Section 15

IMAGES OF ALCOHOL AND DRUG ABUSE
Brain Pollution and the Real Reason You Shouldn't Use

Studying the effects of drugs and alcohol on the brain has clearly been one of the most informative and fascinating parts of my work. I had a sense growing up that drugs and alcohol weren't helpful to my overall health. I might add, this notion was helped along by getting drunk on a six pack of Michelob and half a bottle of champagne when I was sixteen years old – I was sick for three days. After that, I've been lucky enough to stay away from drugs and alcohol. After doing this work there's no way you could get me to do marijuana, heroin, cocaine, methamphetamine, LSD, PCP, inhalants or any more than a glass or two of wine or beer. These substances damage the patterns in your brain, and without your brain you are not you.

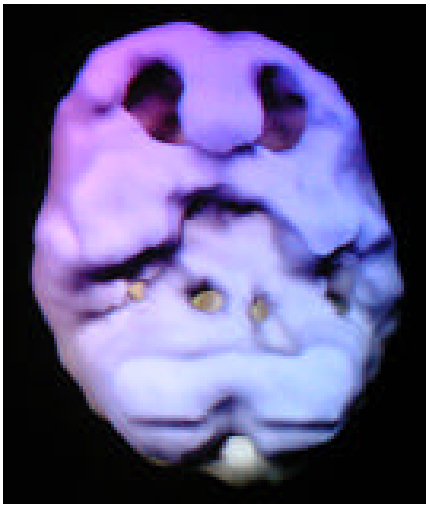
There is really quite a bit of scientific literature on the physiological effects of drugs and alcohol on the brain. SPECT has demonstrated a number of abnormalities in substance abusers in brain areas known to be involved in behavior, such as the frontal and temporal lobes. There are some SPECT similarities and differences between the damage we see caused by the different substances of abuse. I'll discuss the differences in drug abuse patterns below. There tends to be several similarities seen among classes of abused drugs. The most common similarity among drug and alcohol abusers is that the brain has an overall toxic look to it. In general, the SPECT studies look less active, more shriveled, and overall less healthy. A "scalloping effect" is common amongst drug abusing brains. Normal brain patterns show smooth activity across the cortical surface. Scalloping is a wavy, rough sea-like look on the brain's surface. I also see this pattern in patients who have been exposed to toxic fumes or oxygen deprivation. My research assistant says that the drug brains she has seen look like someone poured acid on the brain. Not a pretty site.

SPECT can be helpful in evaluating the effects of drugs and alcohol on the brain. On 3D surface images several substances of abuse appear to show consistent patterns. For example, cocaine and methamphetamine abuse appear as multiple small holes across the cortical surface; heroin abuse appears as marked decreased activity across the whole cortical surface; heavy marijuana abuse shows decreased activity in the temporal lobes bilaterally and heavy alcohol abuse shows marked decreased activity throughout the brain. These findings tend to improve with abstinence, although long term use has been associated with continued SPECT deficits seen years after abstinence. SPECT can be helpful in several ways in drug and alcohol abuse. First, 3D surface SPECT images of drug and alcohol abusers can be used in drug prevention education. Second, SPECT

studies can help break though the denial that often accompanies substance abuse. When one is faced with their own abnormal cerebral perfusion it is hard to remain in denial. Third, SPECT may help evaluate if there is an underlying neuropsychiatric condition that needs treatment.

Marijuana

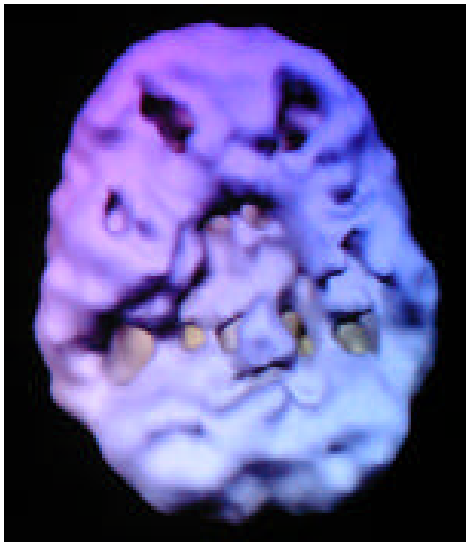
In our experience, marijuana usage typically causes decreased activity in the posterior temporal lobes bilaterally. The damage can be mild or severe, depending on how long a person used, how much use occurred, what other substances were used (nicotine is a powerful vasoconstrictor) and how vulnerable a particular brain is. For more information see Dr. Amen's article High Resolution Brain SPECT Imaging in Marijuana Smokers with AD/HD, Journal of Psychoactive Drugs, Volume 30, No. 2 April-June 1998. Pgs 1-13.



18 y/o – 3 year history of 4 x week use
underside surface view
decreased pfc and temporal lobe activity

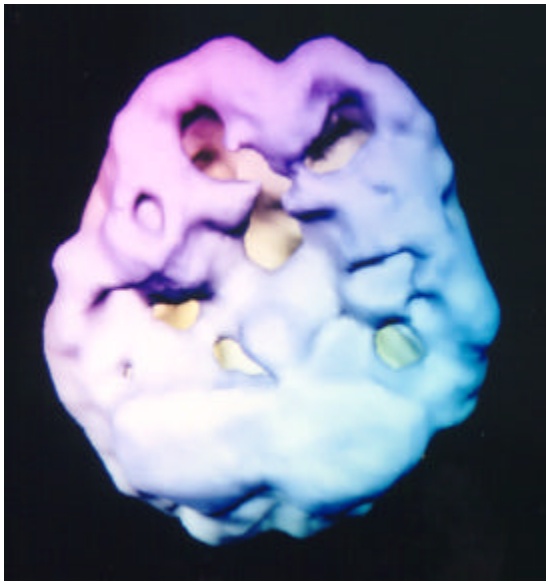
16 y/o -- 2 year history of daily abuse
underside surface view
prefrontal and temporal lobe activity

38 y/o -- 12 years of daily use
underside surface view
decreased pfc and temporal lobe activity

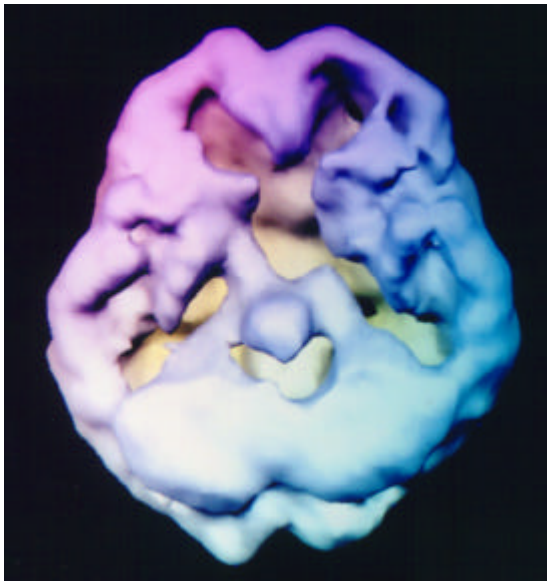


28 y/o -- 10 years of mostly weekend use
underside surface view
decreased pfc and temporal lobe activity

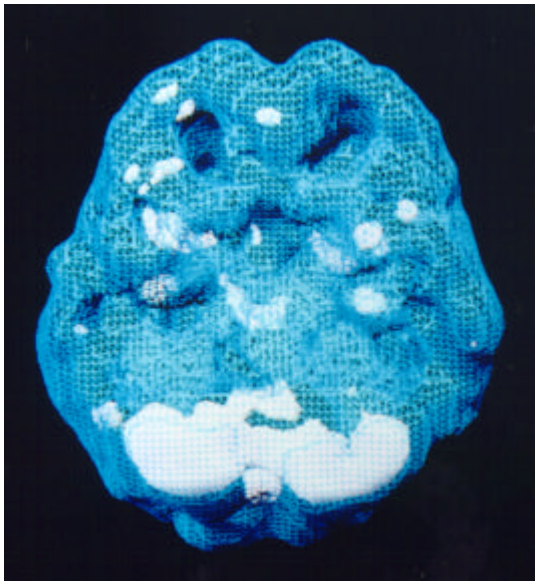
Off and On Marijuana



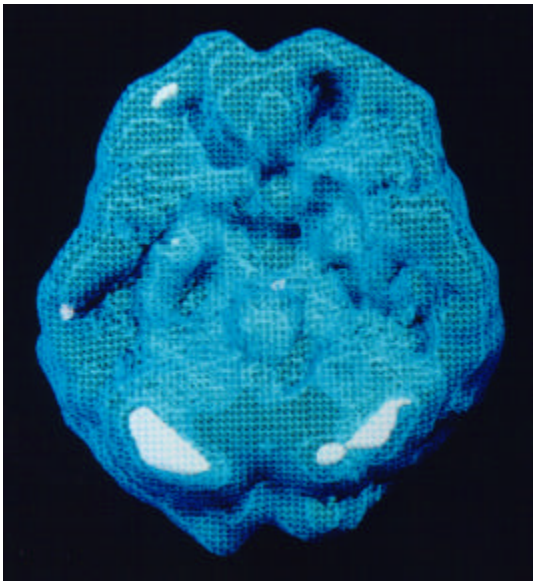
underside surface view, off THC
decreased pfc and temporal lobe activity



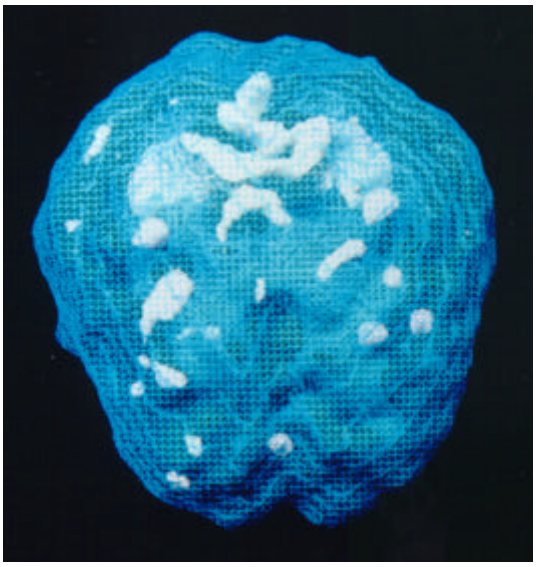
underside surface view, on THC
severe overall decreased activity



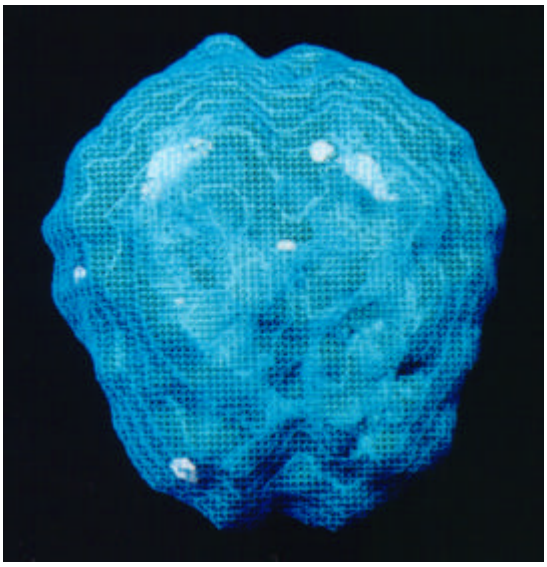
underside active view, off THC
increased deep left temporal lobe activity



underside active view, on THC
overall calming of activity



top-down active view, off THC
patchy increased uptake



top-down active view, on THC
overall calming of activity

This 57-year-old physician had abused marijuana for 30 years. We performed this SPECT series because he had been unable to stop using without feeling very angry, irritable, agitated and anxious.

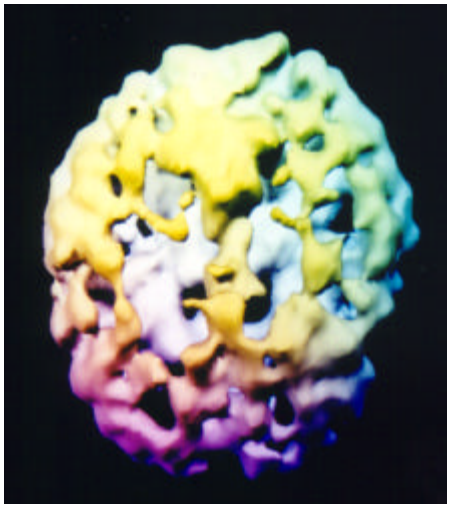
The first study (those images in the right column) was performed after he came to the clinic intoxicated from 3 straight days of heavy usage. The second study (those images in the left column) was performed after he abstained from marijuana usage for 1 month.

Notice the study without marijuana shows decreased temporal lobe activity (likely from the chronic marijuana usage), but also patchy increased uptake, especially increased activity in the deep left temporal lobe (often associated with anger, irritability and anxiety). The study with heavy marijuana usage shows marked overall decreased activity, especially in the prefrontal cortex and temporal lobes (associated with attention, memory and motivational problems) but also there is a decrease in the overactive areas noted in the "off marijuana" study.

This scan series argues for the possibility of "self-medication," but unfortunately this medication has the side effect of causing the potential for long term damage to his brain

Heroin & Methadone

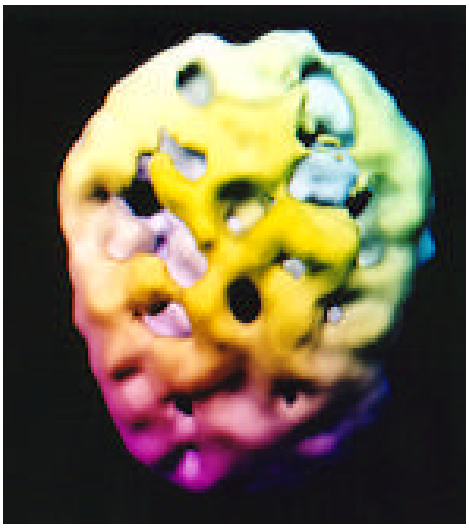
Normal view
top down surface view
full, symmetrical activity



39 y/o -- 25 yr hx of frequent heroin use
top down surface view
marked overall decreased activity

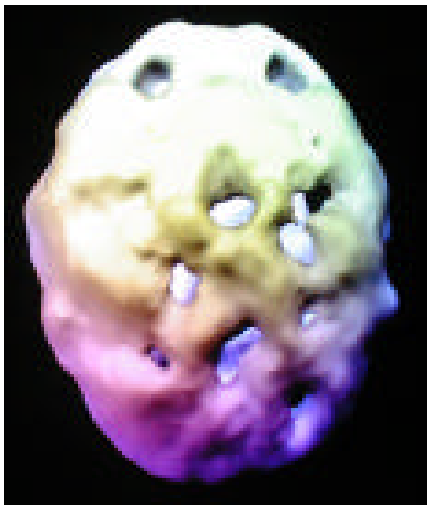
39 y/o -- 25 yrs of frequent heroin use

front on surface view
marked overall decreased activity

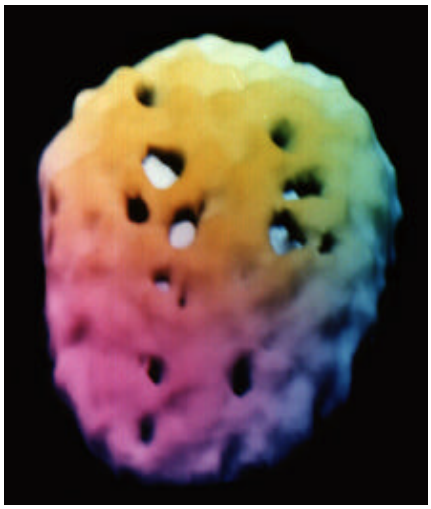


40 y/o, 7 yrs on methadone
heroin 10 yrs prior
top down surface view
marked decreased overall activity

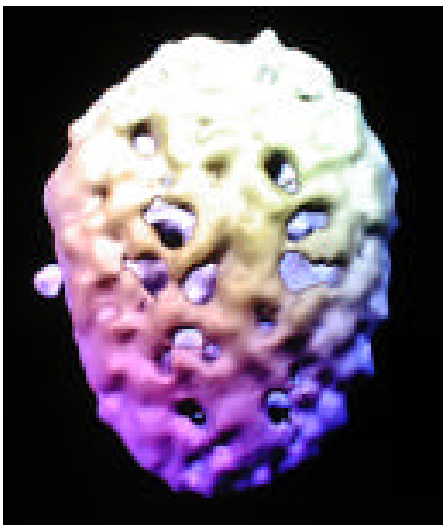
Cocaine & Methamphetamine



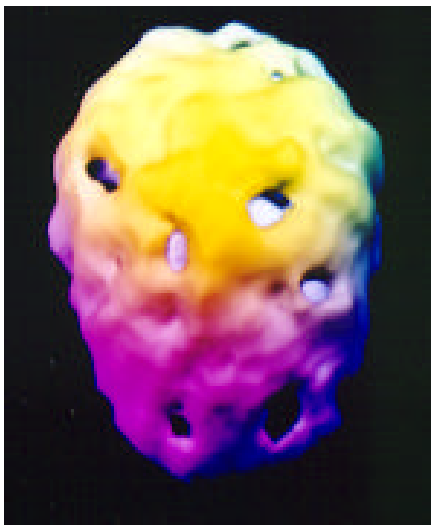
52 y/o – 28 yr hx frequent meth use
top down surface view
multiple holes across cortical surface



24 y/o -- 2 yr hx of frequent cocaine use
top down surface view
multiple holes across cortical surface



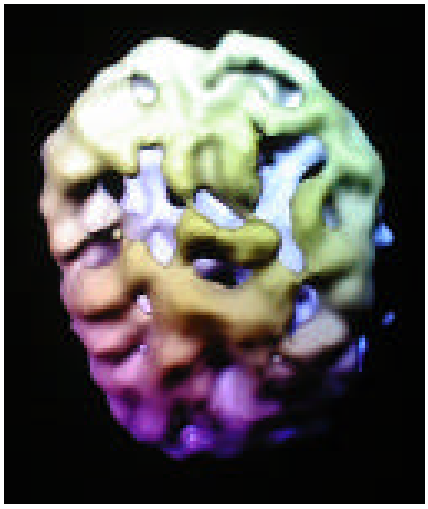
28 y/o – 8 yrs heavy meth use
front on surface view
marked overall decreased activity



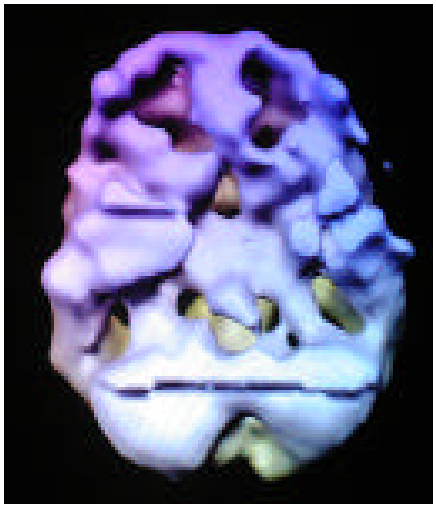
36 y/o, 10 years frequent meth
top down surface view
multiple holes across cortical surface

Alcohol

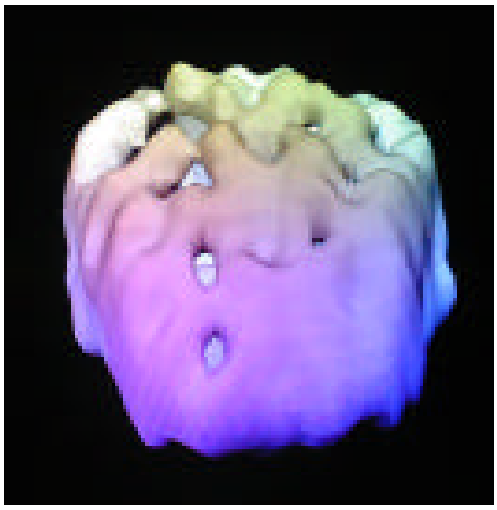
38 y/o – 17 years of heavy weekend use



underside surface view



underside surface view

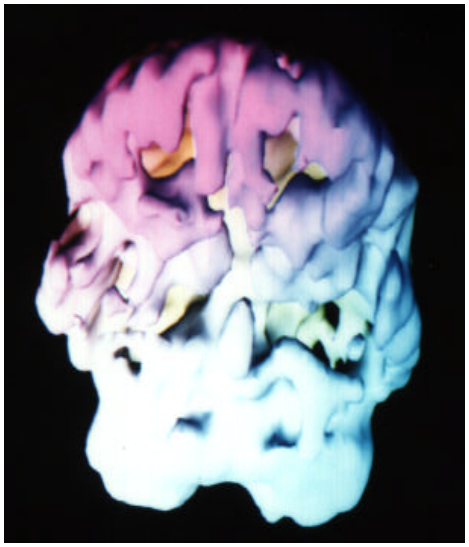


front on surface view

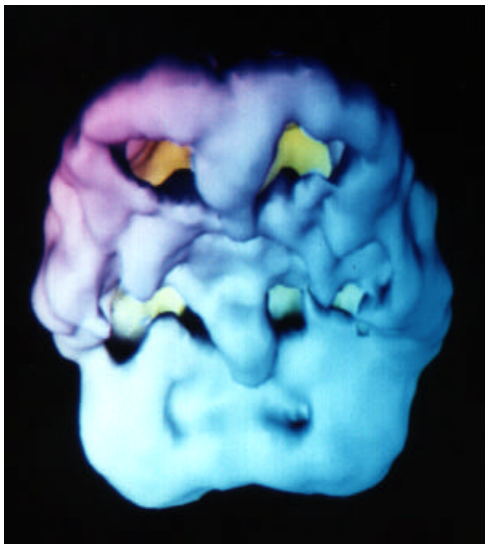
right side surface view

marked overall decreased activity

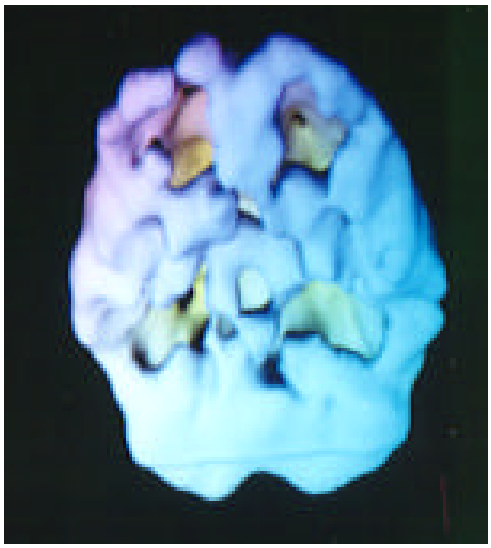
Alcohol



48 y/o -- 22 years of daily use with history of past head injury
underside surface view *front on surface view*
marked scalloping overall decreased activity



44 y/o -- 18 years of daily use
underside surface view
marked overall decreased activity

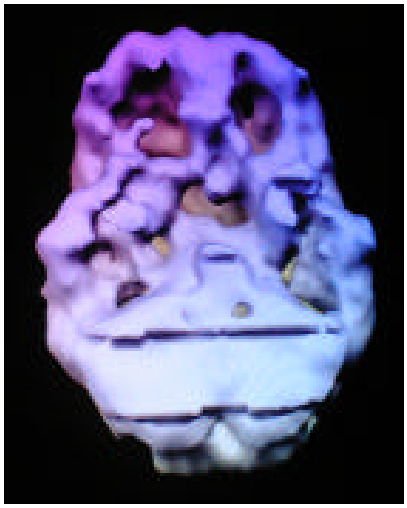


45 y/o -- 25 year history of daily abuse
underside surface view
marked overall decreased activity

Hope for Healing
Alcohol, Cocaine & Meth
On and Off Drugs

top-down surface view
during substance abuse

top-down surface view
a year drug and alcohol free



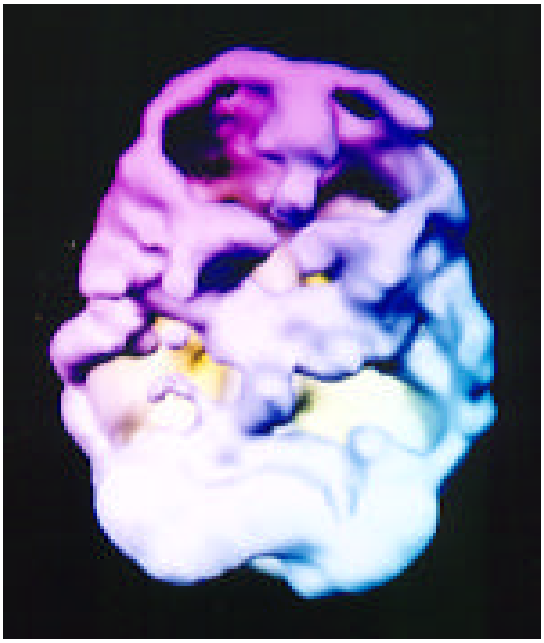
underside surface view
during substance abuse

underside surface view
a year drug and alcohol free

notice the overall holes and shriveled appearance during
abuse and marked improvement with abstinence

Heavy Nicotine & Caffeine Abuse

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



undersurface view
marked decreased overall activity