

# WHAT DOES SUBSTANCE ABUSE DO TO YOUR BRAIN?

by

**Scott Warrick, JD, MLHR, SPHR**

## WORKPLACE FACTS

Most drug users are employed. Of the 13.4 million illicit drug users age 18 or older in the U.S. in 2001, 10.2 million (76.4 percent) were employed either full or part time.

Employed drug abusers cost their employers about twice as much in medical and Workers' Compensation claims as their drug-free coworkers.

*Source: U.S. Department of Health and Human Services. Substance Abuse and Mental Health Services Administration. (2002, September 4). Results from the 2001 National Household Survey on Drug Abuse: Volume I. Summary of National Findings (Office of Applied Studies, NHSDA.)*

<http://www.samhsa.gov/oas/nhsda/2k1nhsda/vol1/chapter2.htm#2.empl>

Also, The International Labour Organization's "InFocus Programme on Safety and Health at Work" reports:

- **Absenteeism is 2-3 times higher for drug and alcohol users than for other employees,**
- **Employees with chemical dependence problems may claim 3 times as many sick days and file 5 times as many workers' compensation claims,**
- **In many workplaces, 20 to 25 per cent of accidents at work involve intoxicated people injuring themselves and innocent victims and**
- **On-the-job use of drugs/alcohol account for 15%-30% of ALL accidents at work.**

## **Is It An Employer's Business What An Employee Does On His/Her Own Time?**

**Yes.** Studies show that off the job drug use affects on the job performance and safety. The residual affect of various drugs can impair one's ability to reason and function for days after ingesting the substance. Marijuana, for instance, affects one's depth perception, which explains why marijuana users tend to "rear end" others when driving and why they get their fingers caught in machines at work. As a result, drug and alcohol users are:

- **3.6 times more likely to injure themselves or another person in a workplace accident,**
- **5 times more likely to be injured in an accident off the job which, affects their attendance and/or performance on the job,**

- **One-third less productive than non-drug using employees and**
- **Incur 300% higher medical costs than non-drug using employees.**

Unfortunately, these “users” also spread other problems in the workplace:

- 44% sell drugs to other employees and 18% steal from co-workers to support their habits.

~~ Source: OHS Safety and Health Services

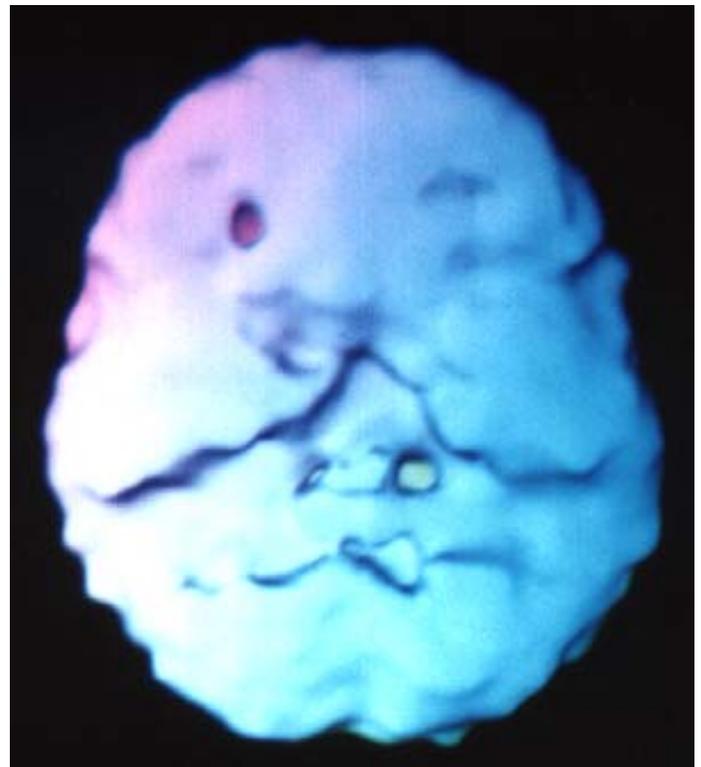
## What Does A “Normal” Brain Look Like?

### SURFACE SCANS

(FOREHEAD is at the top of the Scan)



**TOP SURFACE BLOOD FLOW VIEW**



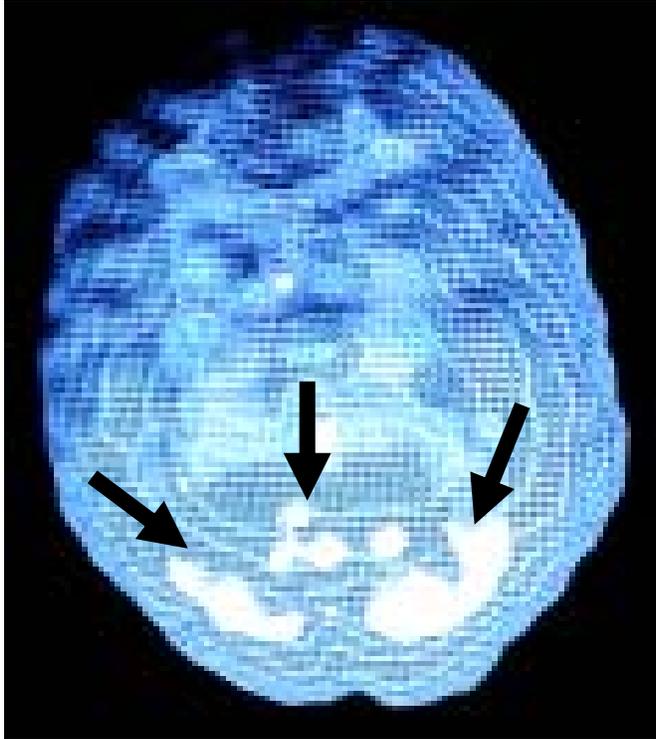
**UNDER SURFACE BLOOD FLOW VIEW**

These are two “surface” SPECT scans indicating blood flow to the brain. The one on the left is looking down on the brain. The one on the right is a view looking up into the brain. This is how blood flow in a brain **SHOULD** look. Notice how full these scans look. The top view is rounded and full looking. The one on the right is also full and reveals the natural curvatures of the brain.

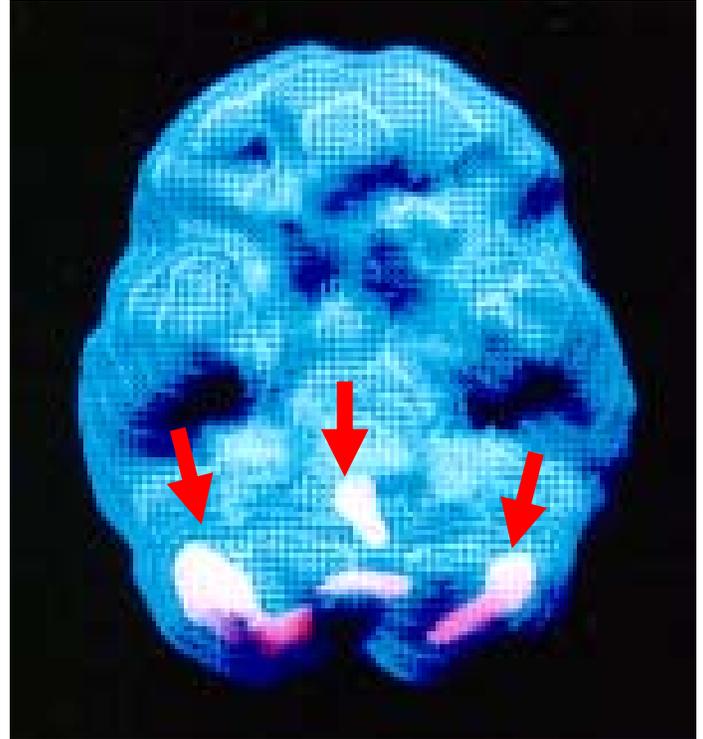
# What Does A “Normal” Brain Look Like?

## ACTIVITY SCANS

(FOREHEAD is at the top of the Scan)



TOP VIEW



UNDERVIEW

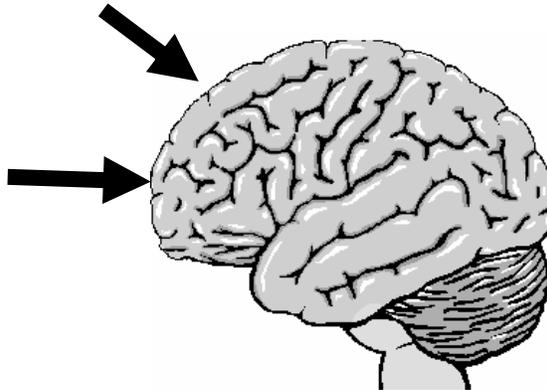
These are two “activity” SPECT Scans indicating metabolic activity in the brain. Again, the one on the left is looking down on the brain. The one on the right is a view looking up into the brain. This is how a brain’s activity level **SHOULD** look. The darkened areas, or “red” spots, are 15% “hotter.”

These scans show a nice “cool” blue or gray color. The back of the head (bottom of the scan) is lit up. This is the **cerebellum**. The cerebellum integrates information from the brain that indicates your position and movement and uses this information to coordinate limb movements. This area is a hotter area since your body movements and coordination is constantly “running.”

# FUNCTIONAL AREAS OF THE BRAIN

In order to understand the brain, one must understand how it works. In short, there are 5 major brain systems that relate to behavior.

## The Frontal Lobes



The frontal lobes control such functions as decision making, judgment, organization, etc. Commonly, these functions are referred to as “Executive Functions.” This is the part of the brain that makes us human. It comprises 30% of the human brain. In short, the frontal lobes determines our...

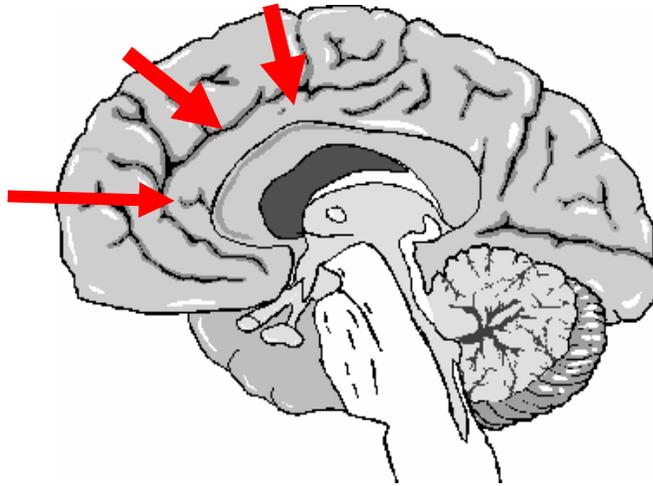
### FUNCTIONS

attention span  
perseverance  
judgment  
impulse control  
organization  
self-monitoring and supervision  
problem solving  
critical thinking  
forward thinking  
learning from experience  
ability to feel and express emotions  
influences the limbic system  
empathy

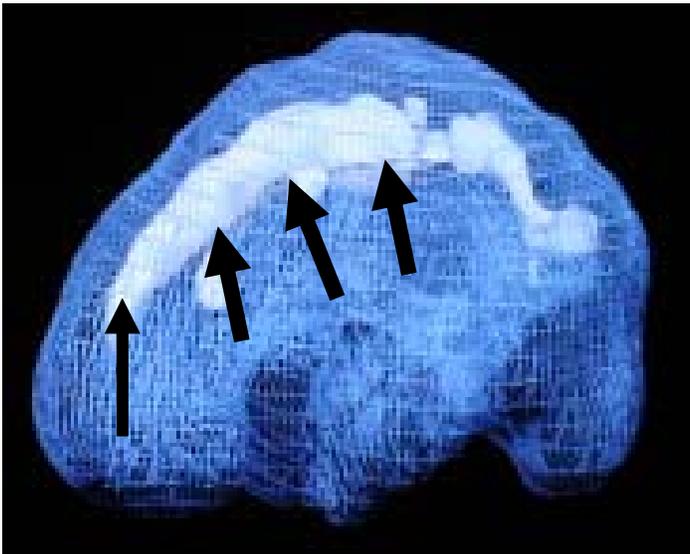
### PROBLEMS

short attention span  
distractibility  
lack of perseverance  
impulse control problems  
hyperactivity  
chronic lateness, poor time management  
disorganization  
procrastination  
unavailability of emotions  
misperceptions  
poor judgment  
trouble learning from experience  
short term memory problems  
social and test anxiety

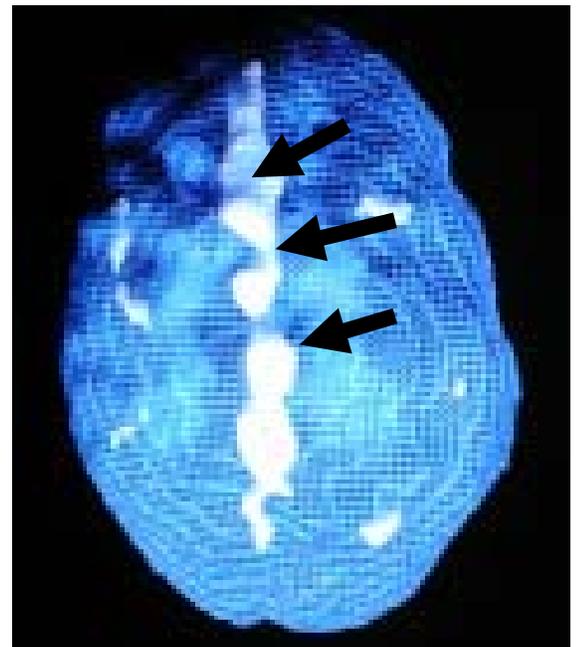
# The Cingulate Gyrus (The “Stick Shift”)



(FOREHEAD is at the top of the Scan)



**LEFT SIDE VIEW**



**TOP VIEW**

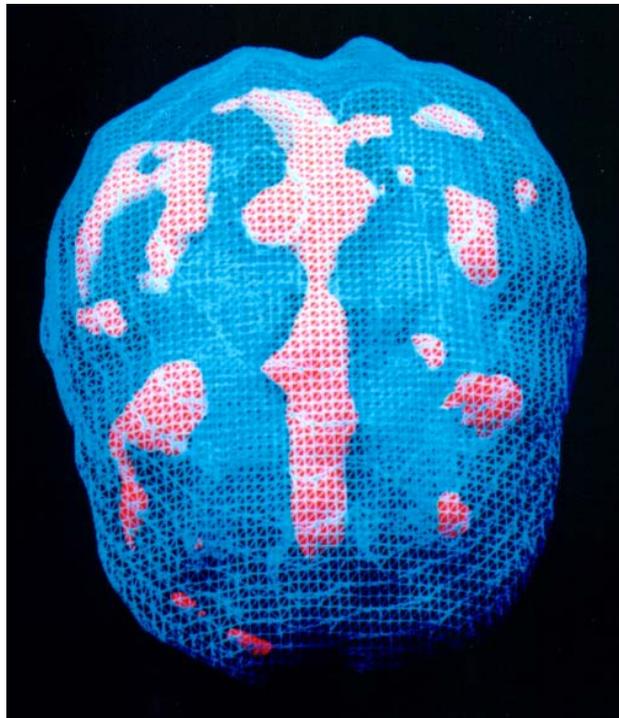
## **FUNCTIONS**

allows shifting of attention  
cognitive flexibility  
adaptability  
helps the mind move from idea to idea  
gives the ability to see options  
helps you go with the flow  
cooperation

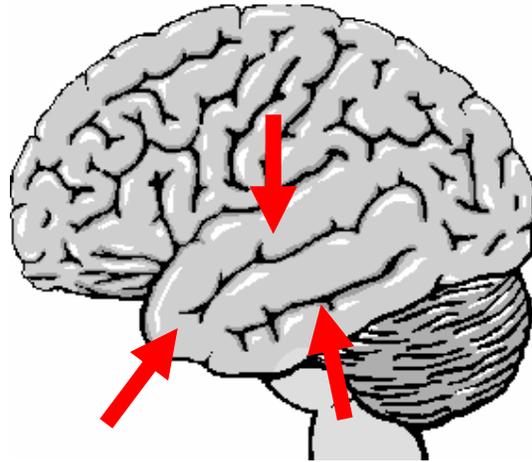
## **PROBLEMS**

worrying  
holds onto hurts from the past  
stuck on thoughts (obsessions)  
stuck on behaviors (compulsions)  
oppositional behavior, argumentative  
uncooperative, tendency to say no  
addictive behaviors  
(substance abuse, eating disorders, chronic pain)  
cognitive inflexibility  
obsessive compulsive disorder  
OCD spectrum disorders  
eating disorders, road rage

## **PMS!**



# The Temporal Lobes (“Sideburns”)



## **Dominate Side (usually left)**

understanding and processing language  
intermediate term memory  
long term memory  
auditory learning  
retrieval of words  
complex memories  
visual and auditory processing  
emotional stability

## **Non-Dominate Side (usually right)**

recognizing facial expression  
decoding vocal intonation  
rhythm  
music  
visual learning

## **PROBLEMS**

### **Dominate Side (usually left)**

aggression, internally or externally driven  
dark or violent thoughts  
sensitivity to slights, mild paranoia  
word finding problems  
auditory processing problems  
reading difficulties  
emotional instability

### **Non-Dominate Side (usually right)**

difficulty recognizing facial expression  
difficulty decoding vocal intonation  
implicated in social skill struggles

# PROBLEMS

## Either One or Both Temporal Lobes

memory problems, amnesia

headaches or abdominal pain without a clear explanation

anxiety or fear for no particular reason

abnormal sensory perceptions, visual or auditory distortions

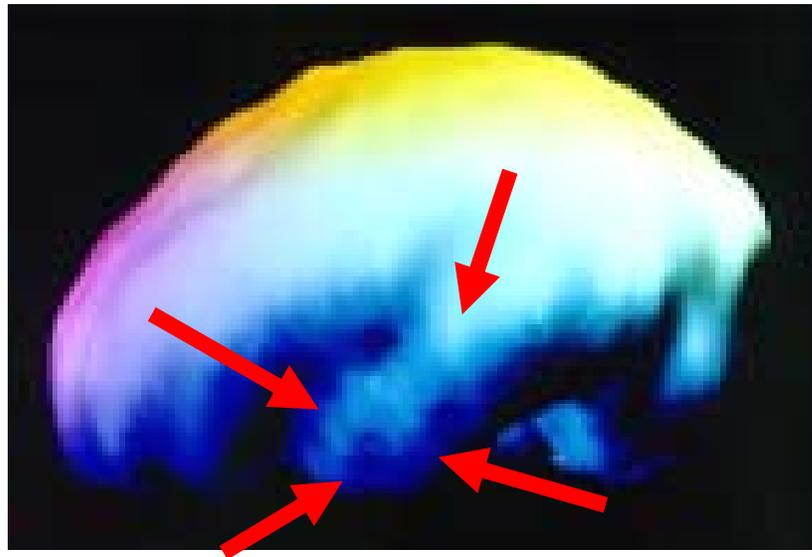
feelings of déjà vu or jamais vu

periods of spaciness or confusion

religious or moral preoccupation

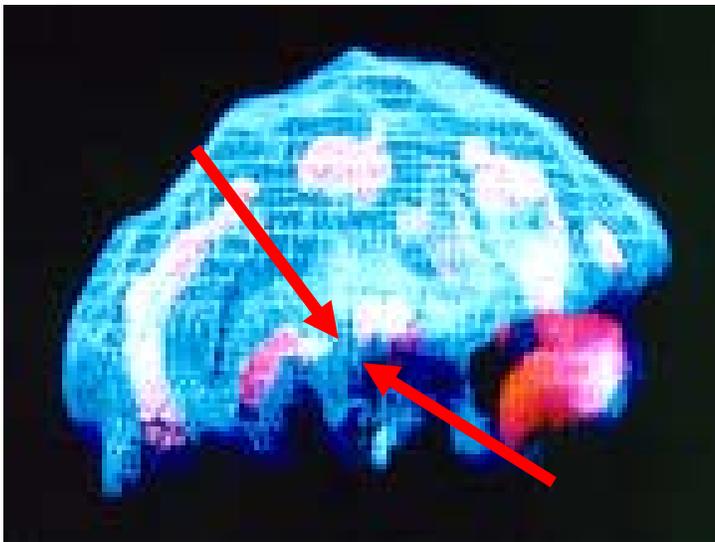
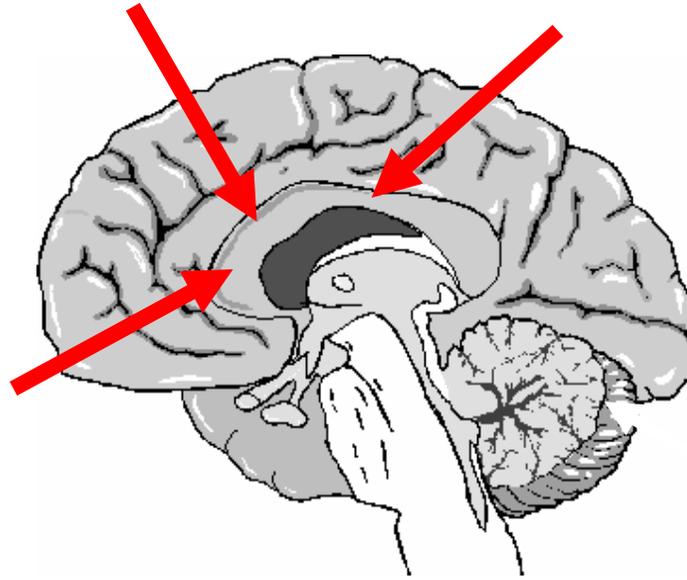
hypergraphia, excessive writing

seizures

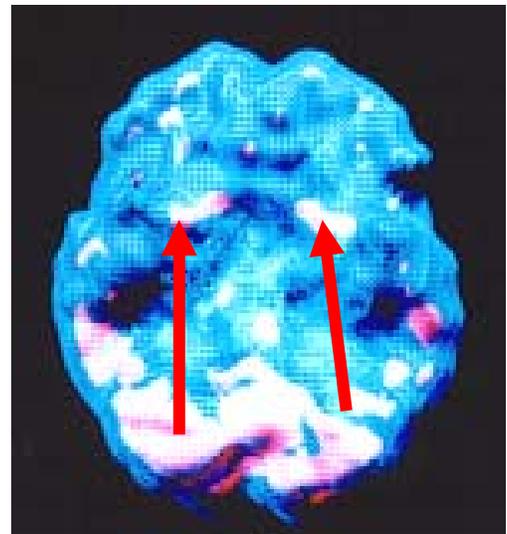


**SIDE SURFACE SHOT VIEW OF HEALTHY BLOOD FLOW TO  
A LEFT TEMPORAL LOBE**

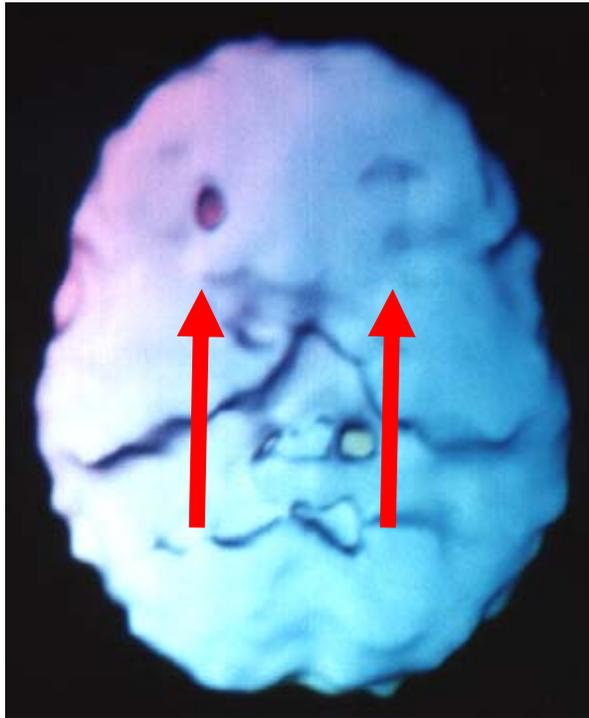
# The Basal Ganglia System



**Left Side Activity Shot**



**Underside Activity Shot**



### **Underside Blood Flow Shot**

### **Nice Full Blood Flow To These Areas**

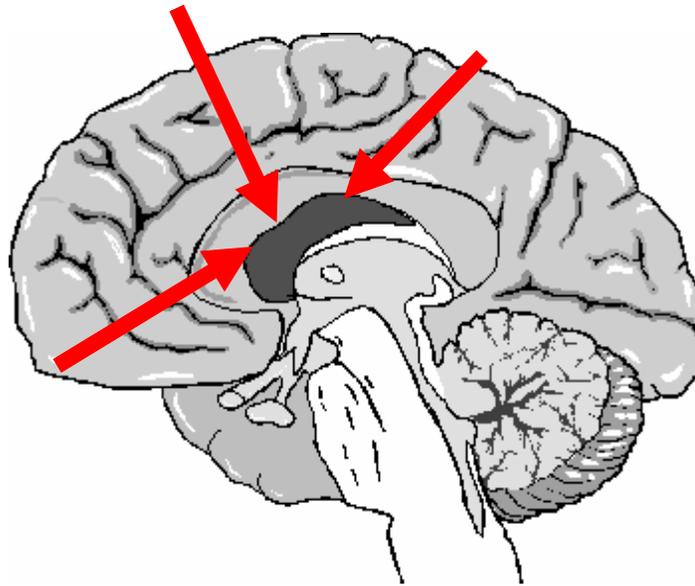
#### **FUNCTIONS**

integrates feeling and movement  
shifts and smoothes fine motor behavior  
suppression of unwanted motor behaviors  
sets the body's idle or anxiety level  
enhances motivation  
pleasure/ecstasy

#### **PROBLEMS**

anxiety, nervousness  
panic attacks  
physical sensations of anxiety  
tendency to predict the worst  
conflict avoidance  
Gilles de la Tourette's Syndrome/tics  
muscle tension, soreness  
tremors  
fine motor problems  
headaches  
low or excessive motivation

# The Deep Limbic System



## FUNCTIONS

sets the emotional tone of the mind  
filters external events with internal perspective  
(emotional coloring)  
tags events as internally important  
stores highly charged emotional memories  
modulates motivation  
controls appetite and sleep cycles  
promotes bonding

directly processes the sense of smell  
modulates libido

## PROBLEMS

moodiness, irritability, clinical depression

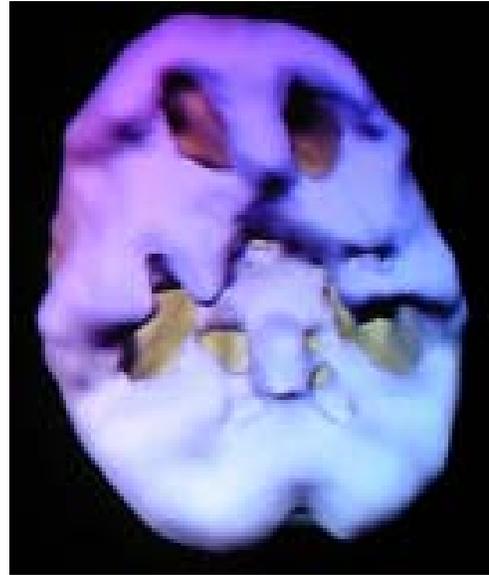
increased negative thinking  
perceive events in a negative way  
decreased motivation  
flood of negative emotions  
appetite and sleep problems  
decreased or increased sexual responsiveness  
social isolation

# ALCOHOL AND DRUG ABUSE

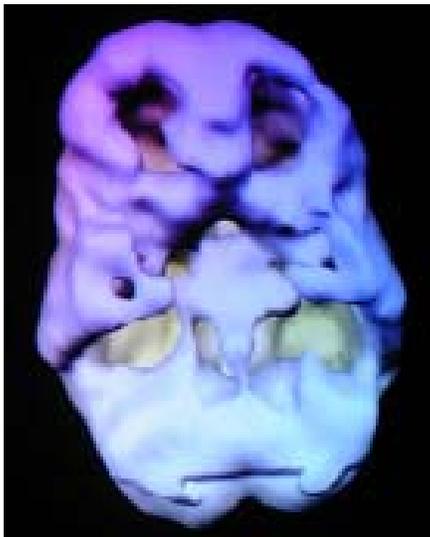
## Marijuana



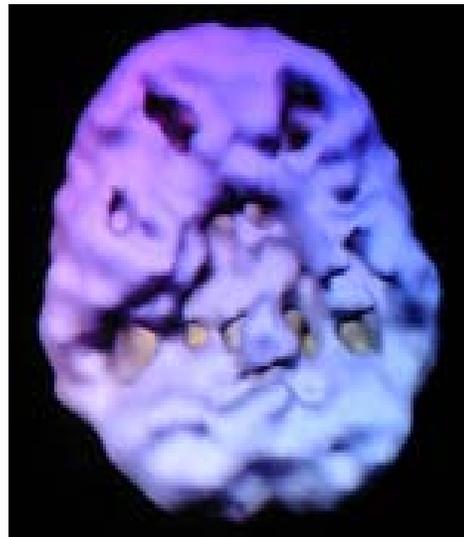
18 yr. old: 3 year history of 4 x week use



16 yr. old: 2 year history of daily abuse



38 yr. old: 12 years of daily use

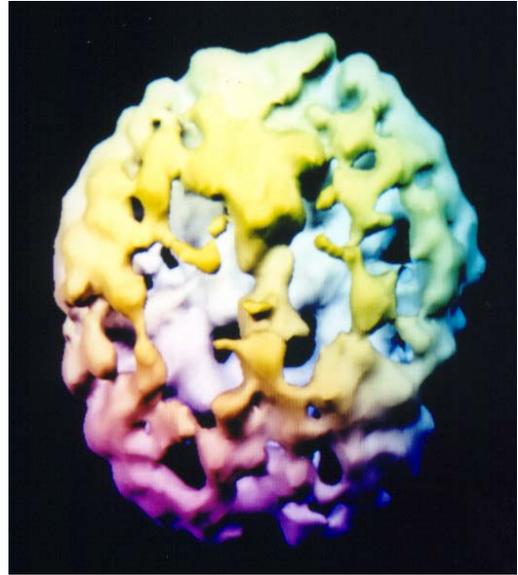


28 yr. old: 10 years of mostly weekend use

**Heroin & Methadone**



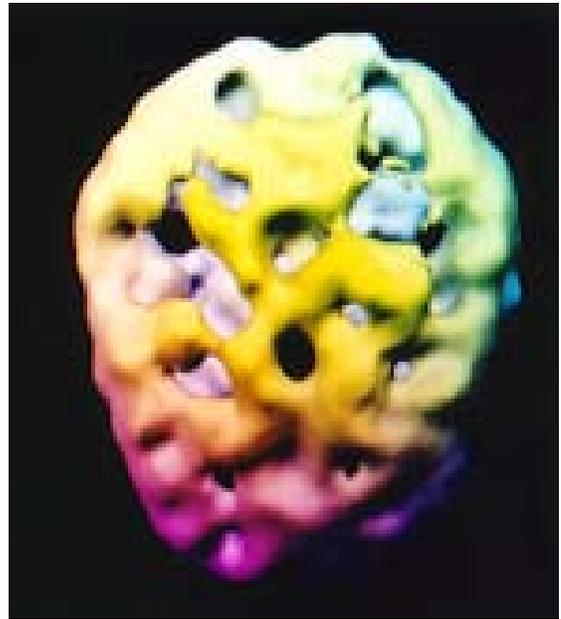
**Normal Brain**



**39 yr. old: 25 year history of frequent heroin use**

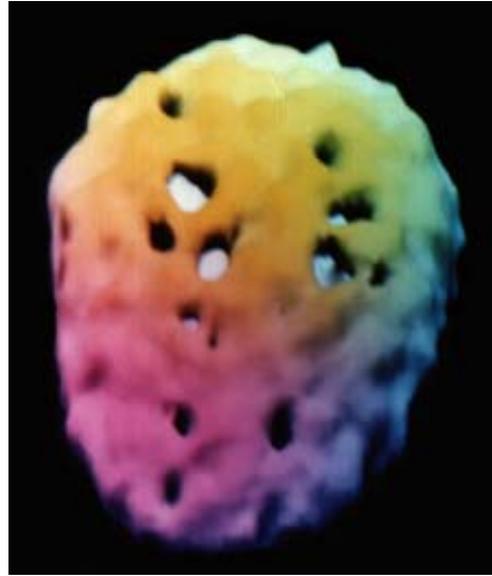
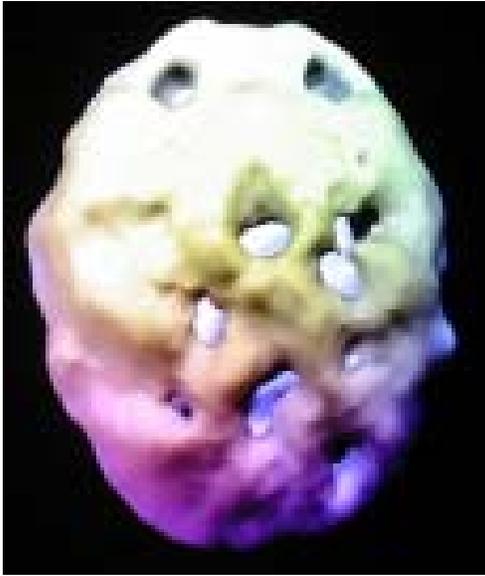


**39 yr. old: 25 year history of frequent heroin use**

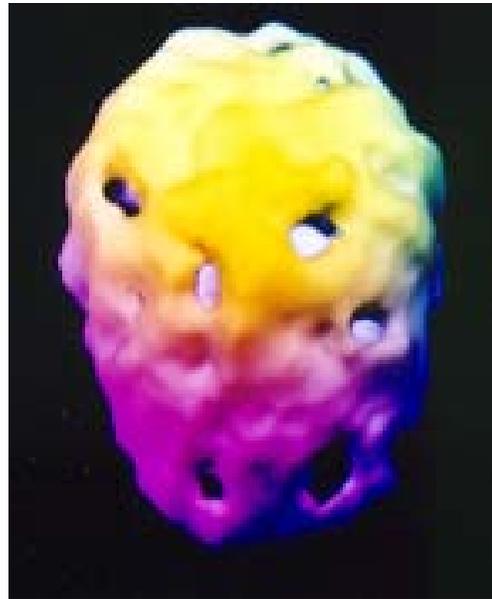
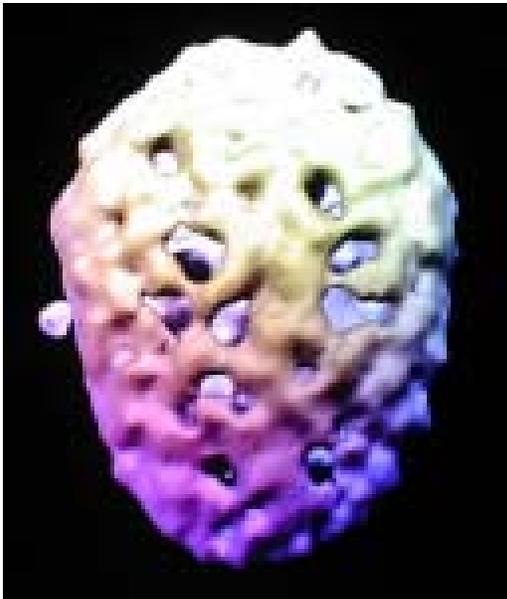


**40 yr. old: 7 years on methodone**

## Cocaine & Methamphetamine



52 yr. old: 28 yr. history of frequent methadone use    24 yr. old: 2 years of frequent cocaine use



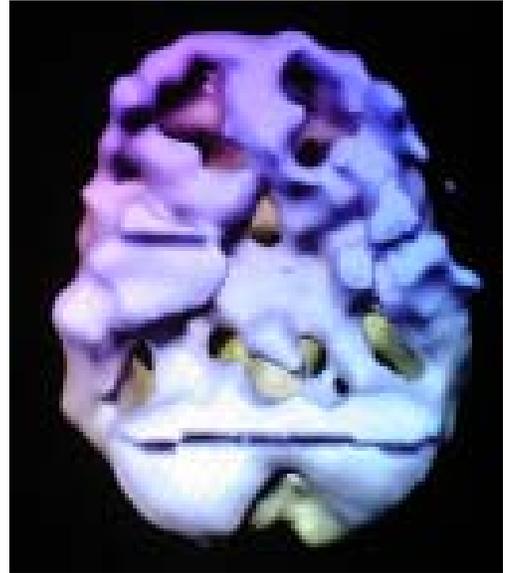
28 yr. old: 8 yr. history of frequent methadone use    36 yr. old: 10 years of frequent methadone use

# Alcohol

38 yr. old: 17 years of heavy weekend use



TOP SURFACE BLOOD FLOW VIEW



UNDER SURFACE BLOOD FLOW VIEW

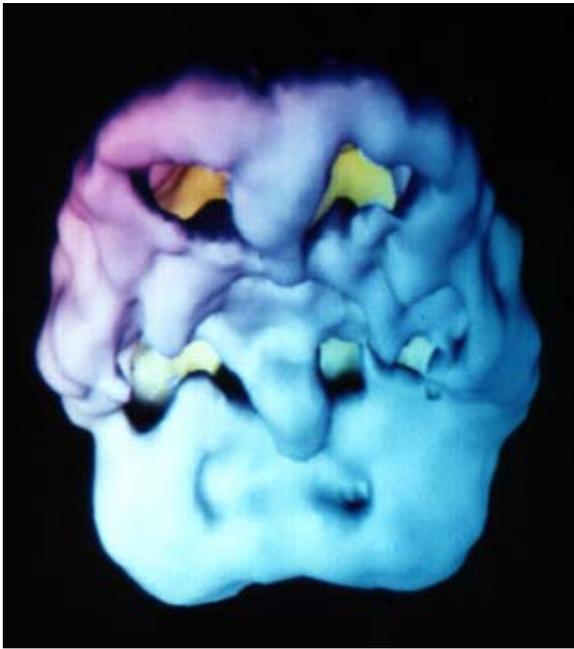


FRONT SURFACE BLOOD FLOW VIEW



RIGHT SIDE SURFACE BLOOD FLOW VIEW

# Alcohol



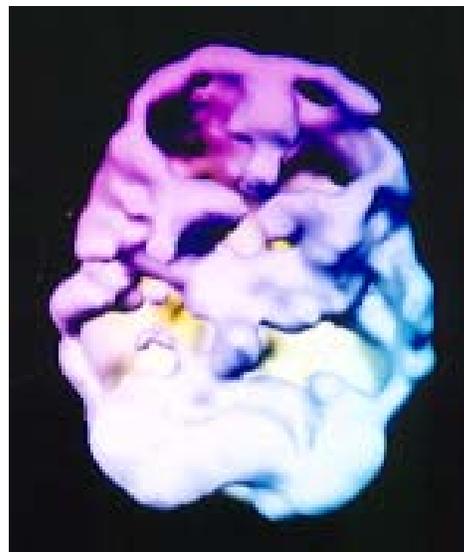
44 yr. old: 18 yrs. Of daily use of alcohol



45 yr. old: 25 years of daily alcohol use

## Heavy Nicotine & Caffeine Abuse

45 y/o -- 27 year history of heavy use: 3 packs of cigarettes and 3 pots of coffee daily



## **WHAT TESTING SHOULD I PUT INTO PLACE?**

**NEVER** put a Substance Abuse Testing Program into place unless you intend to follow through with it. However, most employers should at a minimum have the following testing policies in place:

### **Reasonable Suspicion Testing & Post-Accident Testing**

It is rare to find an employer that does not want to control its safety, productivity and attendance record. Also, most employers want to have the ability to test their employees if they suspect alcohol or drug abuse is occurring in their workplaces. Reasonable Suspicion and Post Accident Substance Abuse Testing can be a great asset in attaining these goals.

Too many employers adopt Pre-Employment Testing or Random Testing, but then never want to do anything about an employee's substance abuse problem if "they like" that employee. If you are not going to take action when substance abuse is discovered, then it is better if you do not test at all. (Of course, by "taking action" I am referring to terminating the employee or sending the employee to be assessed for possible drug/alcohol rehabilitation.)

Other types of testing available to employers are the following: Safety Sensitive Position Testing, Transfer/Promotion Testing, Customer Required Testing, Follow-Up Testing Department of Transportation Testing Requirements, and the Bureau of Workers' Compensation Rate Reduction Testing.

A proper policy will also address the odor of alcohol, the use of prescription drugs, tampering with a specimen or the test itself, which includes diluting the specimen by drinking a gallon of water before taking the test, and voluntary self-disclosure by an employee. The policy should also define a workplace accident as also involving damage to property in addition to individuals. (i.e., Apparent damage to property of \$250 or more.) Employers should also seriously consider requiring employees who test positive on a test and go through rehabilitation to sign a "Conditional Return To Work Agreement" before being allowed to return. These Agreements allow the employer to test the employee whenever the employer wants for the next 2-3 years, they require the employee to continue with his/her treatment for an elongated period of time, etc.