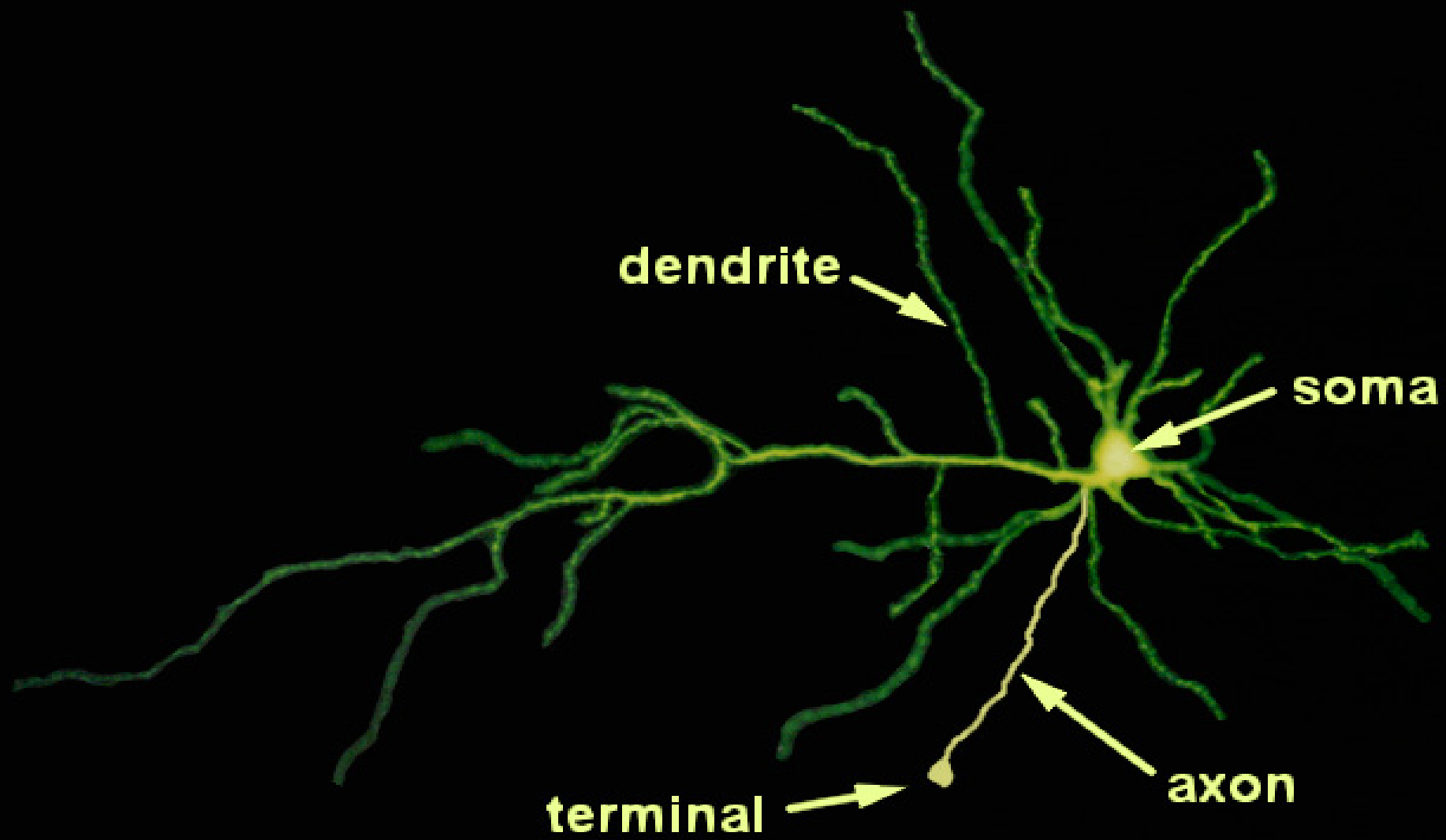
Functions

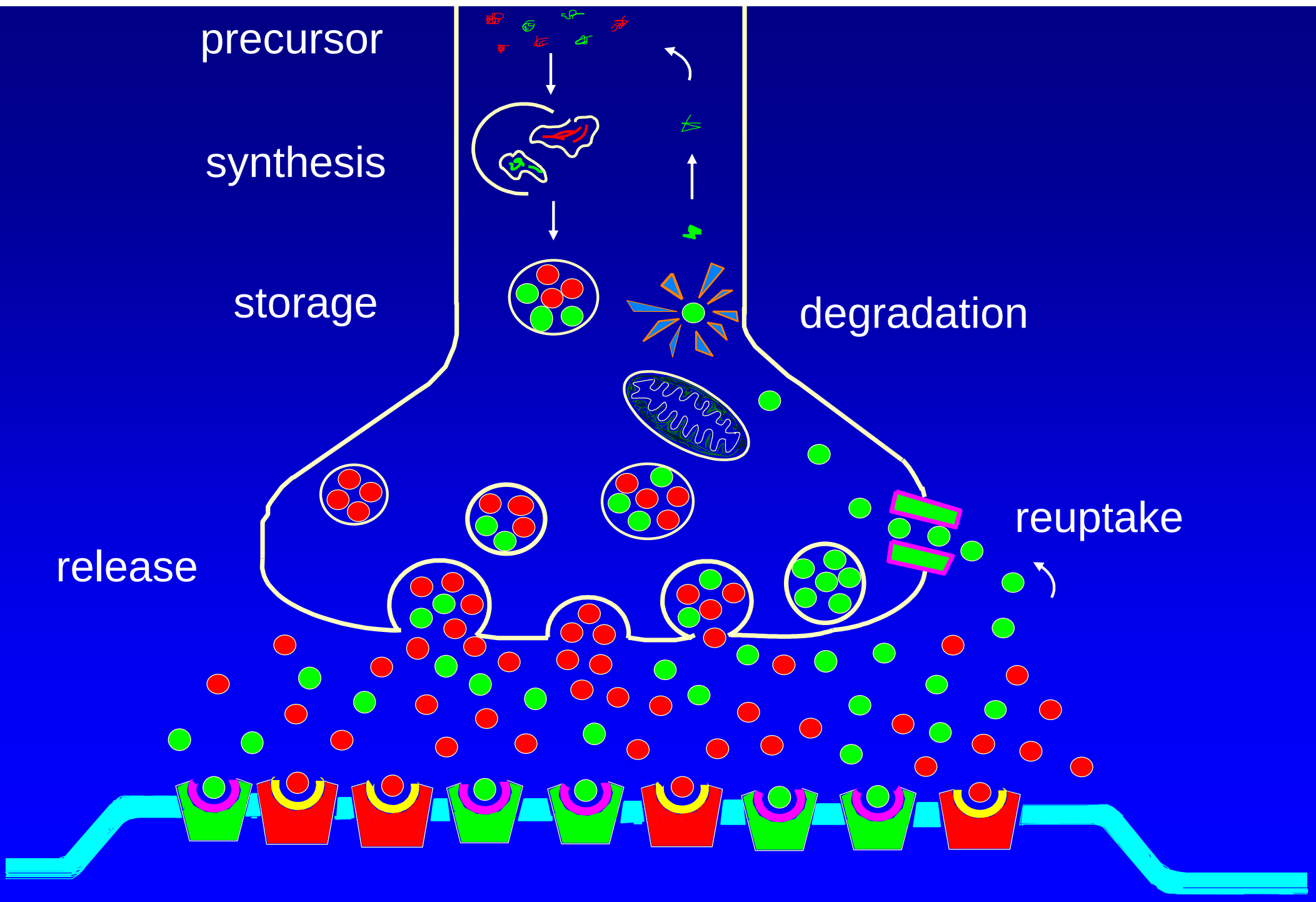
- reward (motivation)
- pleasure, euphoria
- motor function
(fine tuning)
- compulsion
- perseveration

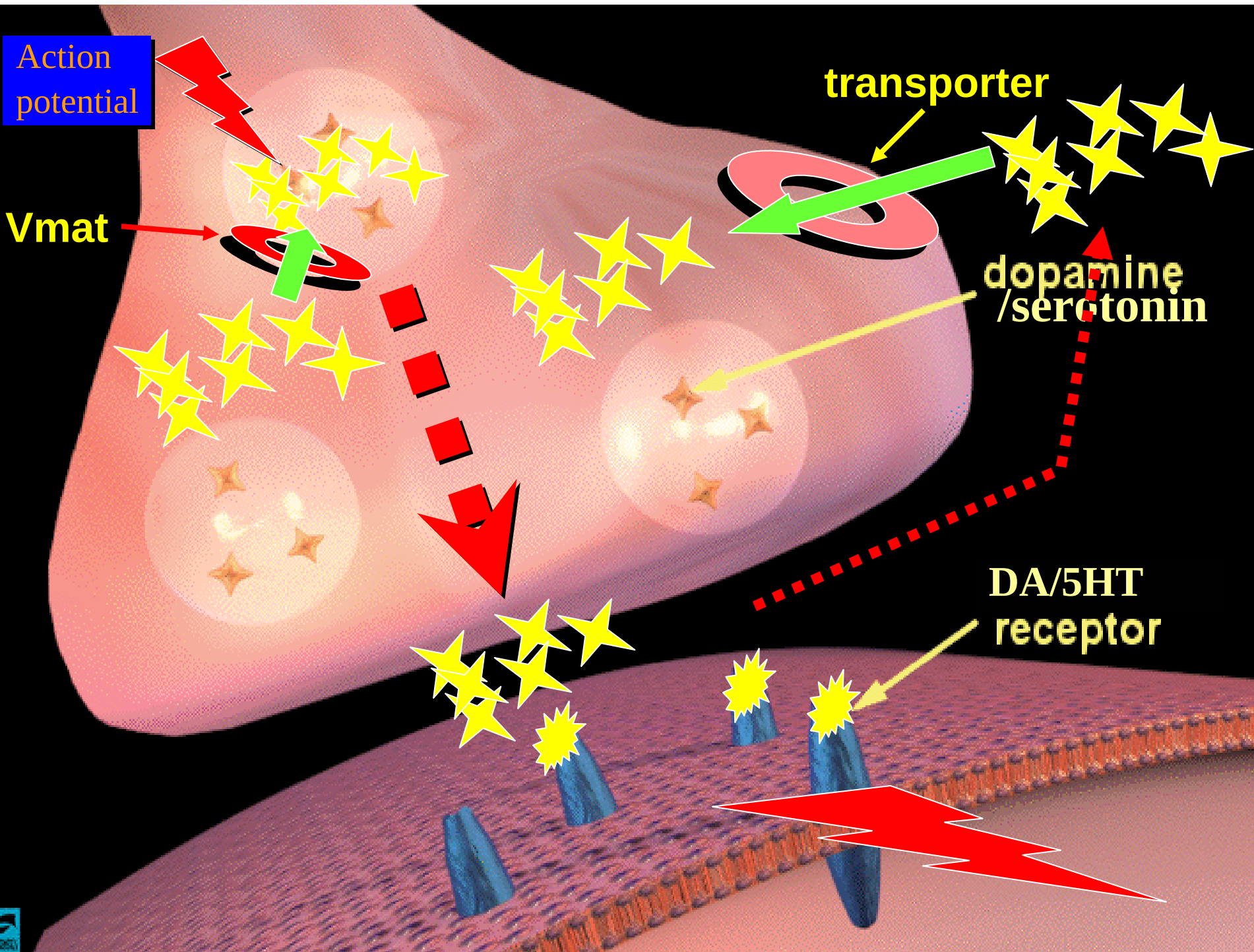
Functions

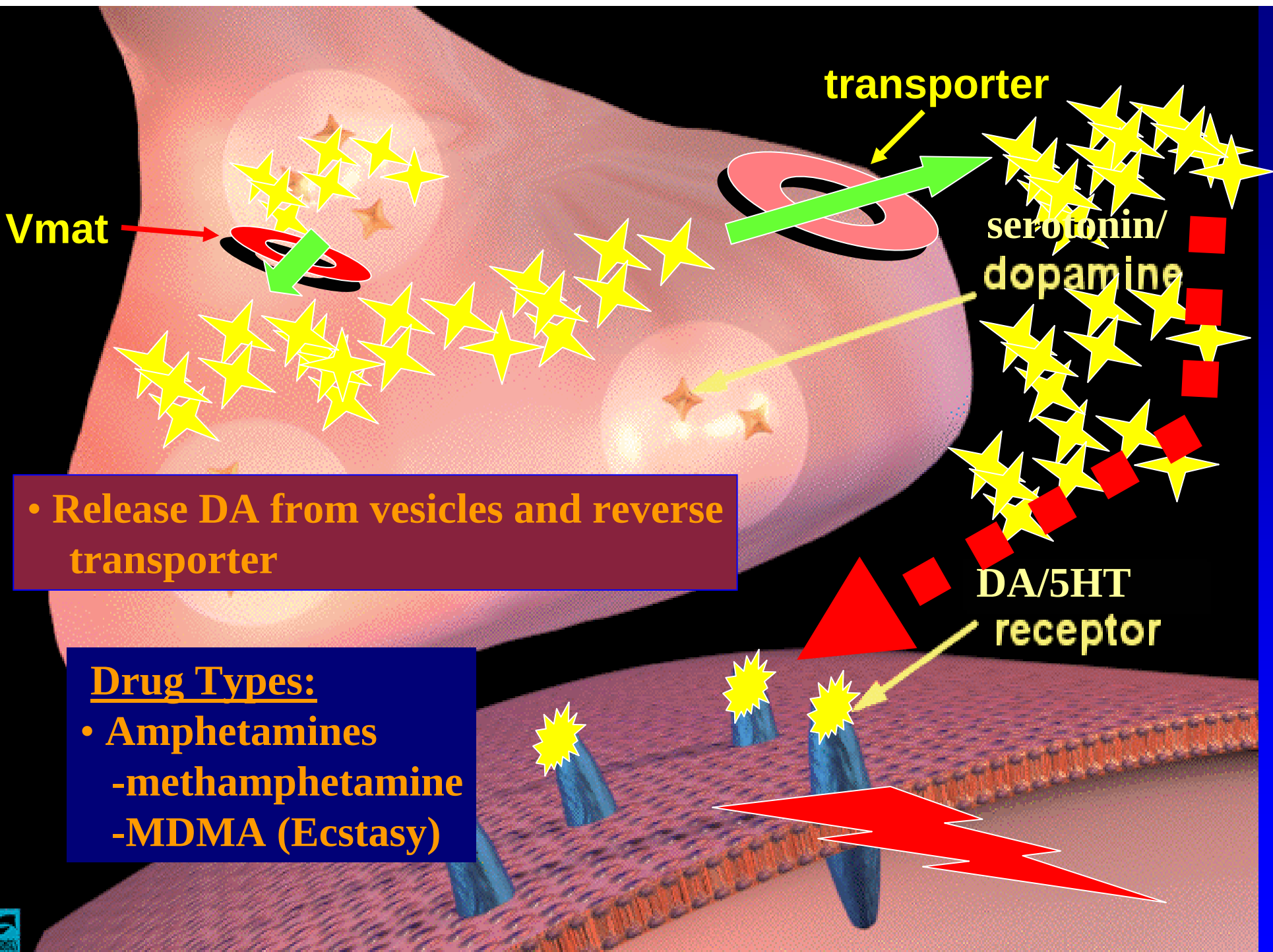
- mood
- memory
processing
- sleep
- cognition





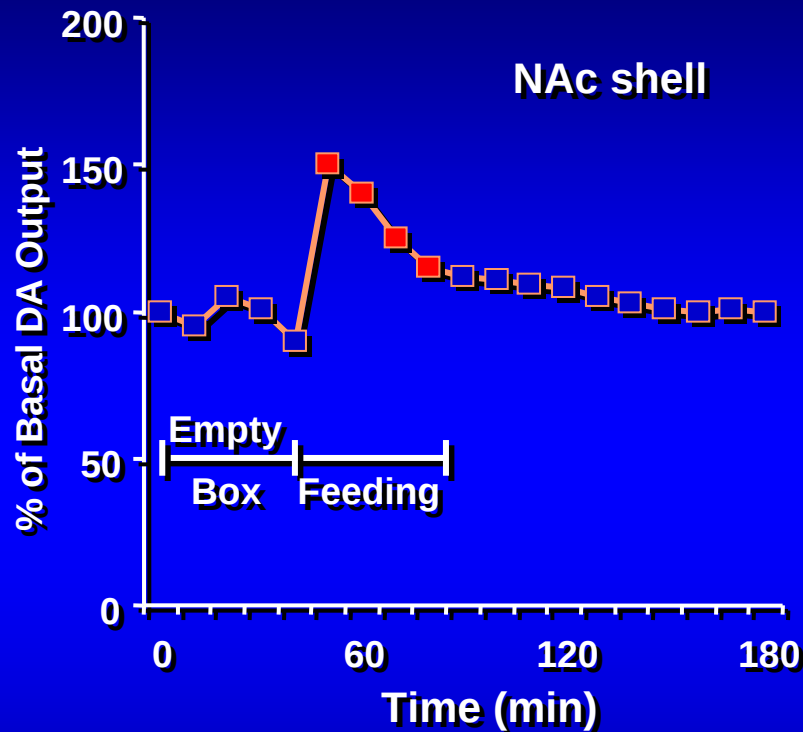






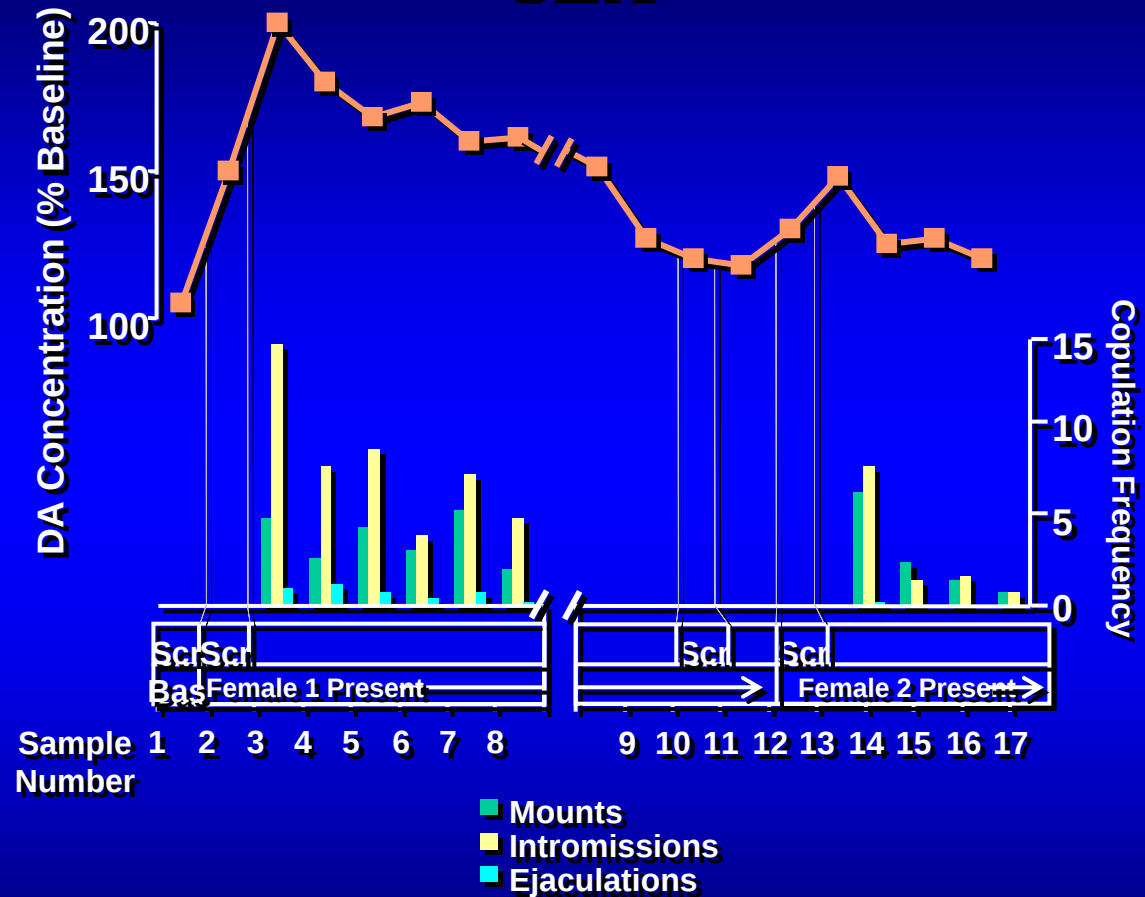
Natural Rewards Elevate Dopamine Levels

FOOD



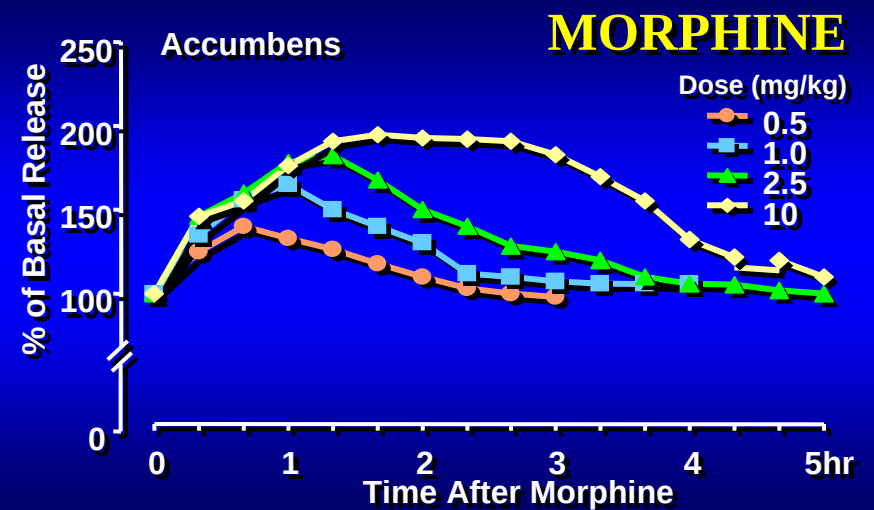
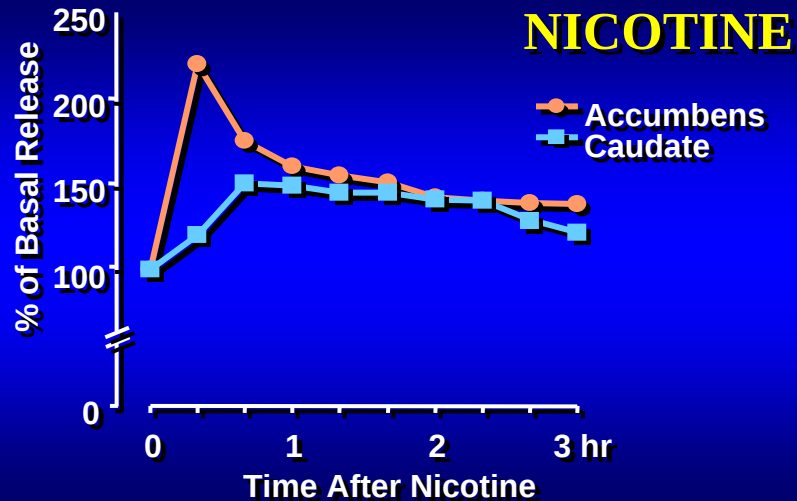
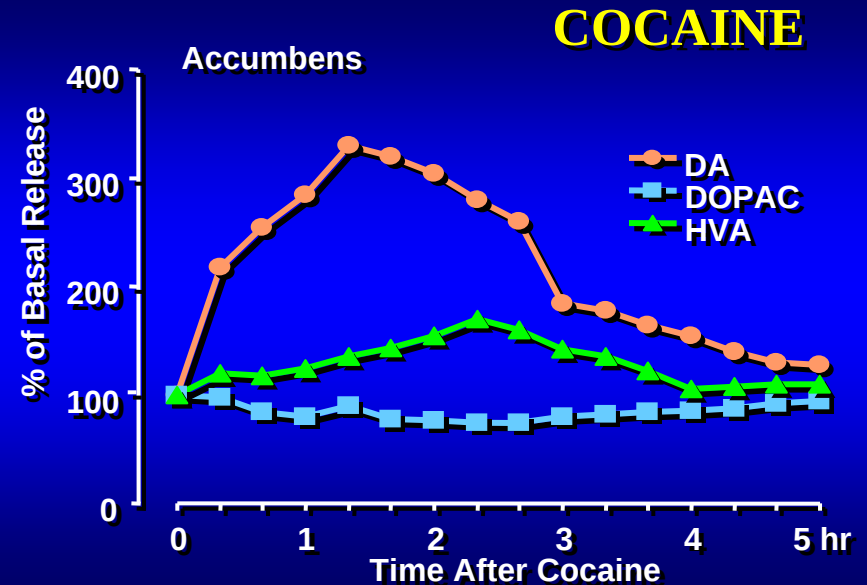
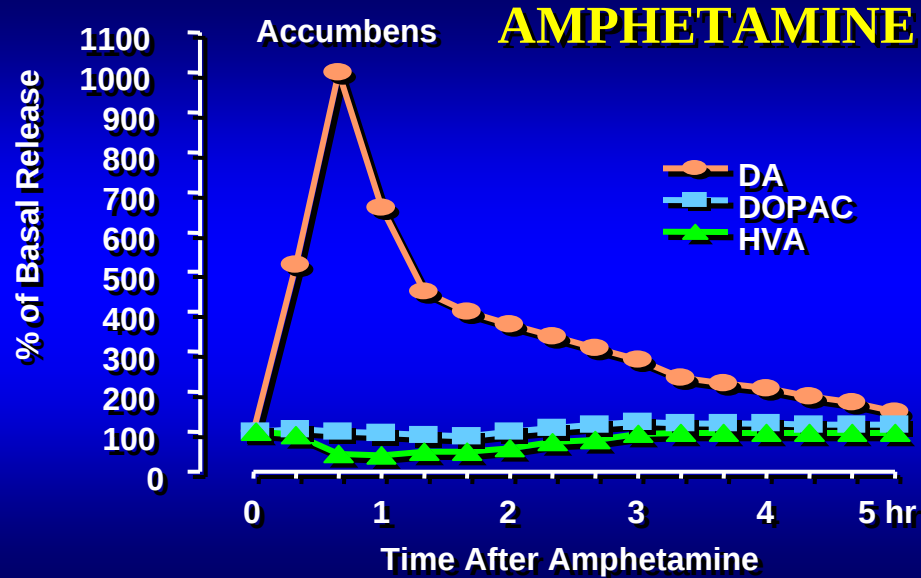
Source: Di Chiara et al.

SEX



Source: Fiorino and Phillips

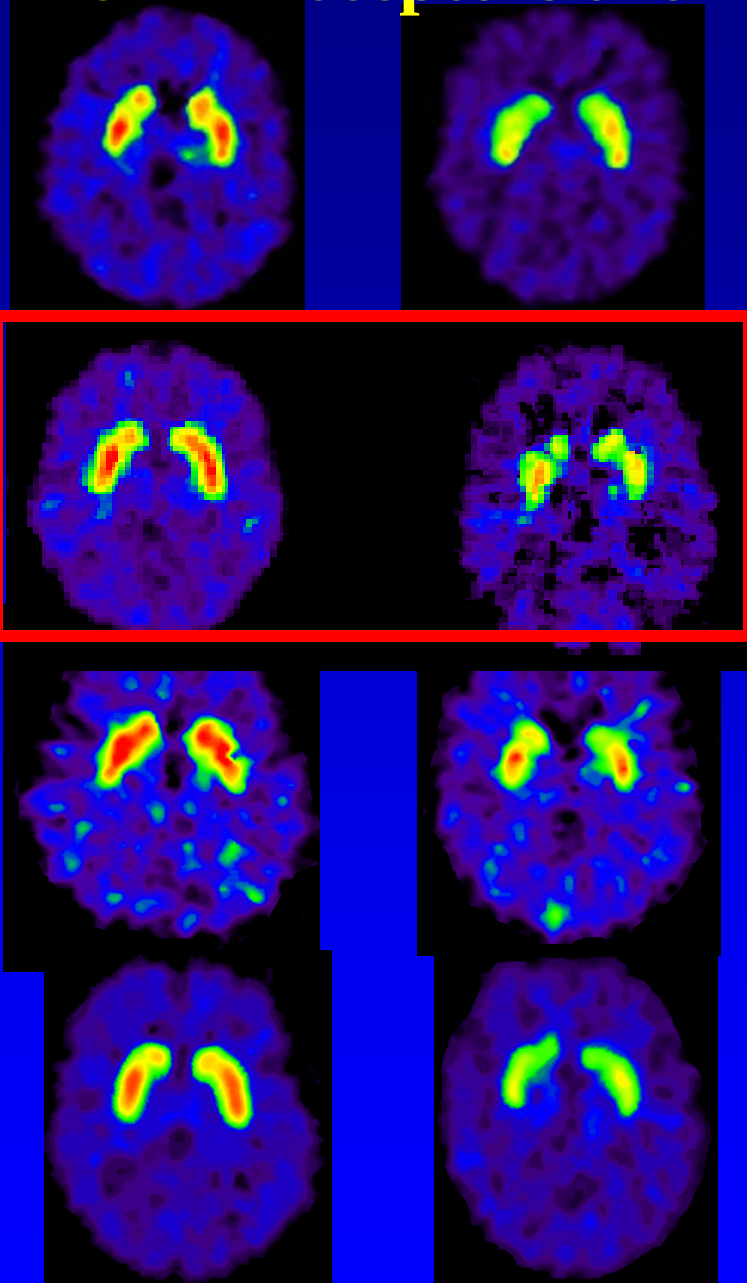
Effects of Drugs on Dopamine Levels



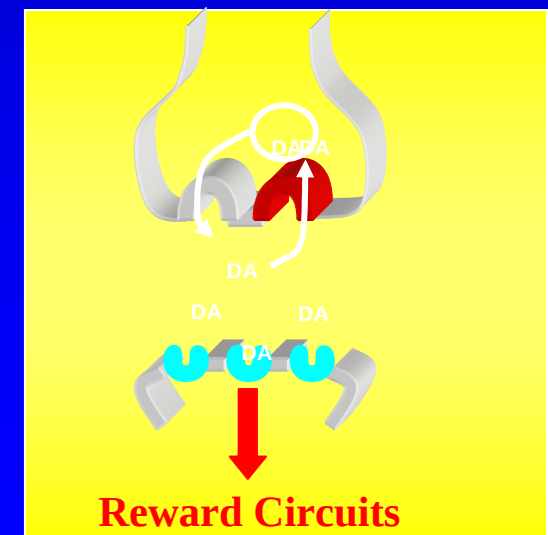
Source: Di Chiara and Imperato

**Chronic methamphetamine
abuse has long lasting effects
on the brain....**

Dopamine D2 Receptors are Lower in Addiction



DA D2 Receptor Availability



Striatal FDOPA Activity

Pre-Amphetamine/Control



Post-Chronic Amphetamine (10 days)

4 weeks



6 months



1 year



2 years



Superior



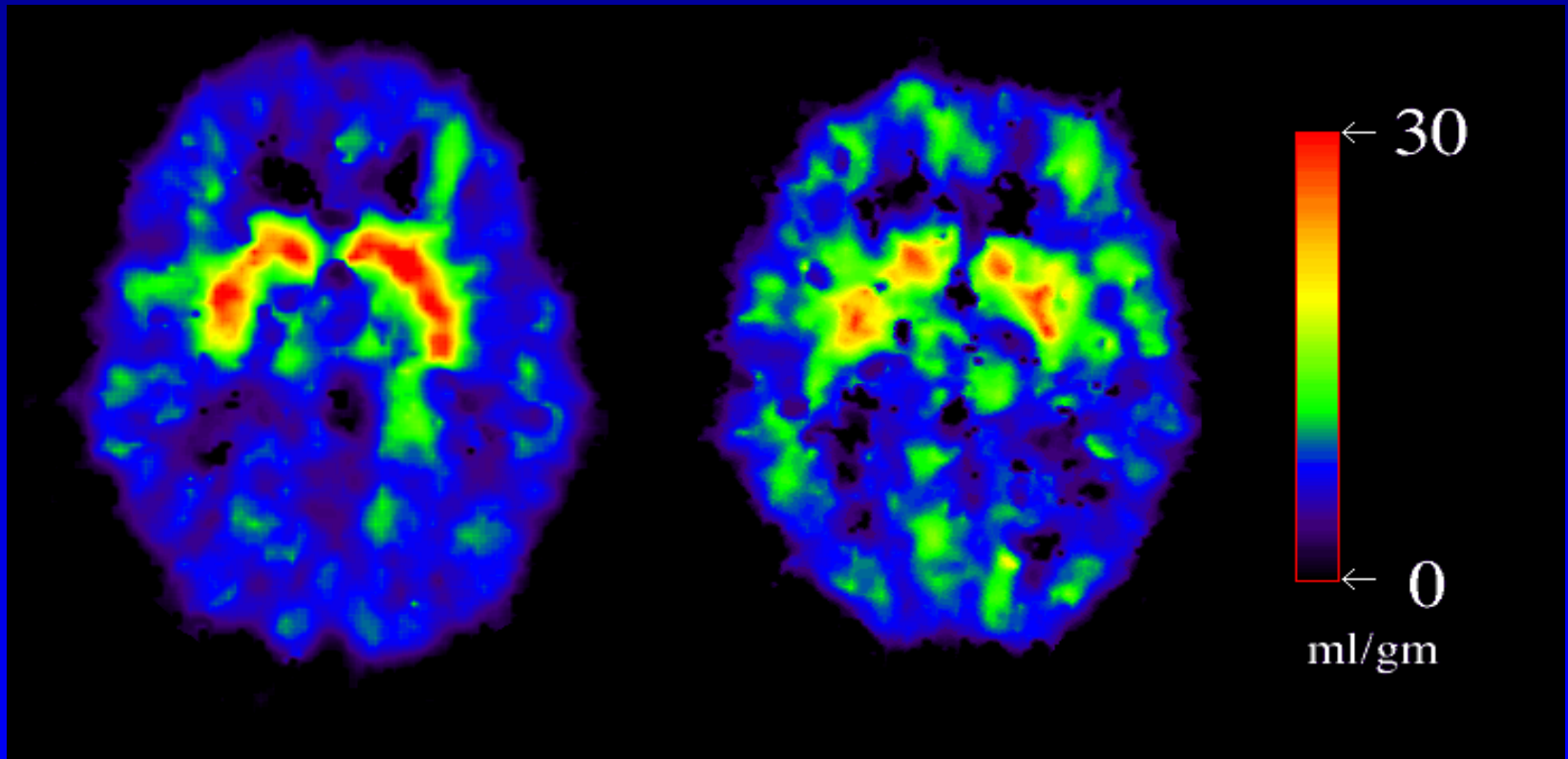
Inferior

METH can be toxic to brain DA cells in laboratory animals.

It is therefore important to determine if METH induces similar changes in DA cells in humans and to assess their functional significance and degree of recovery

METHAMPHETAMINE

Dopamine Transporter Loss After Heavy Methamphetamine Use

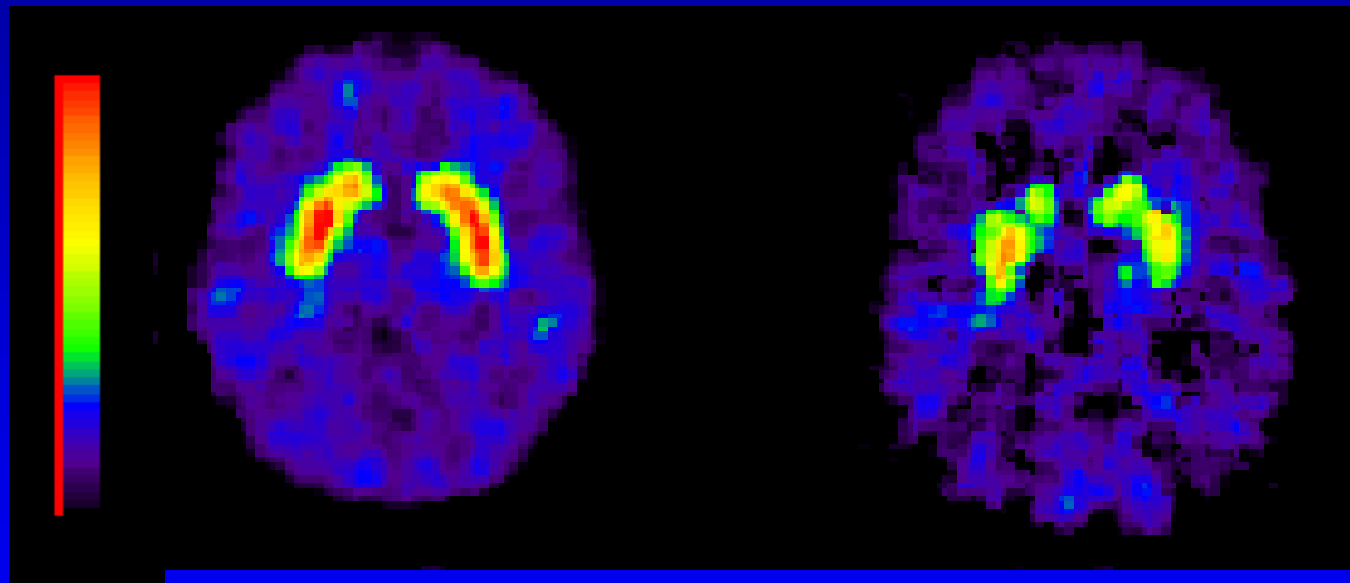


Comparison Subject

METH Abuser

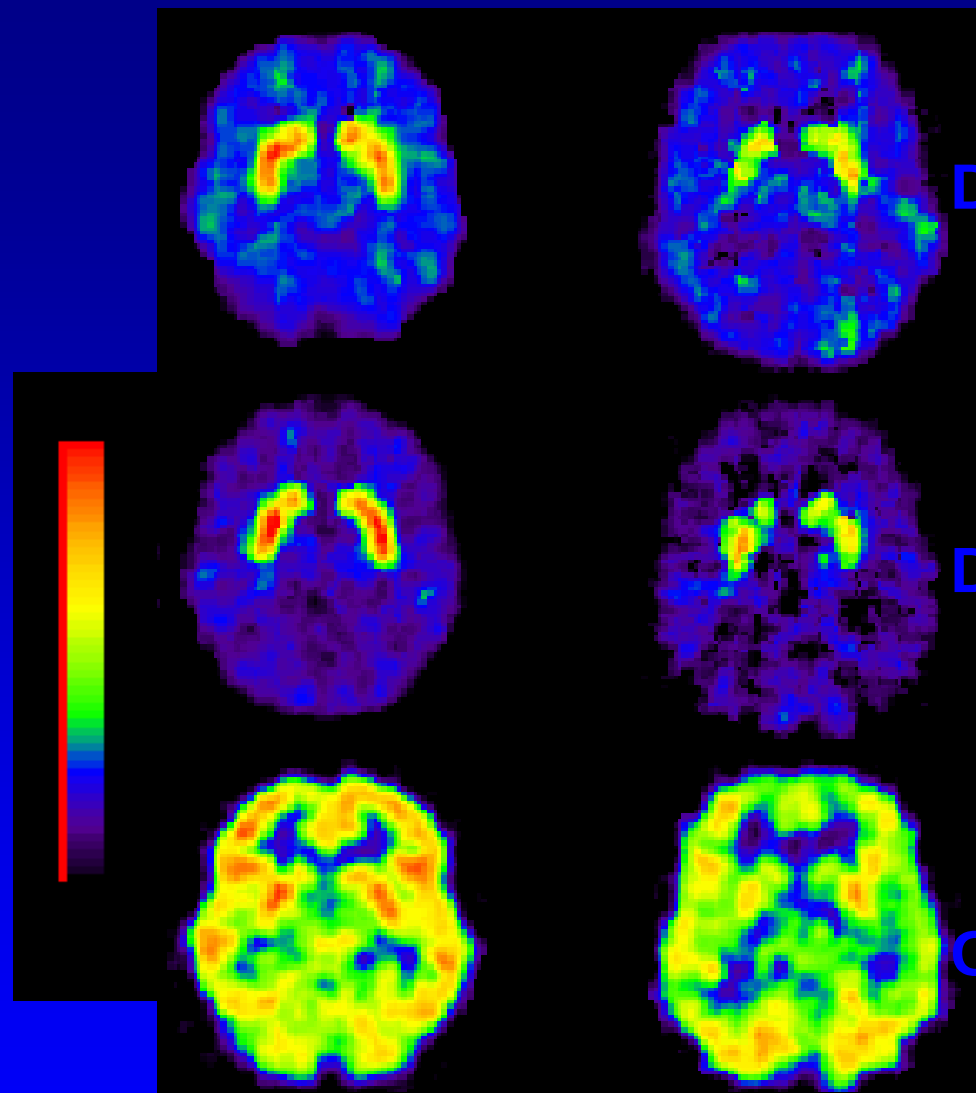
Source: Volkow, N.D. et al., Am J. Psychiatry, 158(3), pp. 377-382, 2001.

Methamphetamine Decreases Dopamine Receptors In the Human Brain



Normal

Methamphetamine

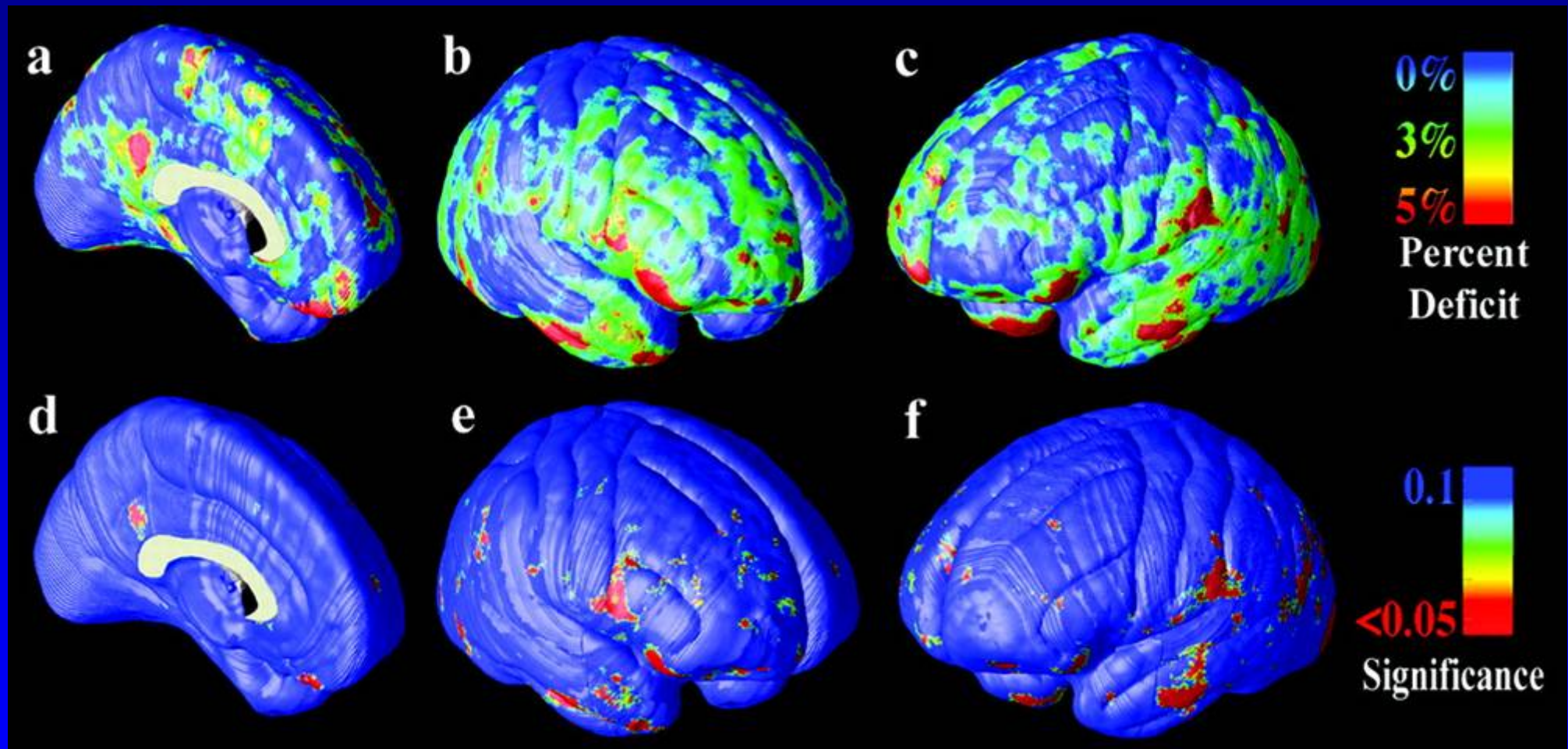


Dopamine Transporters
([¹¹C]d-*threo*-MP)

Dopamine Receptors
([¹¹C]raclopride)

Glucose Metabolism
(2-¹⁸F-FDG)

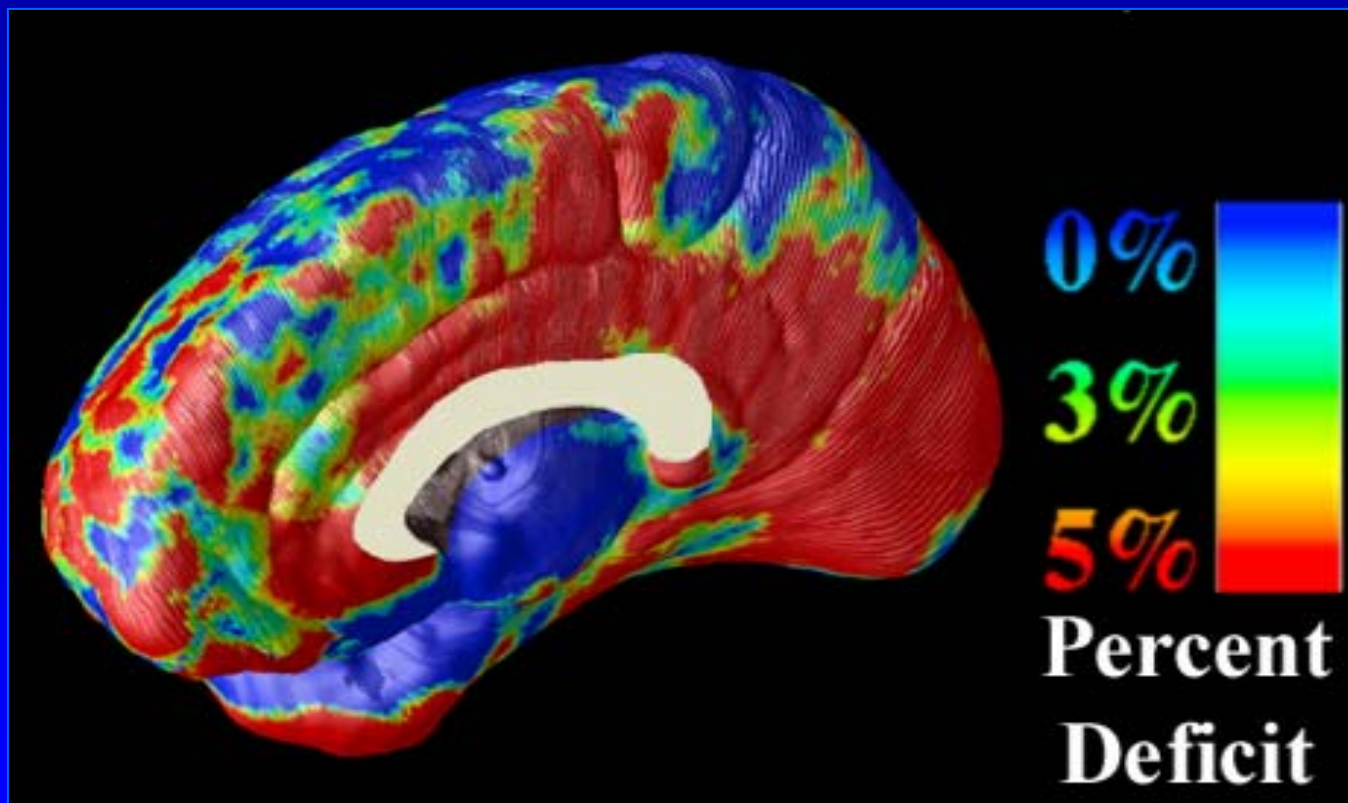
Gray Matter Reductions in Methamphetamine Users



Source: Thompson PM et al., *Journal of Neuroscience*, 24(26), pp. 6028-6036, June 30, 2004.

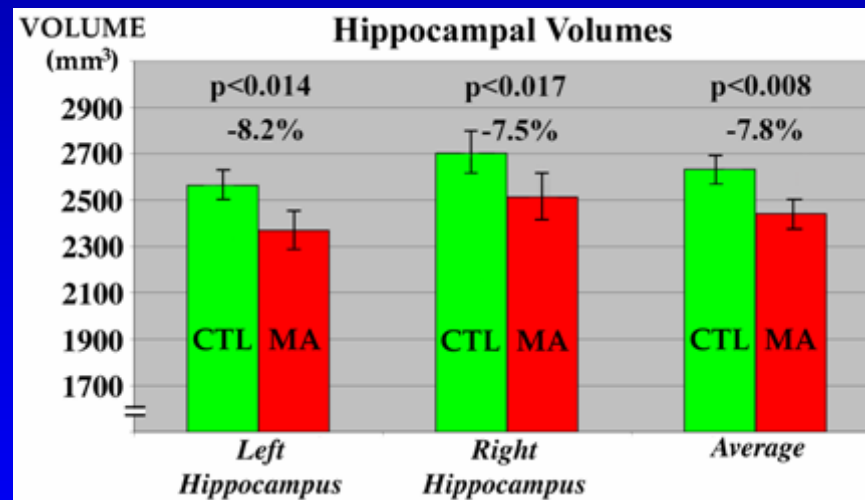
Infralimbic Cortex Even Has Structural Deficits

Methamphetamine users show Gray Matter Loss



Thompson PM et al. (2004): *J. Neurosci.* 24:6028.

Methamphetamine Abusers have Hippocampal Volume Deficits



Thompson PM *et al.* (2004): *J. Neurosci.* 24:6028.

Implication:

Brain changes resulting from prolonged use of psychostimulants, such as methamphetamine may be reflected in compromised emotional, cognitive, and motor functioning

Subjects

~~Detoxification in METH abusers~~ ~~Control~~

	Early (n = 12)	Late* (n = 13)	Si Controls @ (n = 21)
Age range (years)	21 - 47	26 - 38	21 - 43
Age mean (years)	32 ± 8	33 ± 5	32 ± 8
Gender	7 F, 5 M	9 F, 4 M	6 F, 15 M
Years of METH use (range)	2 - 20	2 - 20	0
Years of METH use (mean)	11 ± 7	12 ± 6	0
Amount of METH use (g/day)	3 ± 5	3 ± 4	0
Last day of METH use (range in months)	0.5 - 6	6 - 36	0
Last day of METH use (mean in months)	2.1 ± 1.4	14 ± 7	0

Subjects

METH Abusers:

Inclusion Criteria:

DSM IV criteria for METH-dependence

METH use of at least: 0.5 g/day, 5 days a week and 2 years
2 weeks or more of abstinence

Exclusion criteria:

seropositive for HIV,
co-morbid psychiatric illness and/or neurological disease,
drug-dependence other than METH and nicotine.

Controls:

Inclusion criteria:

Methods

Scanner : CTI 931 (15 slices, 6x6x6.5 mm FWHM).

Tracers: DAT: 4-8 mCi of [^{11}C] *d*-threo-methylphenidate

Dynamic scans obtained for a total of 84 min.

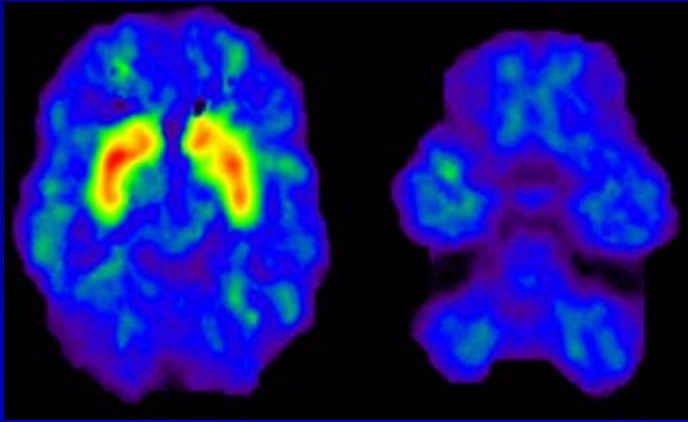
Metabolism: 4-8 mCi of FDG.

Twenty min emission scan started 35 after injection

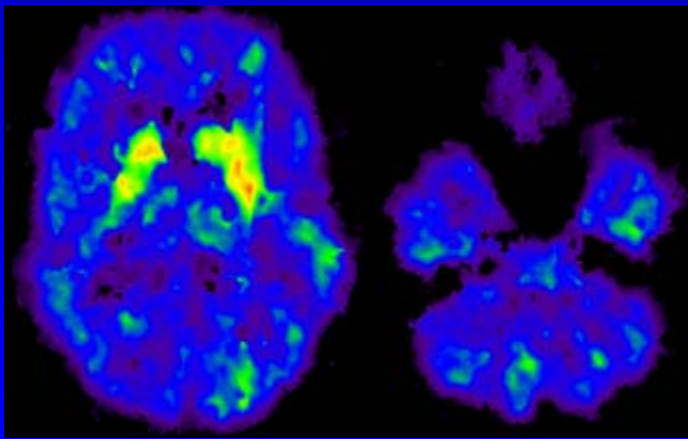
Model: DAT: The ratio of DV in striatum to that of DV in CB corresponds to $(B_{\text{max}}/K_d) + 1$ and was used as model parameter of DAT availability.

Metabolism: Sokoloff model

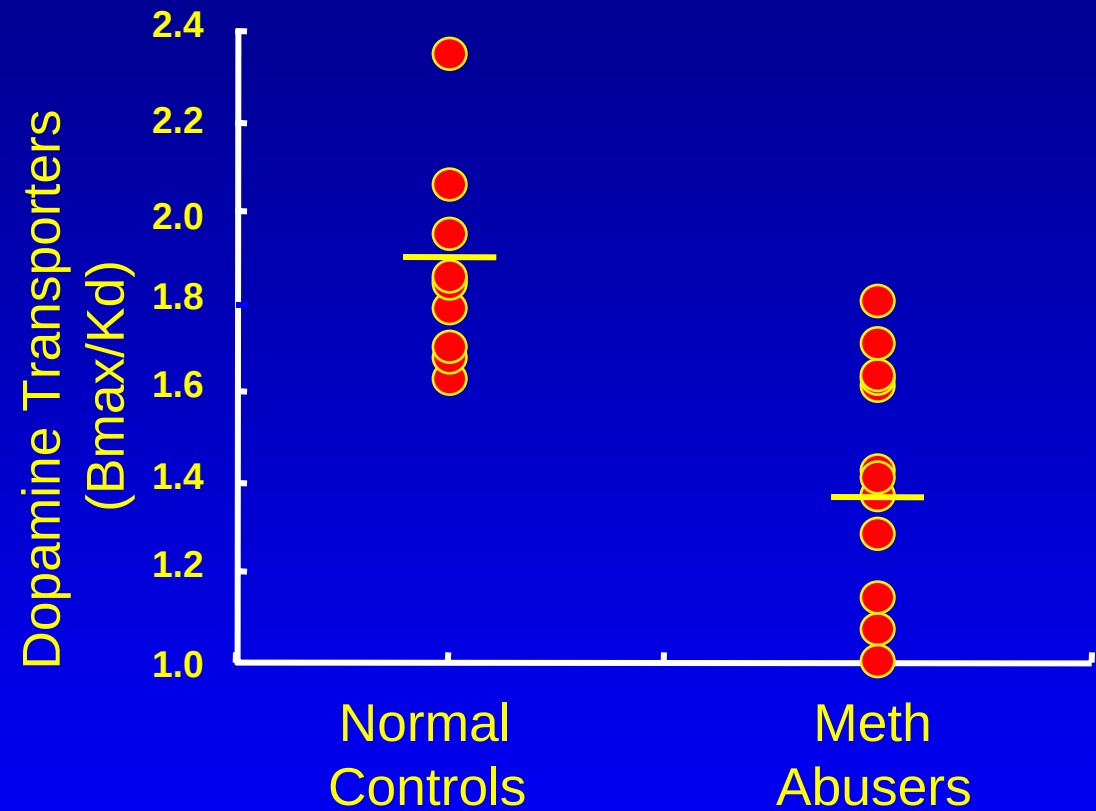
Dopamine Transporters in Methamphetamine Abusers



Normal Control



Methamphetamine Abuser

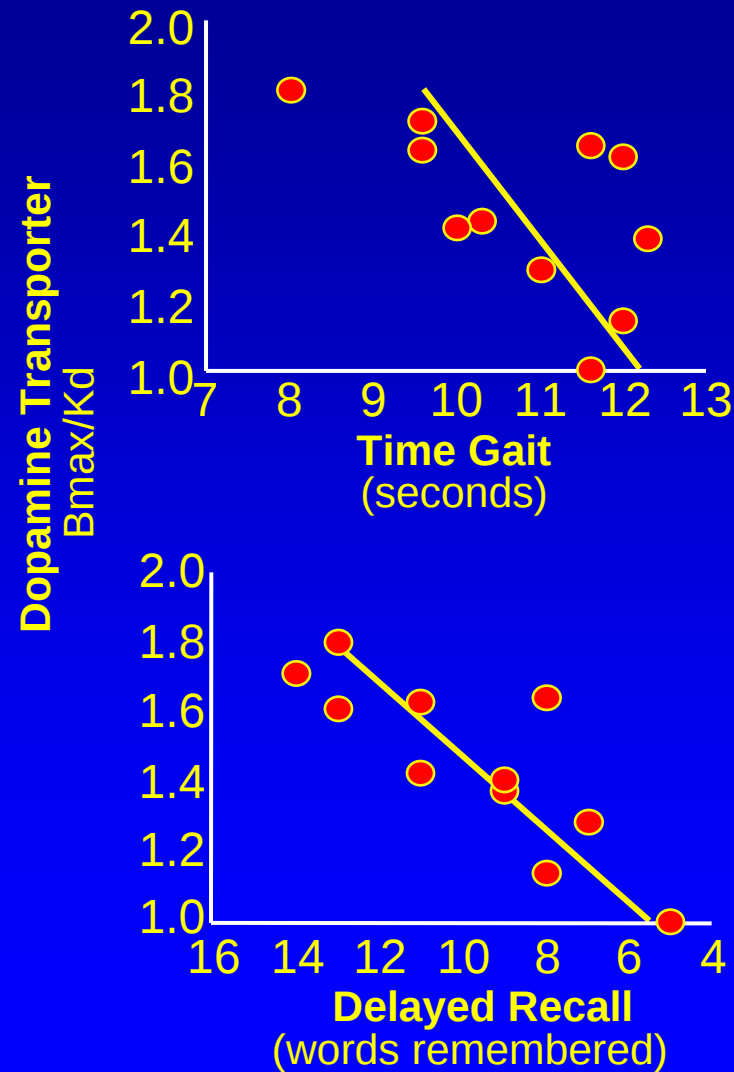


$p < 0.0002$



Methamphetamine abusers have significant reductions in dopamine transporters.

Dopamine Transporters in Methamphetamine Abusers



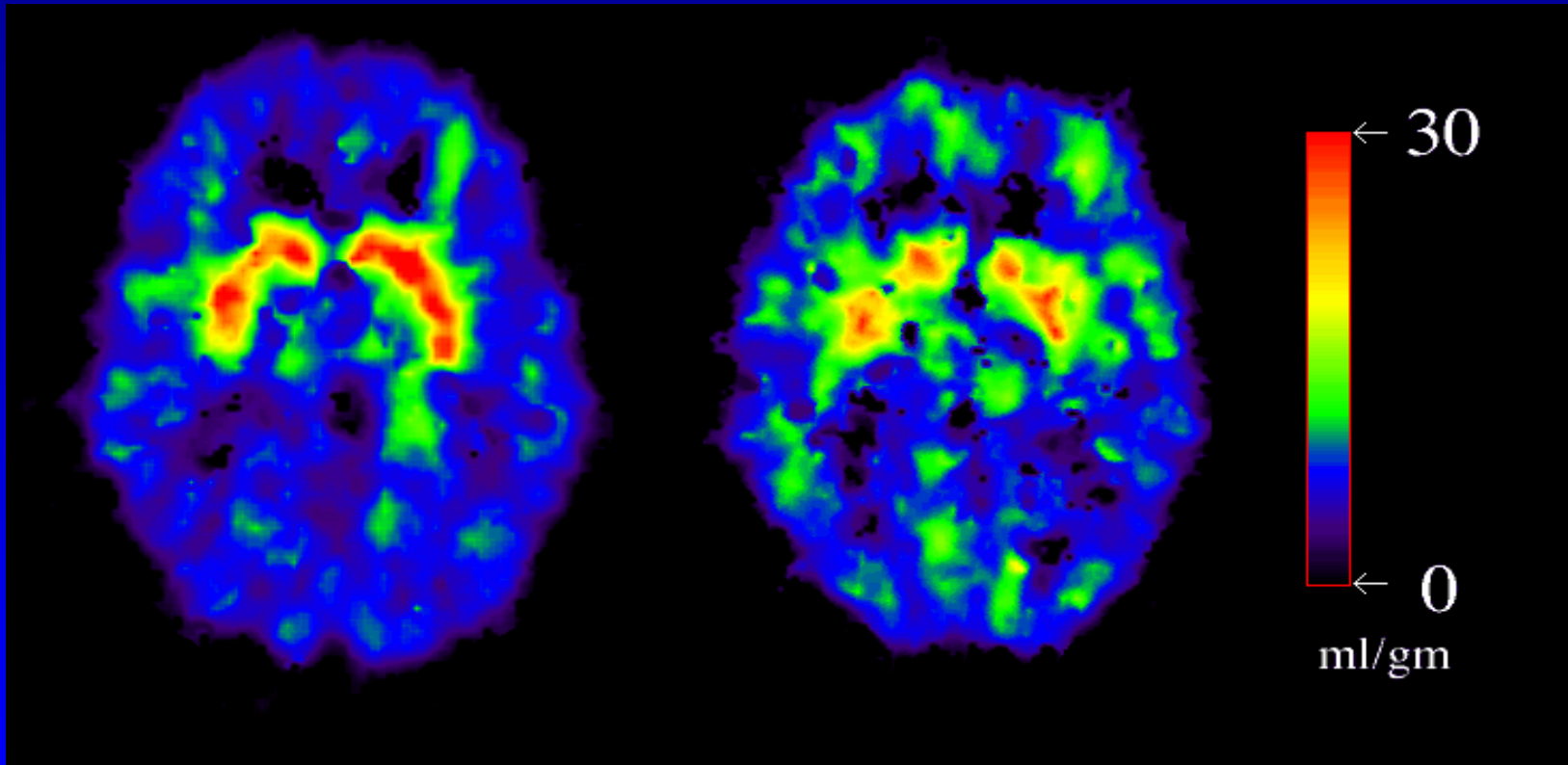
Motor Task

Loss of dopamine transporters in the meth abusers may result in slowing of motor reactions.

Memory Task

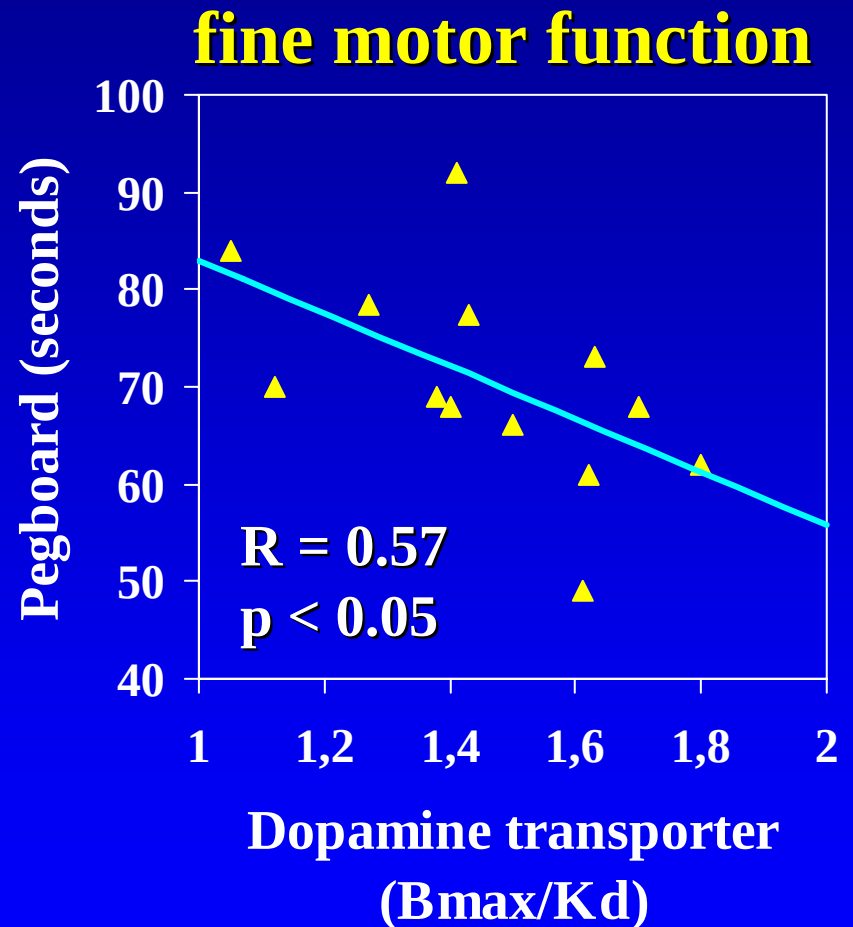
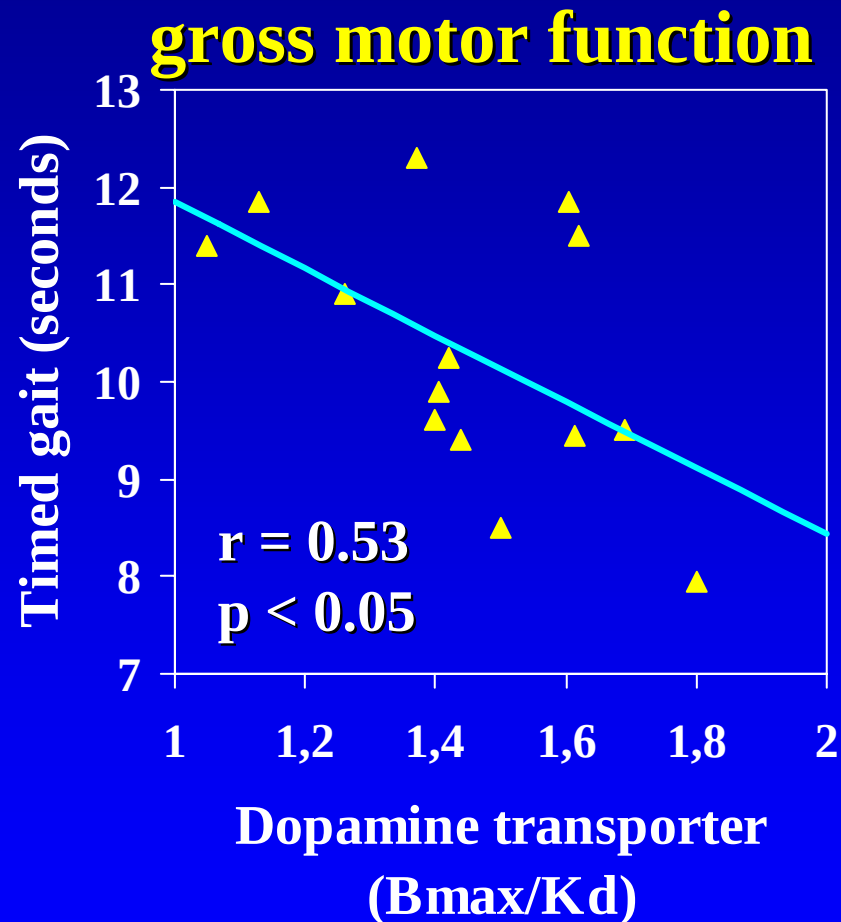
Loss of dopamine transporters in the meth abusers may result in memory impairment.

Dopamine Transporter Loss After Heavy Methamphetamine Use



Source: Volkow, N.D. et al., *Am J. Psychiatry*, 158(3), pp. 377-382, 2001.

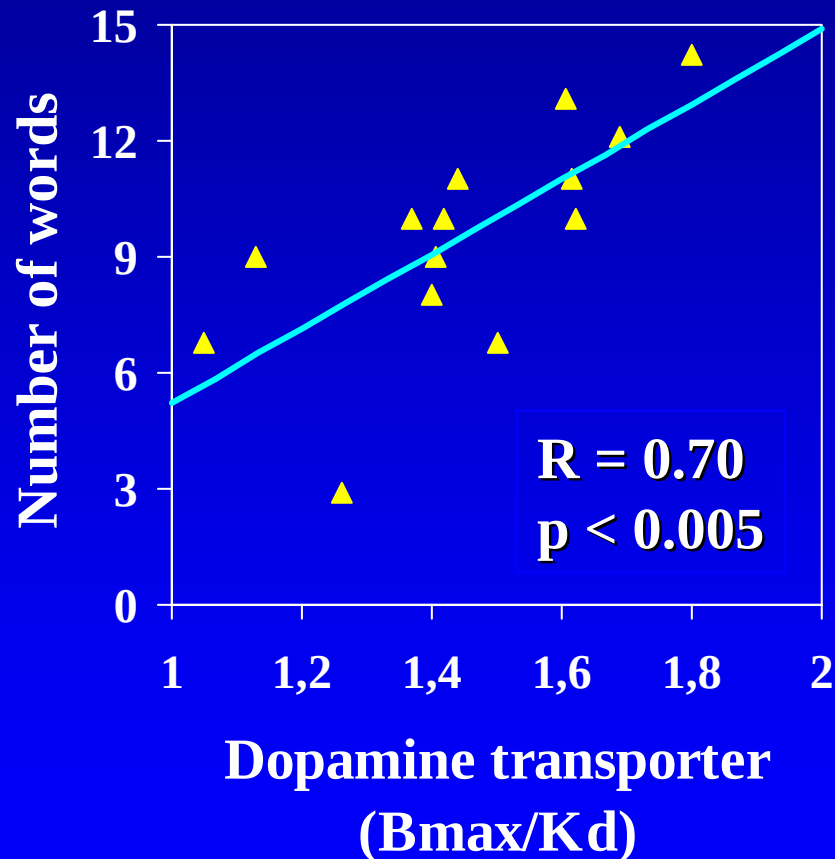
Dependence of Motor Speed on Striatal DAT



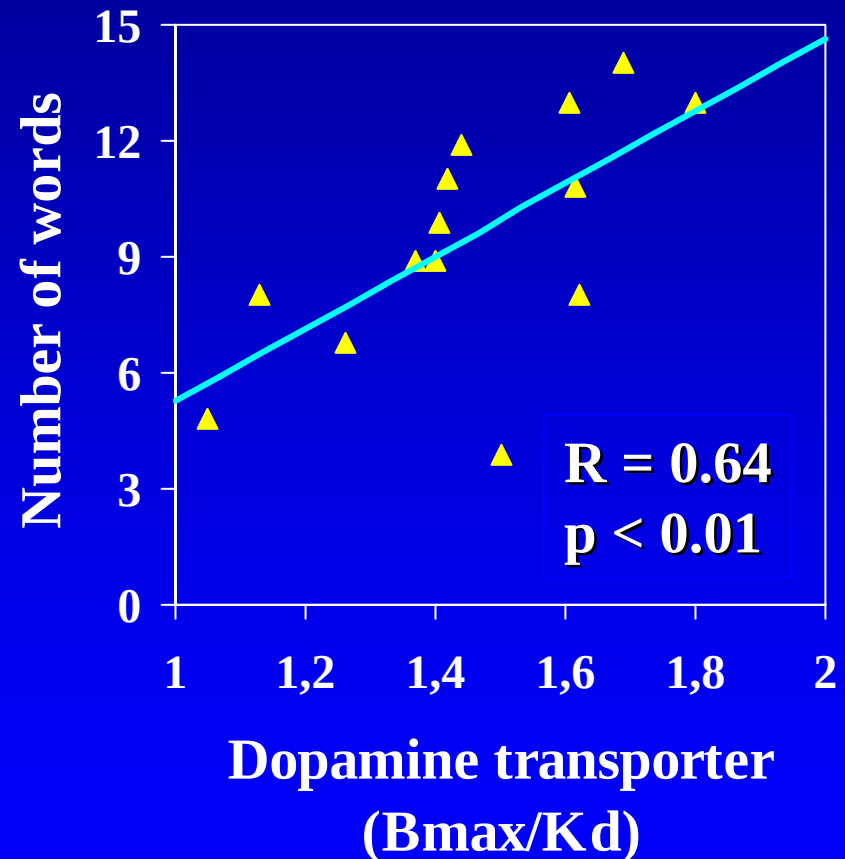
Volkow et al, AJP (in press)

Dependence of Verbal Memory on Striatal DAT

Interference recall



Delayed recall



Volkow et al, AJP (in press)

Summary

- Significant DAT loss in METH abusers tested at early detoxification that is larger in caudate than putamen.
- Decreases in DAT are associated with motor slowing and impaired memory
- DAT losses recover significantly with protracted abstinence but do not return to baseline

Conclusion

- DAT recovery with detoxification could reflect

 - Recovery of damaged terminals

 - Compensation by viable terminals

 - or**

 - Decreases in expression of the DAT

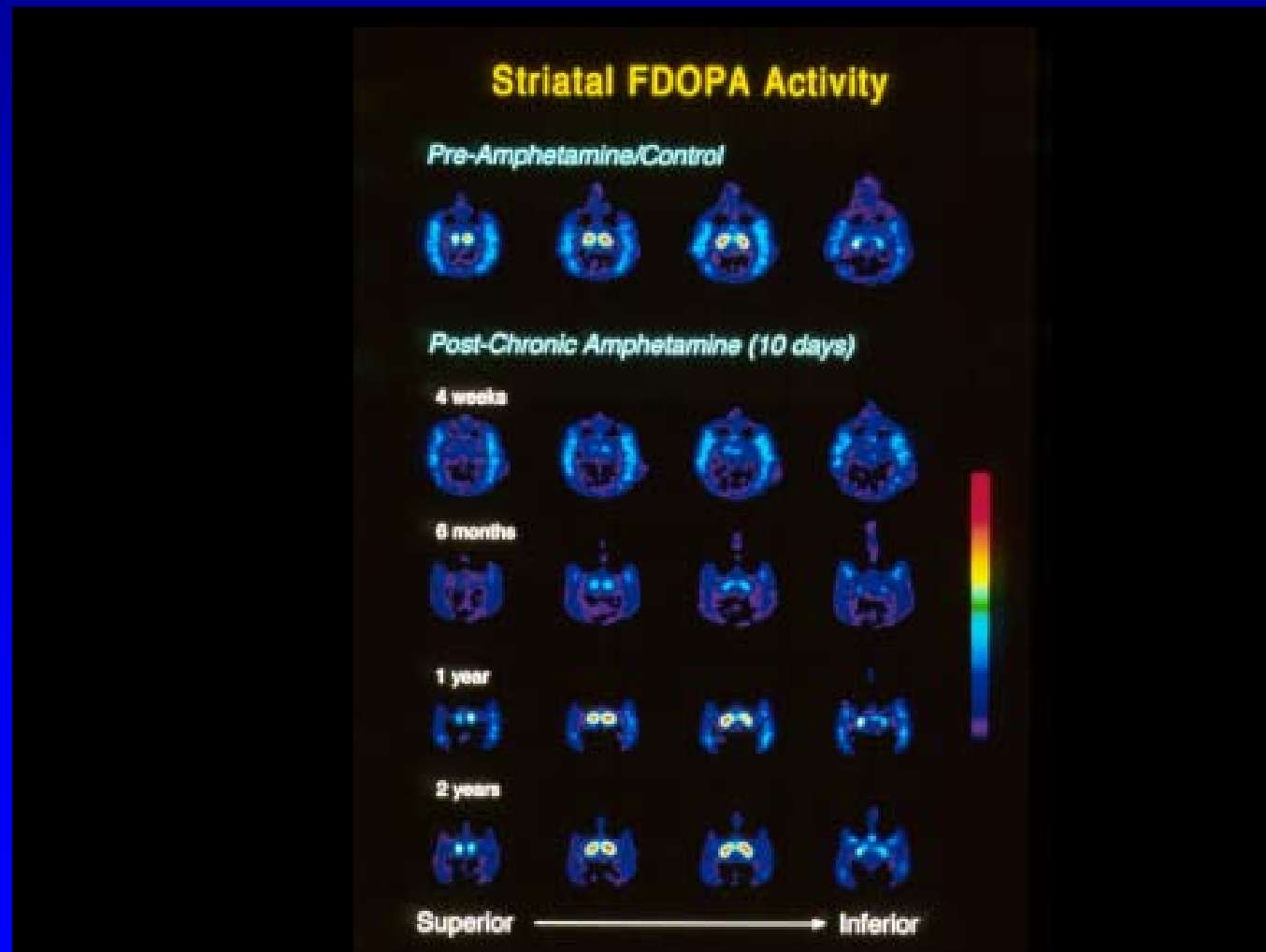
 - Decreases DAT trafficking and internalization

- *DAT recovery while beneficial was insufficient for complete recovery of NP function suggesting that other systems are involved in the NP abnormalities*

Recovery?

What do we know?

Chronic Amphetamine Causes Lasting Changes

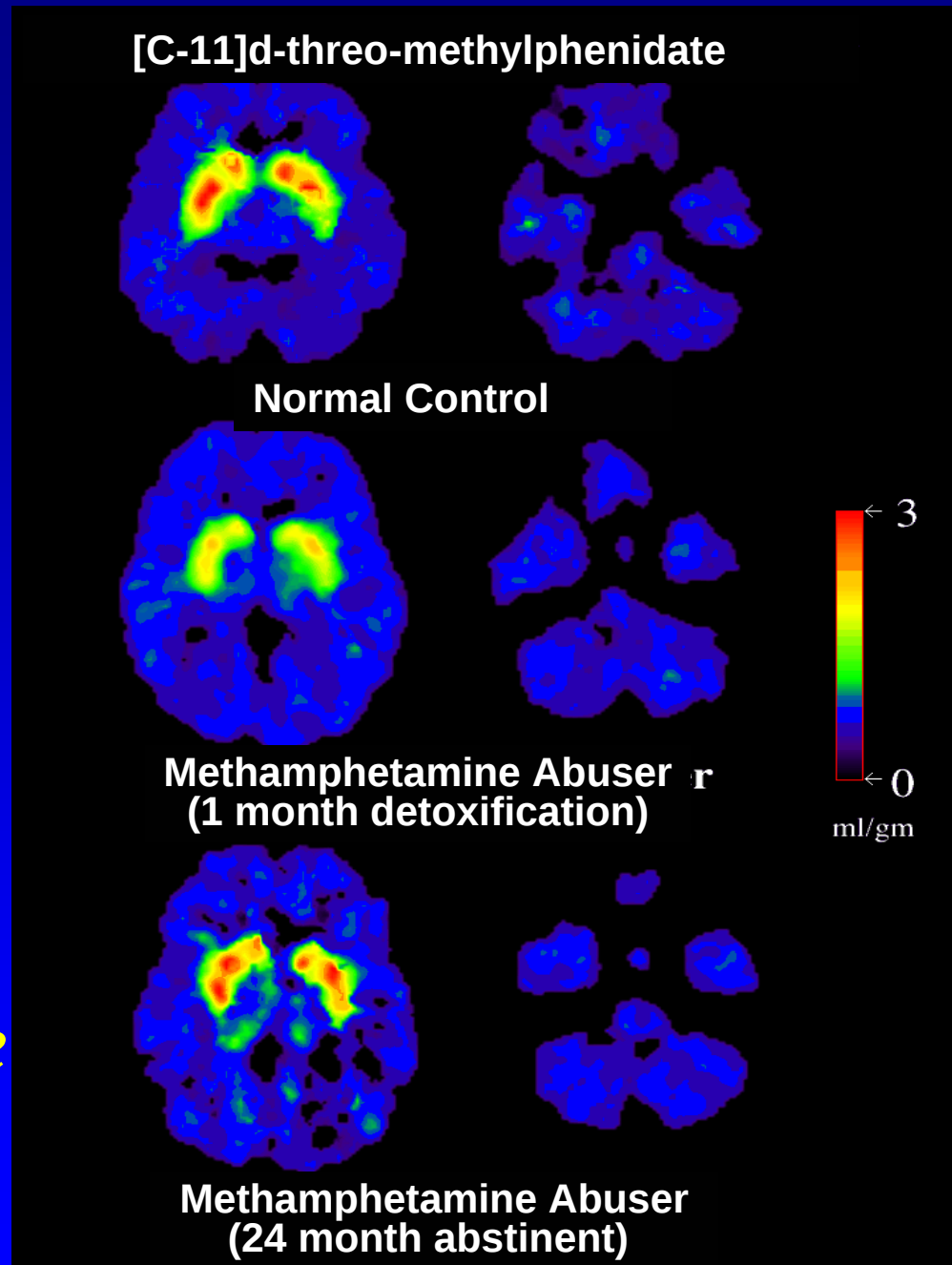


***We Have Generated A Lot of
Evidence Showing That...***

**Prolonged Use of Methamphetamine
Can Change the Brain In Fundamental
and Long-Lasting Ways**

Is there recovery?

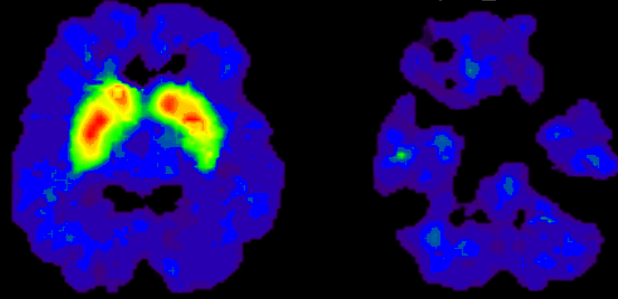
***DAT Recovery
with prolonged
abstinence from
methamphetamine***



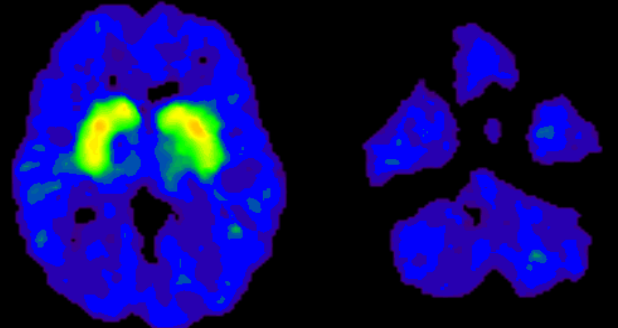
Source: Volkow, N.D. et al., *Journal of Neuroscience*, 21(23), pp. 9414-9418, December 1, 2001.

Effects of Detoxification on DAT

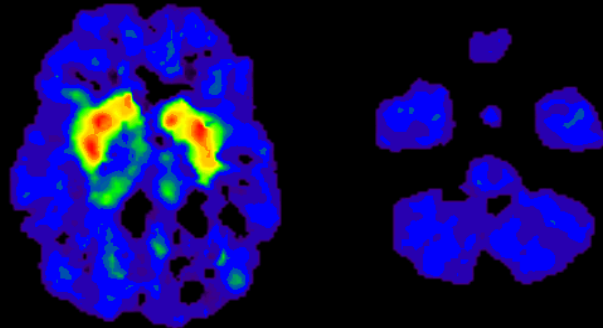
[C-11]d-threo-methylphenidate



Normal Control



Methamphetamine Abuser
(1 month detoxification)

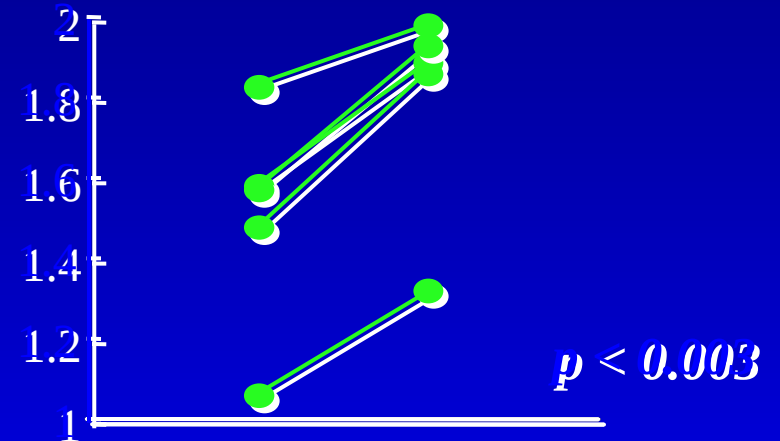


Methamphetamine Abuser
(24 months detoxification)

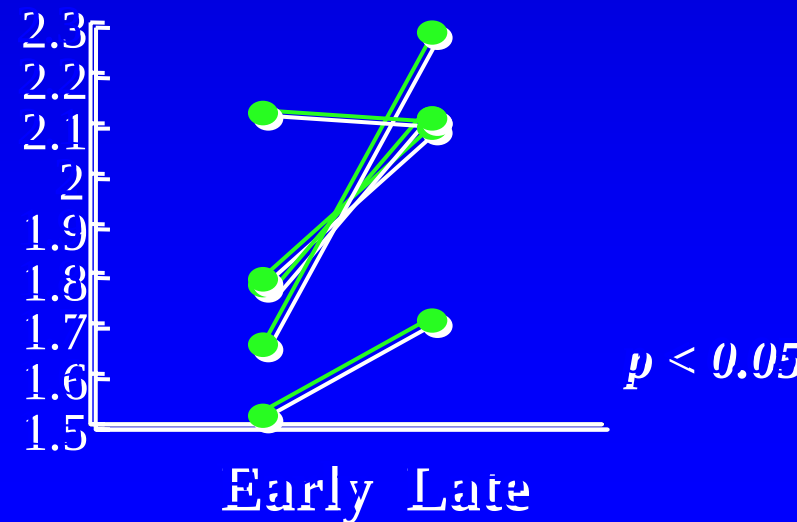
3
0
ml/gm

DA Transporters
(Bmax/Kd)

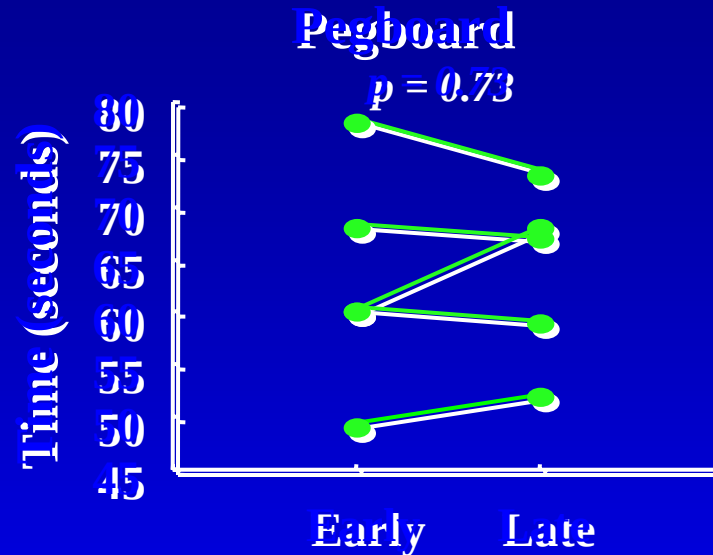
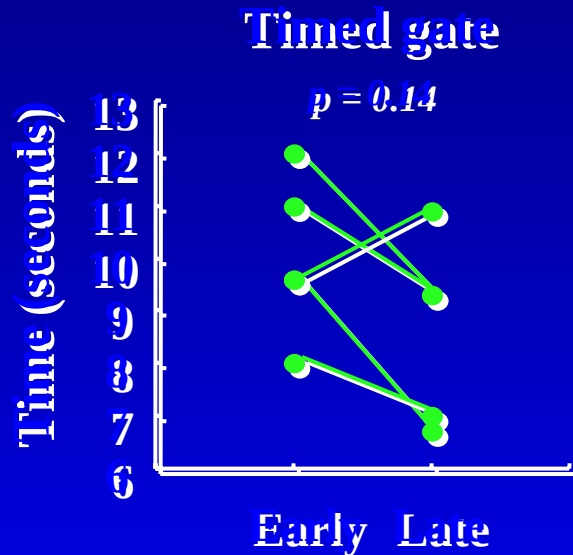
Caudate



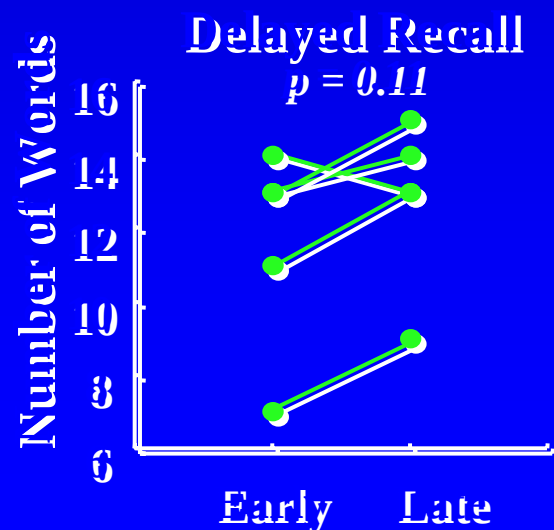
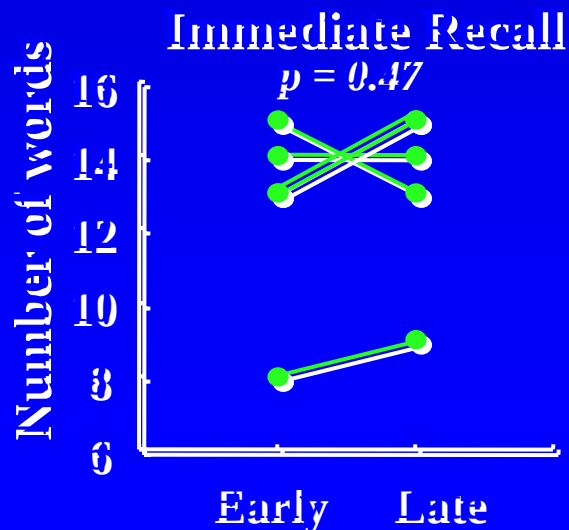
Putamen



Neuropsychological Function in METH Abusers During Early and Late Detoxification

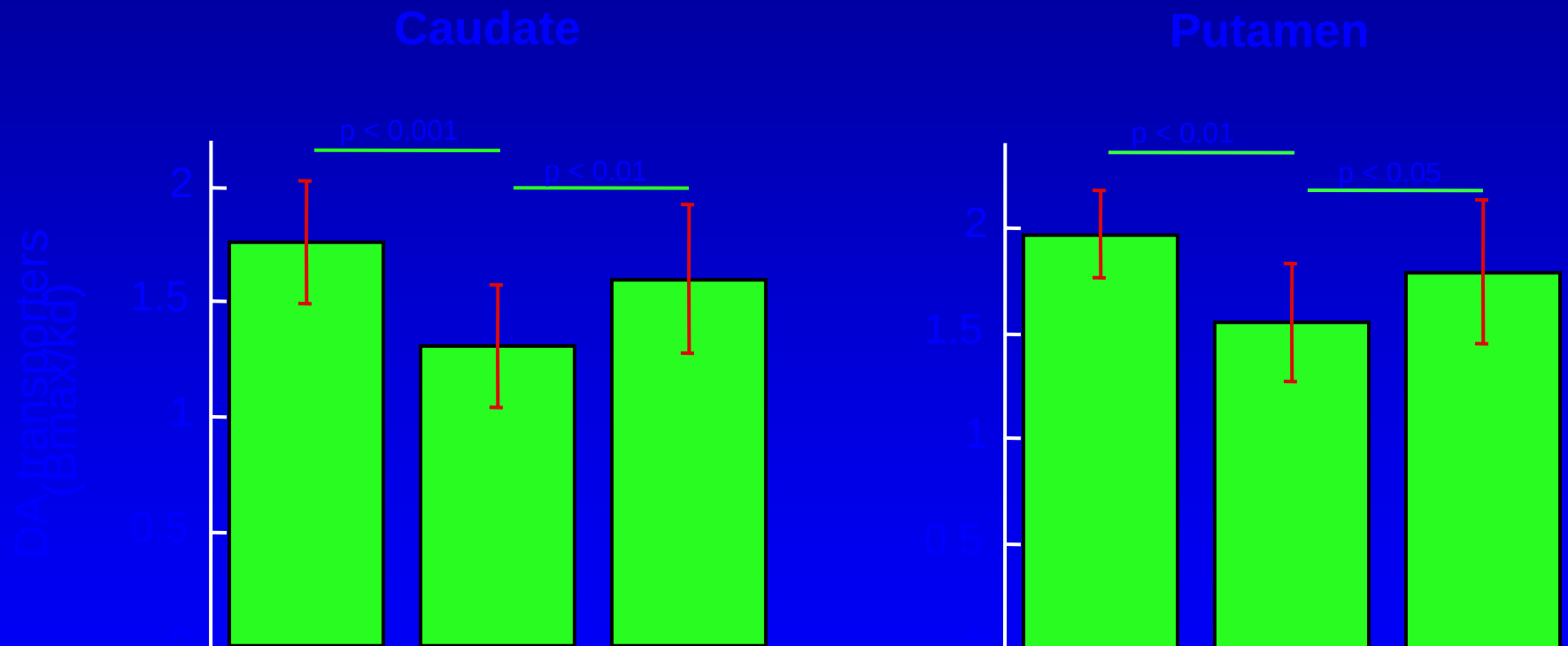


Motor

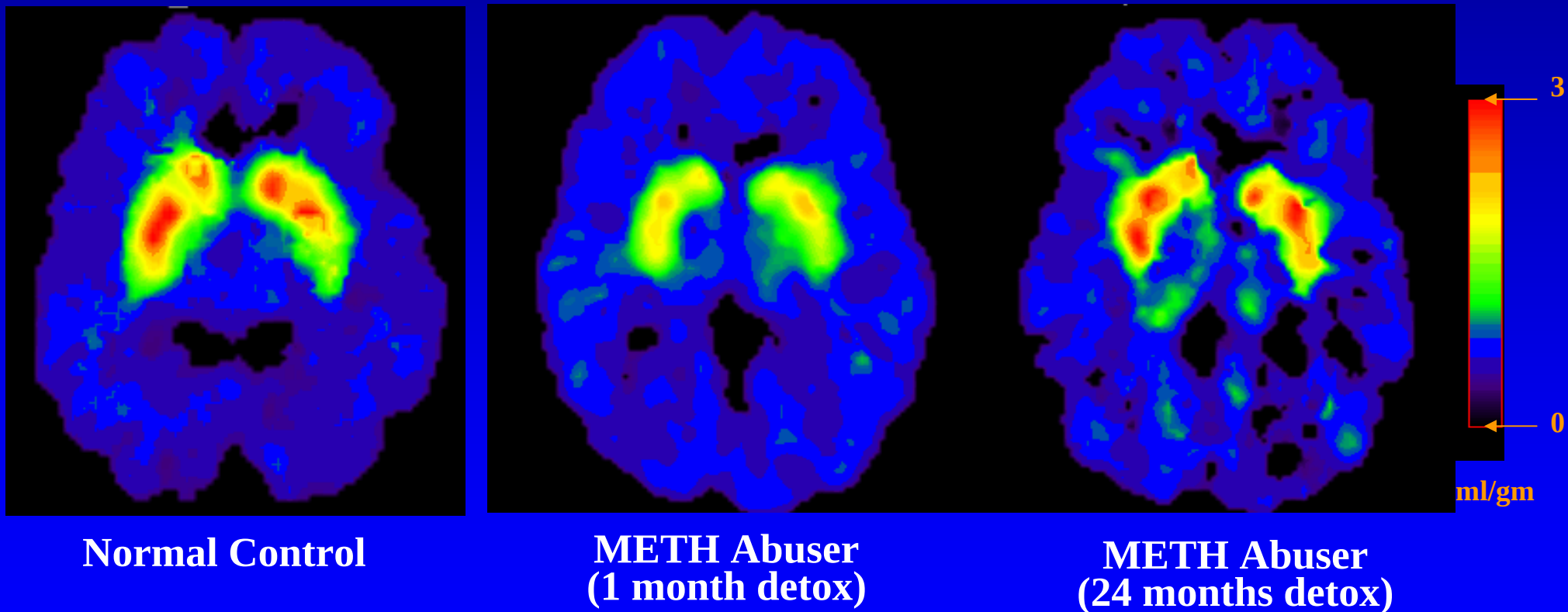


Memory

DAT in Methamphetamine Abusers Tested During Early or During Late Detoxification

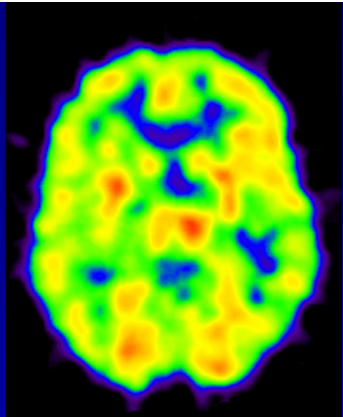


Partial Recovery of Brain Dopamine Transporters in Methamphetamine (METH) Abuser After Protracted Abstinence

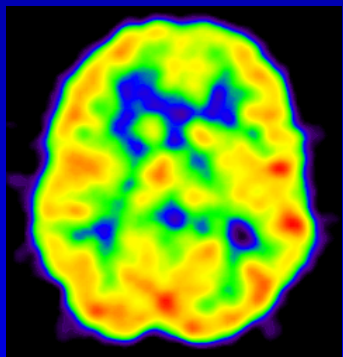


Source: Volkow, ND et al., *Journal of Neuroscience* 21, 9414-9418, 2001.

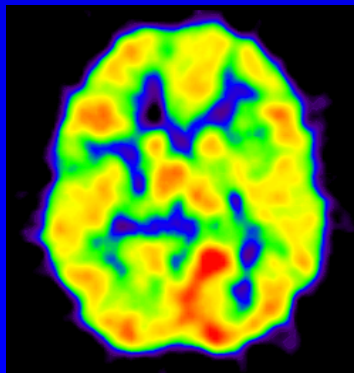
Brain Metabolism in METH Abusers with Abstinence



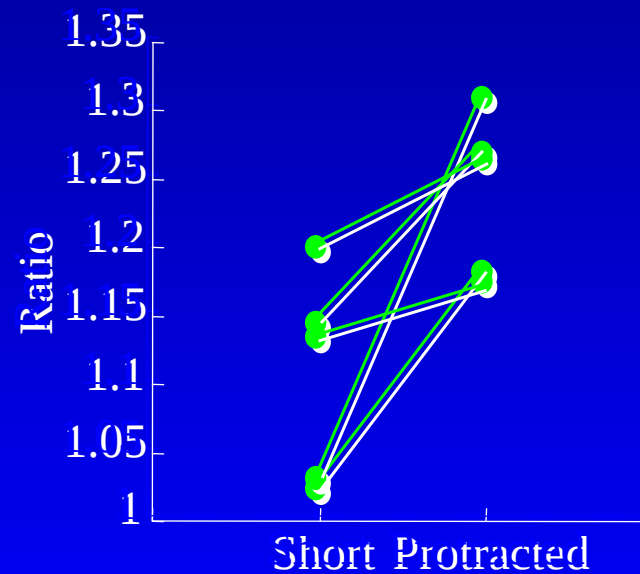
Control



METH Abuser (3 in Detox)

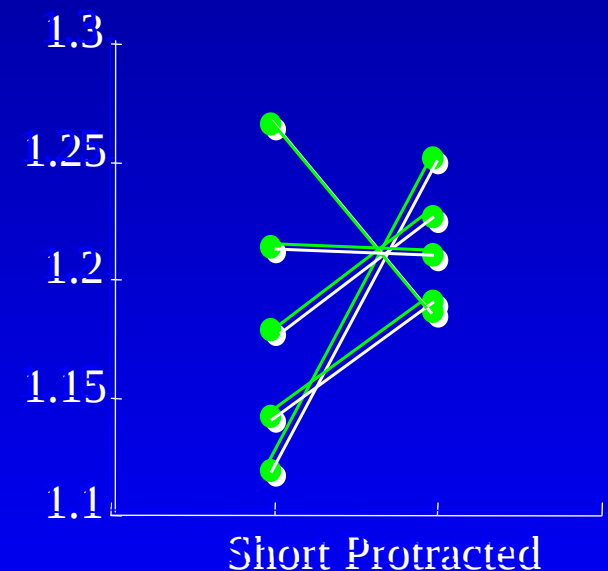


Thalamus



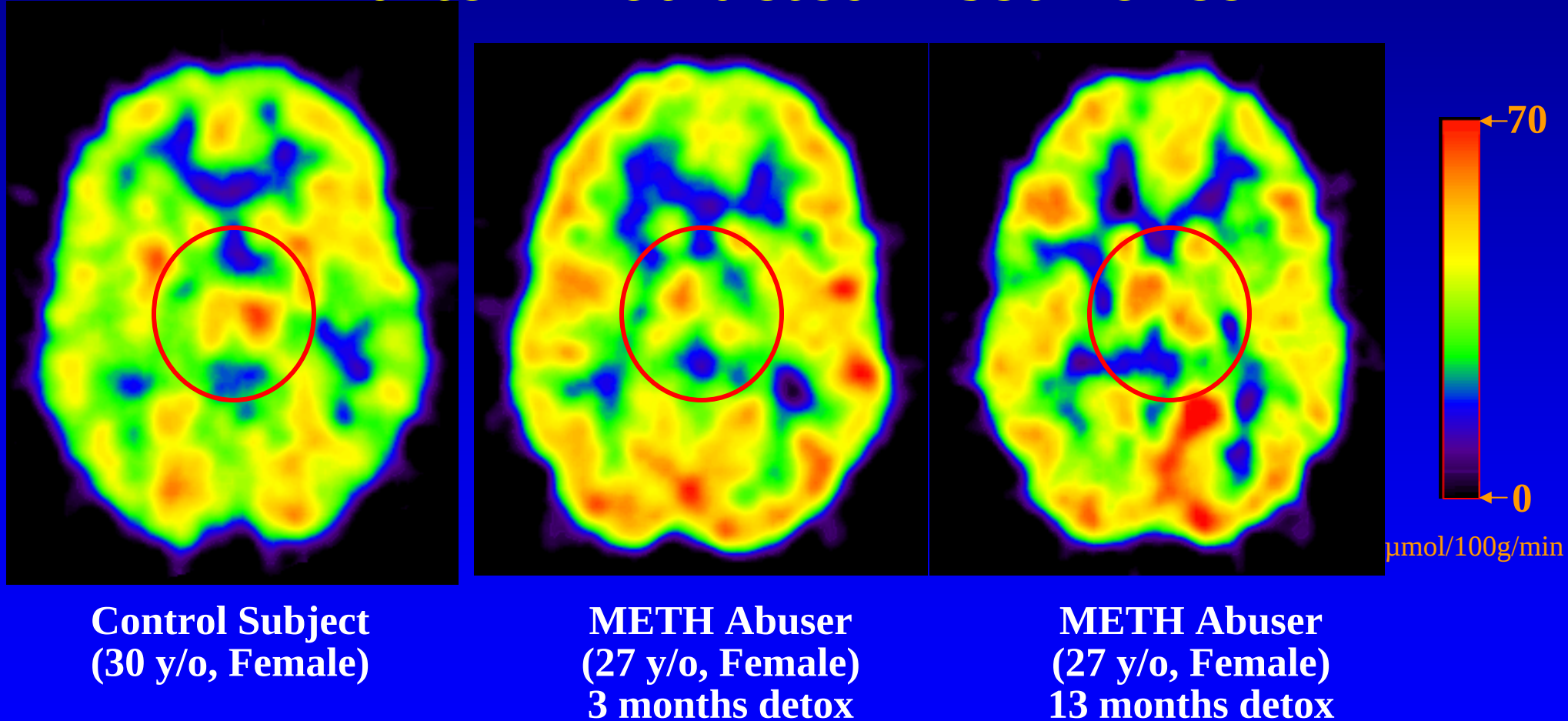
$+12 \pm 9\%$, $p \leq 0.015$

Striatum



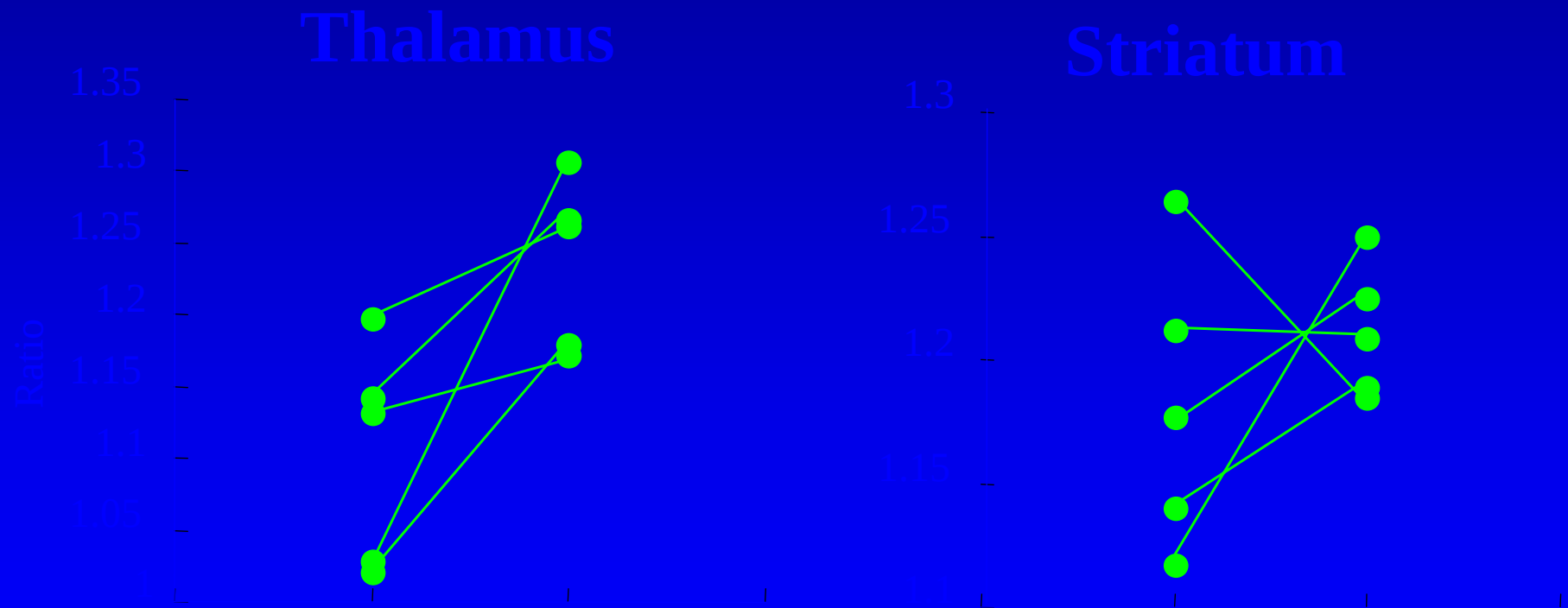
$+2.7 \pm 6.7\%$, $p = 0.34$

Partial Recovery of Brain Metabolism in Methamphetamine (METH) Abuser after Protracted Abstinence



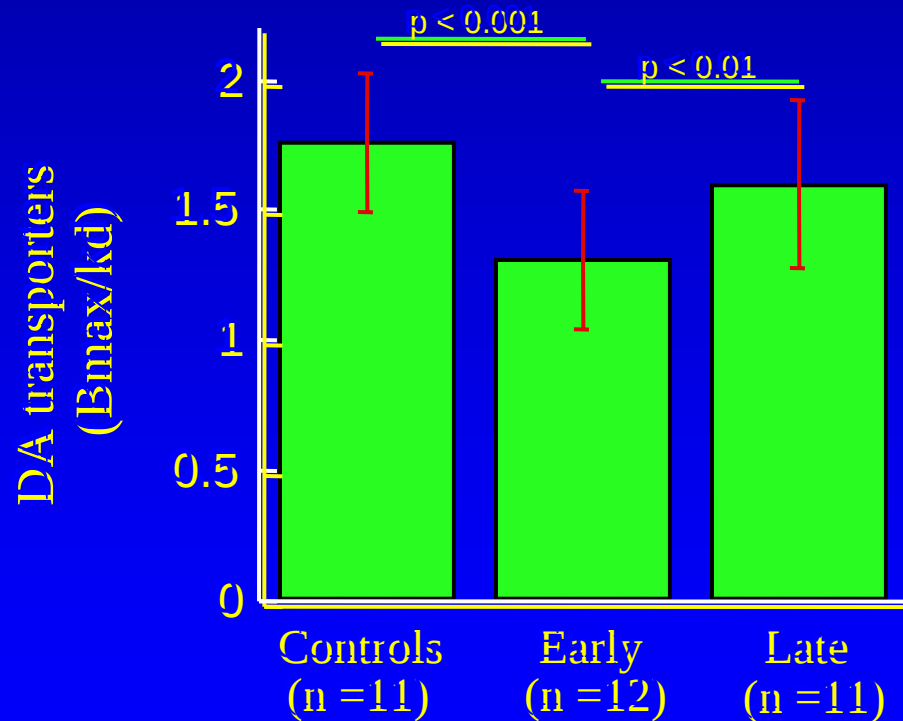
Source: Wang, G-J et al., *Am J Psychiatry* 161:2, February 2004.

Thalamic and Striatal Metabolism in METH Abusers During Early and Late Detoxification

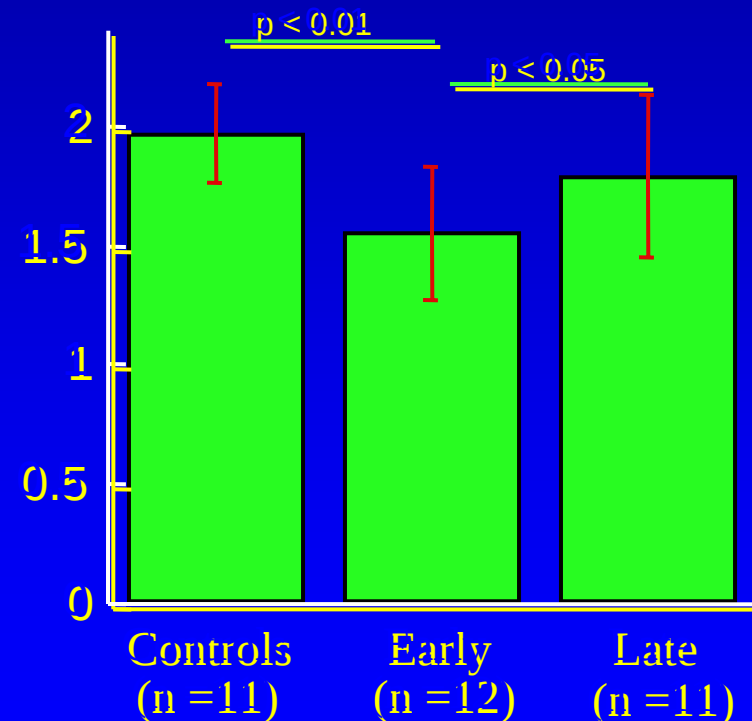


DAT in Methamphetamine Abusers Tested During Early or During Late Detoxification

Caudate



Putamen



Summary

Increases in Metabolism

Early: posterior parietal cortex (precuneus)

Late: posterior parietal cortex (precuneus)

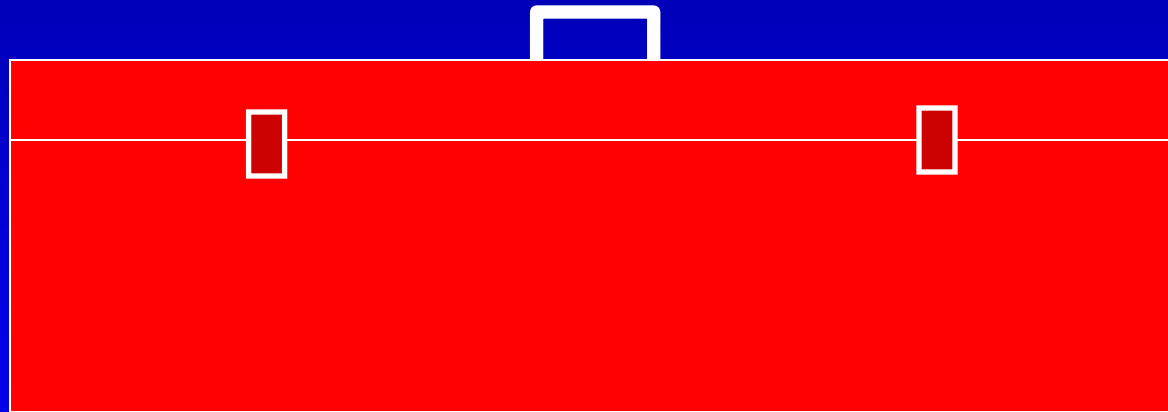
Decreases in Metabolism

Early: caudate, NAc, insula, thalamus,
mesencephalum

Late: caudate, NAc, insula

*Recovery in thalamic metabolism associated with
recovery in NP tests linked to dopaminergic activity*

We Have A Variety Of Effective Treatment Options In The Clinical Toolbox



**...And We Are Trying To
Improve Existing And
Develop New Options**

In Order to Develop Effective Treatments *What Do We Need to Do To...*

- Counteract neuroadaptations that underlie the addictive process?
- Reverse METH's Neurotoxic Effects?



Treatments for Methamphetamine

- Cognitive Behavioral Therapies
- Contingency Management
- MATRIX Model
- New Medications
(treatment and overdose)
are being developed

Methamphetamine Addiction Pharmacotherapies in Clinical Trials

Phase I

Aripiprazole
Atomoxetine
Bupropion
Carvedilol
Clonidine
Lobeline
Modafinil
Perindopril
Prazosin
Rivastigmine
Sertraline
Topiramate

Phase II

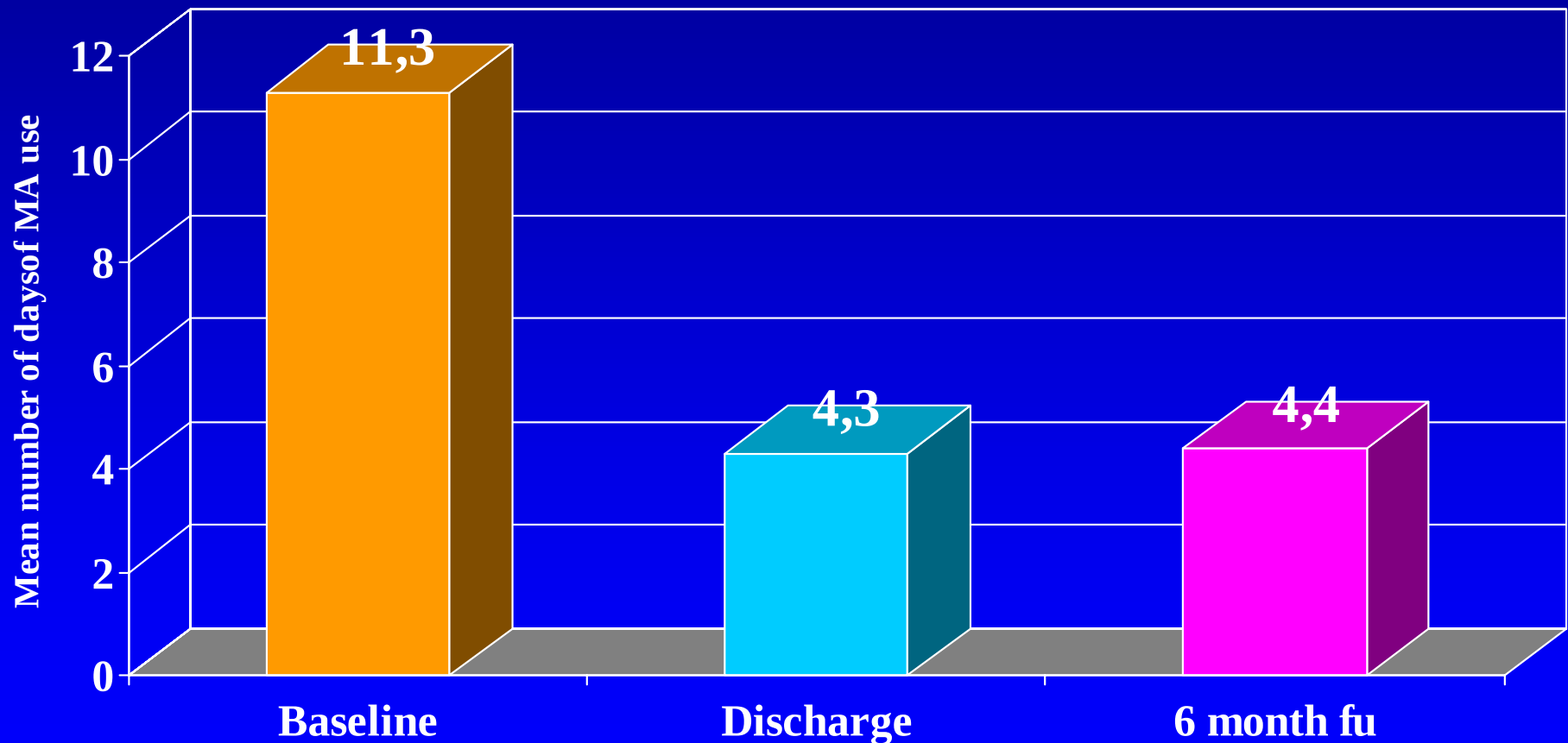
Baclofen
Bupropion
Gabapentin

Clinical Challenges for Treatment of Methamphetamine Addiction

- **Poor treatment engagement rates**
- **High dropout rates**
- **Severe paranoia**
- **High relapse rates**
- **Ongoing episodes of psychosis**
- **Severe craving**
- **Protracted dysphoria**

Many patients may require medical/psychiatric supervision and need ongoing treatment with antipsychotic medications

Self-report of MA use at enrollment, discharge, and 6 month follow-up following Matrix treatment



**The Goal of Treatment
is to help the brain and the person
recover normal function**

What We Need To Know – Future Plans

- **Demographics - who is using meth and why**
- **Brain mechanisms of meth action and addiction**
- **Improved Prevention**
- **Genetic/environmental factors in vulnerability to meth addiction**
- **Progression from meth use to addiction**
- **Better Treatments: Behavioral and Pharmacotherapies**
- **Prenatal effects**

Visit Our Website @



The screenshot shows the NIDA (National Institute on Drug Abuse) website. The header features the NIDA logo, the text "NATIONAL INSTITUTE ON DRUG ABUSE", "The Science of Drug Abuse & Addiction", and the National Institutes of Health logo. A navigation bar includes links for HOME, ABOUT NIDA, NEWS & EVENTS, FUNDING, and PUBLICATIONS. Below this is a secondary navigation bar with links for RESEARCHERS & HEALTH PROFESSIONALS, PARENTS & TEACHERS, STUDENTS & YOUNG ADULTS, and EN ESPAÑOL. A search bar is located on the right. The main content area is divided into three columns. The left column features a "NEW! COMMUNITY DRUG ALERT BULLETIN: INHALANTS" and a "News & Events" section with links to a message from the director and an inhalant abuse report. The middle column has sections for "Students & Young Adults", "Parents & Teachers", and "Researchers & Health Professionals", each with descriptive text and a "more" link. The right column is titled "Drugs of Abuse" and lists various substances with links. A large blue box with the website URL is overlaid on the bottom left. The bottom of the page contains a "Related Topics" section with links to drug testing, prevention research, stress and drug abuse, treatment research, and trends and statistics.

NIDA NATIONAL INSTITUTE ON DRUG ABUSE
The Science of Drug Abuse & Addiction

keep your body healthy

HOME | ABOUT NIDA | NEWS & EVENTS | FUNDING | PUBLICATIONS

RESEARCHERS & HEALTH PROFESSIONALS | PARENTS & TEACHERS | STUDENTS & YOUNG ADULTS | EN ESPAÑOL

SELECT A TOPIC... SEARCH

NEW! COMMUNITY DRUG ALERT BULLETIN: INHALANTS

News & Events

[Message from the Director - Consequences of the Abuse of Anabolic Steroids](#)

[Inhalant Abuse: Research Report](#)

Students & Young Adults

Education resources & materials on drugs of abuse, marijuana, ecstasy, smoking, steroids, ([more](#))

Parents & Teachers

Drug information & facts, education materials, curriculum guides, classroom tools, ([more](#))

Researchers & Health Professionals

Grants & funding, research at NIDA, clinical trials, meetings, ([more](#))

Drugs of Abuse

- ♦ [Acid/LSD](#)
- ♦ [Alcohol](#)
- ♦ [Club Drugs](#)
- ♦ [Cocaine](#)
- ♦ [Ecstasy/MDMA](#)
- ♦ [Heroin](#)
- ♦ [Inhalants](#)
- ♦ [Marijuana](#)
- ♦ [Methamphetamine](#)
- ♦ [PCP/Phencyclidine](#)
- ♦ [Prescription Medications](#)
- ♦ [Smoking/Nicotine](#)
- ♦ [Steroids \(Anabolic\)](#)

Related Topics

- ♦ [Drug Testing](#)
- ♦ [Prevention Research](#)
- ♦ [Stress & Drug Abuse](#)
- ♦ [Treatment Research](#)
- ♦ [Trends & Statistics](#)

Teen Drug Use Declines 2003-2004 - Results from the Monitoring the Future Survey, 2004

[Application for 2005 NIDA Directors' Travel Awards to CPDD, Orlando, Florida](#)

[Application for the 2005](#)

NIDA Sites

- ♦ [backtoschool.drugabuse.gov](#)
- ♦ [smoking.drugabuse.gov](#)
- ♦ [hiv.drugabuse.gov](#)
- ♦ [marijuana-info.gov](#)
- ♦ [clubdrugs.org](#)

www.drugabuse.gov