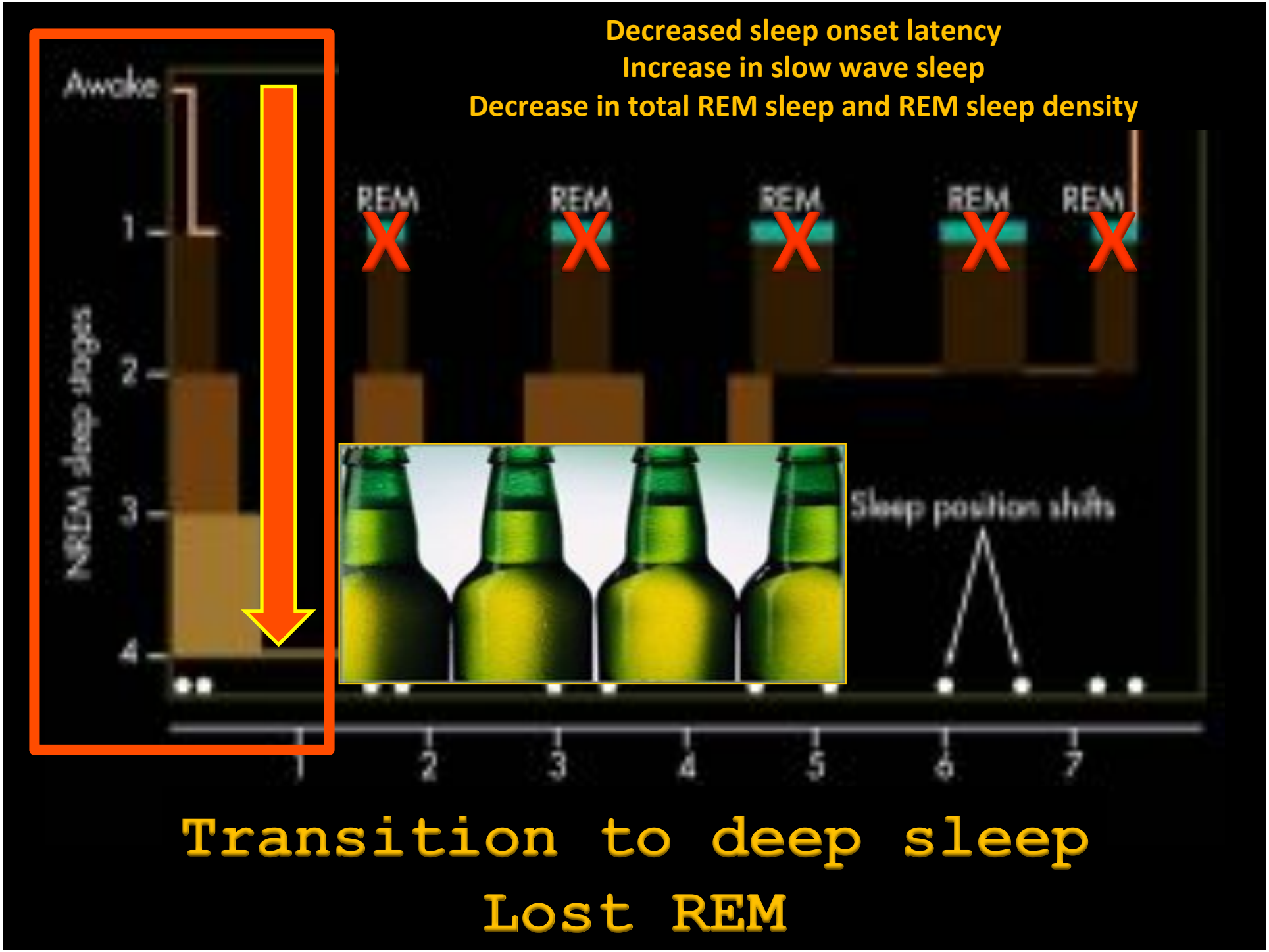

Decreased sleep onset latency
Increase in slow wave sleep
Decrease in total REM sleep and REM sleep density
Awake
1
2
3
4
NREM deep stages
REM
REM
REM
REM
REM
X
X
X
X
X
Sleep position shifts
1
2
3
4
5
6
7
Transition to deep sleep
Lost REM

REM and Alcohol Use

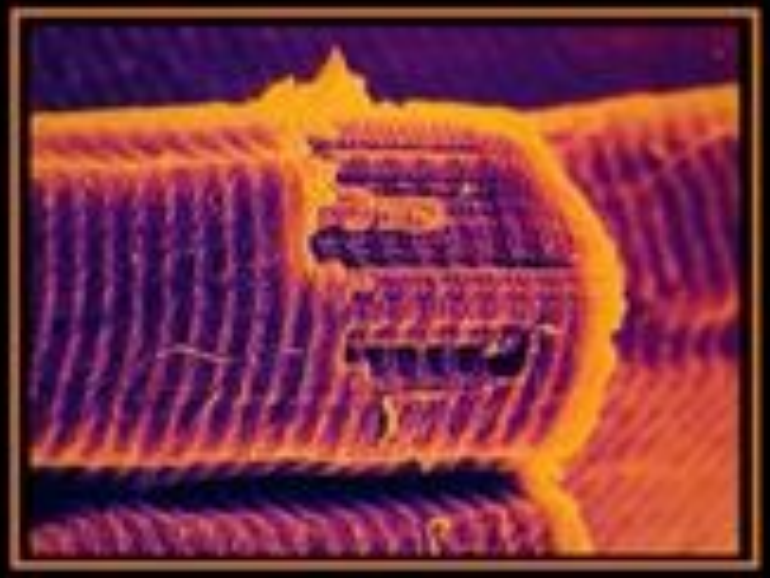
You are asleep but your CNS is not recovering!

You wake up the next day with an exhausted brain and central nervous system. Your alertness levels are decreased. Your level of focus is decreased. Your attention span is decreased. Your ability to process information is decreased. Your reaction time is 25% slower. Time to exhaustion is decreased. Perception of fatigue is higher!

None	1-2	3-4	5>
2:27	1:31	:58	:31


HGH
HGH
1 1/2 - 2 1/2 HOURS
Awake
1
2
3
4
NREM sleep stages
REM
REM
REM
Sleep position shifts
1
2
3
4
5
6
7
Hours of sleep
8 HOURS OF SLEEP

Sleep and GROW



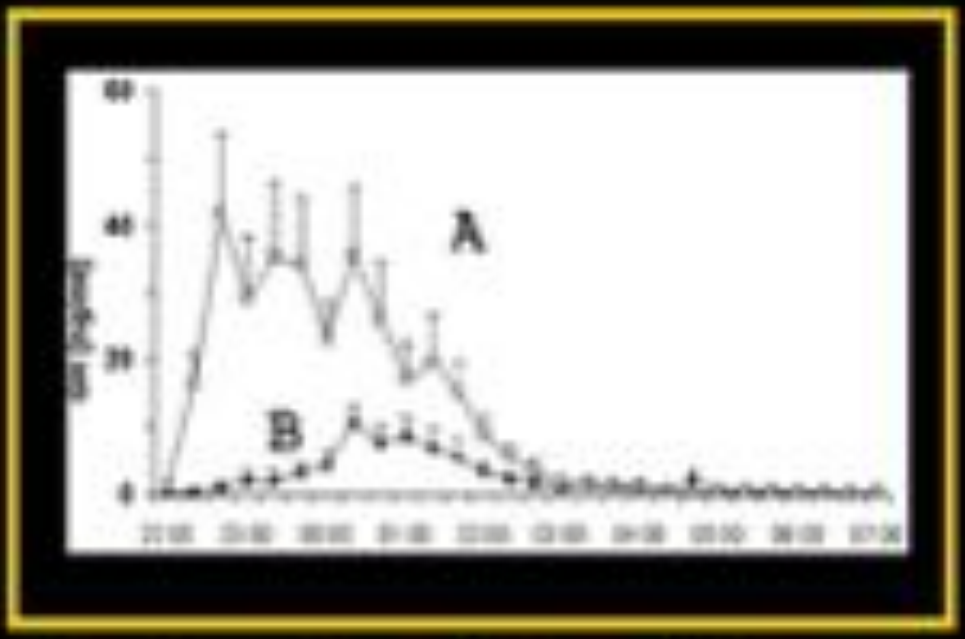
Sleep is a critical component in the muscle building process and should not be overlooked. Your muscle tissue repairs itself and grows during rest periods but sleep is more important than waking rest periods.

Here's why:

Life of an Athlete
Human Performance Project

The release of growth hormone reaches its peak during deep sleep
Your metabolic rate slows which is perfect for muscle tissue repair and growth
Increased blood flow to the muscles

HGH Release at night



A. sleep from 10pm. - 6am.
B. Sleep from 12am. - 8am.

) early... Lots of HGH

ised during the earlier hours of the
ter hours. Thus, sleep schedules are
A (8 hours of sleep from 10 pm to 6
r GH release than B 8 hours of sleep
8 am. The above diagram shows pulses
corresponding to the four sleep
during an average good night's sleep.

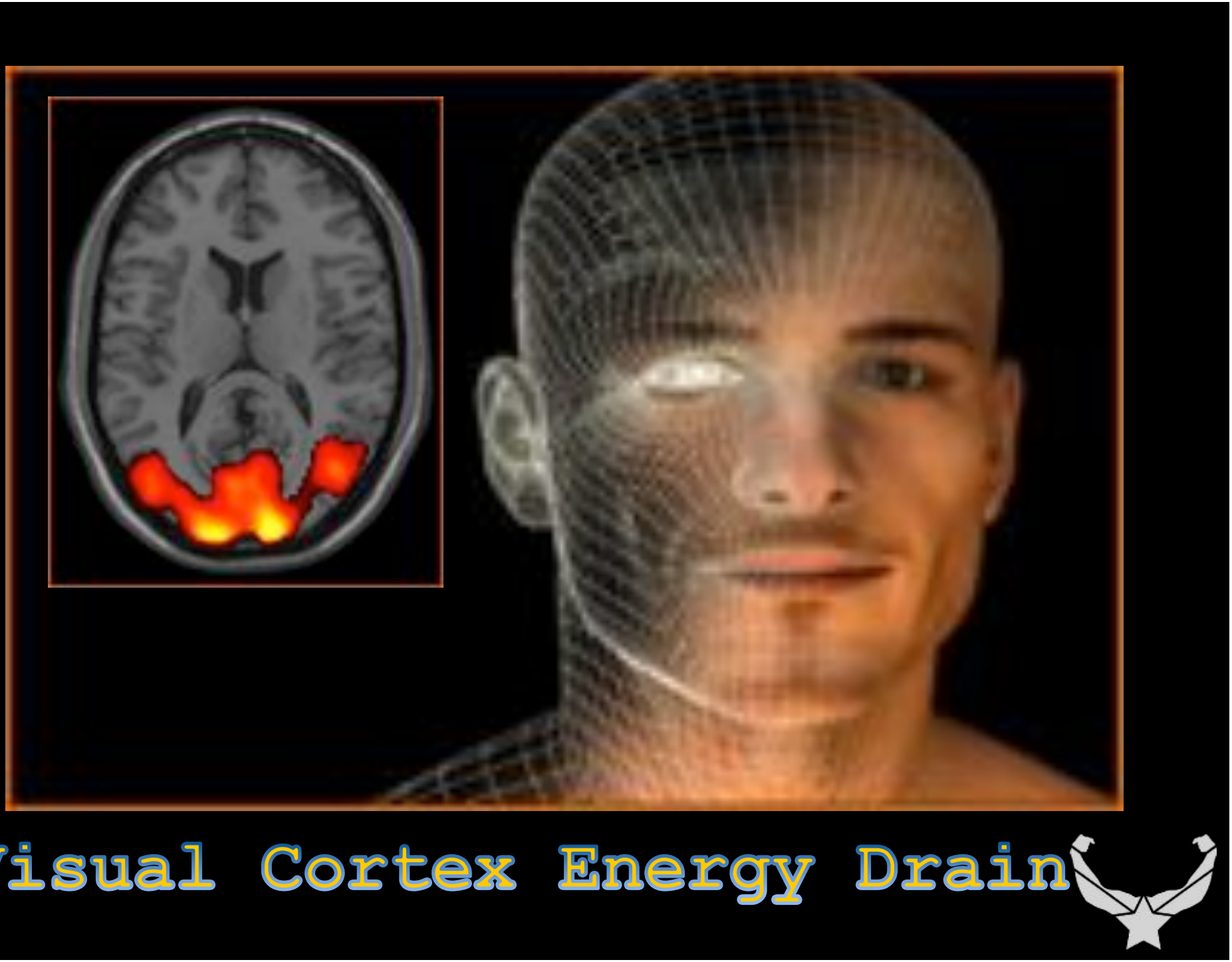
Life of an Athlete
Human Performance Project


I-net Generation

Life of an Athlete

STRESS
TIME LOSS
CNS FATIGUE
RECOVERY DELAYS
METABOLISM CHANGES
LOSS OF FOCUS

Technology has increased significantly the sedentary hours per week for all populations including athletes.


Visual Cortex Energy Drain

During an athletic competition,

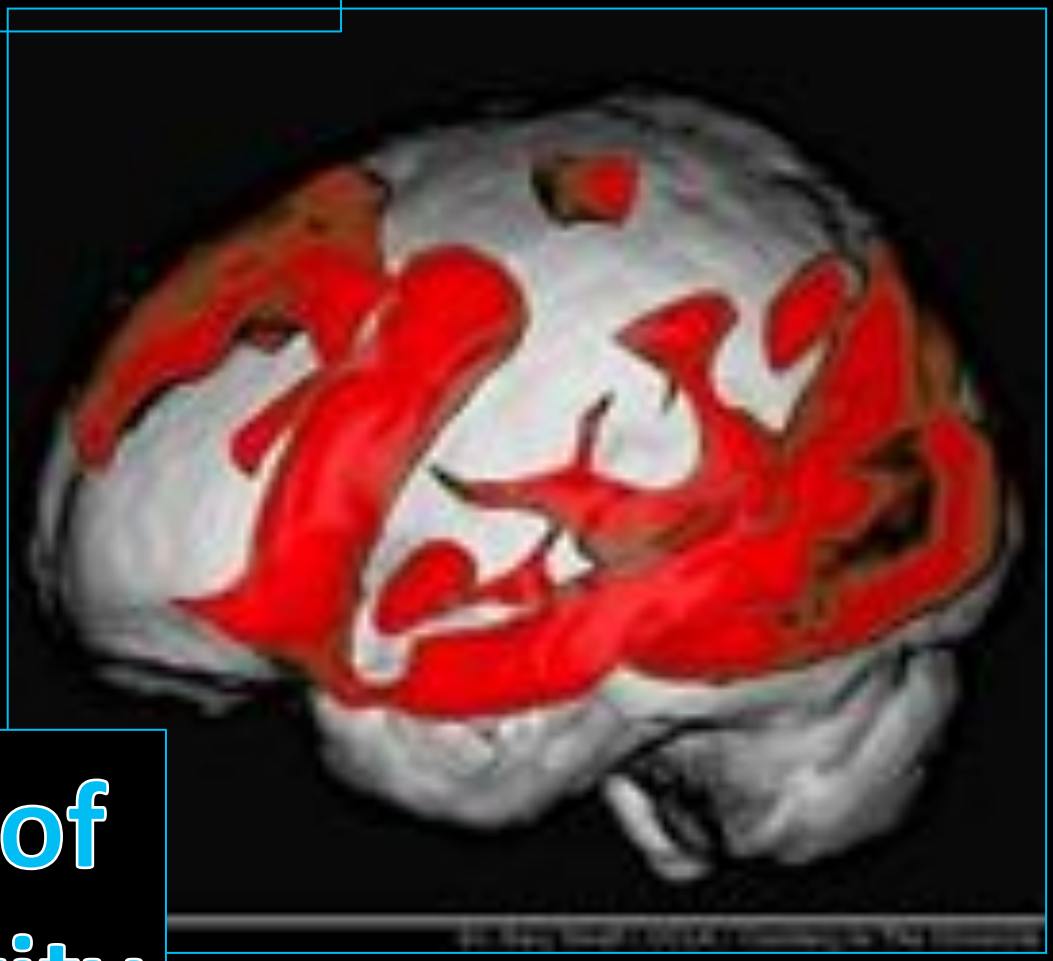
YOUR EYES PROCESS MORE THAN 120 MILLION BITS OF INFORMATION EVERY SECOND.

READ

INTERNET

Rest means Rest…

The CNS can rest and reboot critical energy when the brain function is minimal…



Nearly 2/3 of brains activity

Biggest Drain

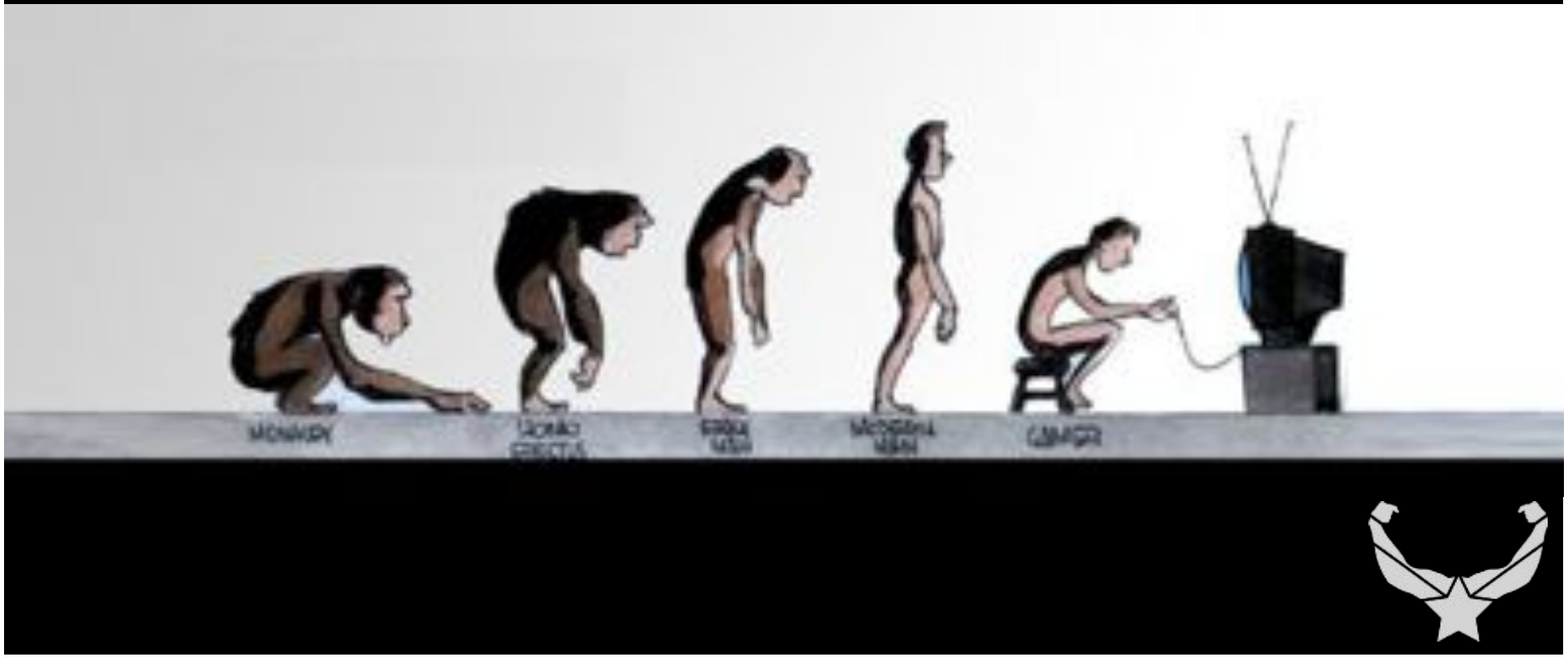
Tracking/following moving objects

Depth between objects

Speed/Velocity objects travel

The visual cortex drains much of the CNS energy during the waking hours.

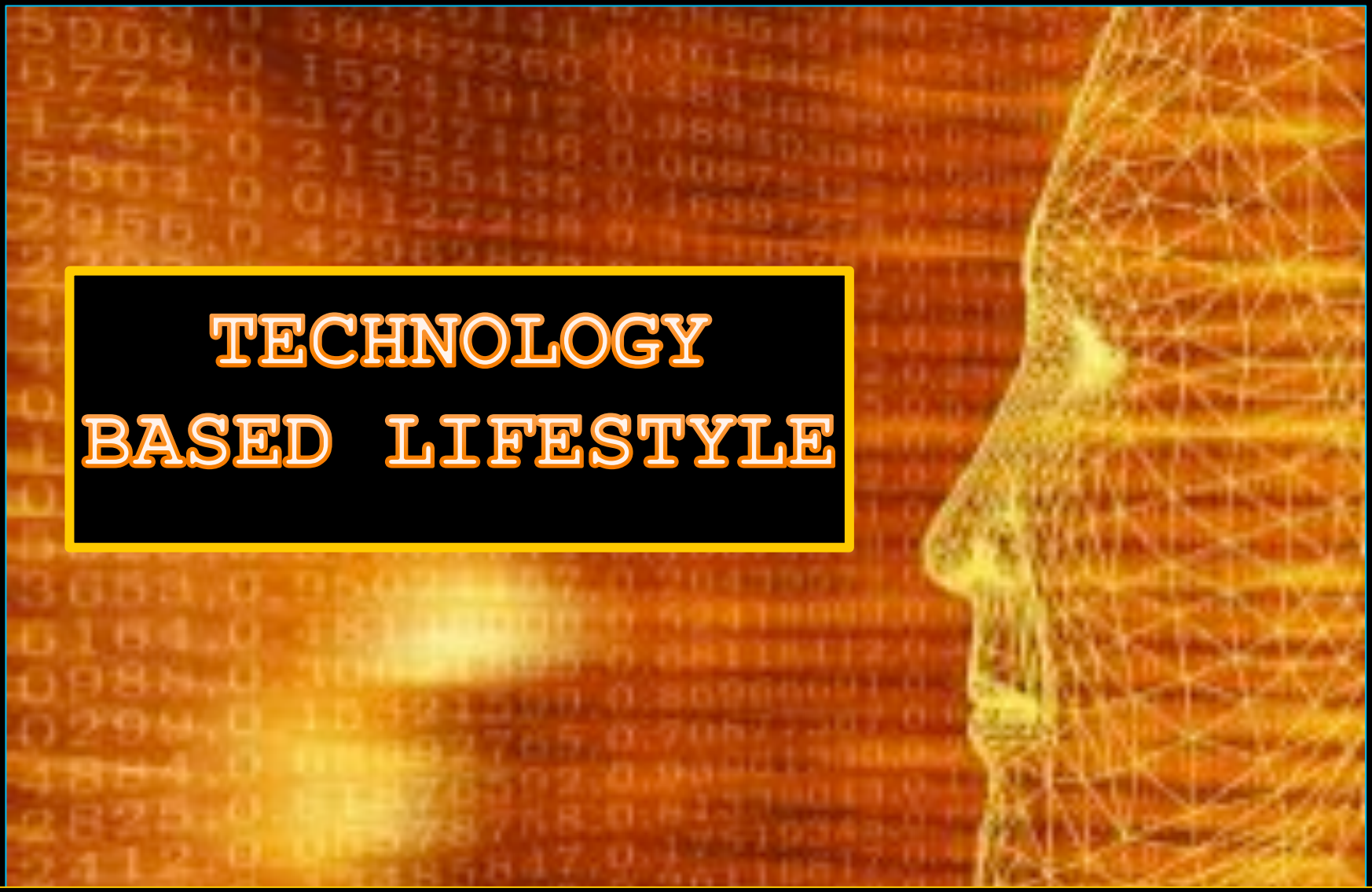
VIDEO  GAMES



Studies conducted at London's Hammersmith Hospital found that dopamine levels in players' brains doubled while competing in video games.

"I really only play Xbox," "I have been playing a lot of Call of Duty recently. I find myself playing like 30 hours per week. People don't know it's [me]. It is fun, I am very competitive in everything I do."

Michael Phelps



Is not conducive to optimal training, recovery, adaptation or performance.

Tech creates problems

Blue Light Disturbances

Blue light from a 10:00 AM sky, blue light from your computer screen at midnight – it makes no difference to our circadian rhythms. It's all the same to our bodies, because for millions of years blue light meant daylight, not late night. Texting or channel hopping on TV and it's the blue light specifically that appears to monitor our sleep patterns the most. Computer screens, iphones, TV or Ipads send late into the night distract your natural physiological processes, more than you need for sure!

The adverse effects of night-time light on sleep and circadian rhythms can be reduced by replacing blue-enriched light with red- or orange-enriched white light after sunset.

Using these devices in total darkness makes the problem even worse!

But a time or your body can get into a Bio-Rhythm...

It is critical to establish a regular bedtime and wake time. The interval between these two times must allow a person to reach enough sleep. Athletes need more sleep. A typical high school or MIAA athlete would need more than nine hours in bed.

Life of an Athlete
Human Performance Project

Brain Stimulation

Delays brains transition from wake state to sleep

Prevents Brain Shutdown

Blue light keeps you awake and throws off your bio- rhythms!

Blue Light Tips for Athletes

Evening blue light is problematic, and these are some simple steps you can take to mitigate its late-night effect on your sleep.

Keep electronics usage to a minimum or completely eliminate blue light (xlarge, TVs, laptops) after dark.
Go to sleep earlier.
Use candlelight.
Keep your room as dark as possible and your sleeping quarters pitch black.
Install F.lux (totally free) on your computer to cut down on blue light emissions.
If you want to try a somewhat extreme experiment you could even wear orange safety glasses at night.

Do not use blue light devices in total darkness (see pic)

Life of an Athlete
Human Performance Project

Limit blue light at night

Avoid Blue Light and total darkness

Change to PINK

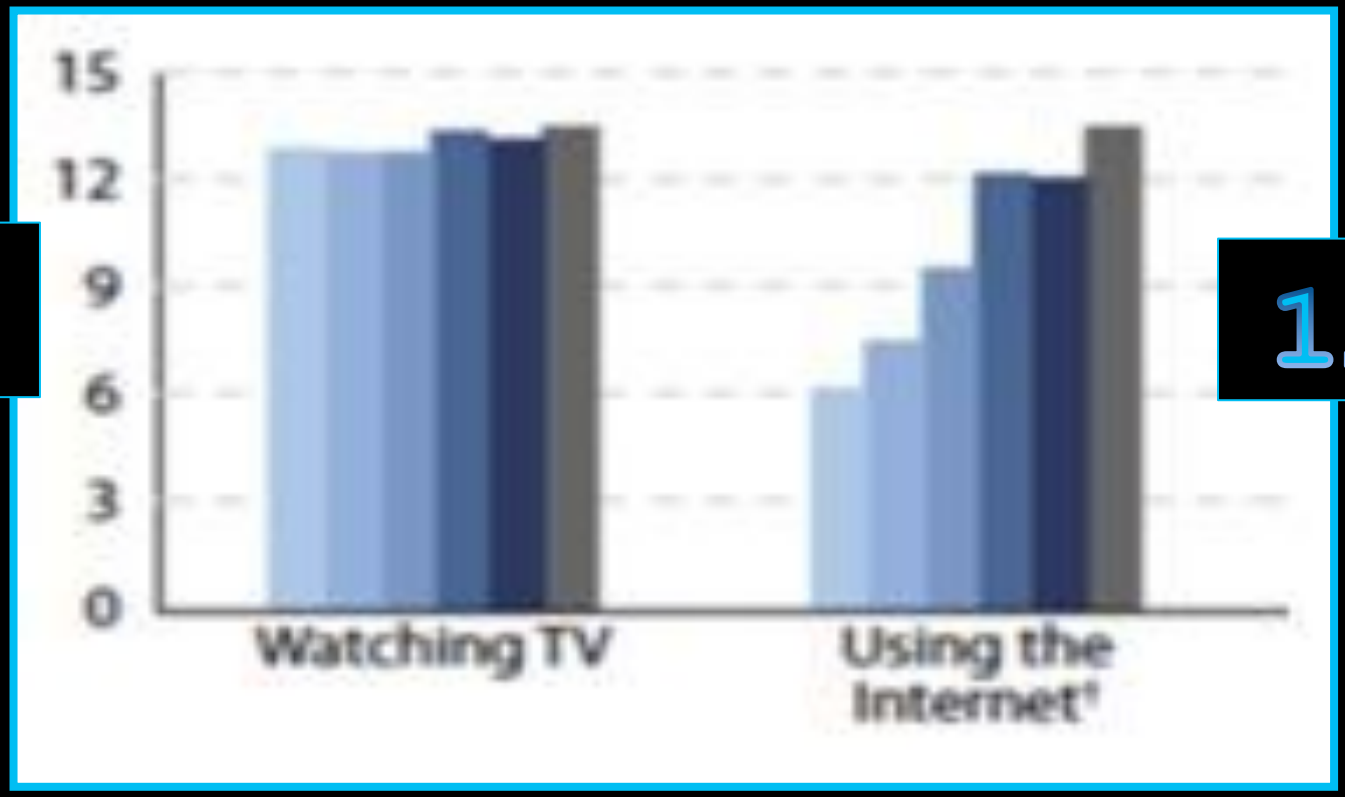
Blue Light Reducing Computer Glasses

Filters

13 HRS

13 HRS

5%



121%

INCREASE IN TV AND INTERNET TIME IN LAST FIVE YEARS

26 HOURS PER WEEK

+10-15-20 Hours

High level populations can use blue light to advantages!

Just like blue light wavelengths can be detrimental to falling asleep, it can also help the brain stay stimulated under CNS fatigue conditions or help speed up the waking reflex in those who need to get highly functional after sleep. RPI in upstate NY is developing these blue light glasses to help with sleep disorders but they also have application for stimulation. Blue light could be utilized shortly after awakening to shorten the grogginess and cotinetos many experience prior to a morning workout. When we consider that morning is now the optimal time for high level training, there is huge applications, said John Underswood, Director of the Human Performance Project.

Life of an Athlete
Human Performance Project


facebook
wasting athletes time since 2004

Stimulants

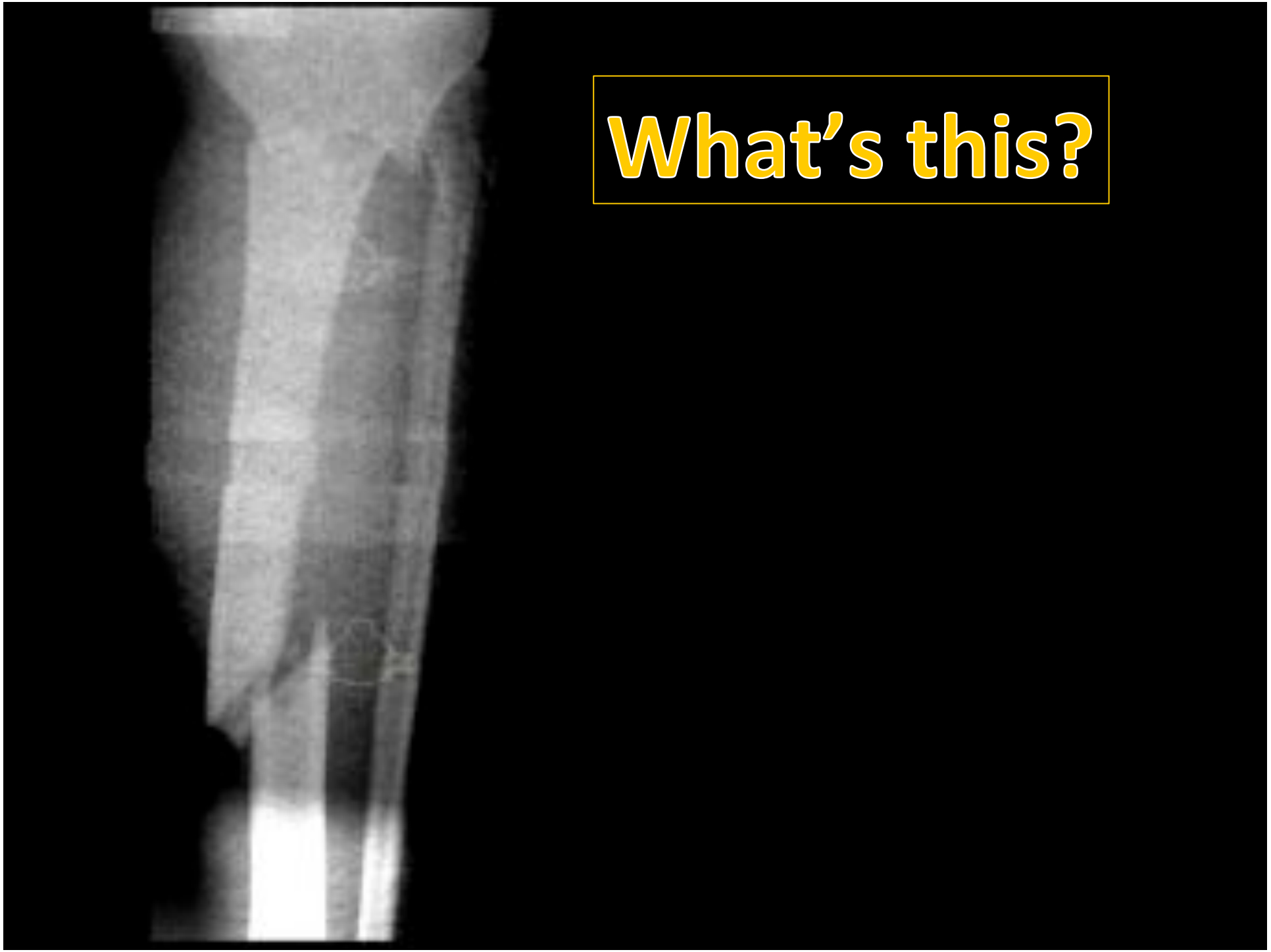
There is no way to make up for the deficits of lost sleep with stimulants

ENERGY DRINKS

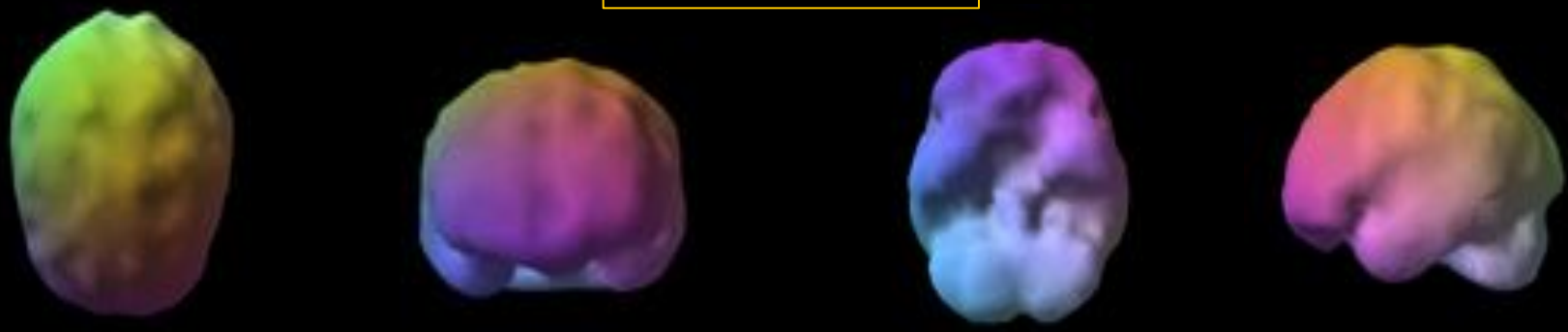
Use of Stimulants for CNS Fatique

Clearly any athlete that is suffering from serious CNS fatigue or Neural Fatigue NF knows that it will be a long painful training session. Many use energy drinks or stimulants or the original coffee or espresso. This is a huge mistake! The athlete will quickly experience an energy spike or surge within ten to twenty minutes and then rapidly sink into even greater deficits of NF. The only way to overcome NF is rest and in particular REM sleep. Power naps less than 30 minutes have been shown to elicit a 30% increase in alertness (NASA says 26 minutes) , but it will not overcome NF. So suffer through the session and head to bed early. It is no different than waiting for your body to recover from the poisoning of alcohol. You are at the mercy of the timeline for return to normalcy!

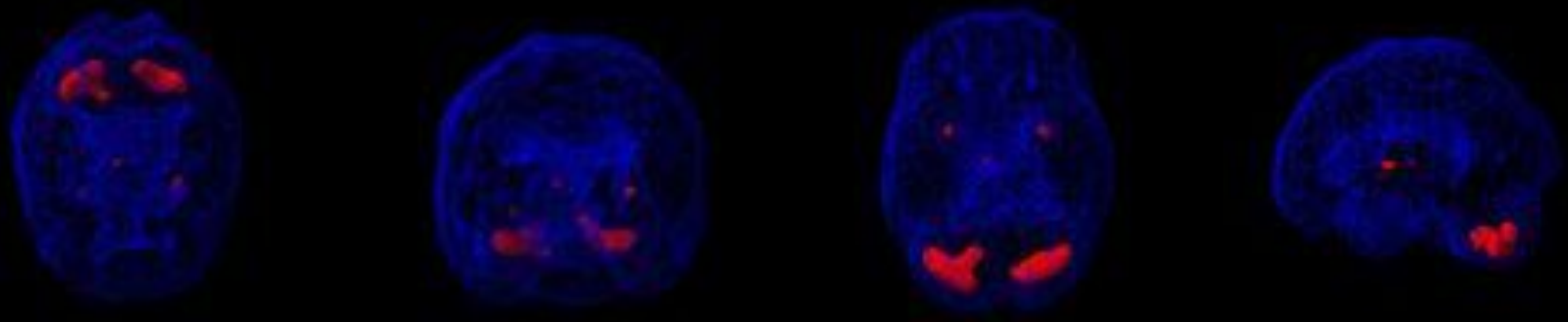
Life of an Athlete
Human Performance Project


What's this?

DAMAGE

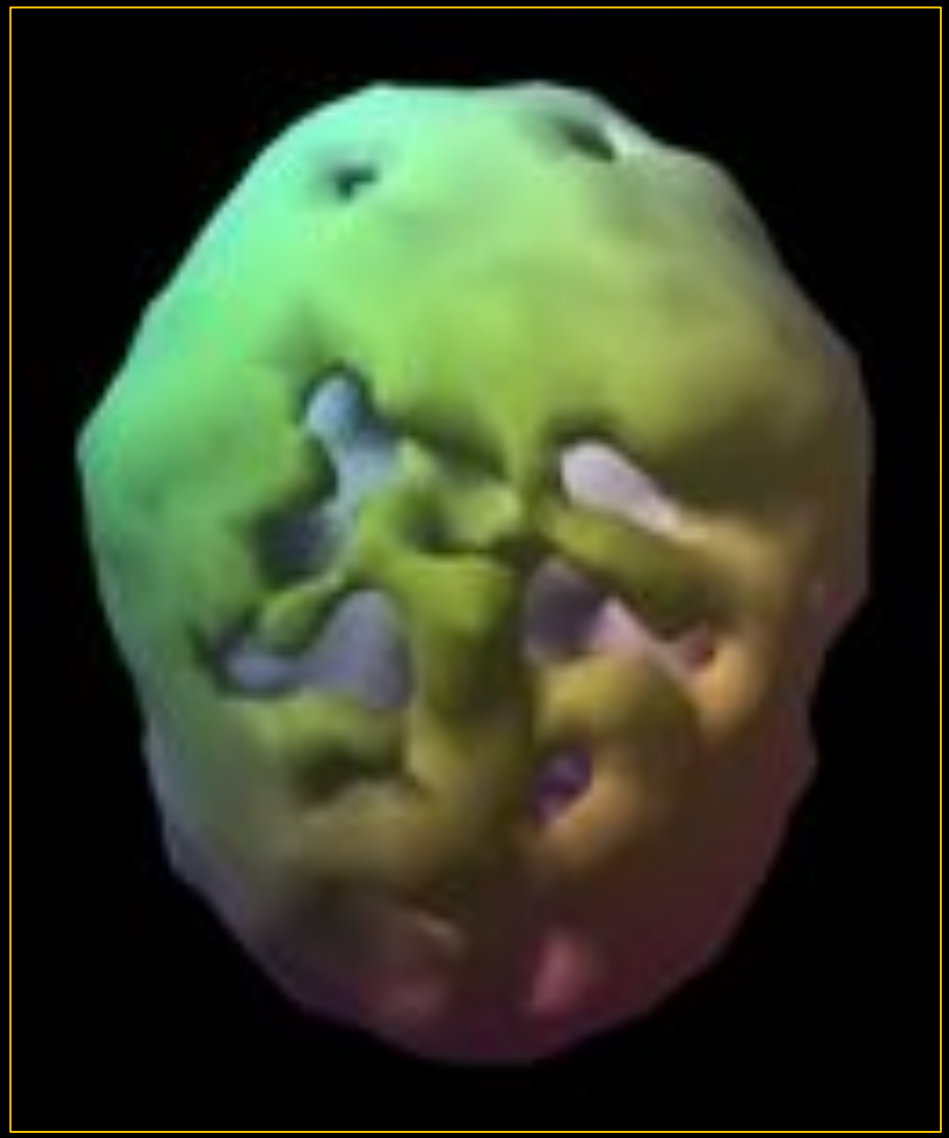


Single Photon Emission Computerized Tomography



ACTIVITY

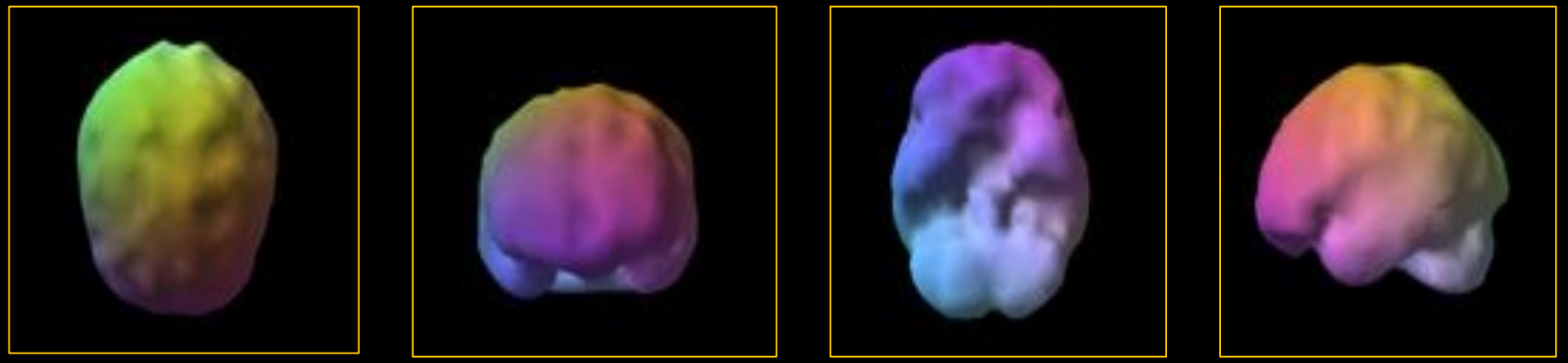
SPECT



We now have indisputable evidence of systemic damage and cumulative damage.

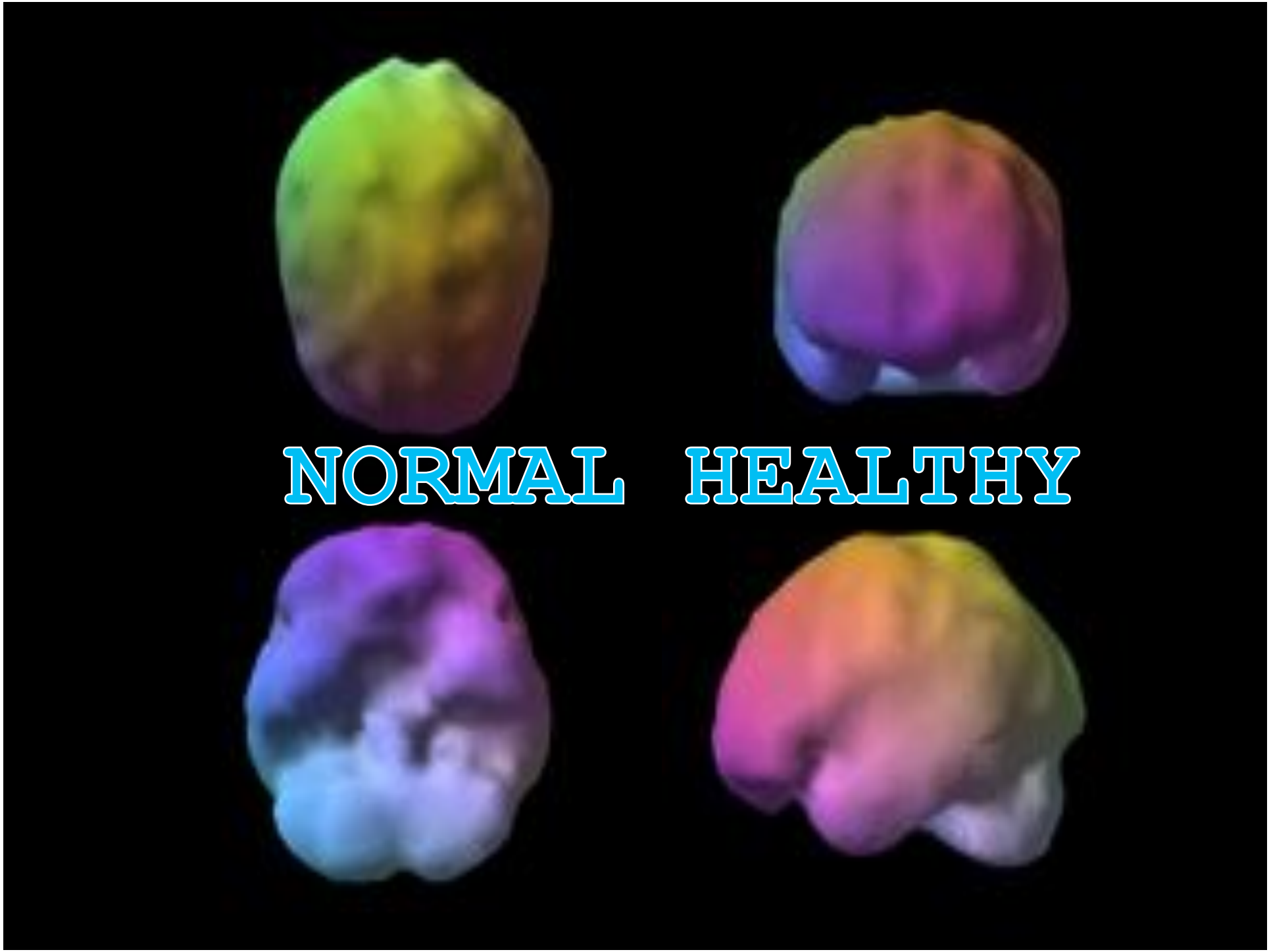
BRAIN SCIENCE ADVANCES

TOP FRONTAL BOTTOM SIDE

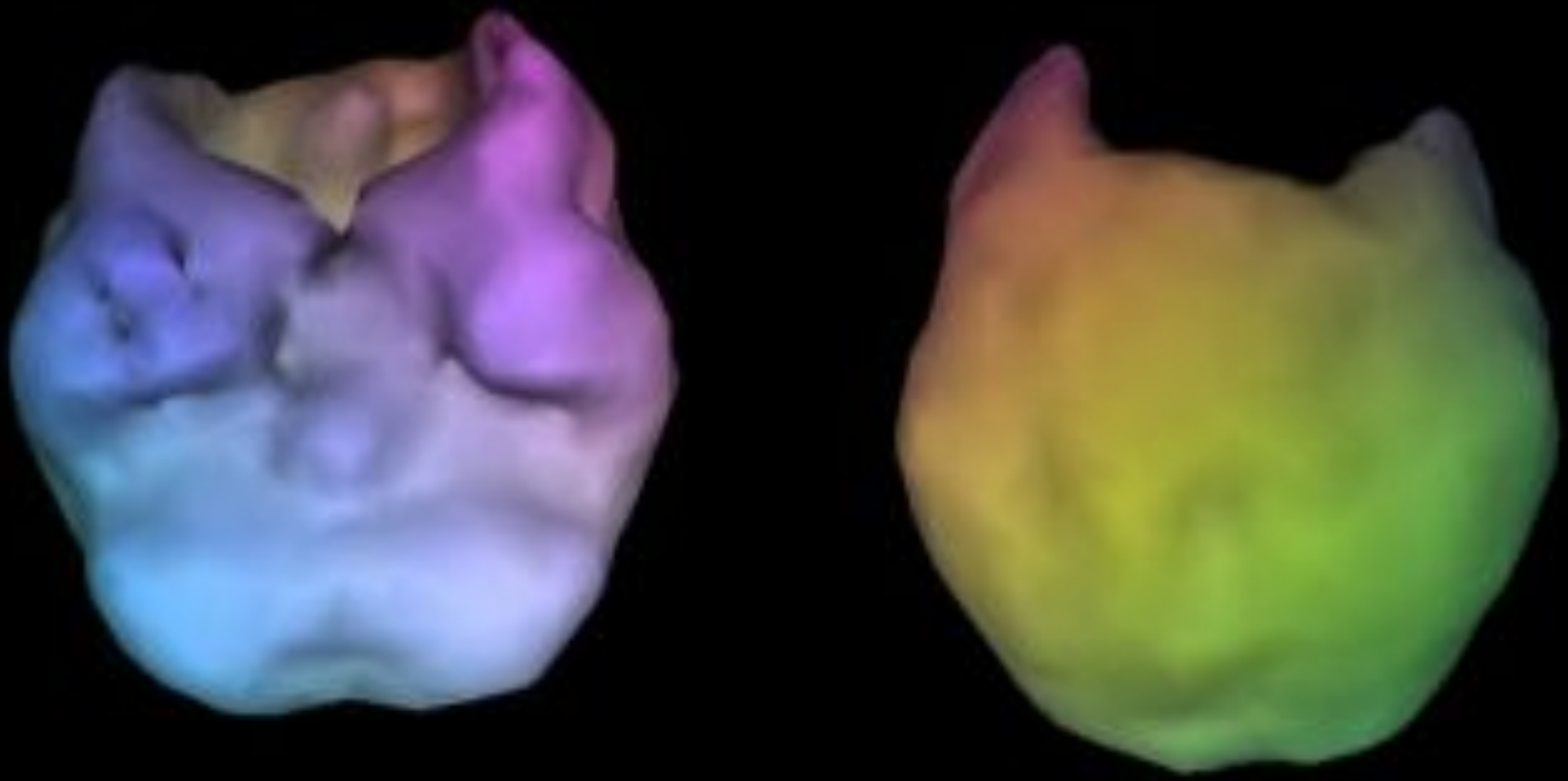


NORMAL

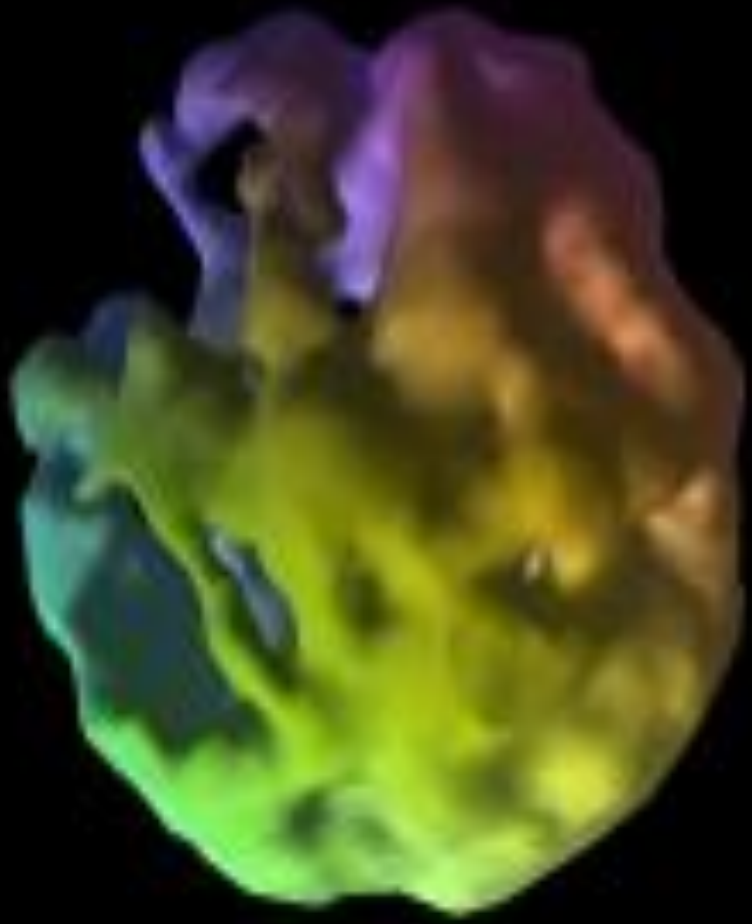
HEALTHY


NORMAL HEALTHY

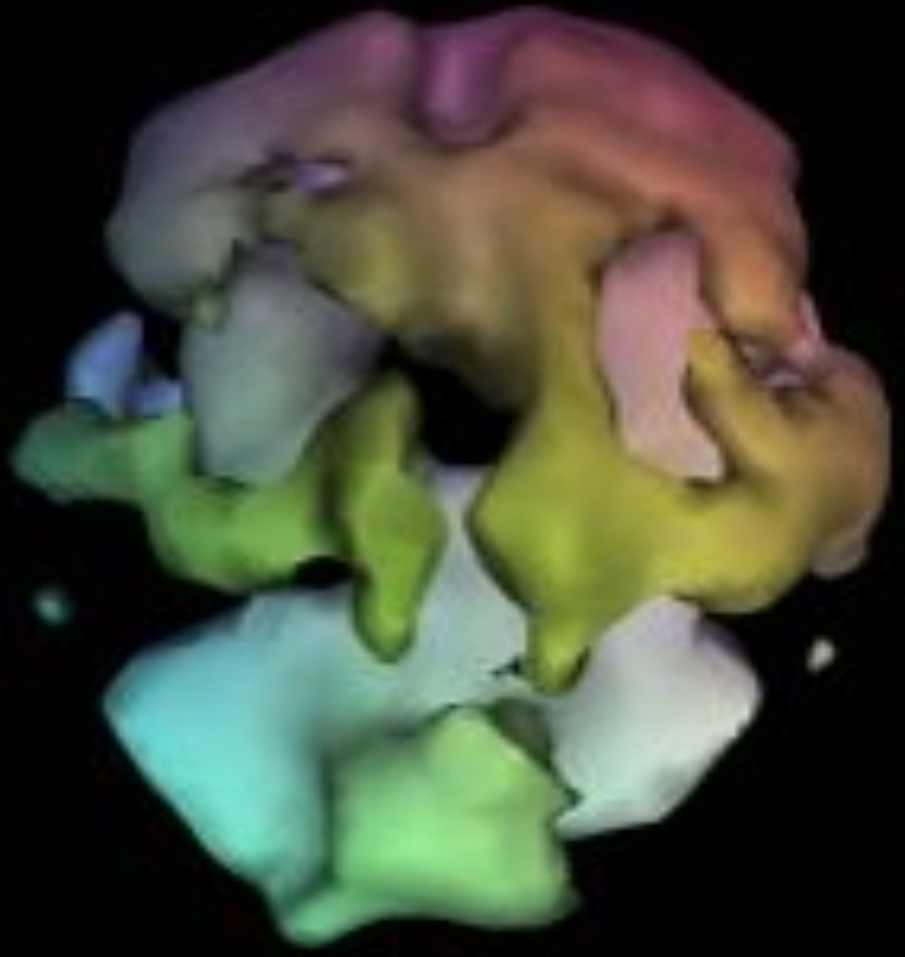
Severe Brain Injury



Stroke

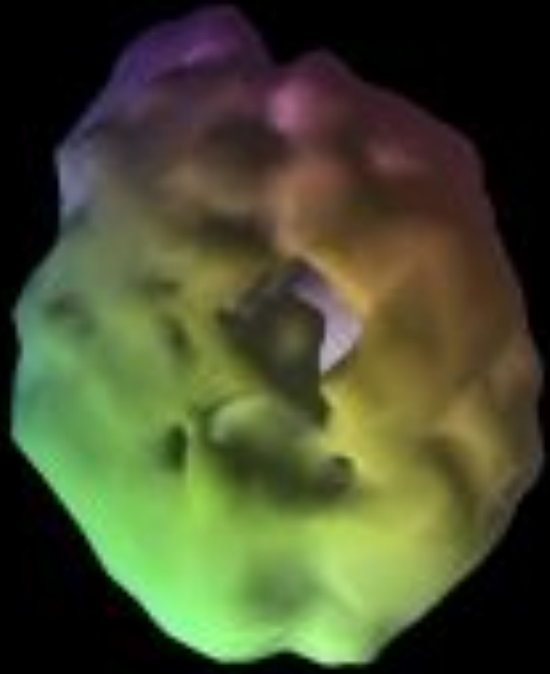


Alzheimer's

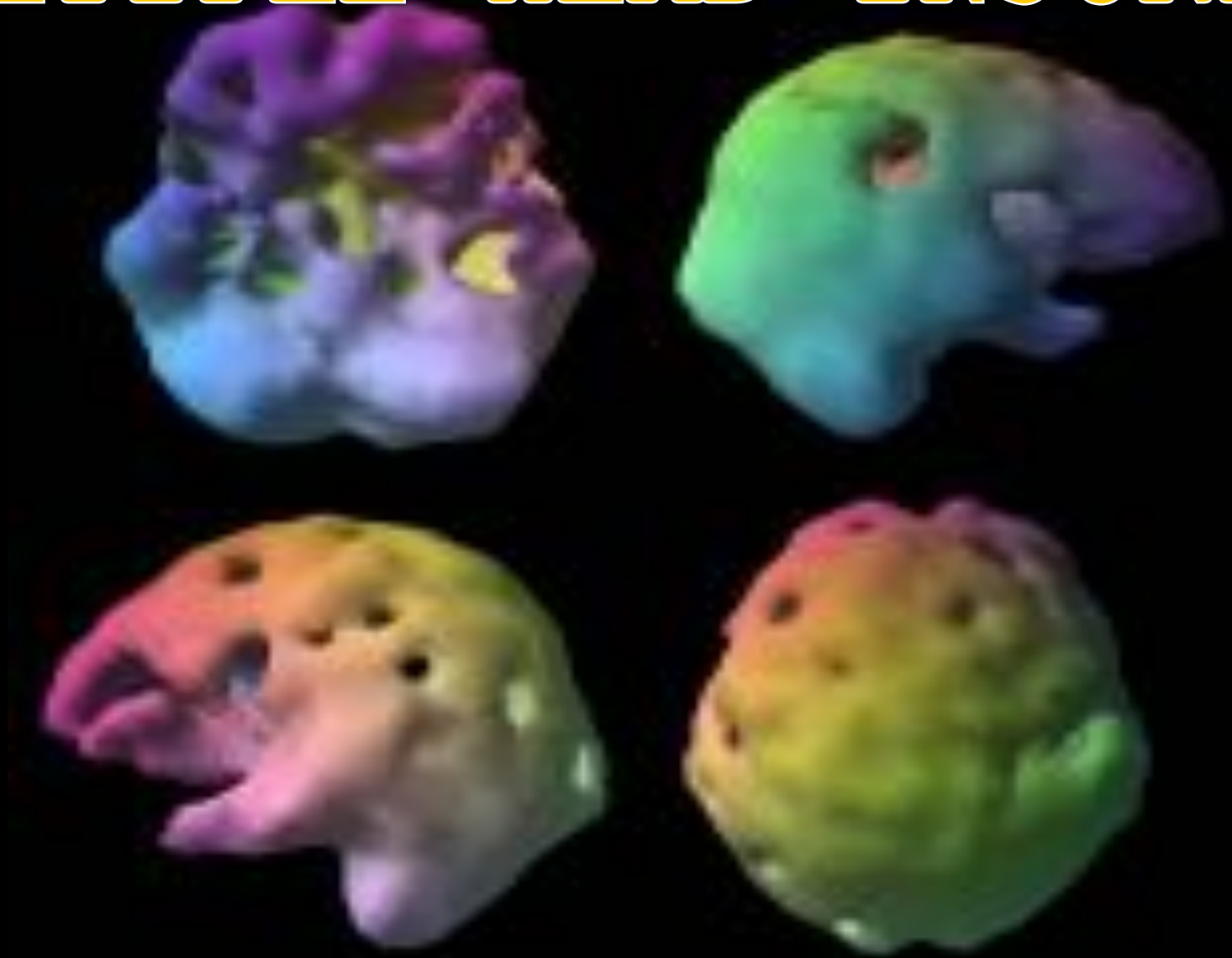


Brain Degeneration

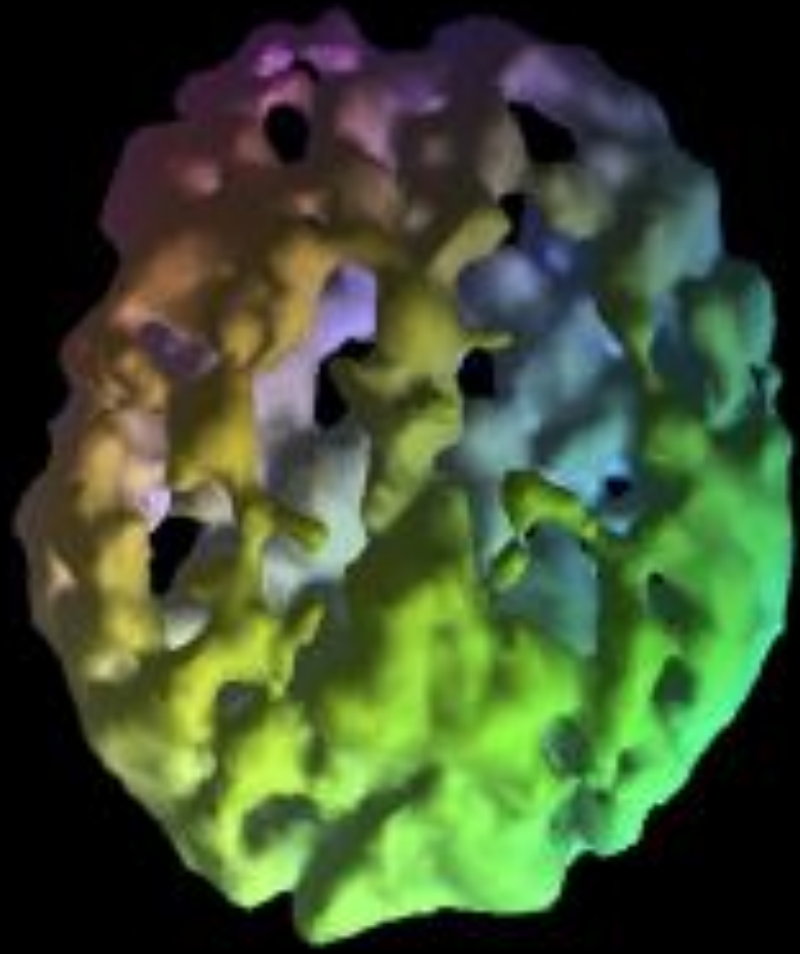
NFL NHL BRAIN INJURY STUDIES



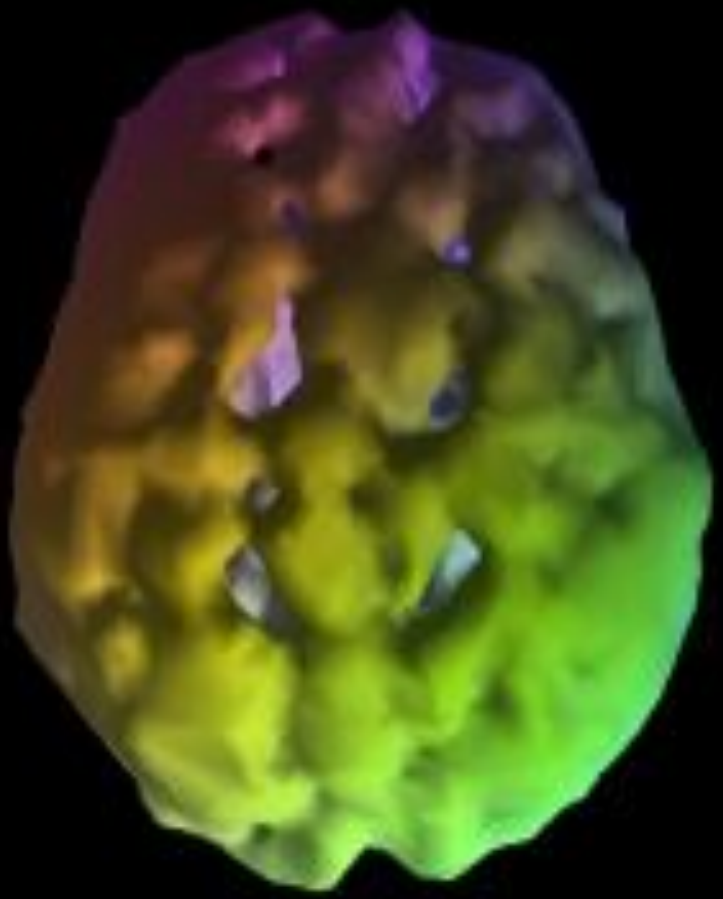
MULTIPLE HEAD INJURIES



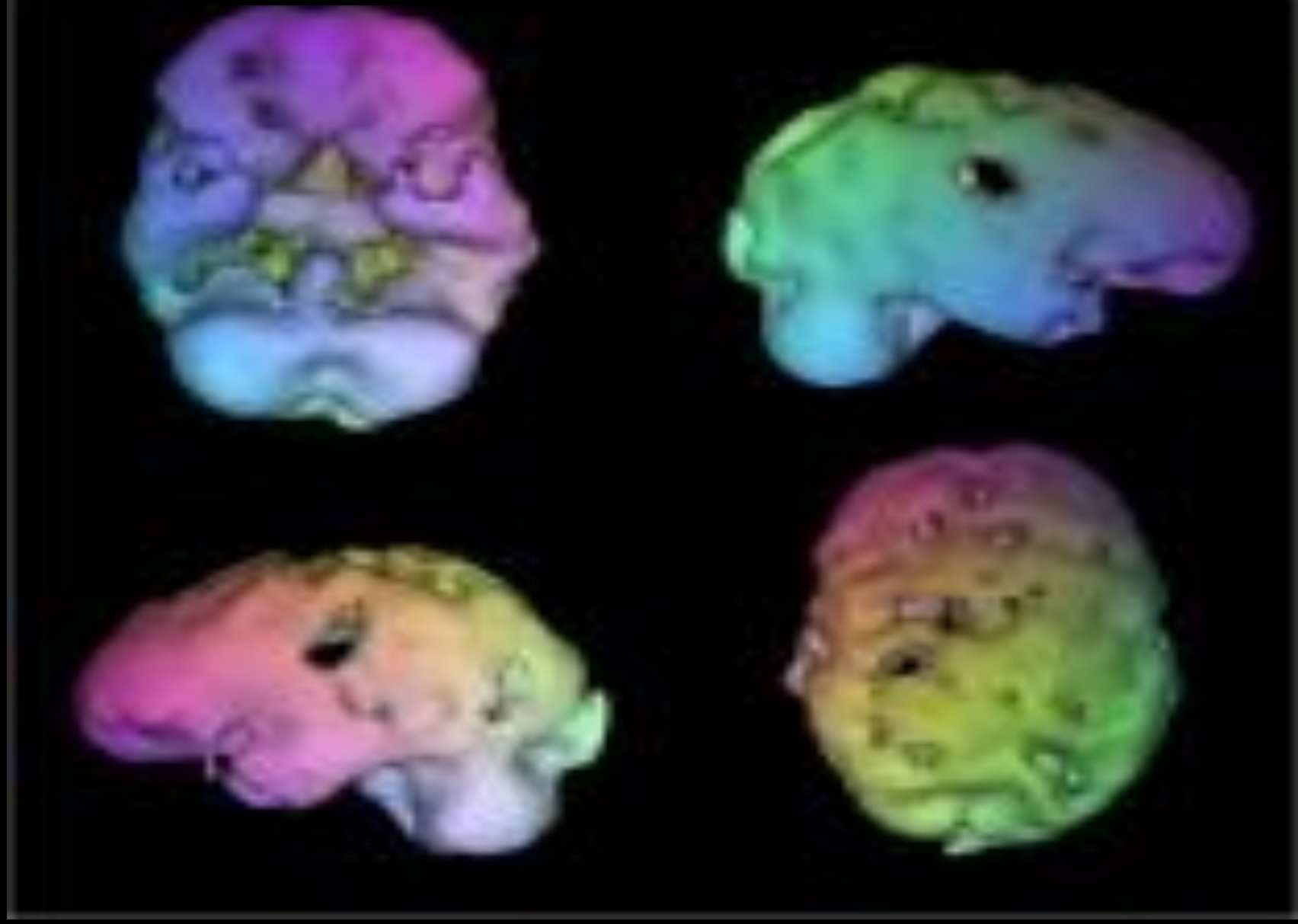
HEROIN



COCAINE

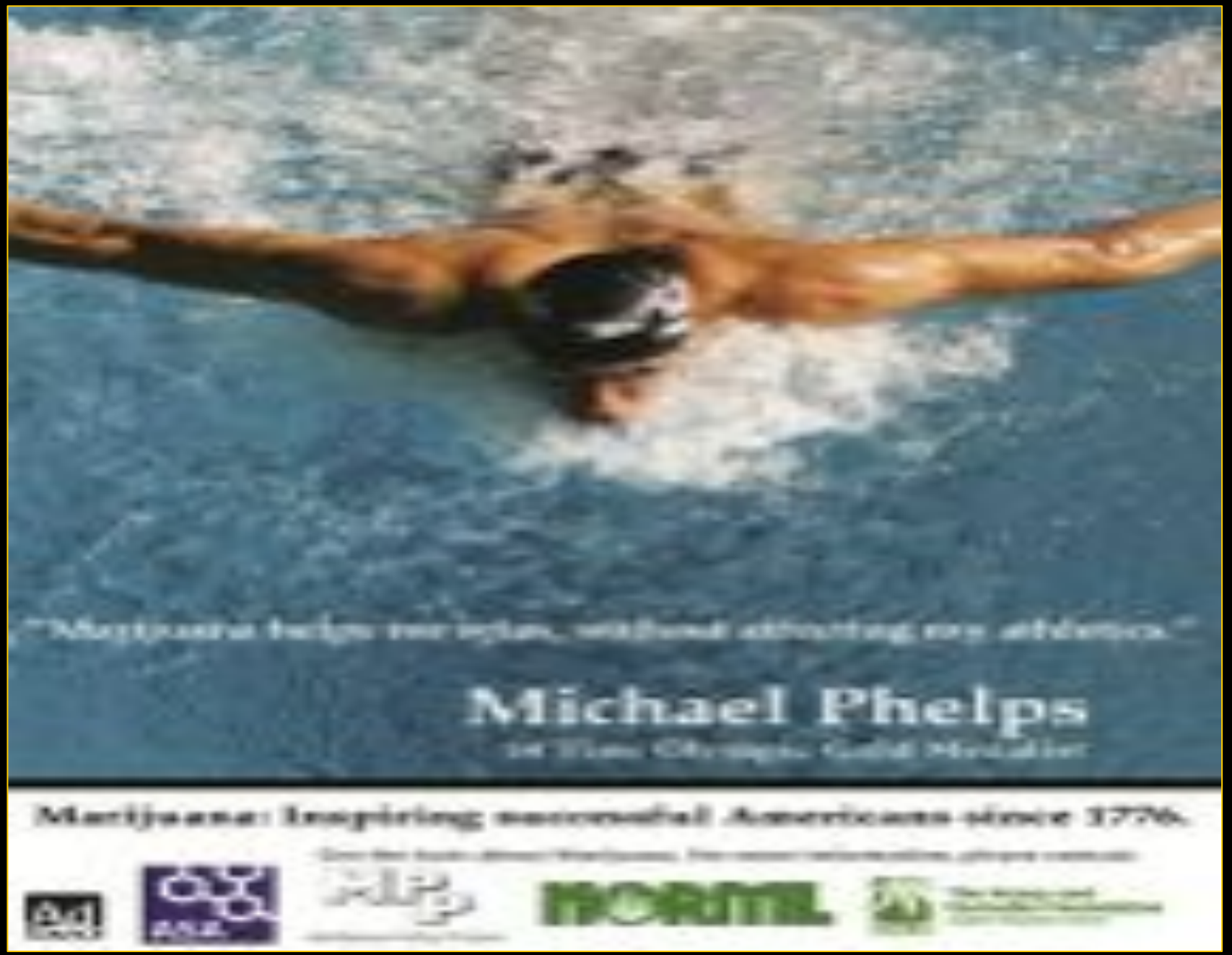


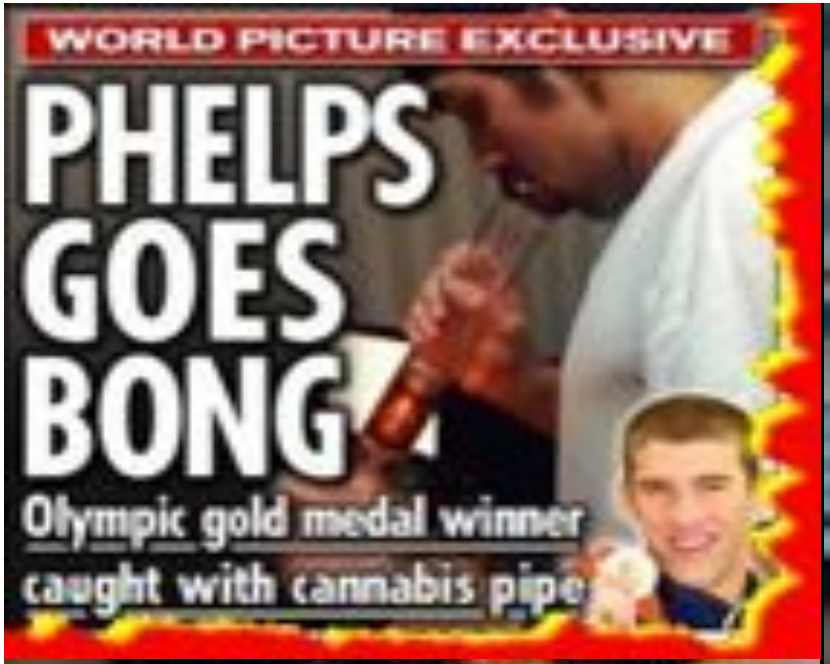
METHAMPHETAMINE



SOCIAL DRUGS


TIME
American
REBEL


Michael Phelps
Marijuana: Inspiring successful Americans since 1776.
NORML


WORLD PICTURE EXCLUSIVE
PHELPS GOES BONG
Olympic gold medal winner caught with cannabis pipe


14 OLYMPIC GOLD MEDALS
37 WORLD RECORDS.
2 AWESOME LUNGS.
Don't let the government fool you


SMOKING MARIJUANA
WASTES POTENTIAL


NCAA
Social Drugs

National Study of Substance Use Trends Among NCAA College Student-Athletes

Alcohol 83%
MJ 22%


Pure Performance Project
John Underwood
Director,
American Athletic Institute

Substance Use Categories

Alcohol
Marijuana
Amphetamines
Anabolic Steroids
Cigarettes
Snuff Tobacco
Cocaine
Ephedrine

RX drugs and Athletes

Although athletes are young and generally healthy, they use a variety of non-doping classified medicines to treat injuries, cure illnesses and obtain a competitive edge. Athletes and sports medicine physicians try to optimize the treatment of symptoms related to extreme training during an elite athlete's active career. According to several studies, the use of Rx medication is more frequent among elite athletes than in the general population.

Substance Use

1985
1997
2001
2005
2009
2012

National Study of Substance Use Trends Among NCAA College Student-Athletes

The NCAA salutes

440,000

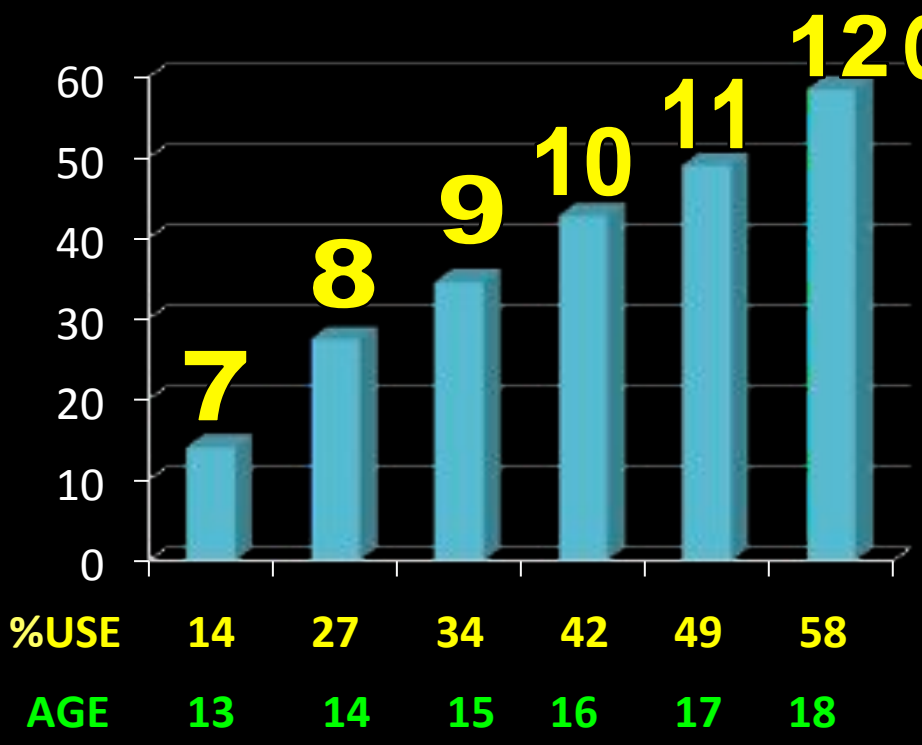
student-athletes

participating in

23 sports at

1,200 member institutions

JR. ATHLETES REPORTING ALCOHOL USE DURING SPORT SEASON



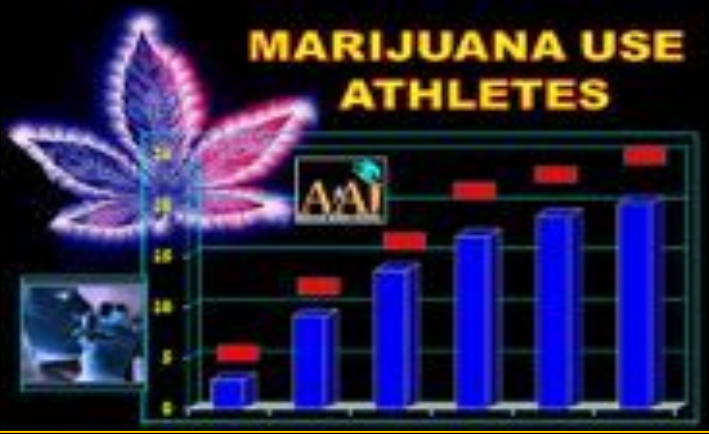
ALCOHOL USE ATHLETES

Middle School – High School

Junior Level

Athlete Use of
Marijuana

Age	Grade	% Using
13	7	3%
14	8	9%
15	9	13%
16	10	17%
17	11	19%
18	12	20%

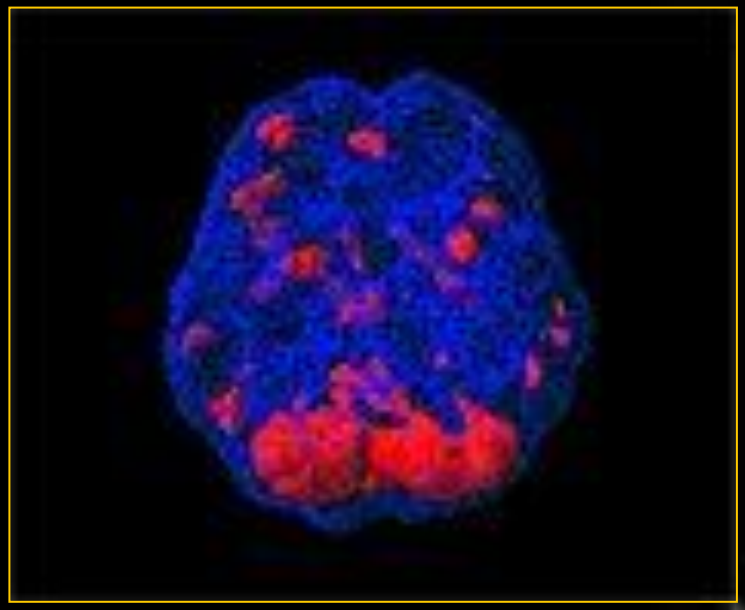


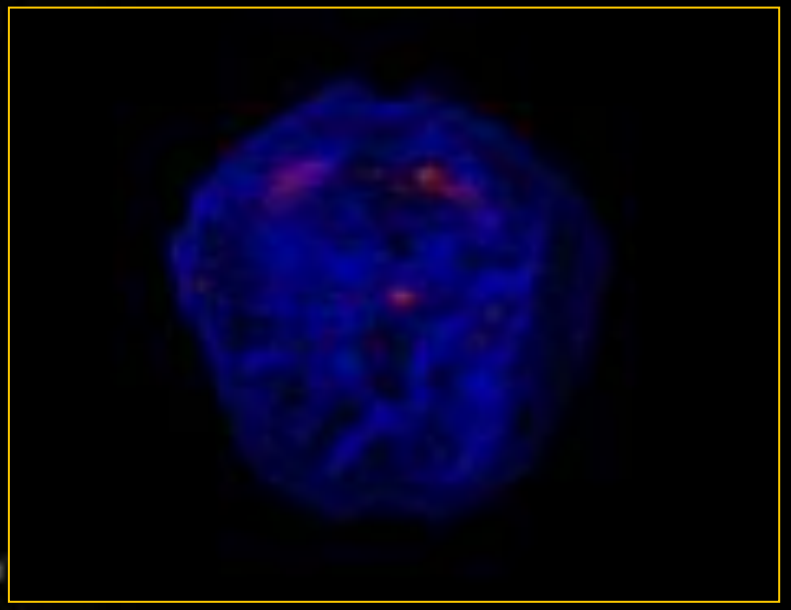
Brain Activity Alcohol

Not under influence

Intoxicated

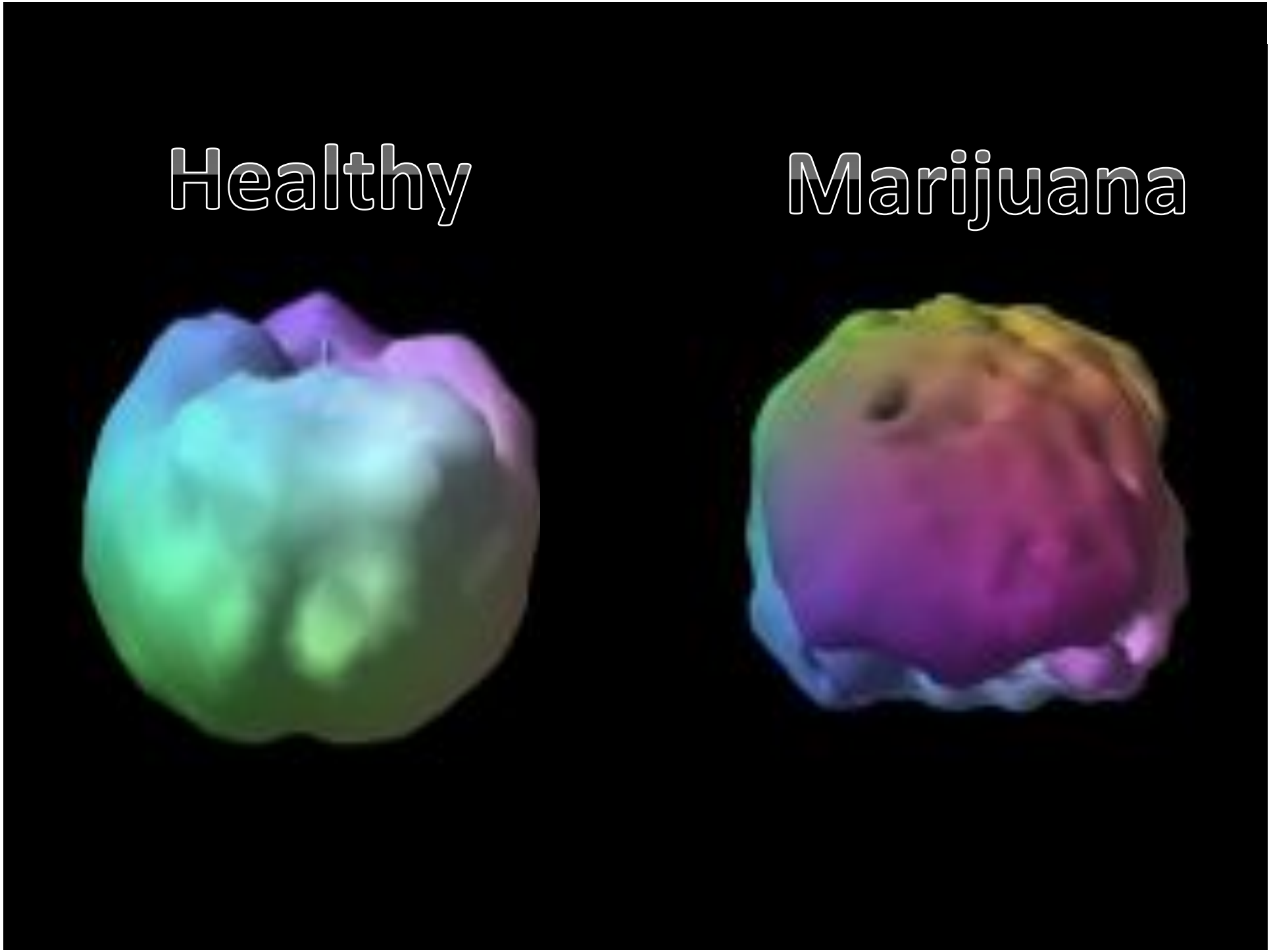
Brain Activity Marijuana

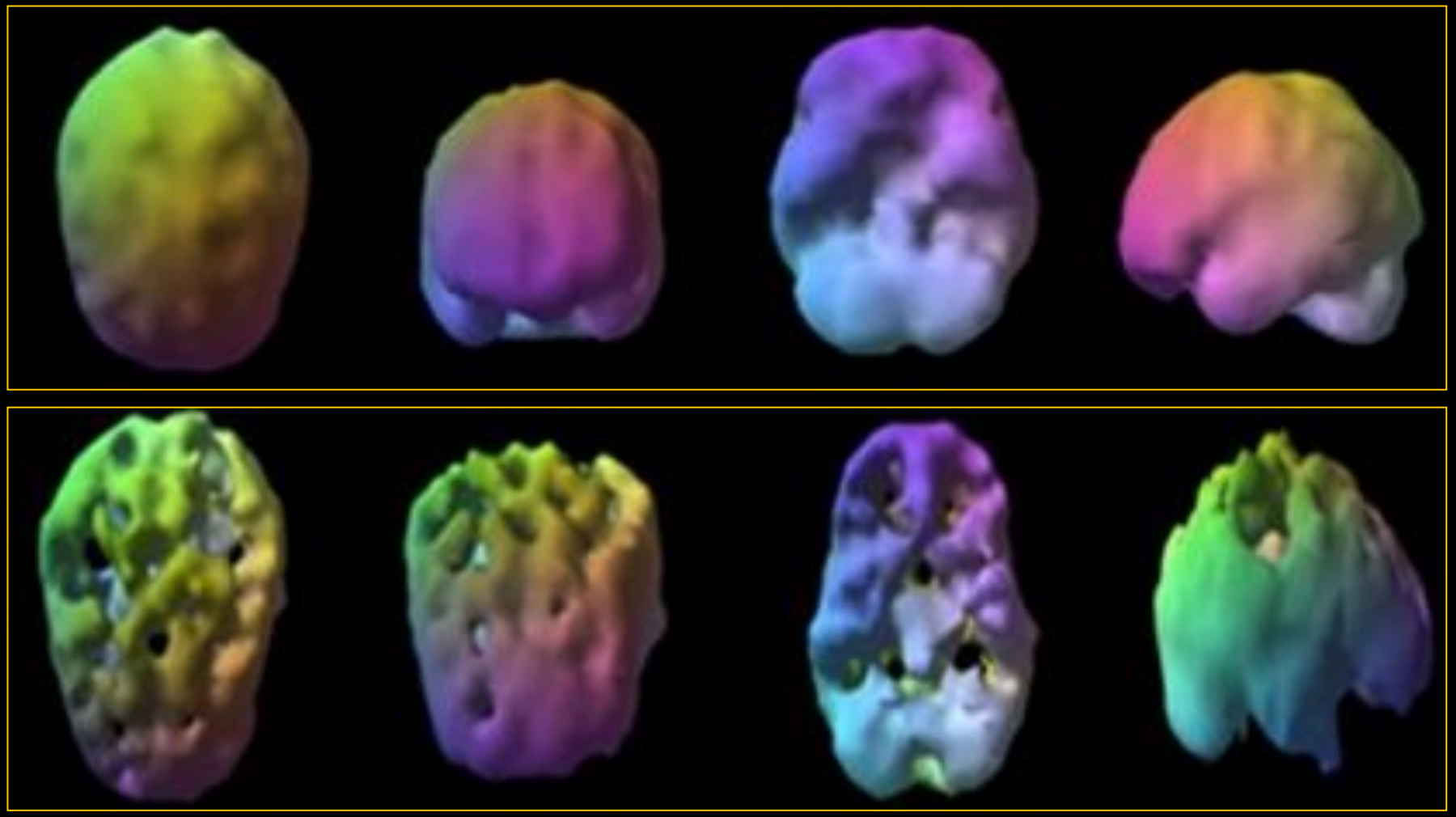




Not under influence

Stoned

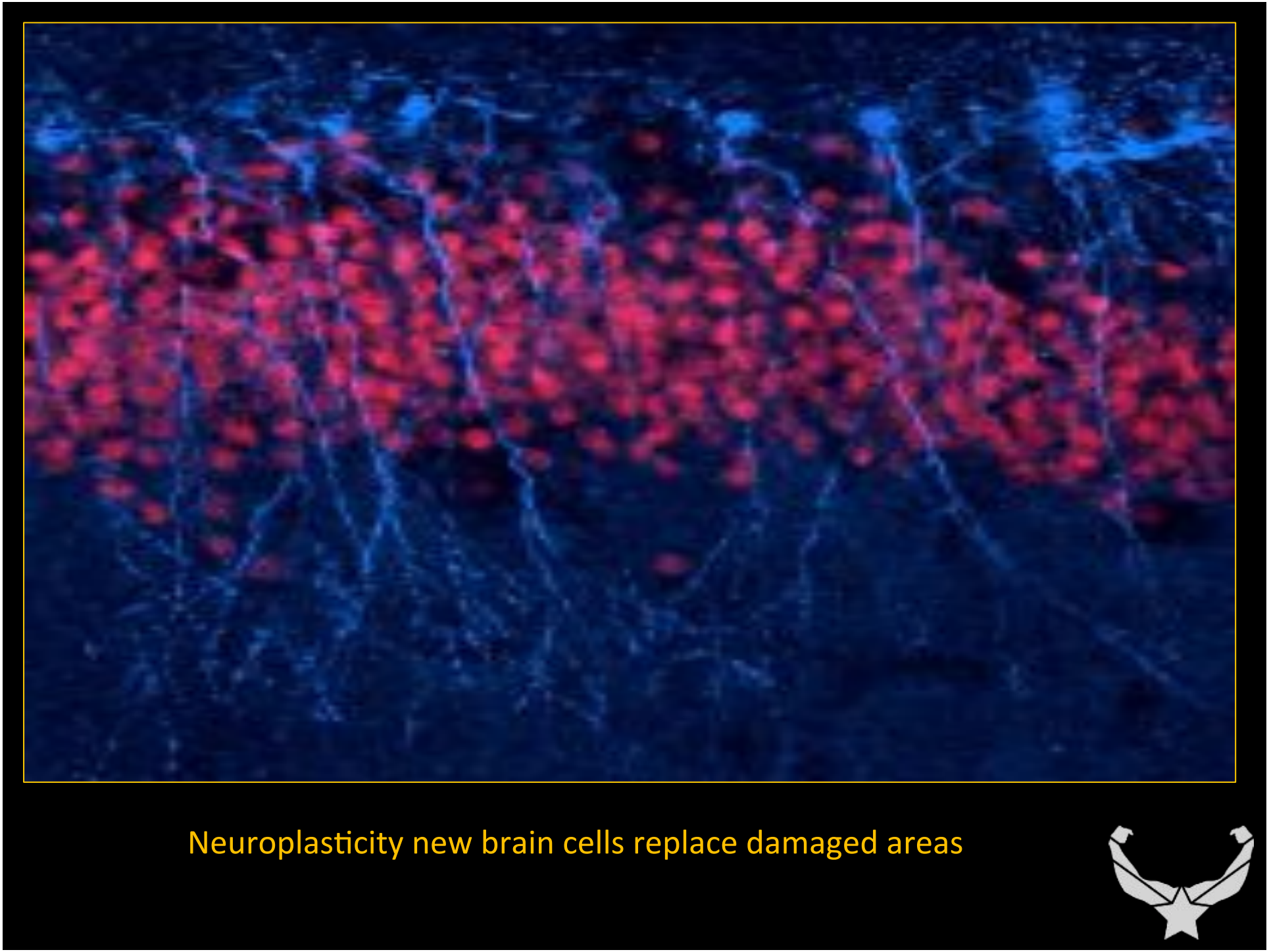

Healthy
Marijuana



Take your chances

Alcohol no alcohol one year later

HEALTHY



Neuroplasticity new brain cells replace damaged areas

Positives and Negatives

EVERY CHECK IN THIS COLUMN WILL HELP YOU MAXIMIZE YOUR PERFORMANCE:

- ✔ Elevate Blood Glucose
- ✔ Rested (8+ hours of sleep)
- ✔ **Post Training** Nutritional Recovery
- ✔ Non-weight Bearing
- ✔ Rest
- ✔ Refuel
- ✔ Rehydrate
- ✔ Sleep

Maximum Results for your effort!

A SINGLE CHECK IN THIS COLUMN AND IT IS ALL UNDONE

Marijuana

✔ Alcohol

ALCOHOL EFFECTS PHYSICAL/MENTAL

For 24 hours after heavy drinking, it is impossible to have any training effect take place

24 HOURS

DEFICITS

AAI American Athletic Institute

There are effects from any amount of alcohol. Even one drink!

PHYSICAL

COGNITIVE

The hangover is just the beginning…

M T W R F S S


ALCOHOL UNKNOWNS

Alcohol is converted to acetaldehyde by the enzyme alcohol dehydrogenase, and then from acetaldehyde to acetic acid by the enzyme acetaldehyde dehydrogenase. Acetaldehyde (ethanal) is between 10 and 30 times more toxic than alcohol itself.

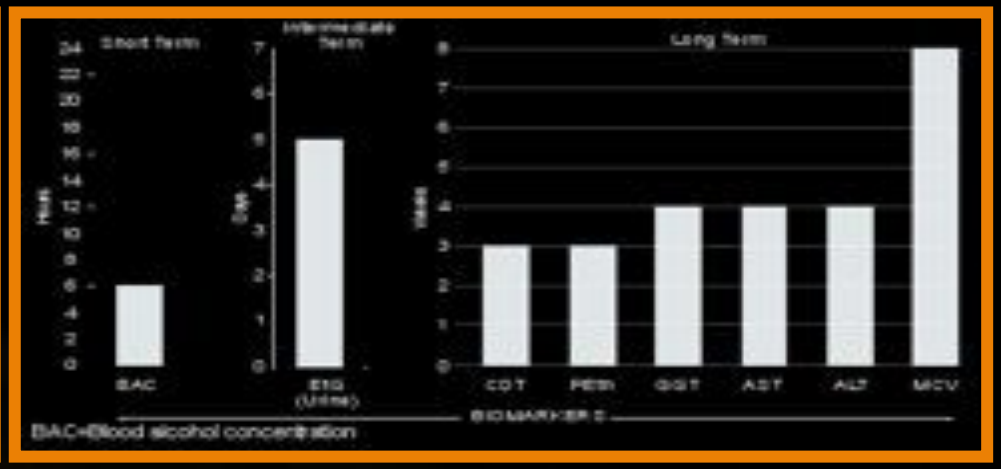
10x 20x 30x

ALCOHOL>ACETALDEHYDE

The smallest of measures

IN URINE

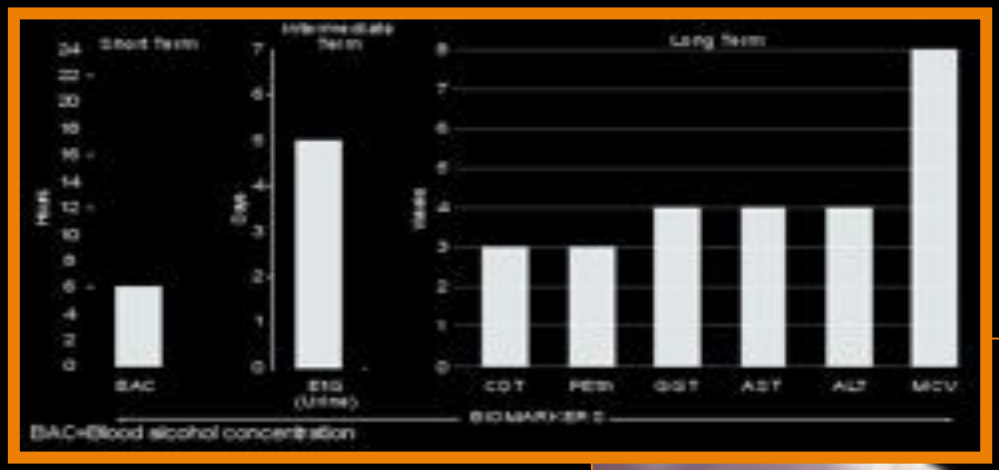
(0.02%) non-oxidative pathway produces ethyl glucuronide (EtG), which is excreted in the urine.



Windows of Assessment for Various Alcohol Biomarkers

4-5 DAYS

80 HRS.

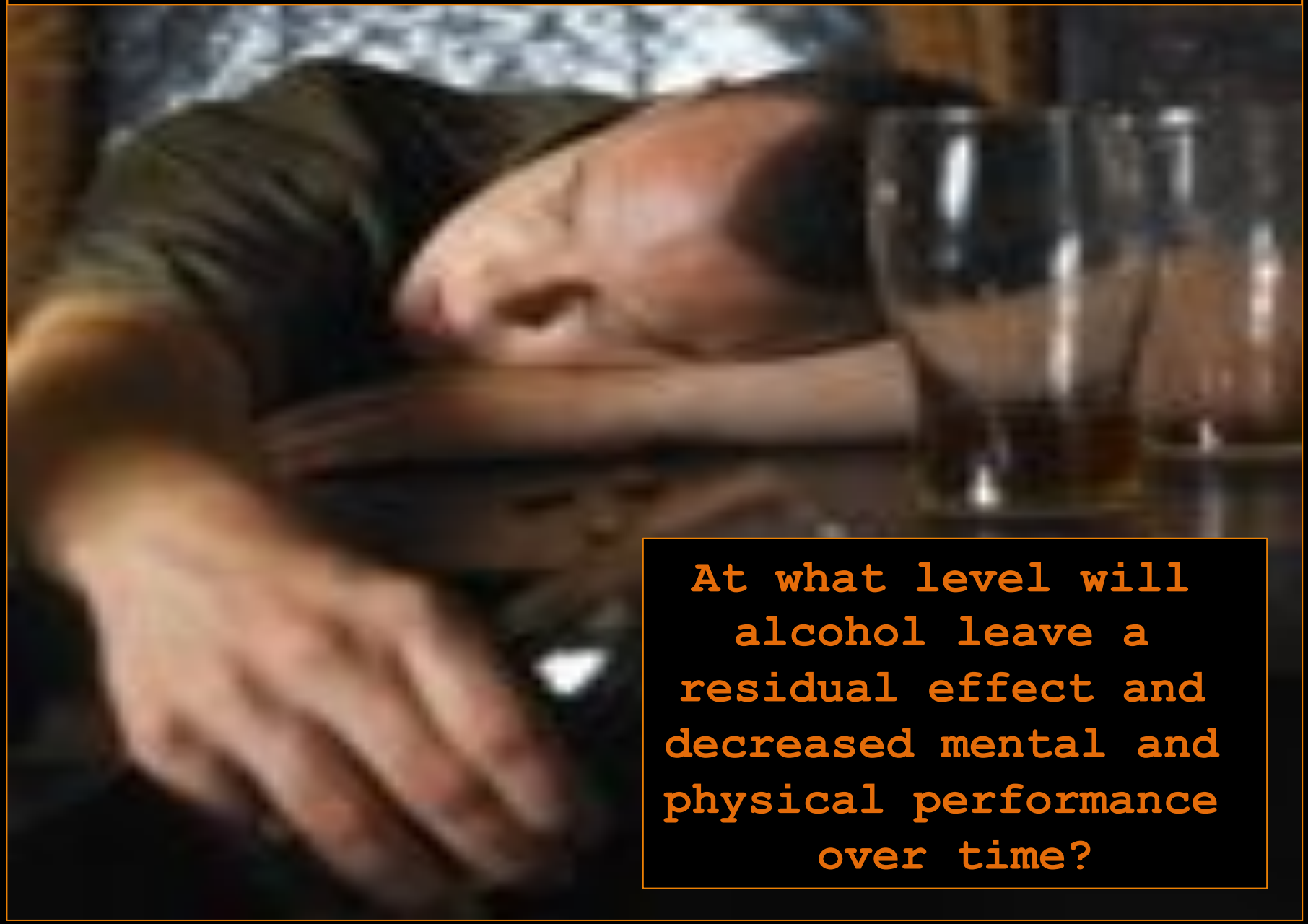


IN BLOOD

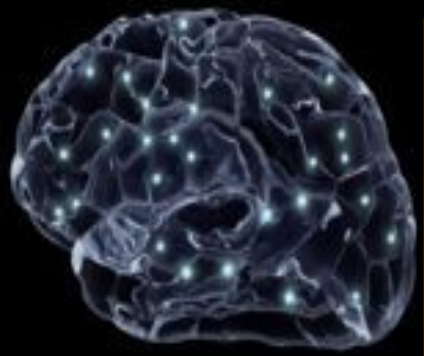
3-8 WEEKS

The more you drink the more you impair brain, body and CNS function.

DECREASED MENTAL PHYSICAL PERFORMANCE



At what level will alcohol leave a residual effect and decreased mental and physical performance over time?



Effects of alcohol begin at 1-2 drinks
Effects increase dramatically at 3-4 drinks
Effects at 5-6 drinks have serious residual effect

RESIDUAL EFFECTS

RED GREEN BLUE 12 35 50


1
2
3
4
Minimal
Residual

The residual effect of alcohol or a hangover has been shown to reduce performance by an average of 11.4% in elite athlete populations.

<11.4%

PERFORMANCE POTENTIAL

Muscle Function

Ethanol is a very small molecule. Because of its size and polarity (charge), it can readily enter (diffuse without the concomitant expenditure of energy in the form of ATP) through the cell membrane of skeletal muscle.

In the process, ethanol can disrupt the molecular configuration of the fatty acyl groups of the phospholipids of the skeletal muscle. Ultimately, this could interfere with several processes including the entry of calcium ions into the nerve terminal or an increased binding of calcium to the sarcoplasmic reticulum of the muscle.

Calcium is the cation (a positively charged ion) which is involved in the control of the rate of release of neurotransmitter into the synapse (the area between the nerve and the muscle) and plays the most important role in muscle contraction and relaxation.

Thus in summary, alcohol is not a fuel for muscle contraction and alters fuel metabolism to increase lactate production and decrease lactate degradation. Furthermore, disrupts the molecular configuration of skeletal muscle and compromises its ability to perform muscle contraction. (Balon/Underwood 2004)

Alcohol Nerve Muscle

Alcohol injected right on the nerve directly, strips off the fat from that location and slows conduction there. Multiple speeding impulses pile up and come through as one single impulse. So a stream of impulses such as:

gogogogogogogogo——gogogogogogo——

comes through the block area as:

go——go——go——go——

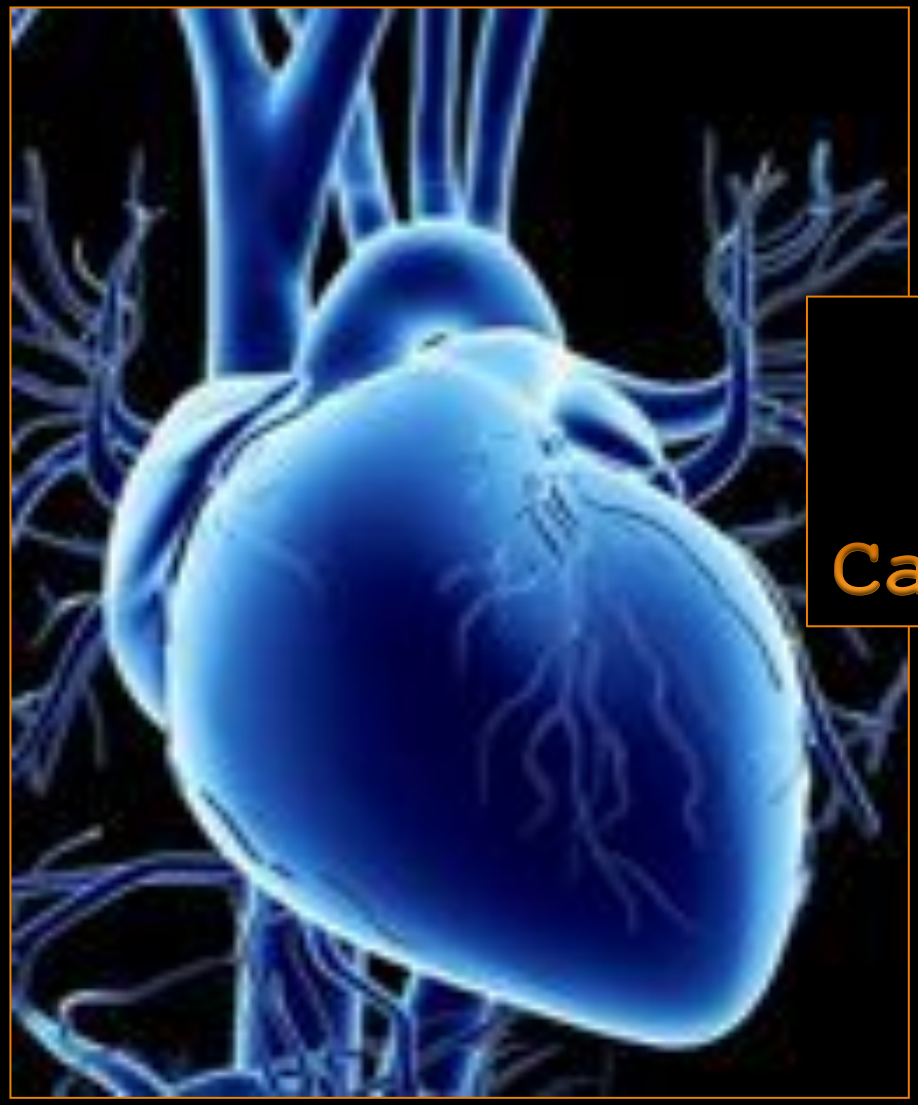
Life of an Athlete

Engineers call this a low pass filter.

When a muscle gets hit with a single "go" it responds. When it gets hit with a barrage of gogogogogogogogo it gets thrown into tetany, a rigid hard to undo contractile state. Worse, it screams for help over feed back circuits which (in spasticity) are mistakenly linked into the motor circuits by reflex spinal pathways.

Slowing certain nerves in the loop can stop the recruitment of the reflex mechanisms which get drawn into the fray from further and further away in the spinal pathways as the recruitment gets worse.

Misfiring of muscle impulses



Cardiac Output
Stroke Volume
Cardiac Arrhythmias

HEART FUNCTION

< O2

>CO2

< VE

LUNG FUNCTION

Blood Glucose Levels

The body has trouble making more glucose because it is expending its energy metabolizing the alcohol. Both of these effects of alcohol can cause severe hypoglycemia low blood glucose levels for 6 to 36 hours after a binge drinking episode.


.08
.07
.06
.05
.04
.03
.02
.01
ALCOHOL AND VISION

Alcohol and Vision

NEWMAN and FLETCHER, who measured seven aspects of visual function in 50 subjects before and after alcohol administration. Blood alcohol levels ranged from 58 to 218 mgThe tests and results follow:

Decreased levels were seen in:

Sensitivity to Light	
Saccadic Tracking	Glare Recovery
Visual Acuity	Eye Coordination
Distance Judgment	Depth Perception
Lateral Visual Field	Glare Resistance

Ability to:

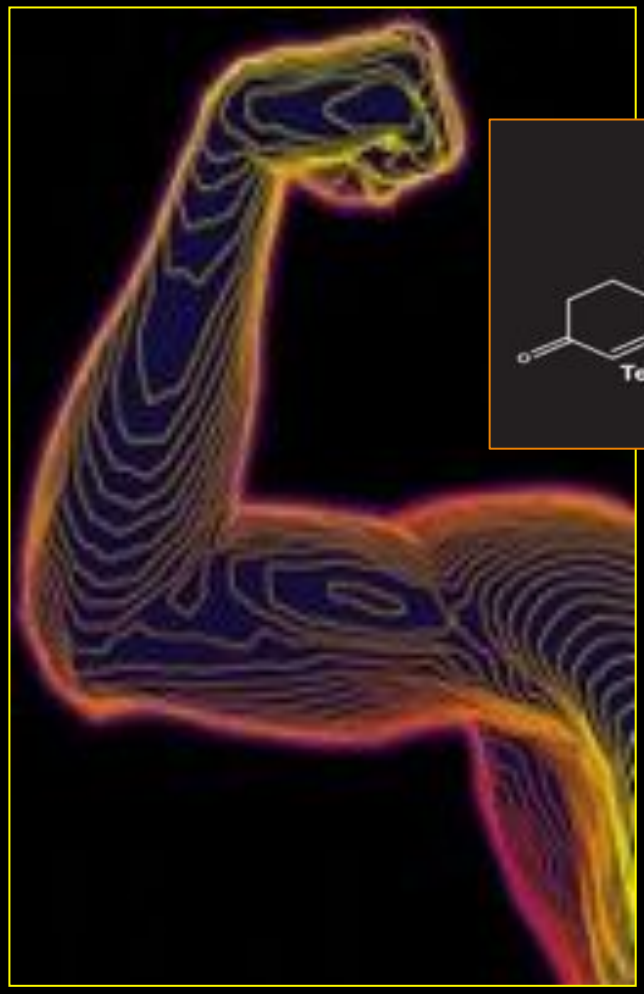
Track and follow moving objects...
Determine depth between objects...
Determine the speed or velocity of a travelling object...

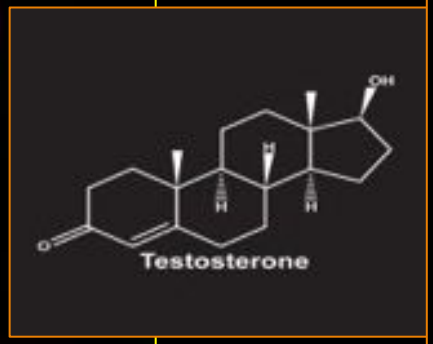
Open your eyes!

Life Attitude

TRAINING HORMONES


TESTOSTERONE
ALCOHOL





Heavy maximal level training followed by excessive alcohol consumption can result in hormonal disruptions for up to 96 hours (4 days)

TRAINING EFFECT
RECOVERY
PERFORMANCE

THE 96 HOUR HOLE

(12-20 hours after the start of drinking) the testosterone level was only about half what it was…

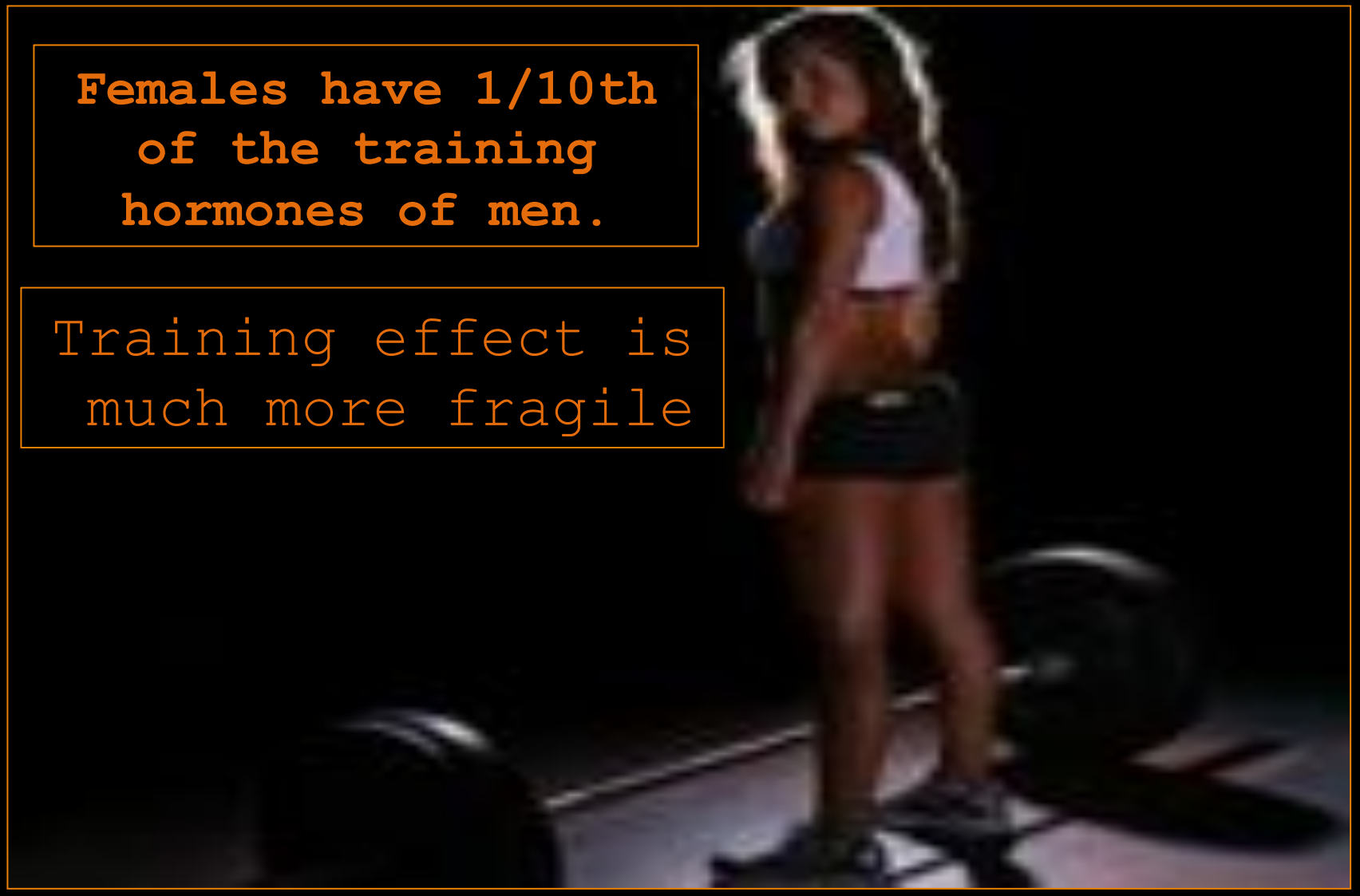
TESTOSTERONE

Some males who drink heavily & regularly have testosterone levels similar to female levels.

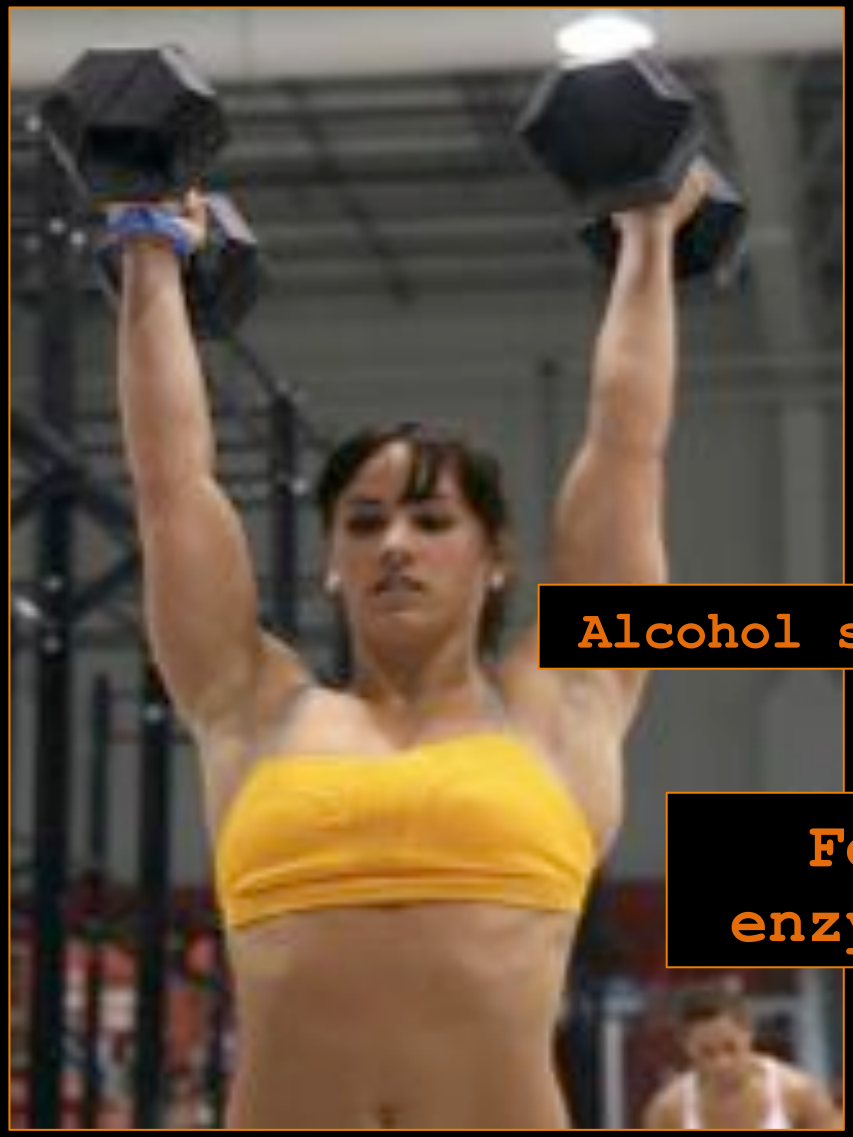
Alcohol And Testosterone

Females have 1/10th of the training hormones of men.

Training effect is much more fragile



Female Training Effect



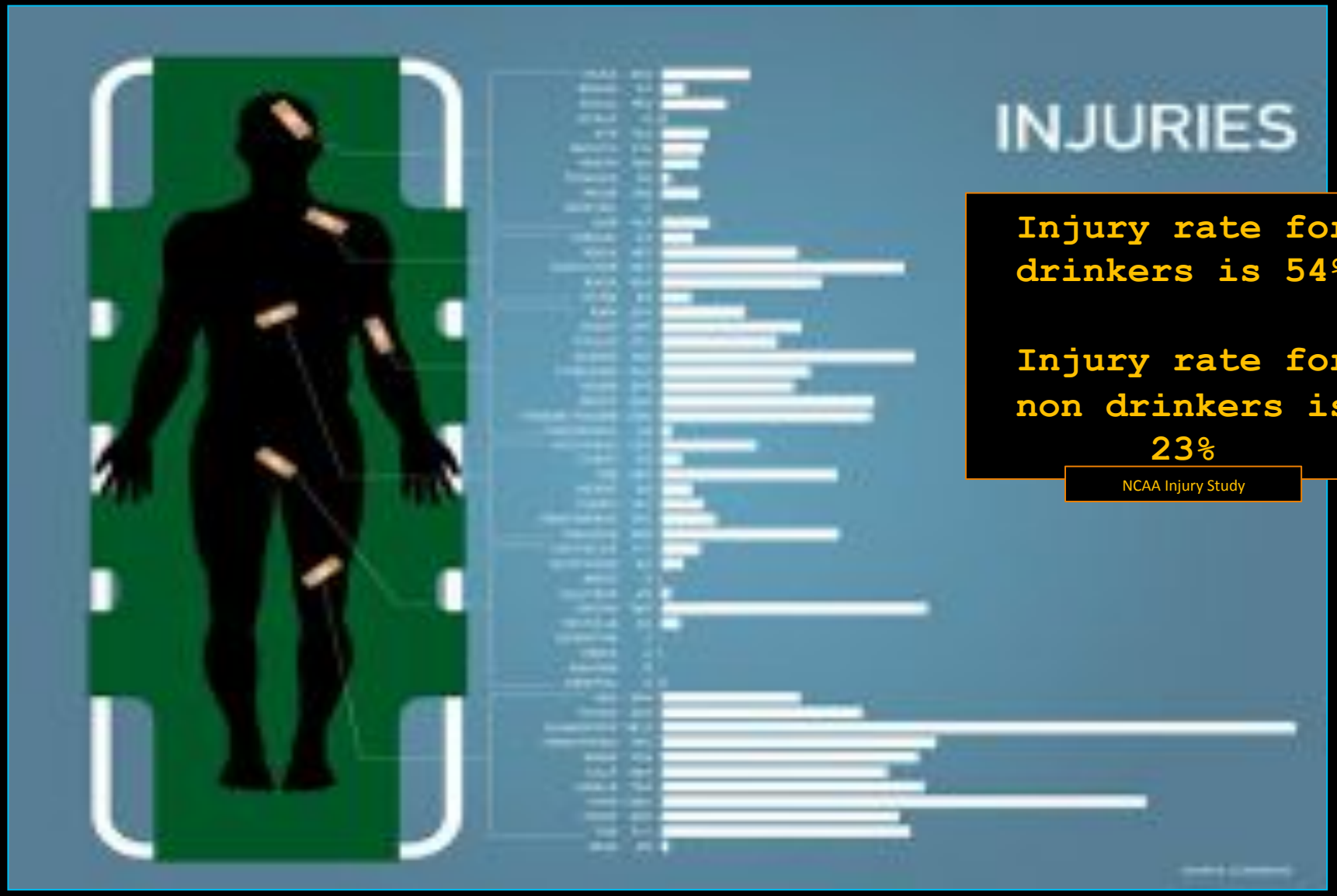
Alcohol stays in the female body longer

Females have less of the enzymes to breakdown alcohol

Alcohol>affects on females

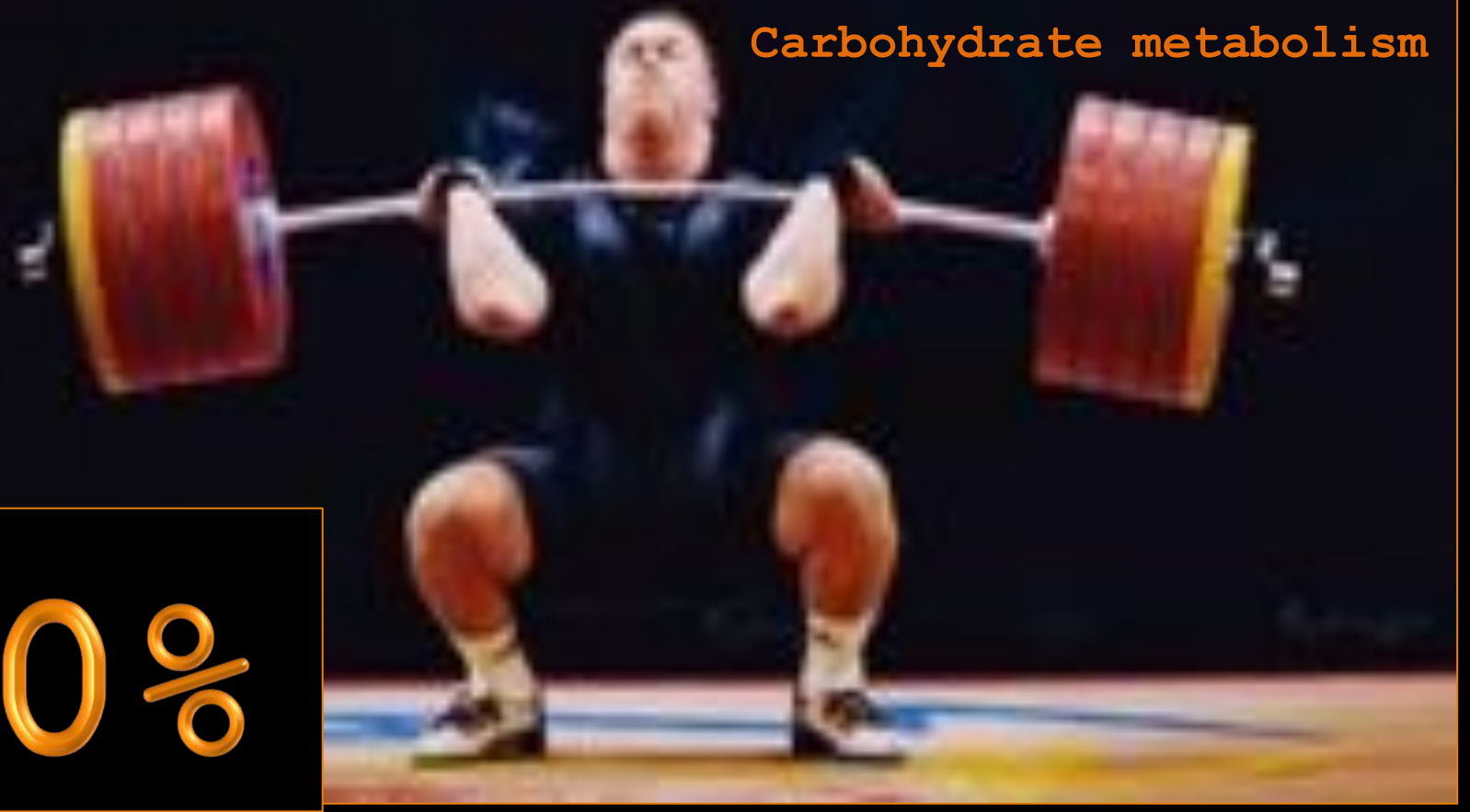

Alcohol and Sickness
Life of Athlete
The impairment of cellular immune response can be attributed to acute alcohol use...

Sickness


INJURIES
Injury rate for drinkers is 54%
Injury rate for non drinkers is 23%
NCAA Injury Study

HGH

Maintains muscle mass
Repairs muscle fiber
Fat metabolism
Carbohydrate metabolism



70%

Human Growth Hormone

STRENGTH/POWER

<11%

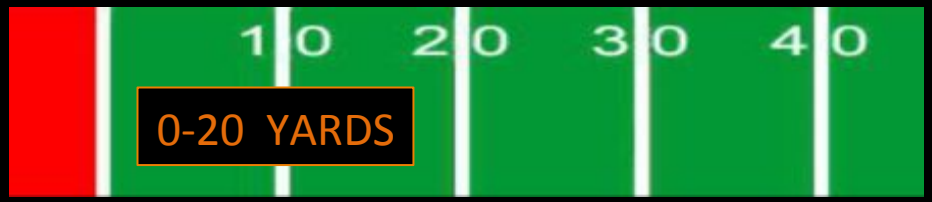
EXPLOSIVE POWER

POWER ENDURANCE

Drunks Can't JUMP

Static CM Jumps

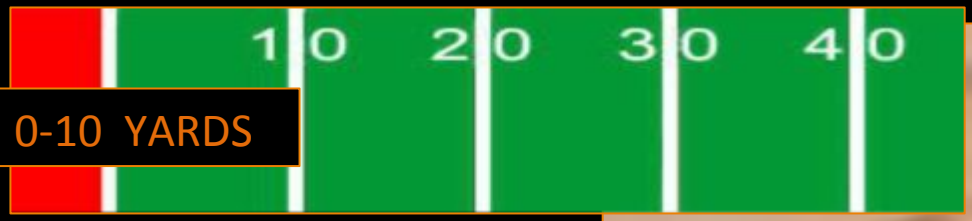
7 of 13 subjects >

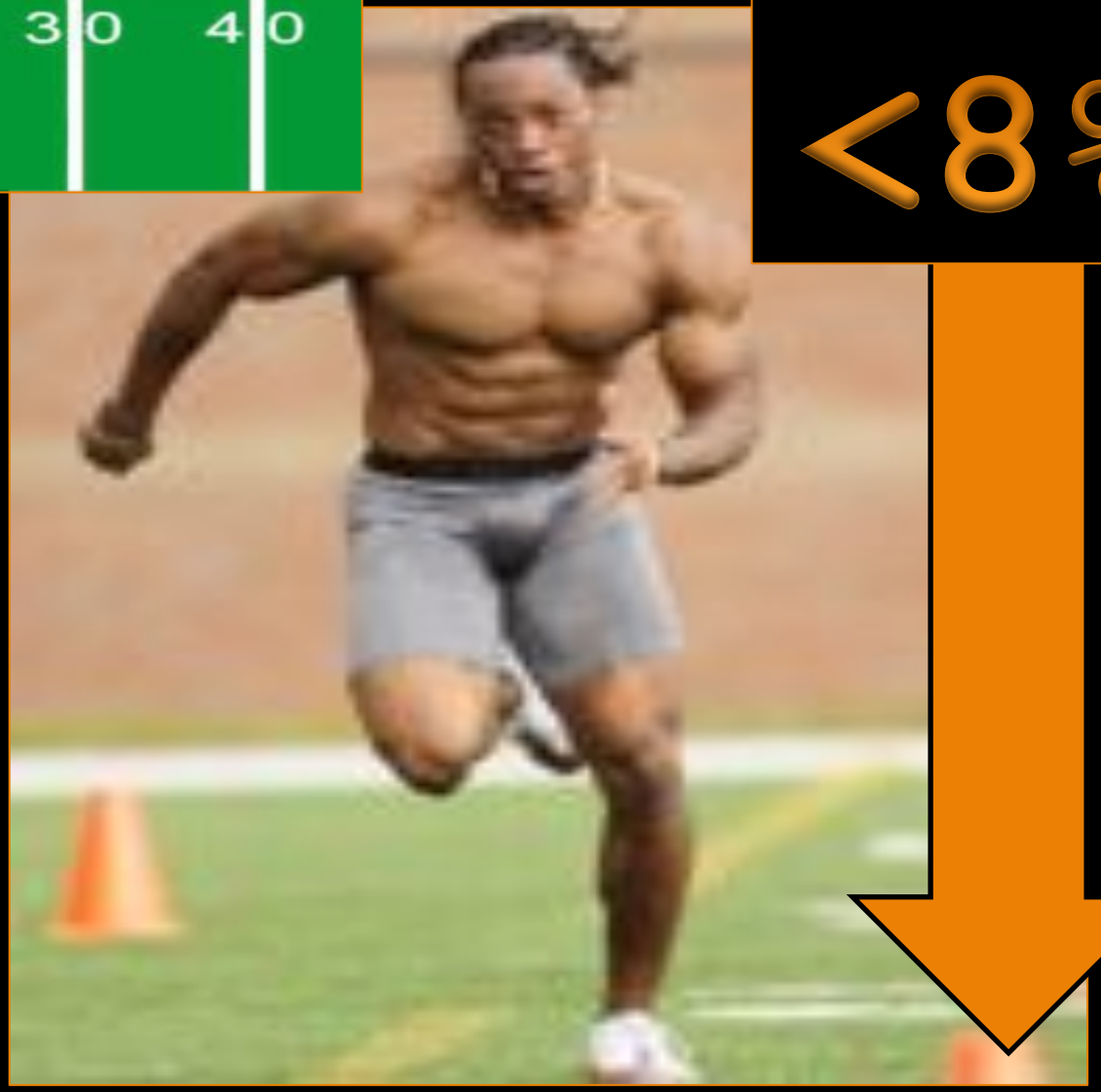


<6%

ACCELERATION SPEED

AAI
American Athletic Institute





<8%

START UP SPEED

0-5 yds.

<8%

LATERAL SPEED

<6.96%

ENDURANCE

AAI
American Athletic Institute

FAT BURNING DECREASED

Alcohol greatly affects the amount of fat your body can and will burn for energy!

Just a mere 24g of alcohol consumption showed whole-body fat oxidation (the rate at which your body burns fat) decreased by 73%!

American Journal of Clinical Research

1X DRUNK = 14 DAYS LOST TRAINING EFFECT

American Athletic Institute has studied the impact of alcohol on condition in elite athletes. Impact has shown significant projections in lost physiological condition that correlates to as much as

14 days of lost training effect…for each time drunk…

WASTING YOUR TIME

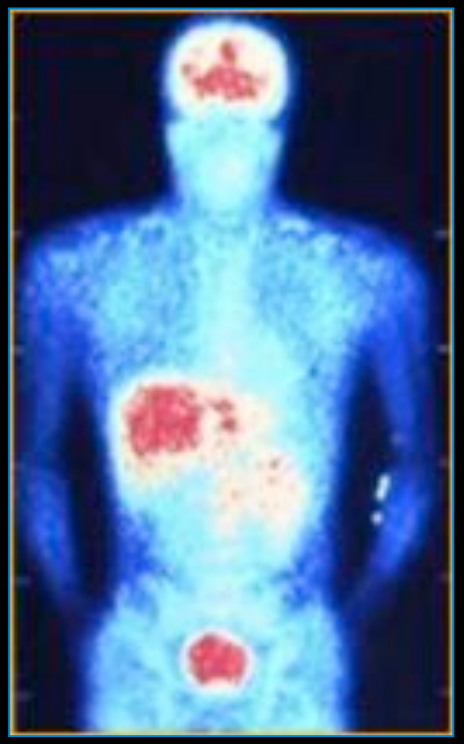
Throwing away your hard work?

one night of drinking
wipes out 2 weeks of training

The Effects of Marijuana on High Level Mental and Physical Performance

John G. Underwood
Director American Athletic Institute

Life of Athletes



THC Deposit Sites

Global Athlete

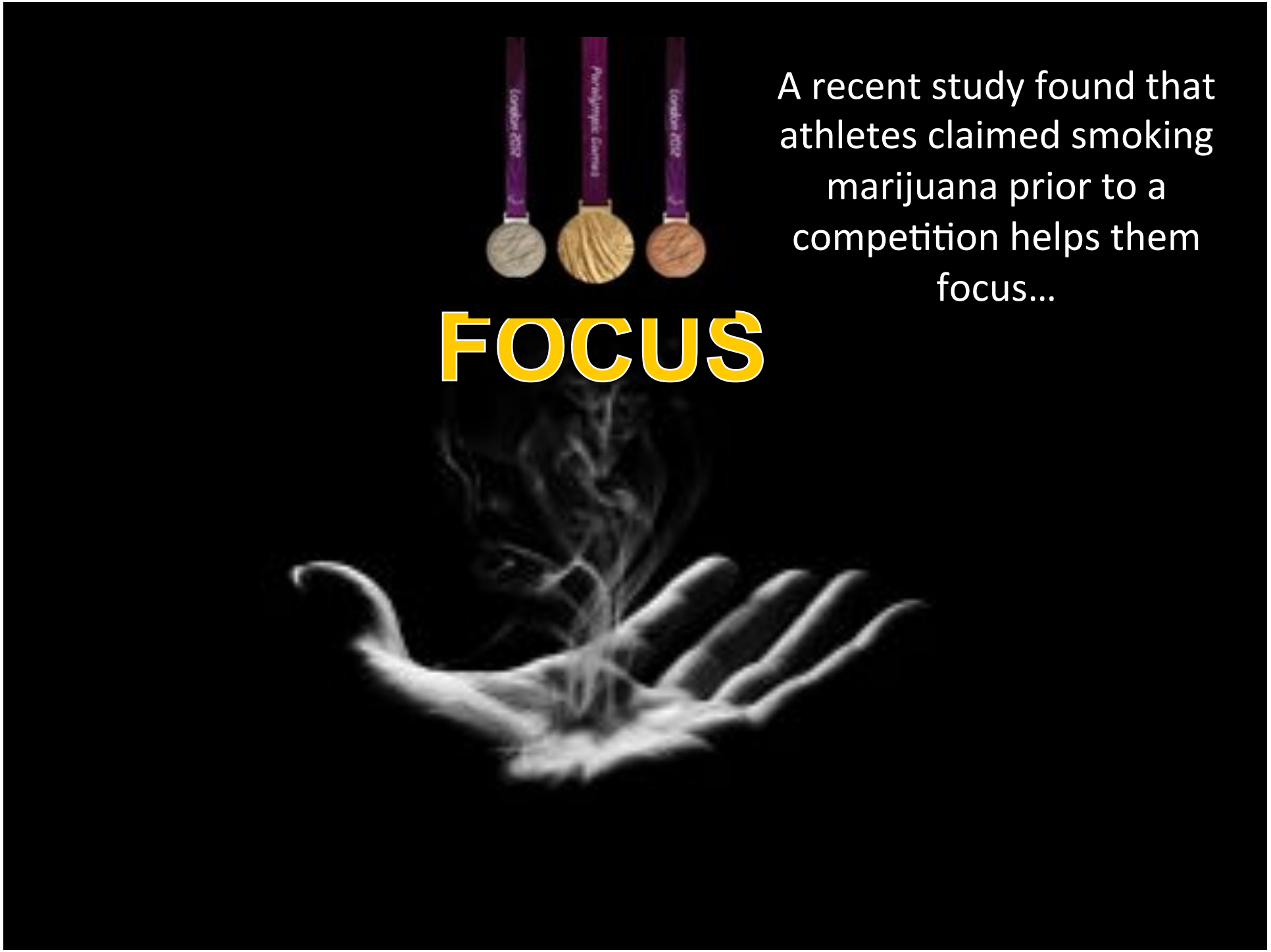
MARIJUANA

Project

Education


NCAA
NCAA study released in January, 22.6
percent of athletes smoke weed...
College football players (26.7 percent)
ranked the highest among major sports.
About half the team smokes, he estimates. "It's a team thing.

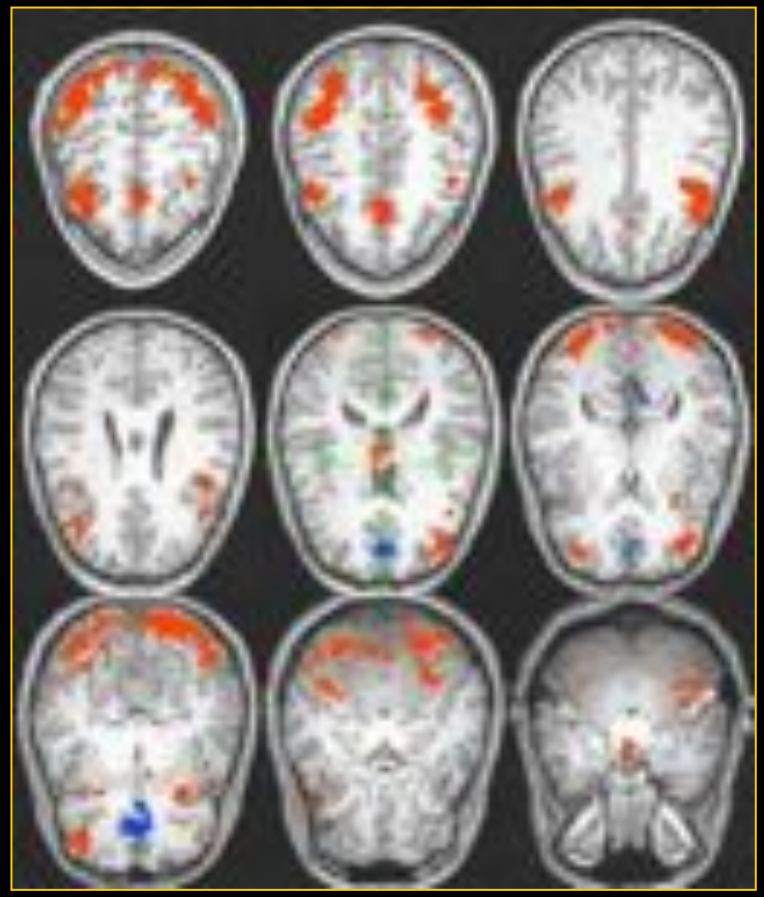

Athletes and social drug use...
THE PARTY is OVER
Write articles
Create Awareness
ATHLETE LIFESTYLE ISSUES

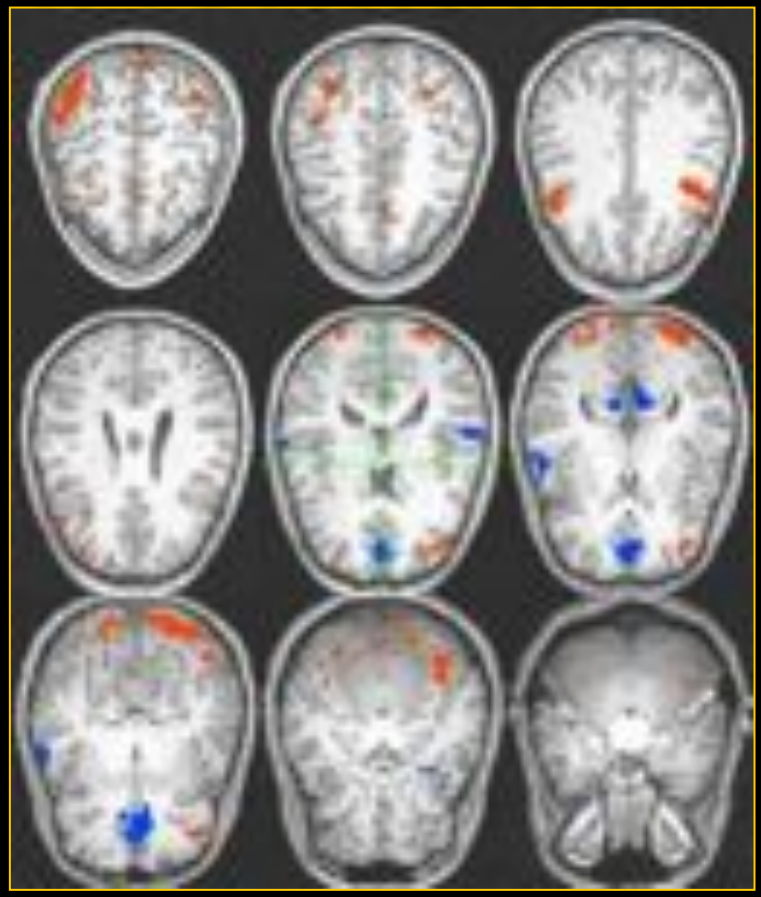

FOCUS
A recent study found that athletes claimed smoking marijuana prior to a competition helps them focus…


What research has been done worldwide that we can give our athletes to dispel this perception?

Effects of THC (1 mg) on activation on concept reaction to task

Reaction to task formation





Before **After**

Oranges represent positive and blues negative activation

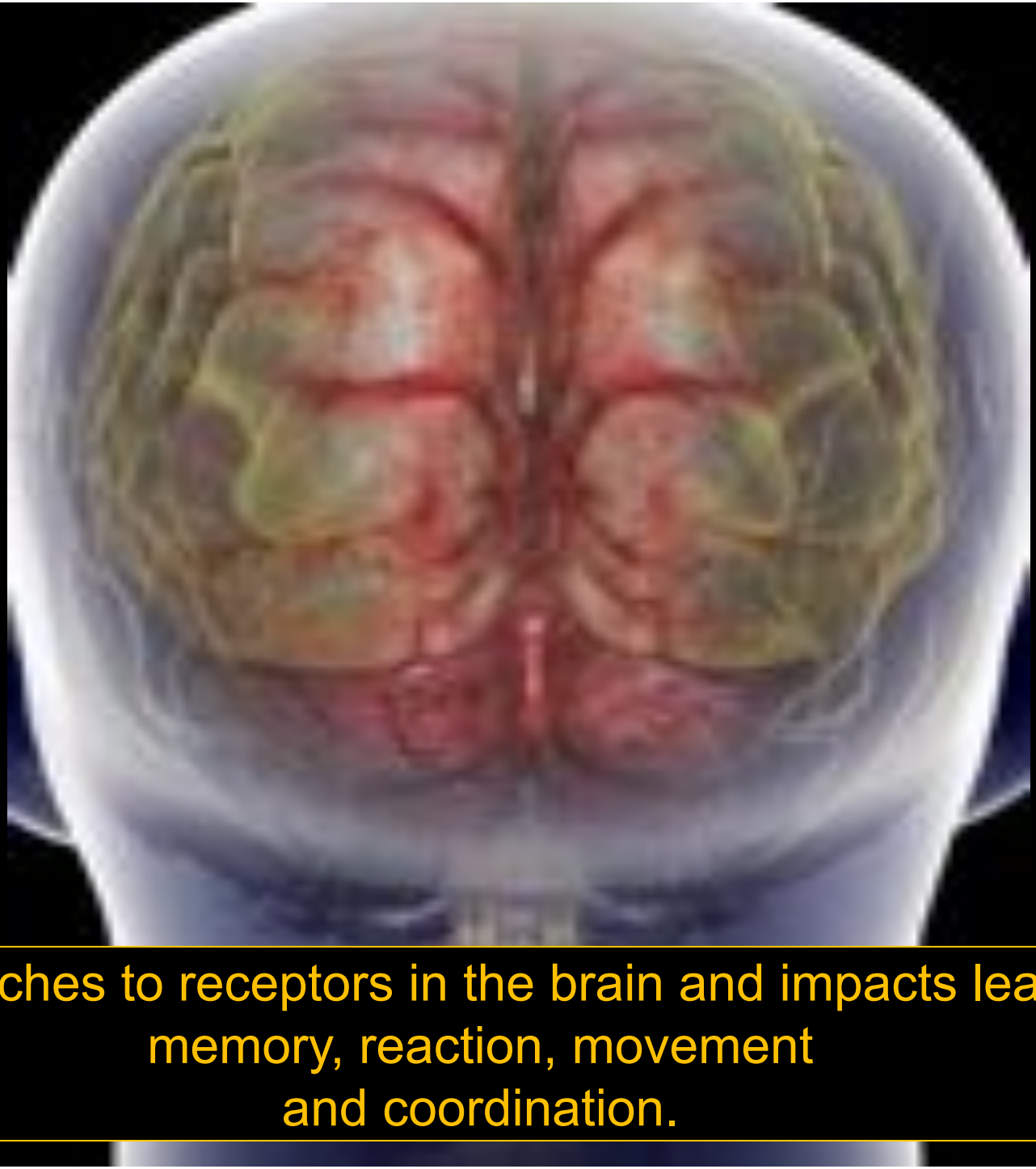
B

R

A

I

N



THC attaches to receptors in the brain and impacts learning, memory, reaction, movement and coordination.

Receptors

There are membranes of particular nerve cells in the brain that have special protein receptors called, cannabinoid receptors, that bind with the THC. When the THC binds to these nerve receptors, a series of chemical reactions occur that alter the function of those nerve cells.

Deposit Sites

NIDA

Cannabinoid Receptors *'hot-spots'*

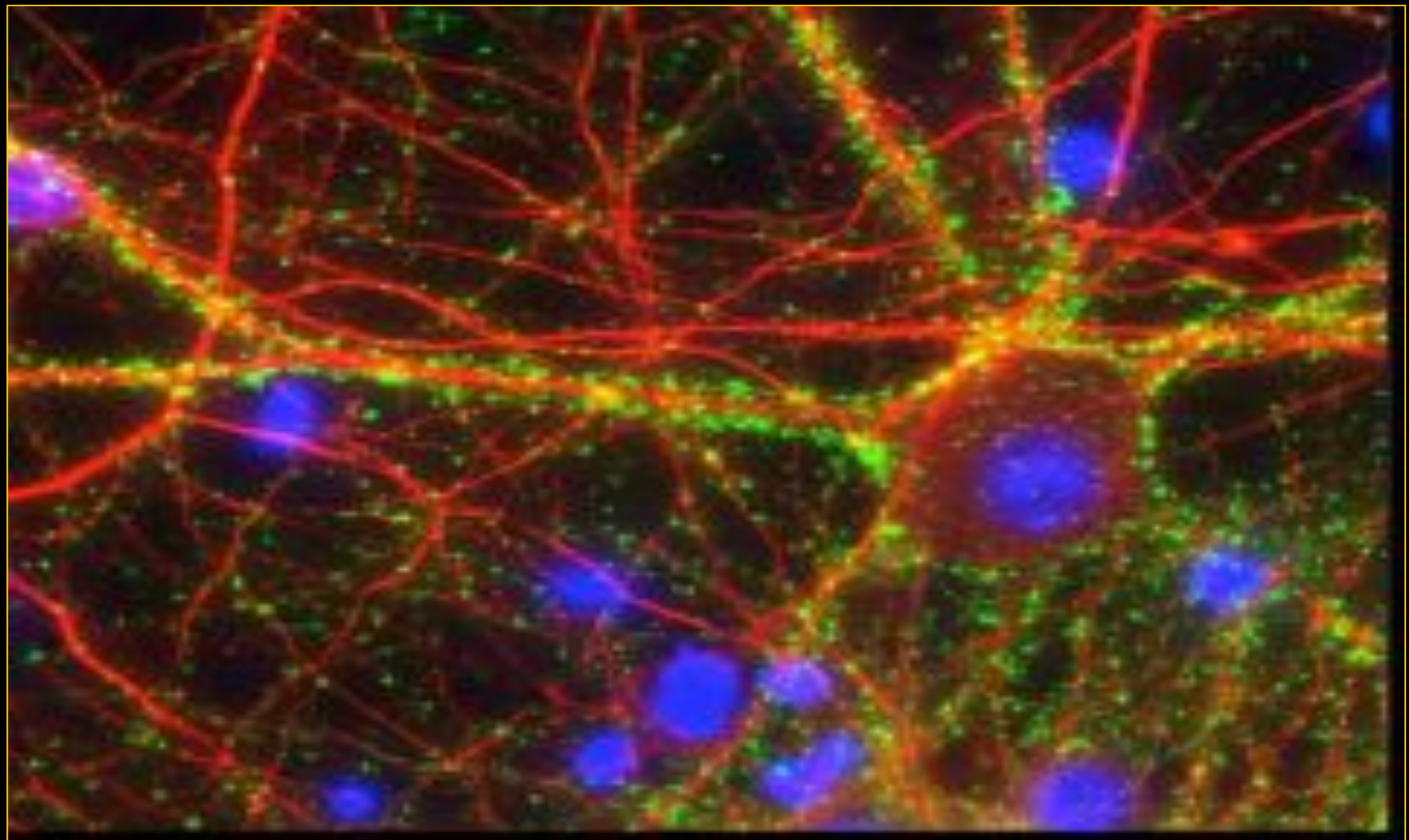
MRI scan of cellular cannabinoid reception.
(Image © BBC 2009 -

Brain
Liver
Pancreas
Kidney
Skin
Prostate
Cervix
Testes

B

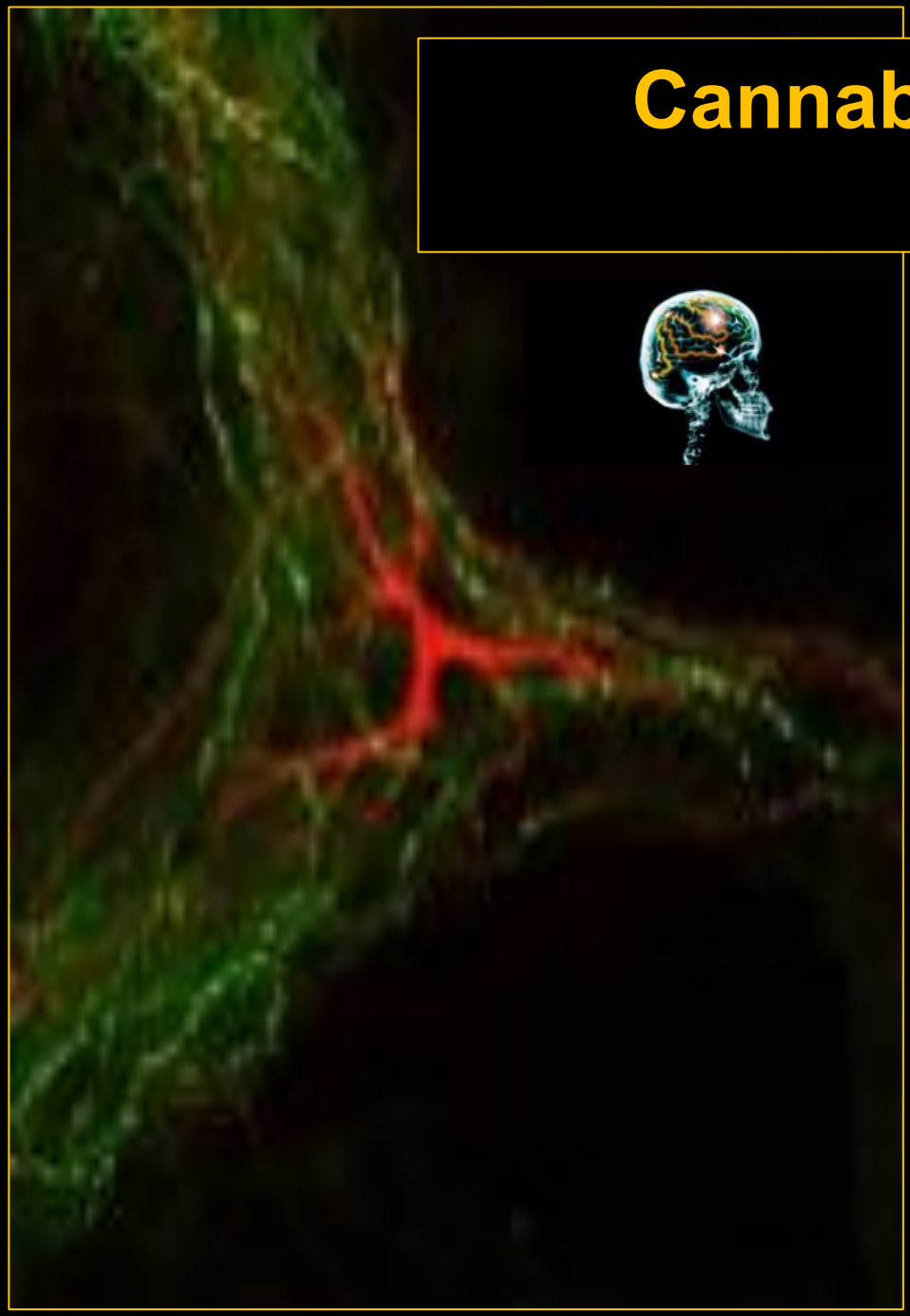
O

D



THC bound to receptor sites

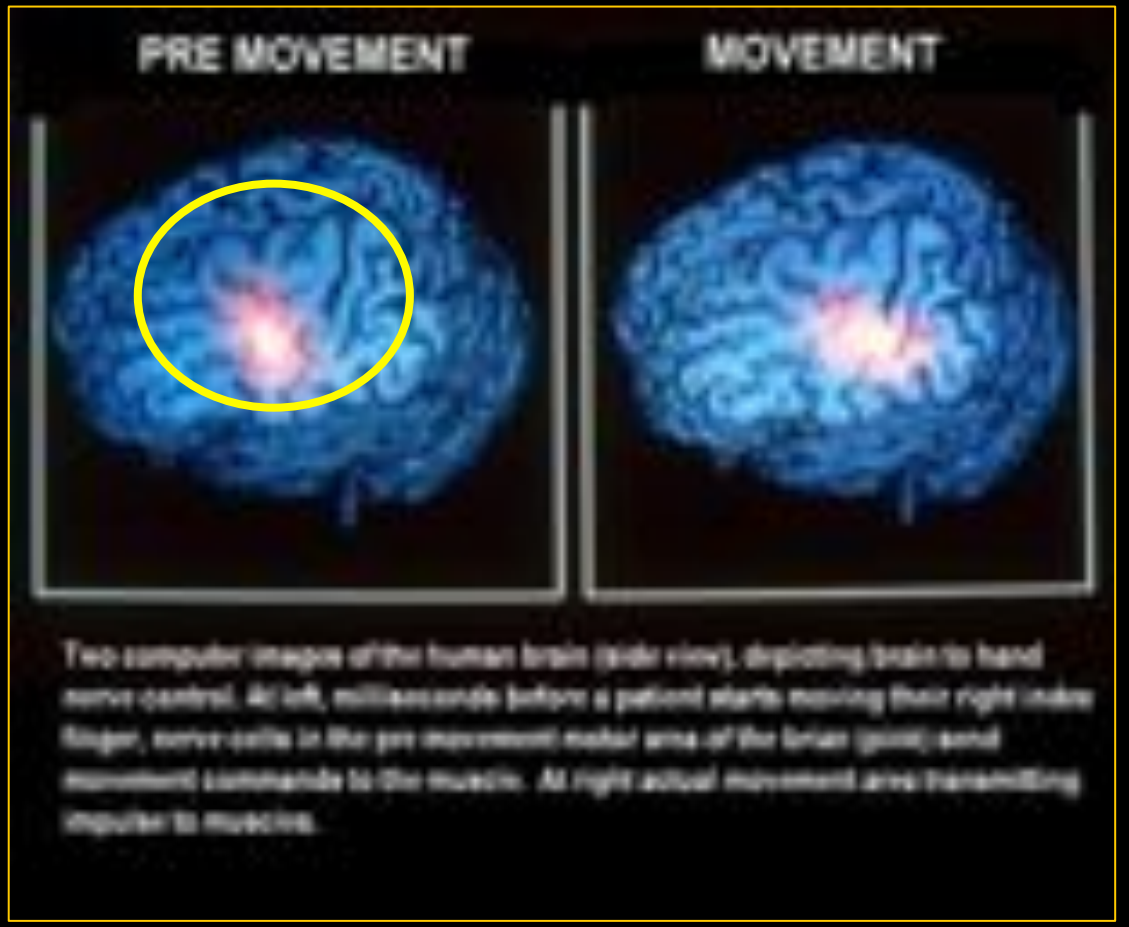
Cannabinoid Receptors in Brain



memory

cognition
reward
sensory perception
emotions
motor control
movement memory
coordination

Pre Movement-Movement

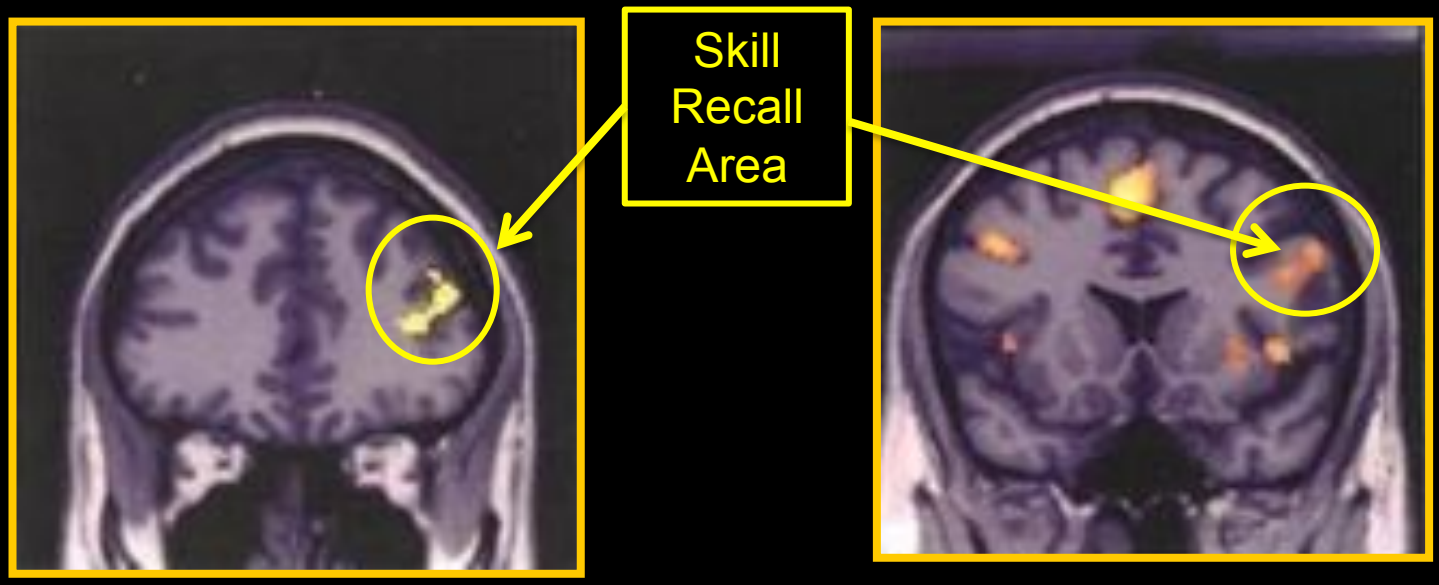


LOCATOR

Human Movement

Initiation of impulses for movement during finger tapping

MARIJUANA SKILL IMPAIRMENT



NON USER

SIMPLE HAND SKILL

MARIJUANA USER

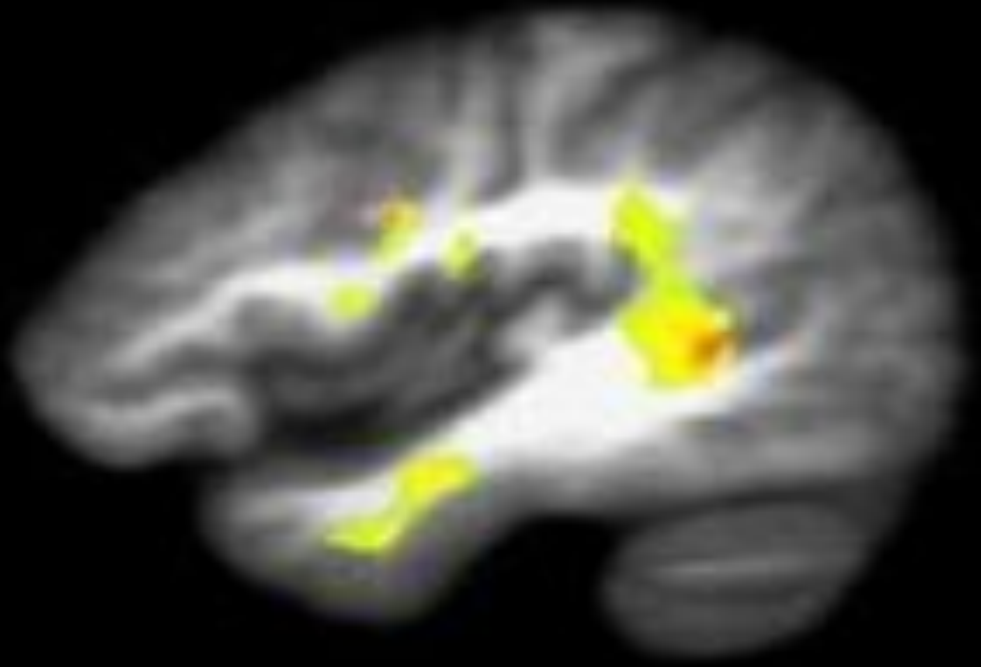
SIMPLE HAND SKILL

Note: Subject not under influence during scan.

POT OR NOT? YOUR CHOICE YOUR GAME

White matter matters

THINK



COMMUNICATE


CANNABINOIDS
INCREASE THE SECRETION
OF SOMATOSTATIN
The hypothalamus also secretes a chemical called Somatostatin (SS). When it releases Somatostatin it travels to the pituitary which inhibits or stops the release of growth hormone into the blood.
SOMATOSTATIN BLOCKS HGH

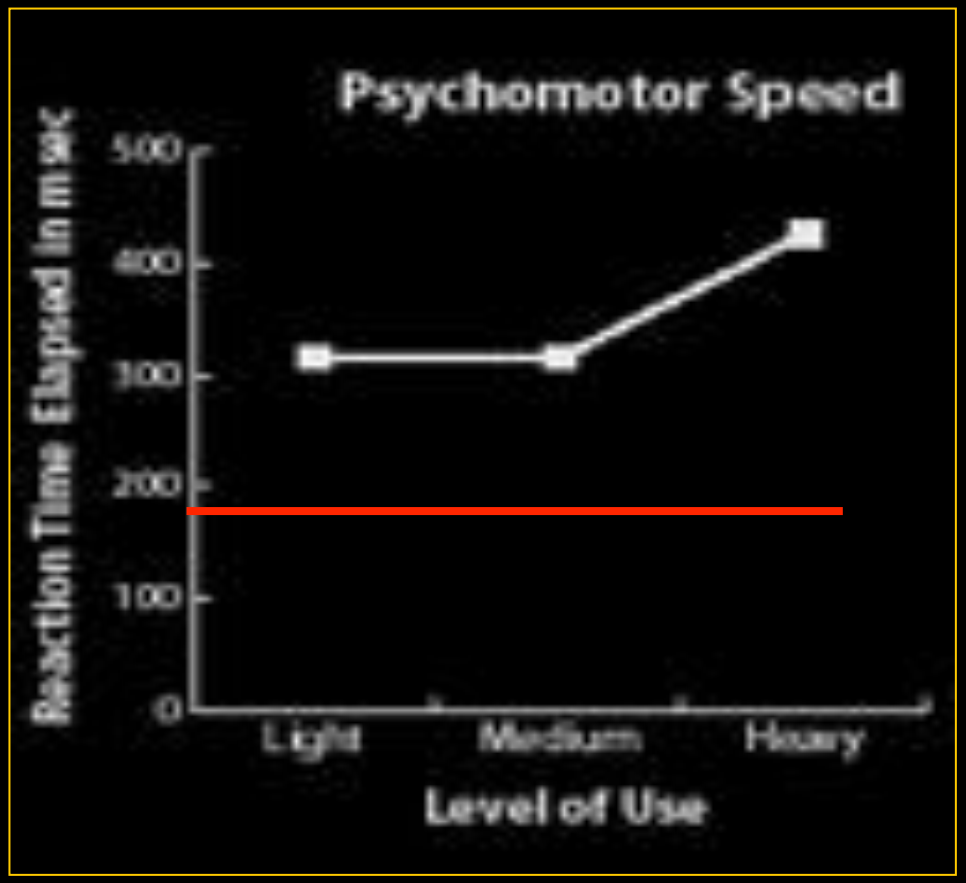
LITTLE BRAIN

CEREBELLUM

Coordination

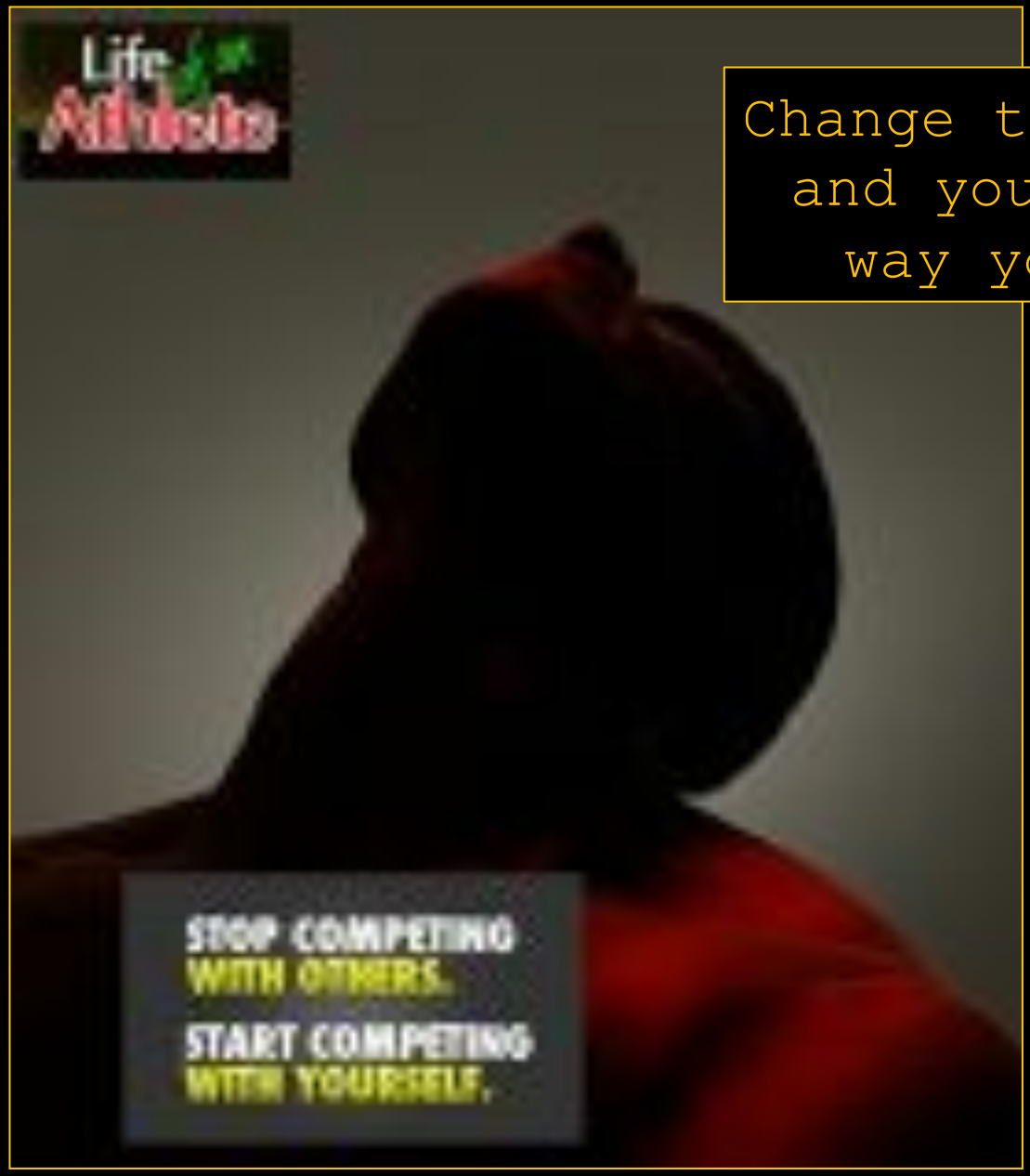
- Equilibrium
- Balance
- Muscle tone
- Ability to perform rapid alternating movements

WEED and REACTION



Average in the .300-.450msec range.

*Highly functional trained athletes have faster reaction times



Change the way you live
and you will change the
way you can compete…

?