Social Trends of Olympians

and their effect on mental and physical performance

2012 ASPC Americas Continental Forum
Toronto, CAN

John Underwood USA

PRESENTER JOHN UNDERWOOD

A former NCAA All-American, International-level distance runner and World Masters Champion, John has coached or advised more than two dozen Olympians including World and Olympic Champions. He is a noted expert in recovery, brain body connection. He has appeared as a guest commentator for ABC Wide World of Sports for Olympic Drug Scandals. John has worked with nearly all sport federations including the NCAA, NHL, NBA, NFL, the U.S. Olympic Committee, Sport Canada and the International Olympic Committee. John is Human Performance Consultant to the US Navy SEALS

Sport Institute of Finland

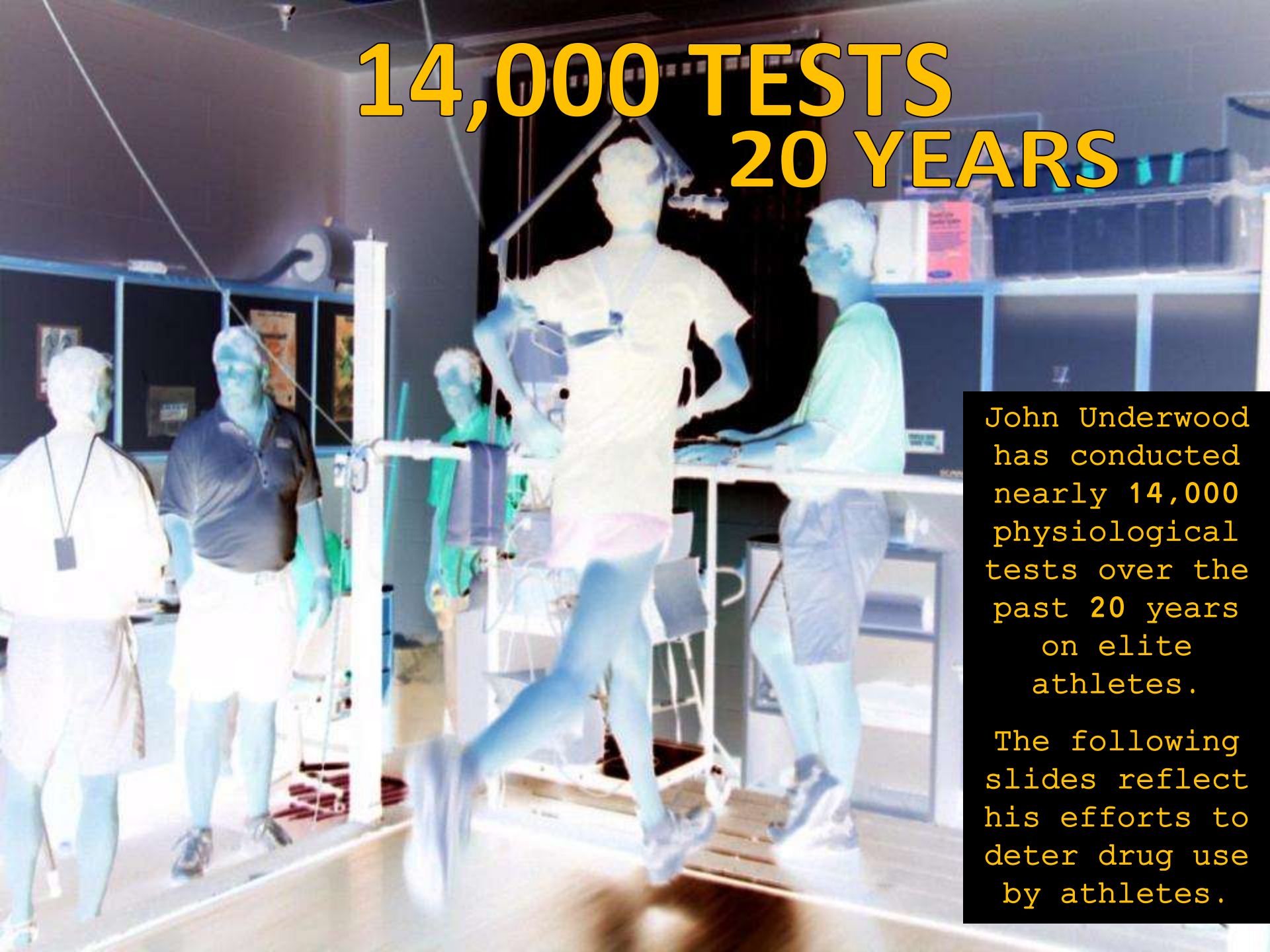

Lake Placid


STATES OLYMPIC TRAINING CENTER


Reception

USOC Lab

Lake Placid, NY



14,000 TESTS
20 YEARS

John Underwood has conducted nearly **14,000** physiological tests over the past **20** years on elite athletes.

The following slides reflect his efforts to deter drug use by athletes.

Laboratory Testing

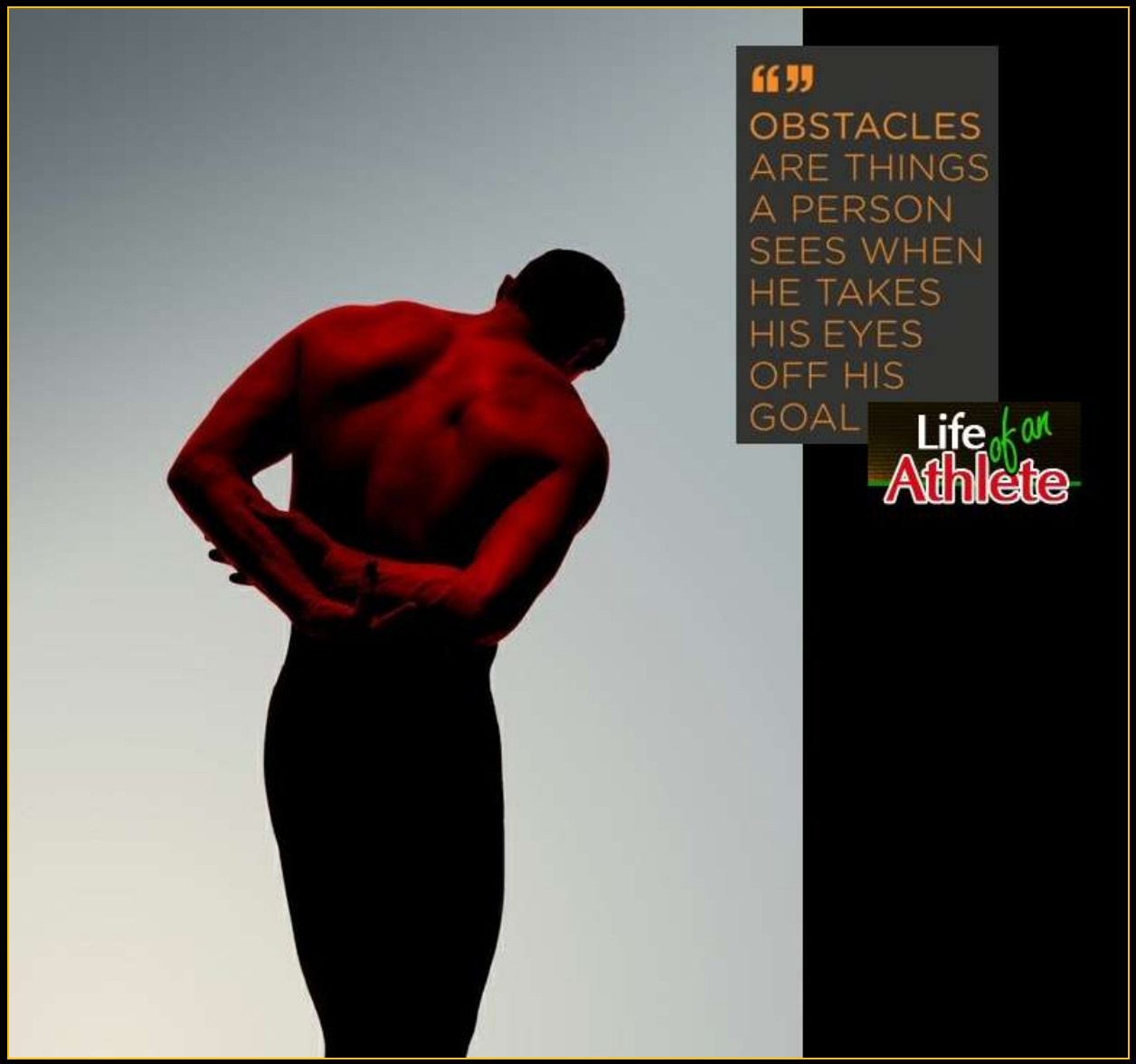

28 OLYMPIANS

UNITED STATES NAVY SEALS

Human Performance Consultant

PUREPERFORMANCE

Lifestyle matters… Lifestyle counts



1%

DEDICATION
MOTIVATION
FOCUS
DISCIPLINE
CHARACTER

Modernization has affected factors in athlete development which are clearly not conducive to optimal mental and physical performance…

Training Recovery Performance

LIFE AS WE LIVE IT

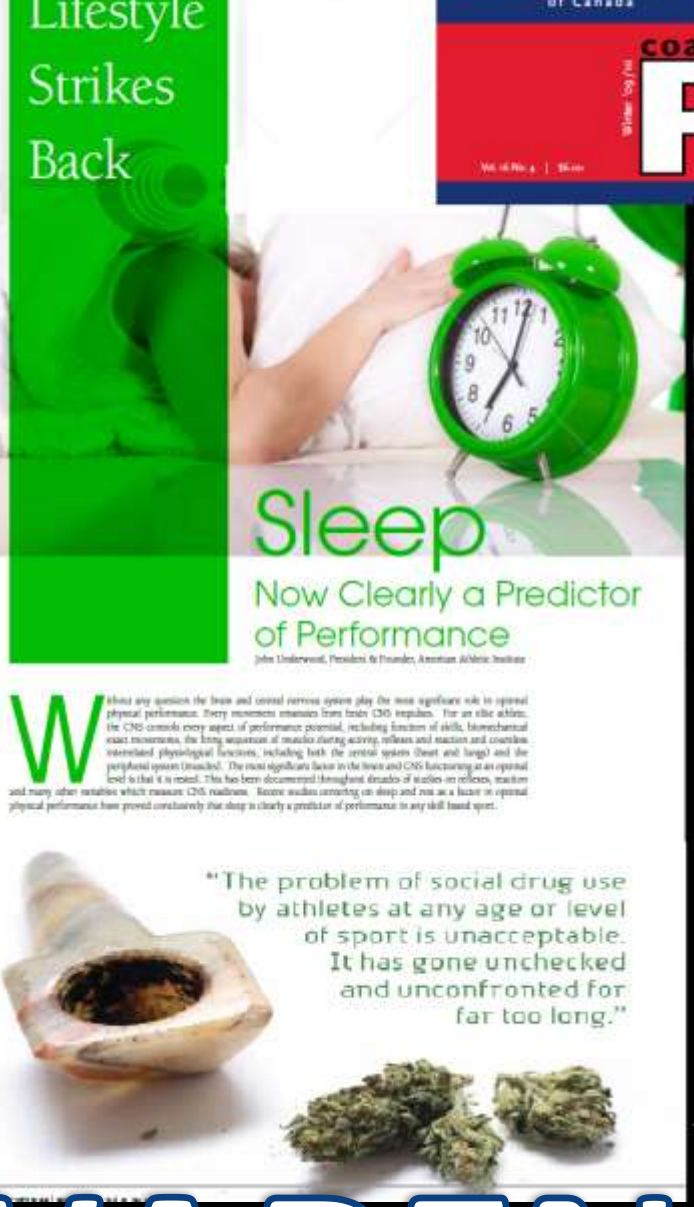
The lifestyle of this century has created conflicts and dilemmas that greatly reduce the effectiveness of top level athletes to train, recover and perform consistently at or near their best.

Life of an Athlete

CHAMPION ATHLETE PROGRAMS

ATHLETE LIFESTYLE EDUCATIONAL MODULES


HighSchool
TODAY
New Mexico's
'Life of an Athlete'
Warns About Alcohol Dangers
Legal Issues
Athletic Facilities
Sports Medicine


Lifestyle
Strikes
Back
Sleep
Now Clearly a Predictor
of Performance
"The problem of social drug use
by athletes at any age or level
of sport is unacceptable.
It has gone unchecked
and unconfronted for
far too long."


coaches
PLAN
du coach


Athletes and social drug use...
THE
PARTY
is OVER
Social drug use among athletes is prevalent and the problem is complex. Athletes may be more likely to abuse alcohol than their non-athlete counterparts and are more likely to suffer behavioral and psychosocial consequences as a result of their drug use. They are also more prone to heavy episodic drinking (HED) (five or more drinks).

AWARENESS

SLEEP

The effect of sleep on high level mental and physical performance

STRESS

The effect of stress on high level mental and physical performance

SOCIAL DRUGS

The effect of social drugs on high level mental and physical performance

RECOVERY

Physiological Considerations for Recovery in Elite Hockey

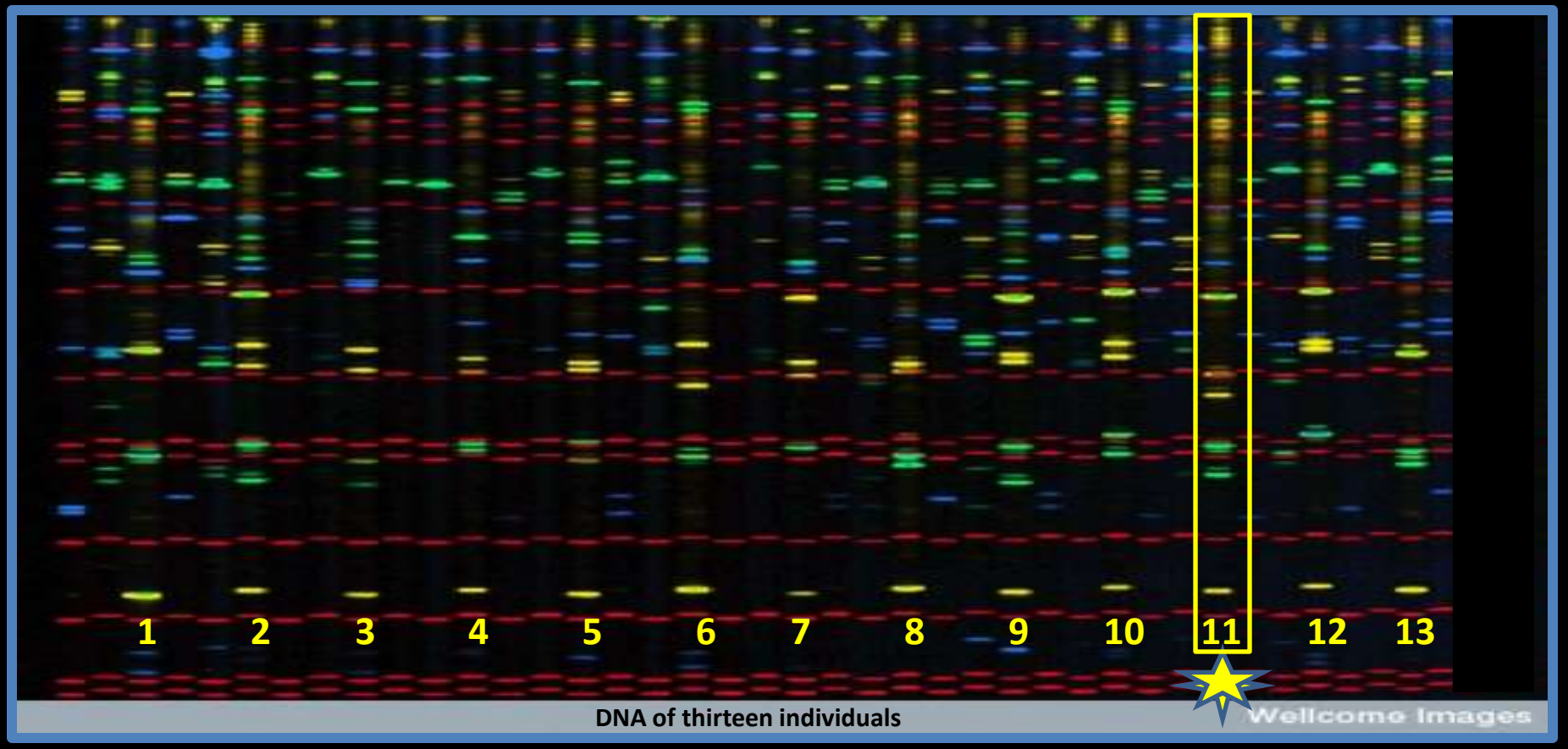
John Underwood Director American Athletic Institute

EDUCATION FOR OLYMPIANS

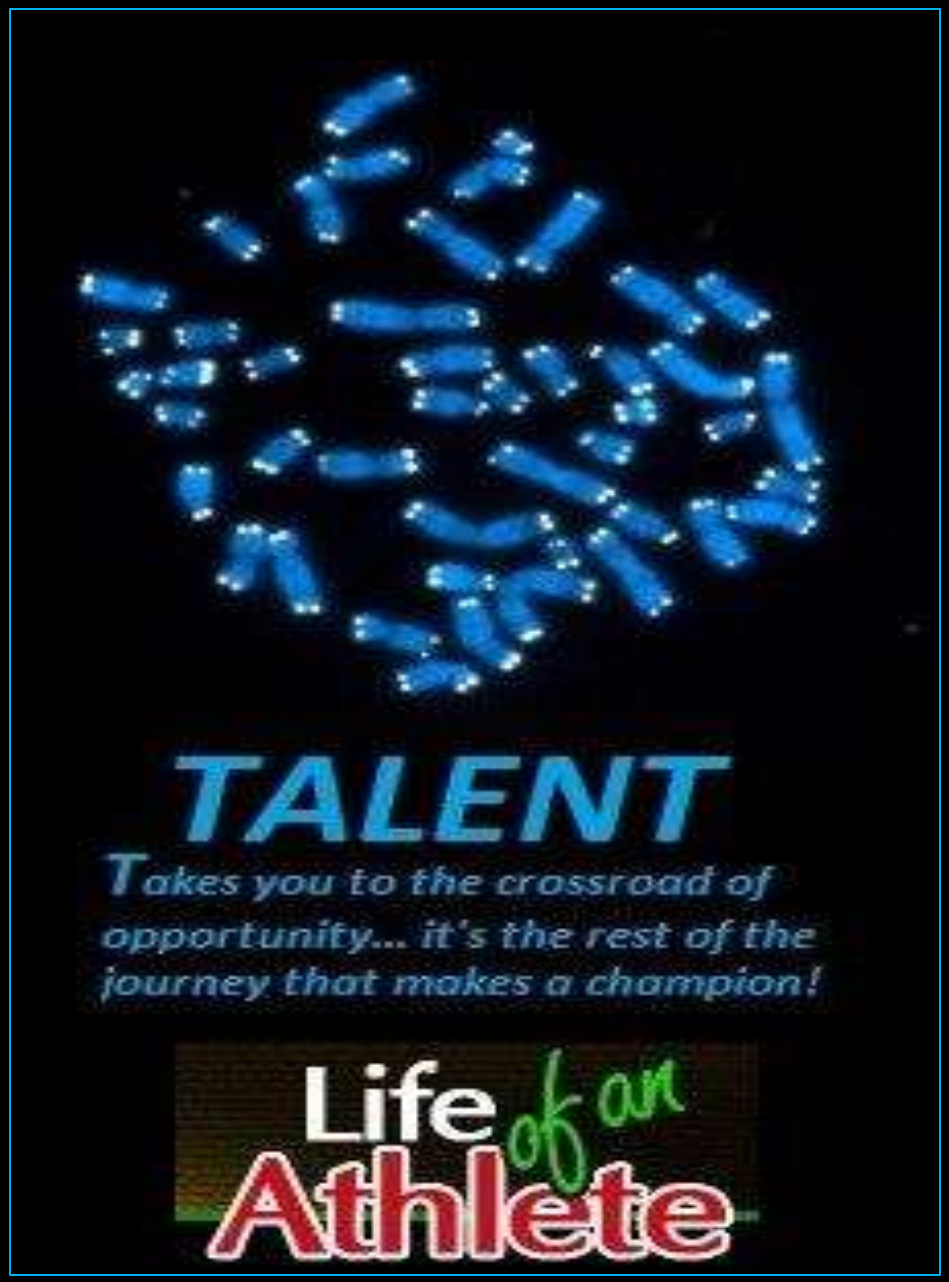
If we do not teach athletes to live an optimal lifestyle
They will still make one up!

PUREPERFORMANCE

ALL THAT MAKES YOU



8% TALENT

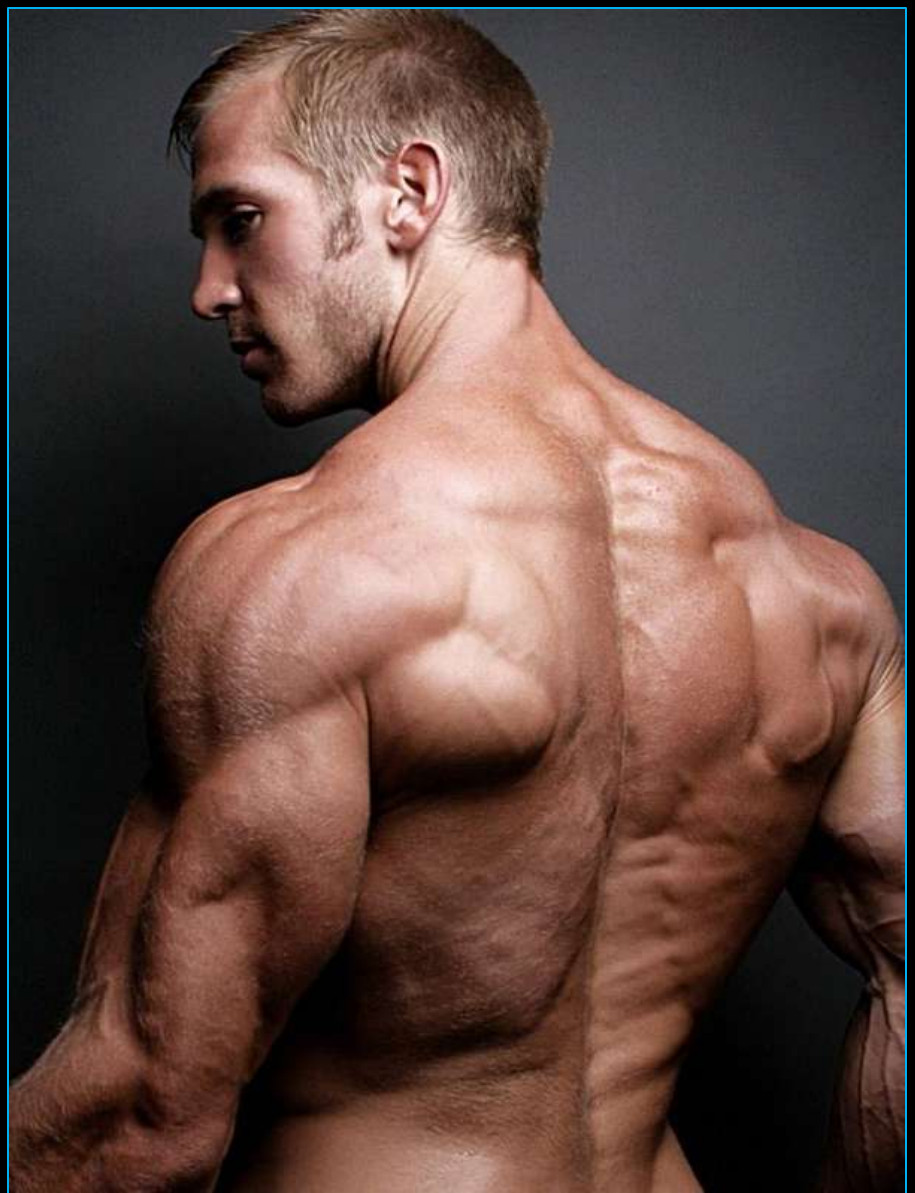


No amount of talent will overcome a lifestyle that is in conflict with elite athletic performance…

SOCIAL ISSUES 2012

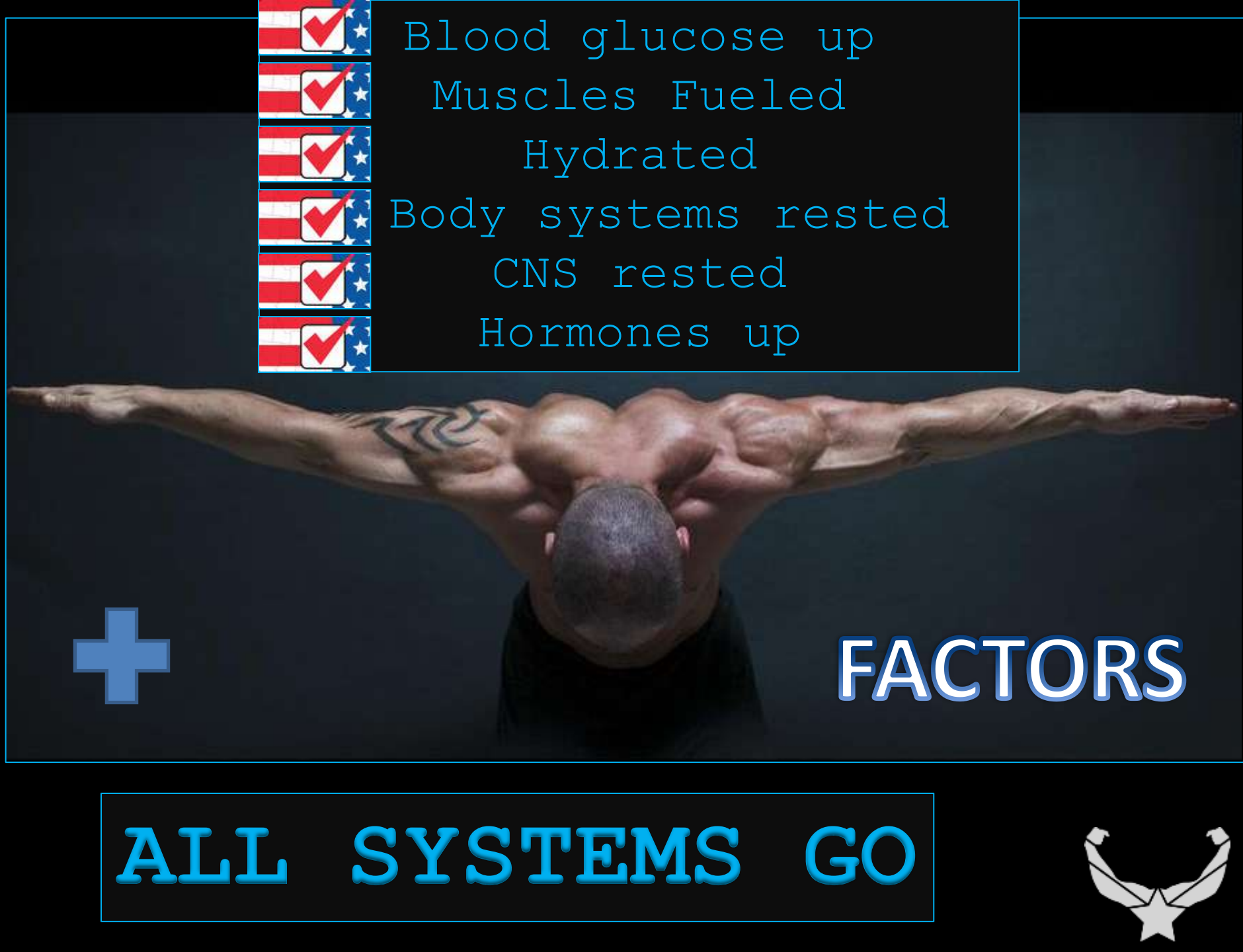
STRESS
TIME MANAGEMENT
SLEEP/CNS FATIGUE
RECOVERY
DIET/NUTRITION
ADVANCED TECHNOLOGY
SOCIAL DRUG USE
PRESCRIPTION DRUG USE
SUPPLEMENTS

It's not just what you are willing to give…
It's what you are willing to give up!



What factors affect mental and physical performance?

In sport we spend most of our time looking at positives and ignore to a great extent the negatives…


Blood glucose up
Muscles Fueled
Hydrated
Body systems rested
CNS rested
Hormones up
FACTORS
ALL SYSTEMS GO

Poor Diet
Poor Sleep
Stress
CNS Overstimulation
Social Drug Use
Poor Recovery
Poor Training Methods

FACTORS

ALL SYSTEMS NO

TRAINING

POOR RECOVERY

Too much (VOLUME)

Too hard (INTENSITY)

SICK

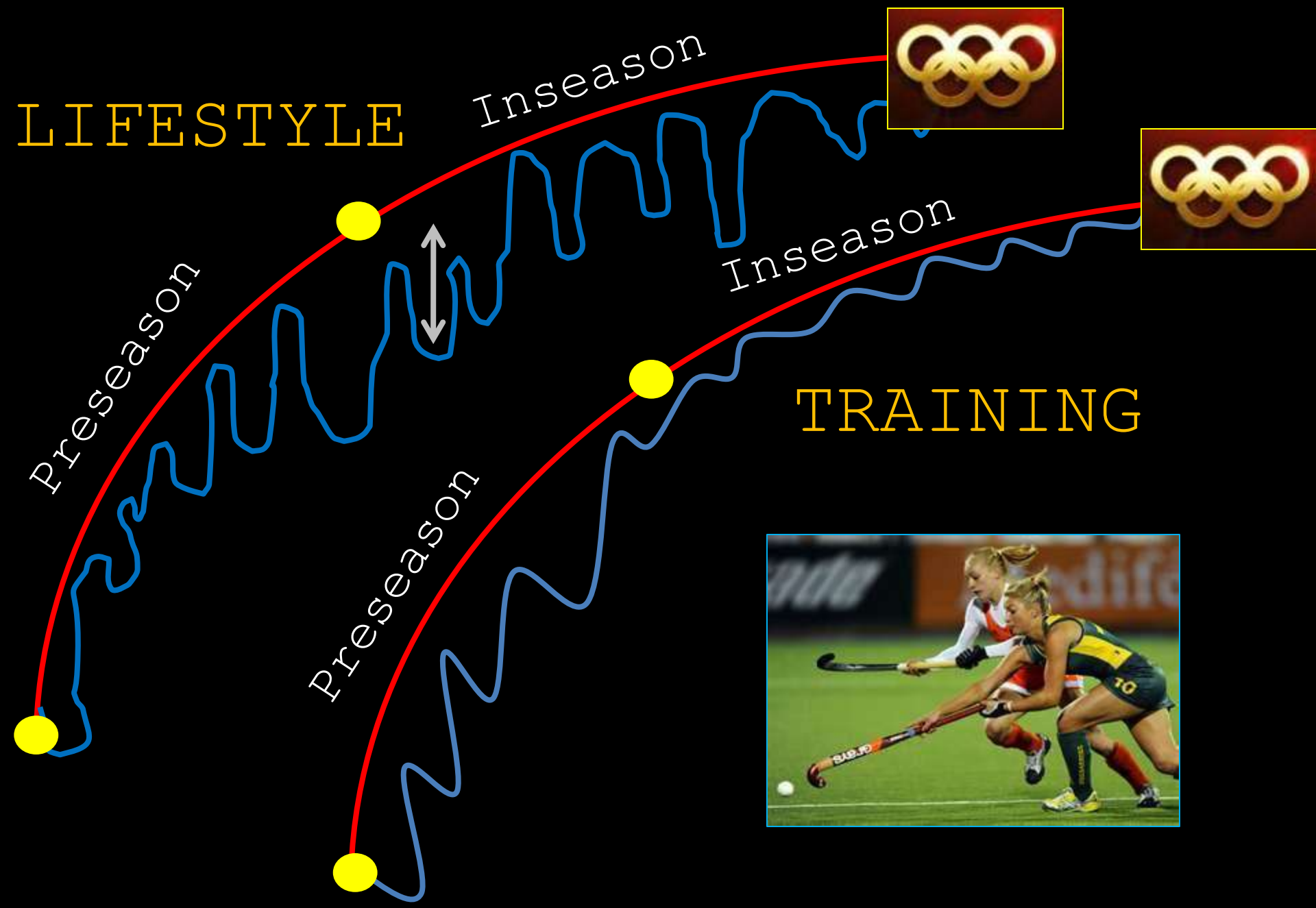
INJURED

MENTAL/PSYCHOLOGICAL

PRETENDING that you care

LIFESTYLE (MOST COMMON)

Performance Factors



4 years
1460 days
35,040 hours

OLYMPIC TIME

Time management

Every day matters
Every day counts

The single largest factor in athletic development is time… Matveev USSR

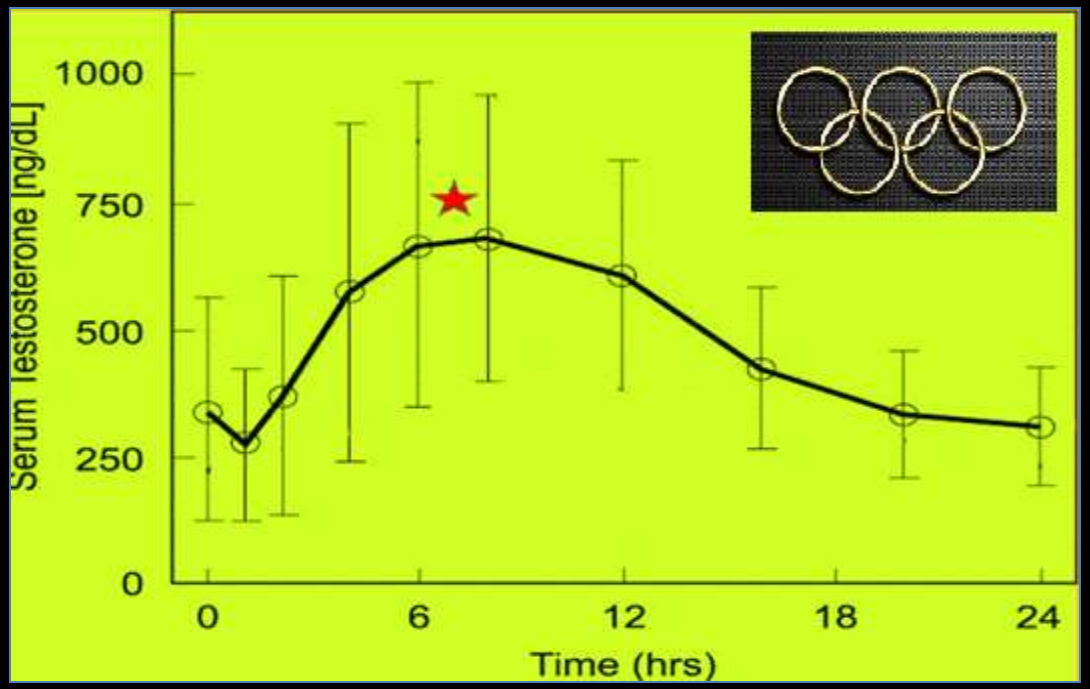
Everyone gets 24 hours . . .
its how you use them that matters

The human body can adapt to less time but there are serious deficits in mental and physical performance…

ATHLETE TIME

1-3 WORKOUTS PER DAY
4-6 HOURS BETWEEN WORKOUTS
24 HOURS FOR FULL RECOVERY
1 HOUR MAX FOR HIGH INTENSITY

It is now necessary to monitor athlete time management with them and for them due to the societal influences that are affecting development.



We know training , training effect and recovery are optimal early in day…

The brain seems to be able to build up energy deficits or energy reserves over several days and will function at that level.

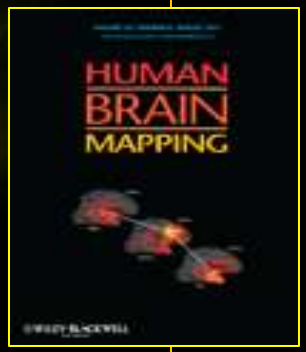
CNS READINESS

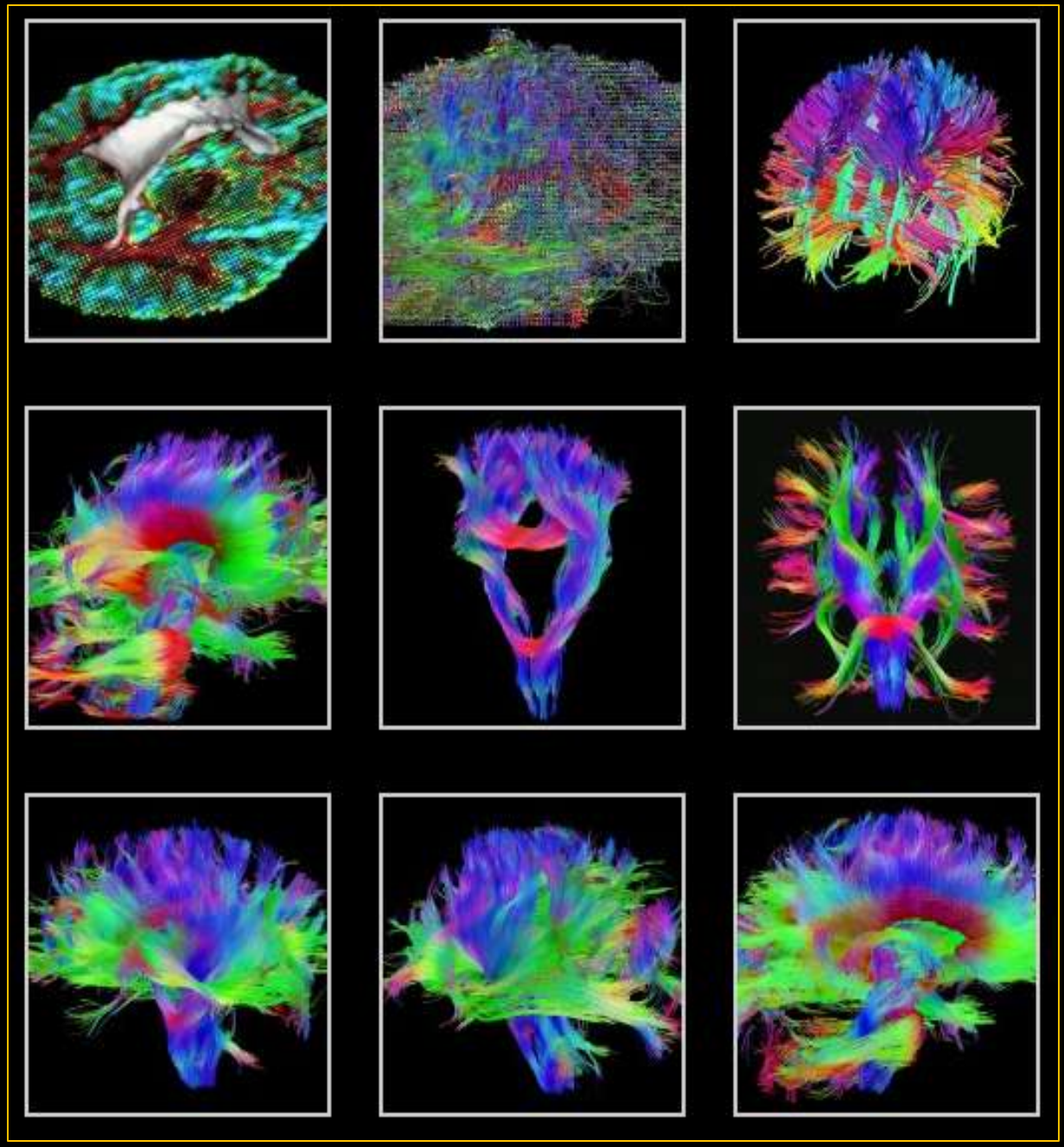
The single biggest factor in optimal performance

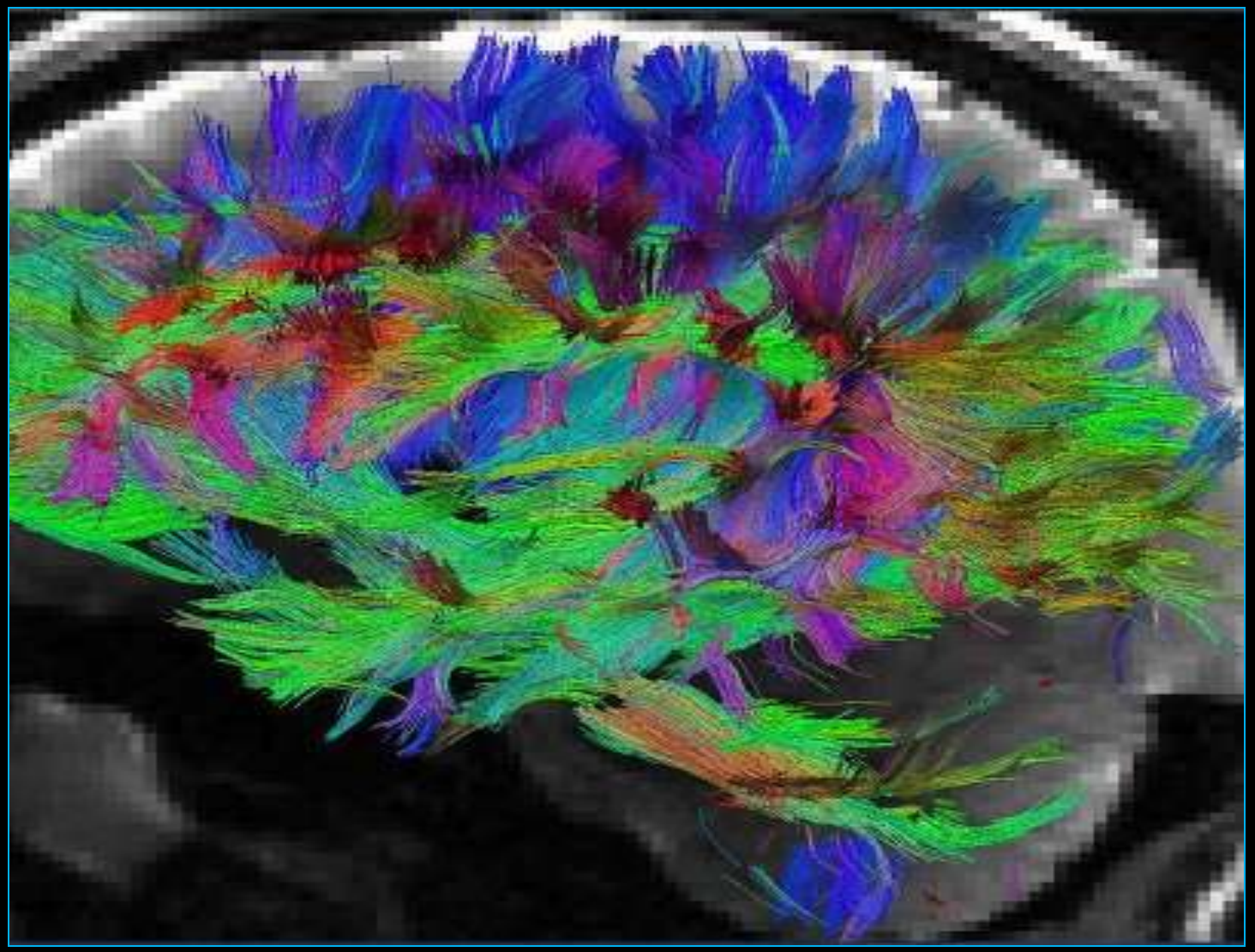
#1

CNS READINESS

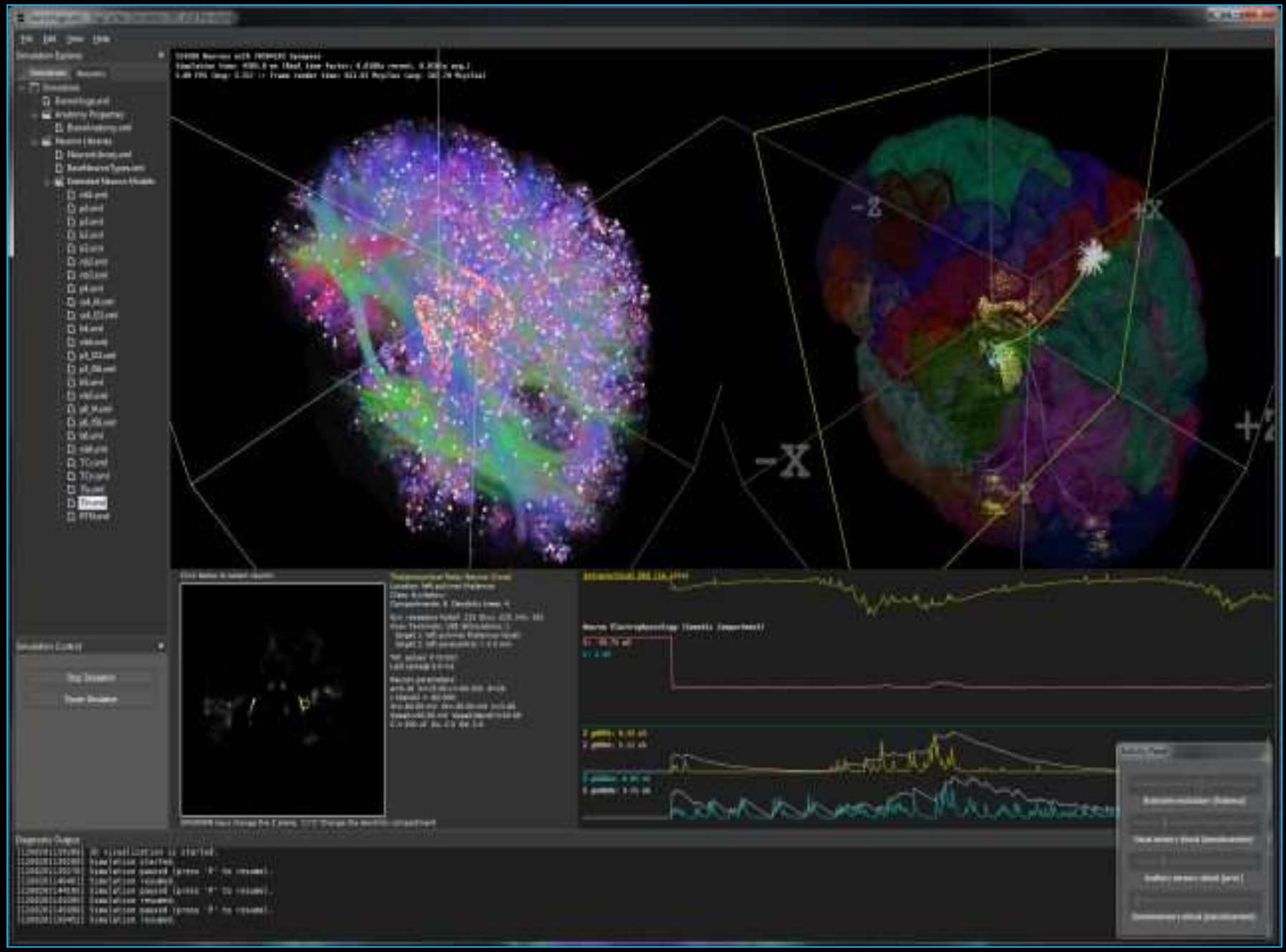

Human
Connectome
Project


HUMAN
BRAIN
MAPPING





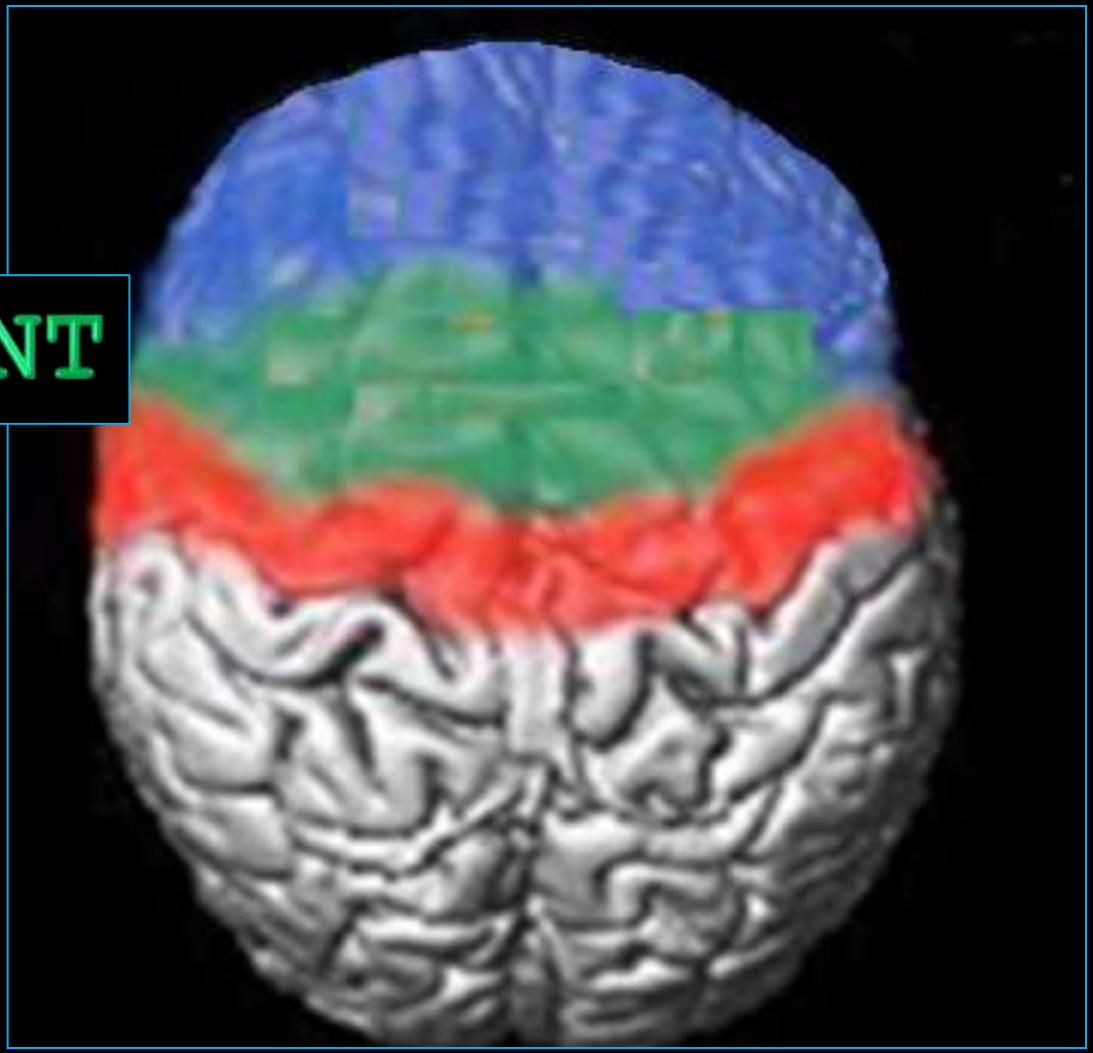
The total surface area of 100 billion neurons is equivalent to four (4) full size football fields.


-Z
+X
-X

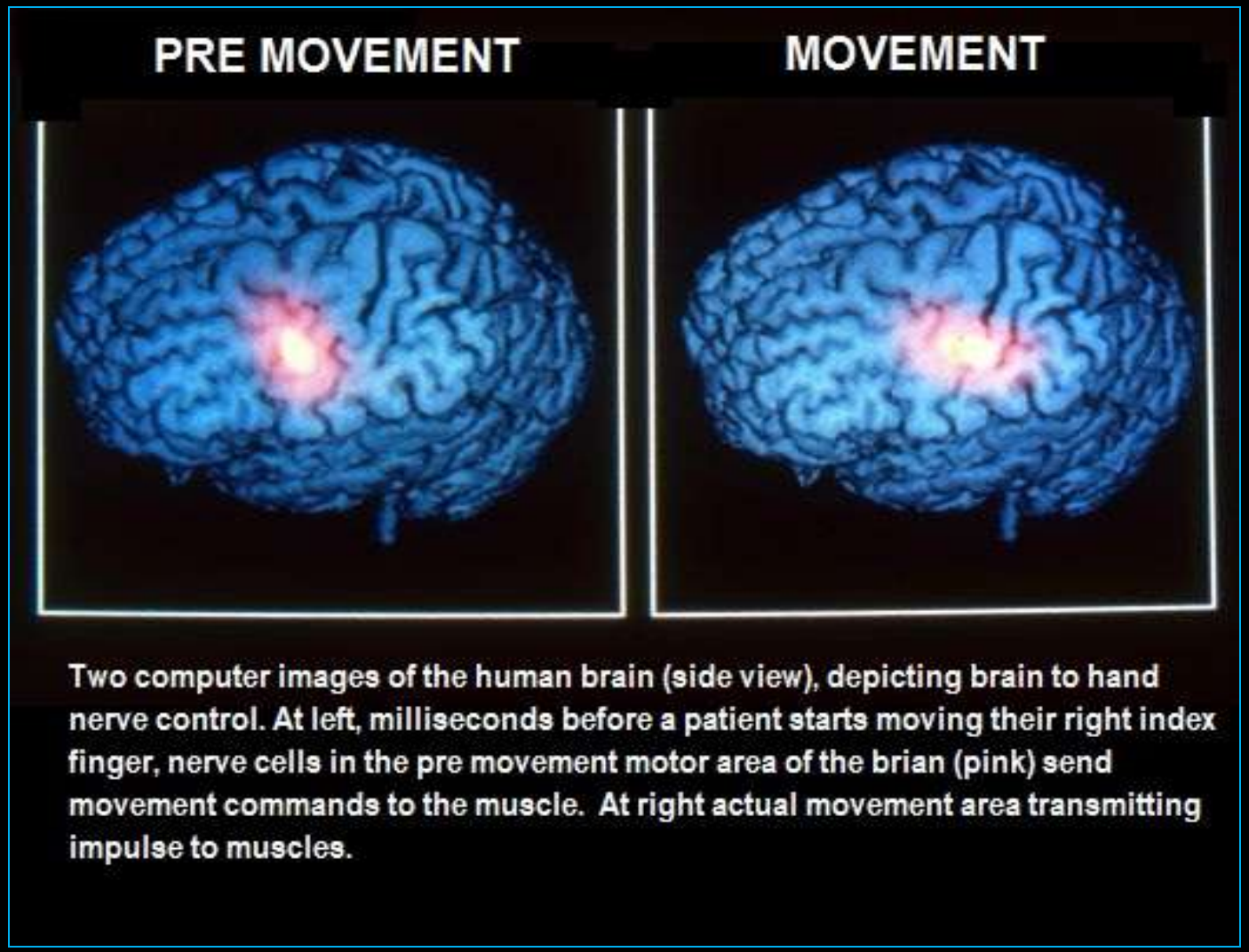
THINKING

PRE-MOVEMENT

MOVEMENT

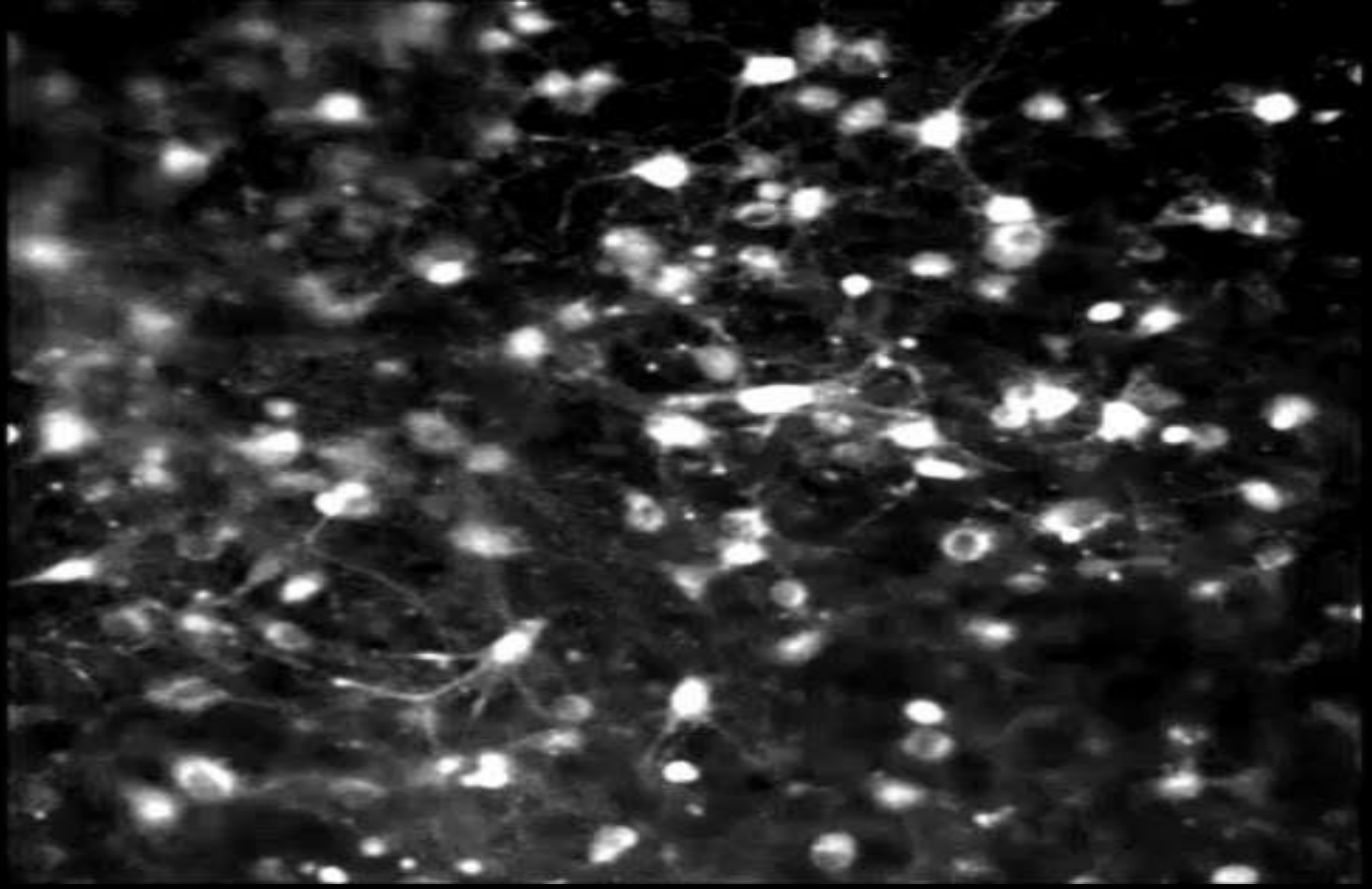


Brain and Movement



Two computer images of the human brain (side view), depicting brain to hand nerve control. At left, milliseconds before a patient starts moving their right index finger, nerve cells in the pre movement motor area of the brian (pink) send movement commands to the muscle. At right actual movement area transmitting impulse to muscles.

Physical Movements

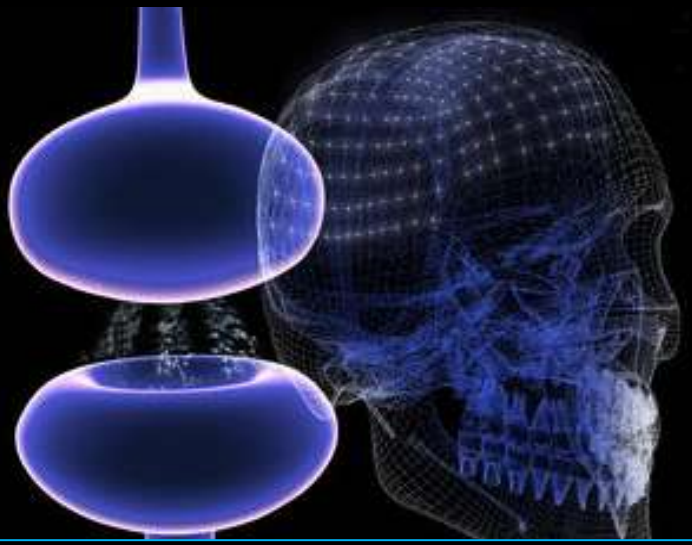


Neuronal activity during physical activity

FIRESTORM

Reaction Time best indicator of CNS Recovery/Readiness

Sending Signals



SENSORY MOTOR


.186 Sec.
London 2012
Reaction time ELITE .186

Normal Humans

.215- .362 Sec.

Reaction Timing Test

SLEEP

The Importance of SLEEP
in Mental and Physical Performance

REACT

Twenty four elite athletes reaction time to visual stimulus rested:

.186 Sec.

Twenty four elite athletes reaction time no sleep overnight:

.246 Sec.

Fatigued Forget it

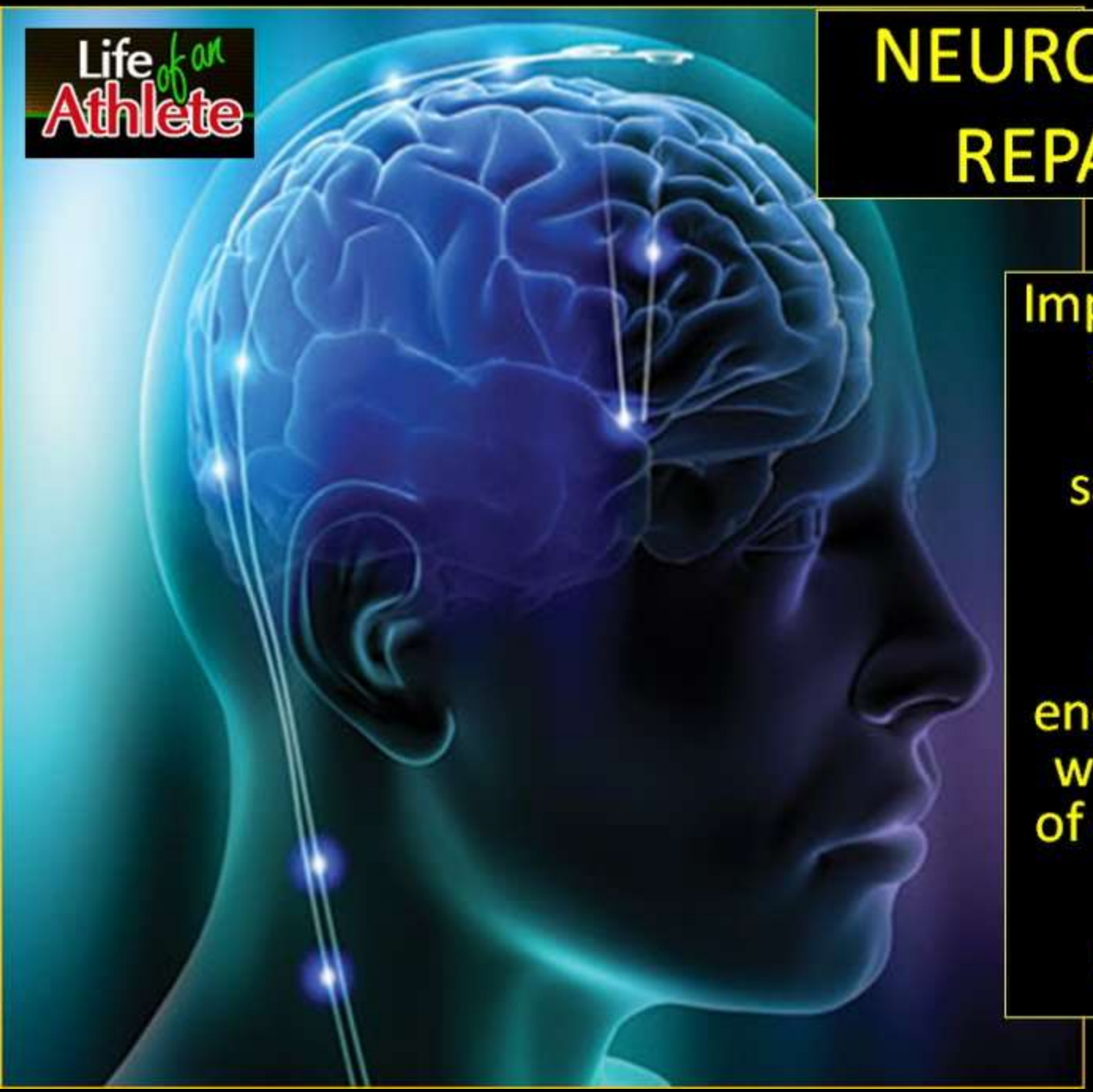
Lifestyle Strikes Back

Sleep

Now Clearly a Predictor of Performance

John Underwood, President & Founder, American Athletic Institute

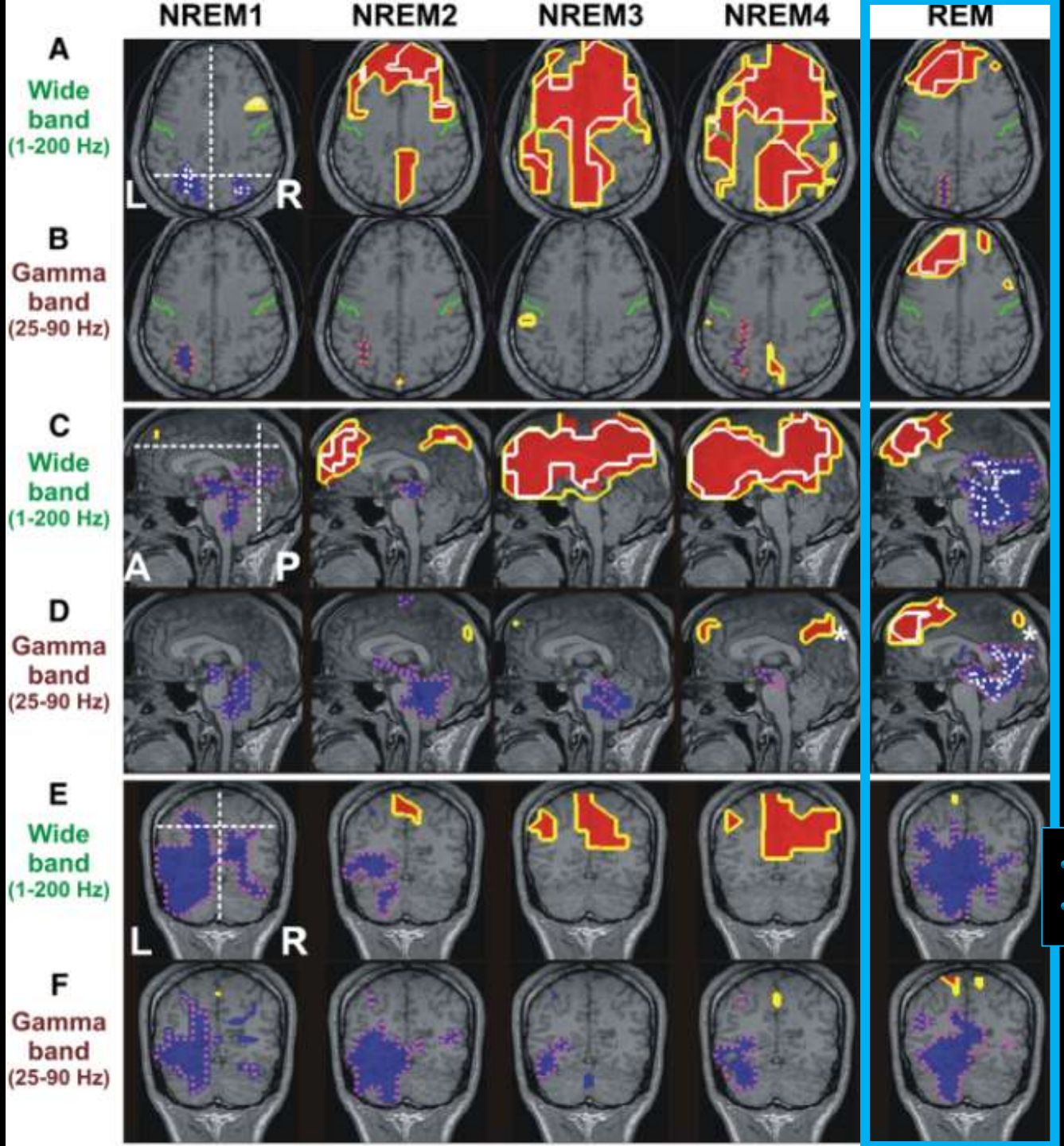
Without any question the brain and central nervous system play the most significant role in optimal physical performance. Every movement emanates from brain CNS impulses. For an elite athlete, the CNS controls every aspect of performance potential, including function of skills, biomechanical exact movements, the firing sequences of muscles during activity, reflexes and reaction and countless interrelated physiological functions, including both the central system (heart and lungs) and the peripheral system (muscles). The most significant factor in the brain and CNS functioning at an optimal level is that it is rested. This has been documented throughout decades of studies on reflexes, reaction and many other variables which measure CNS readiness. Recent studies centering on sleep and rest as a factor in optimal physical performance have proved conclusively that sleep is clearly a predictor of performance in any skill based sport.



NEURONAL REPAIR

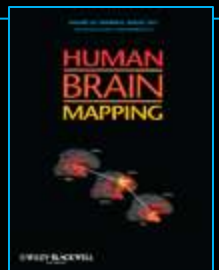
Improper amounts of sleep may cause those same neuronal pathways to become so depleted of energy or flooded with byproducts of cellular activity that they malfunction.

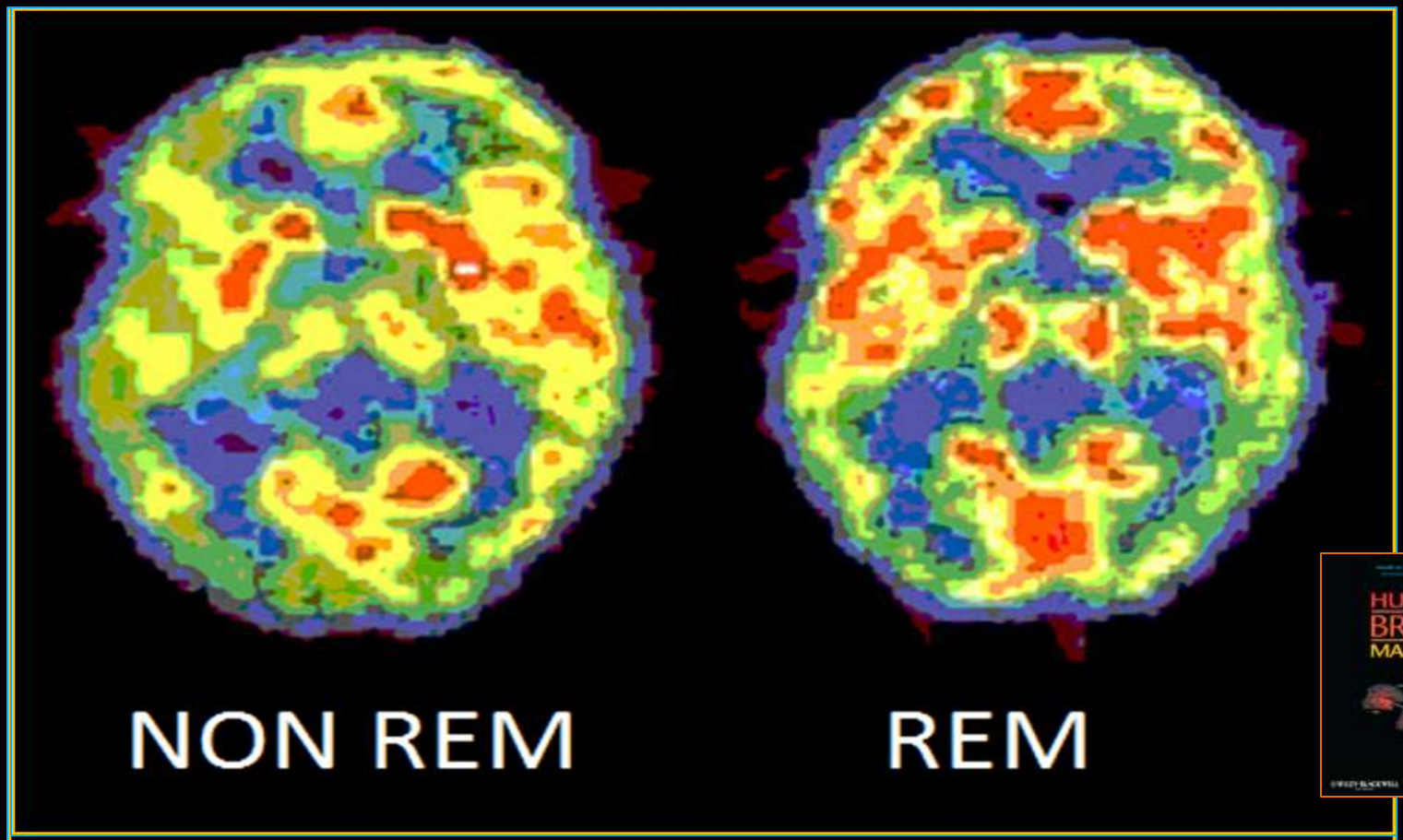
11/2 -21/2 HOURS
OF REM
IN 24 HOURS

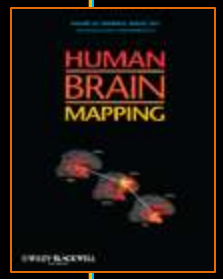


R E M

RECHARGE







You need 1 ½ -2 1/2 hours of REM

You need 8 hours of total sleep to get it

4-6 HOURS

40-54 MINS

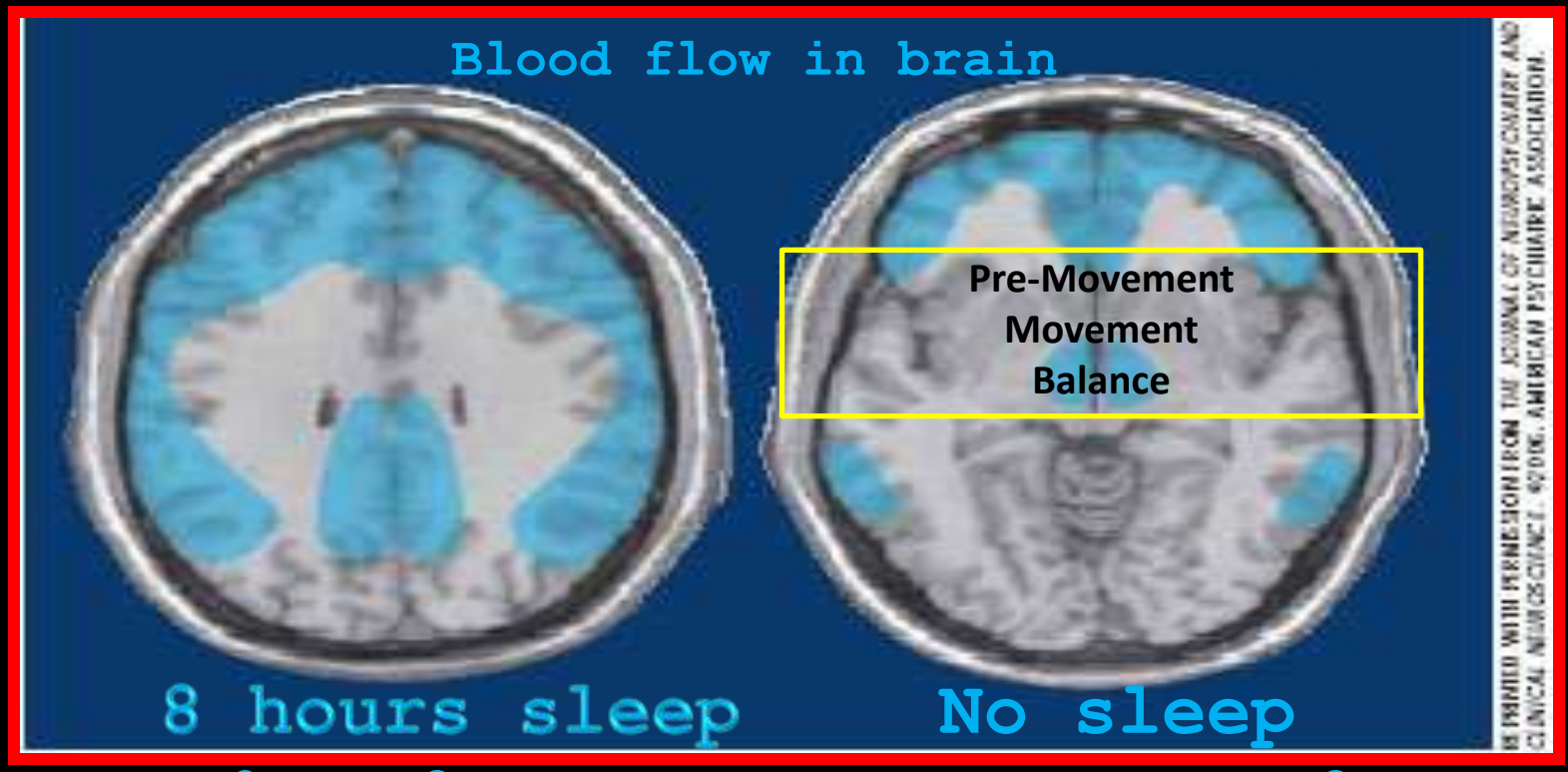
TOTAL SLEEP

ACCUMULATED REM

8 HOURS

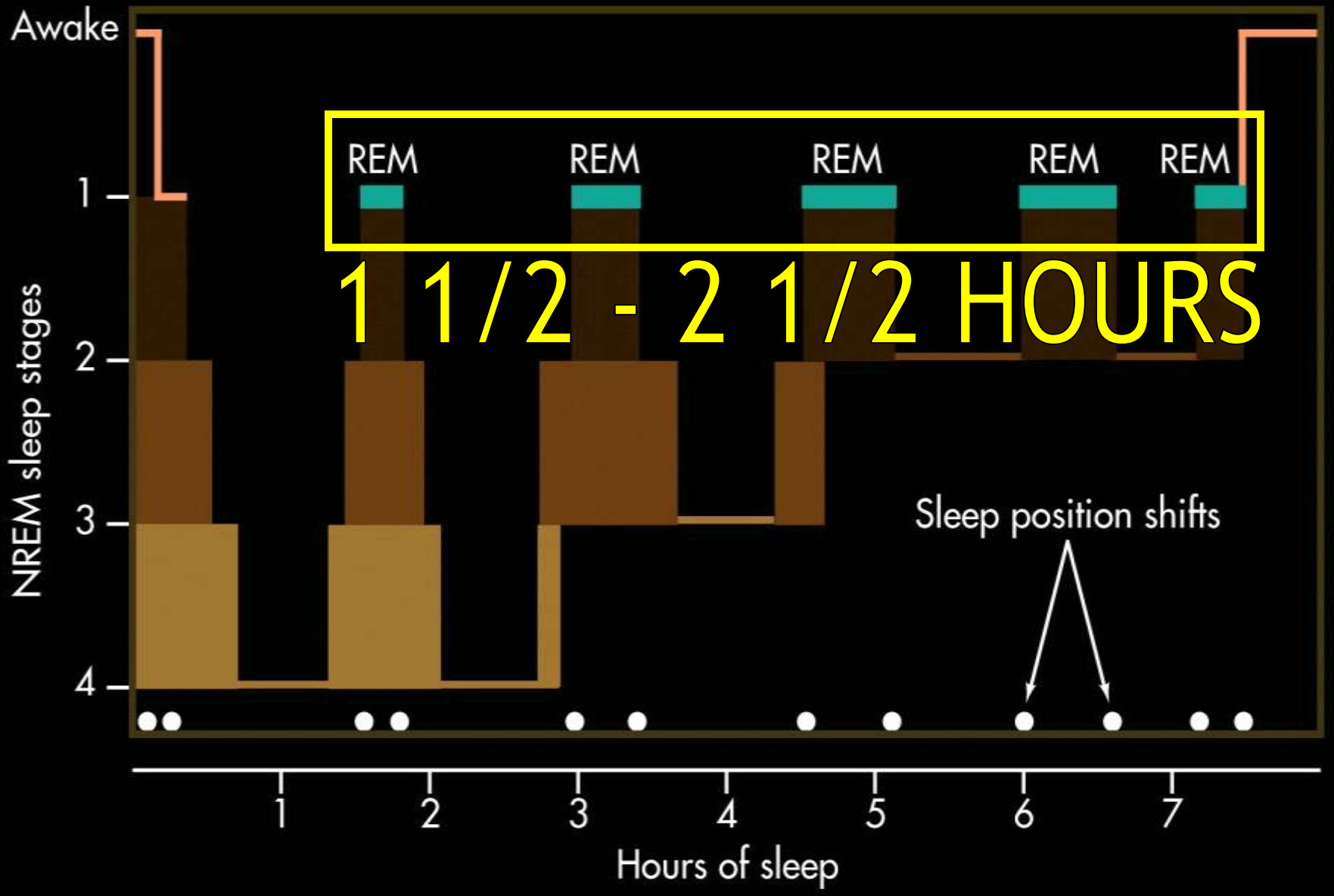
1 ½ -2 HOURS

Rested Tired



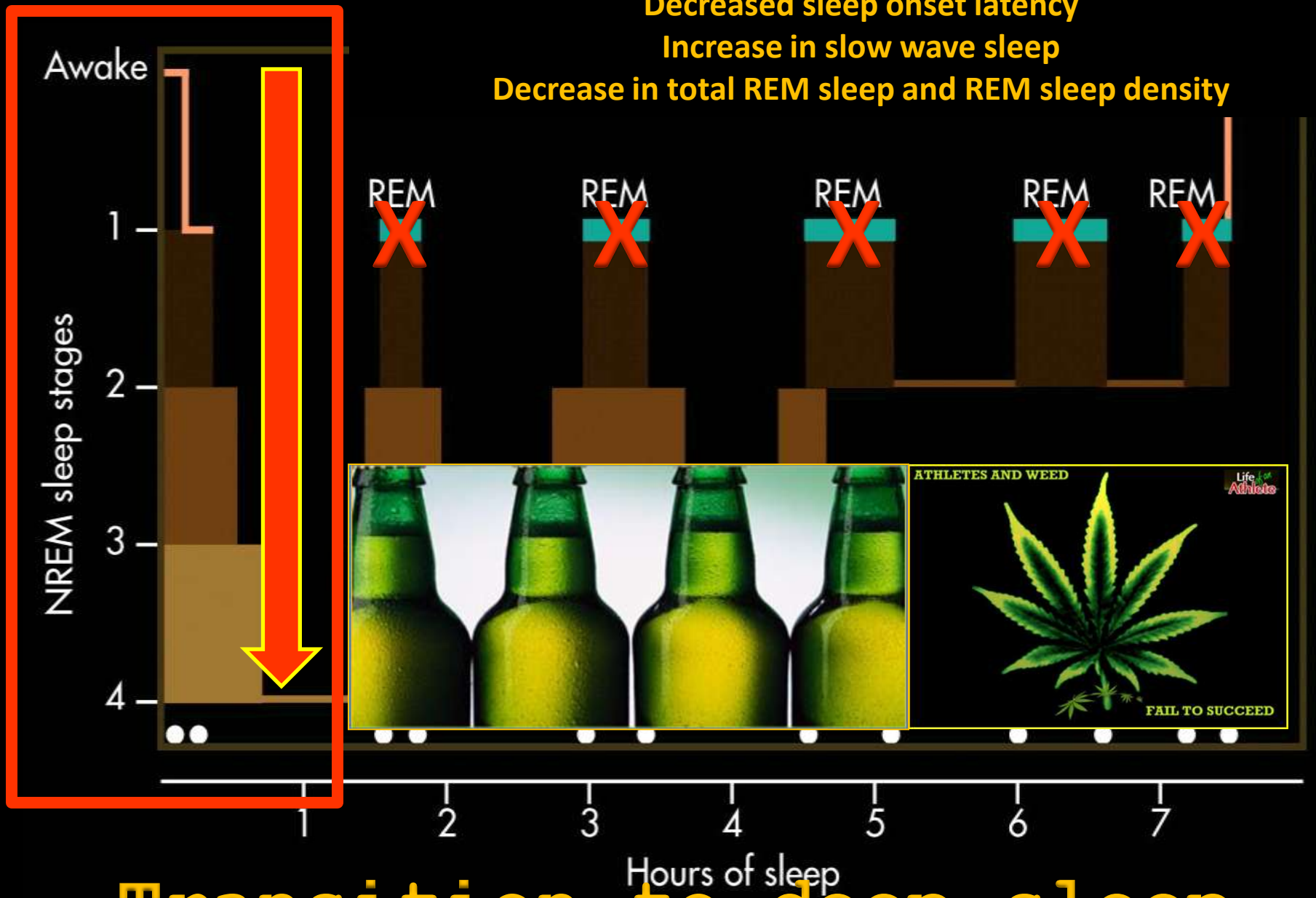
WORKS FAILS

IF THE BRAIN DOESN'T WORK
THE BODY DOESN'T WORK



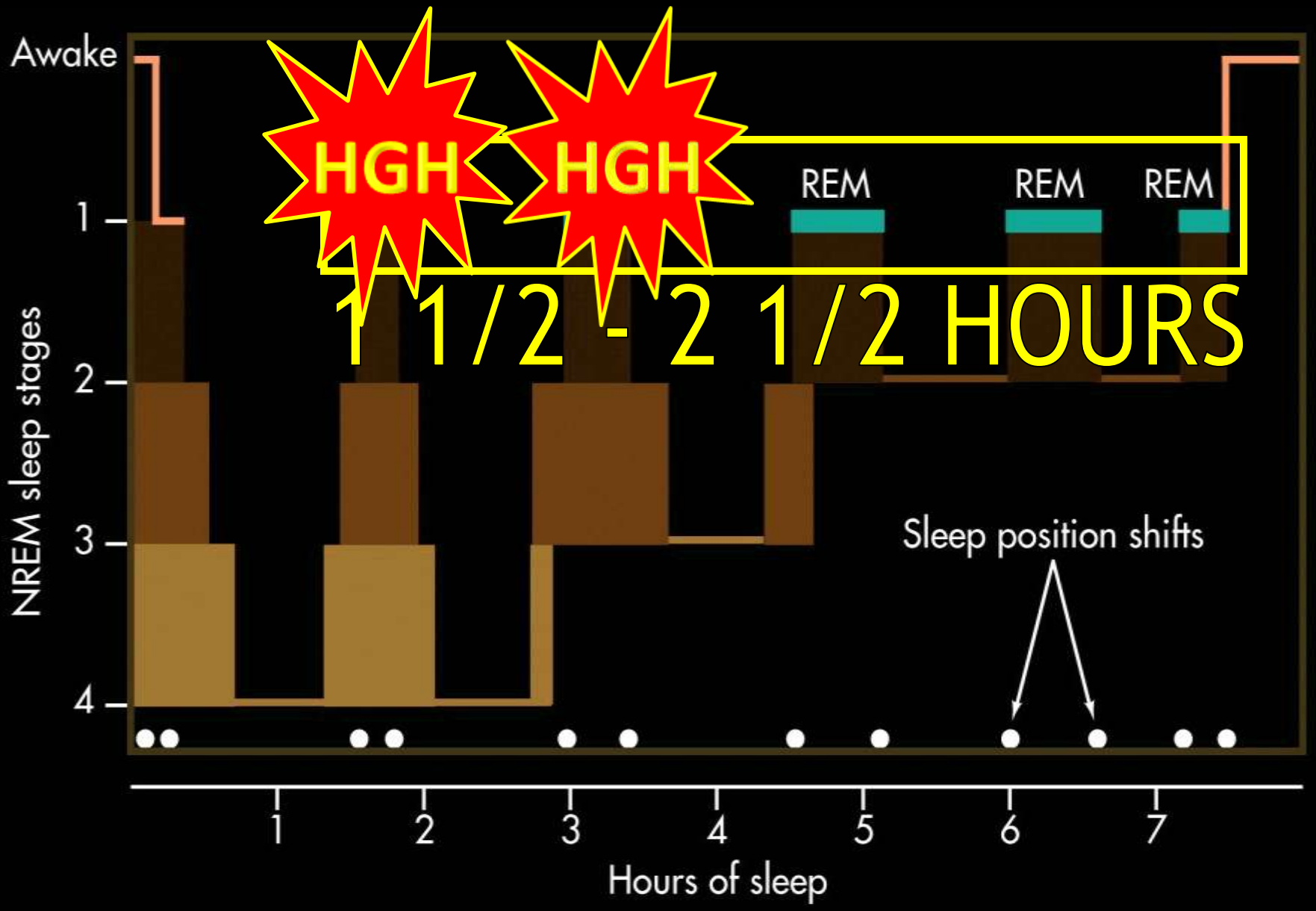
8 HOURS OF SLEEP

Decreased sleep onset latency
Increase in slow wave sleep
Decrease in total REM sleep and REM sleep density

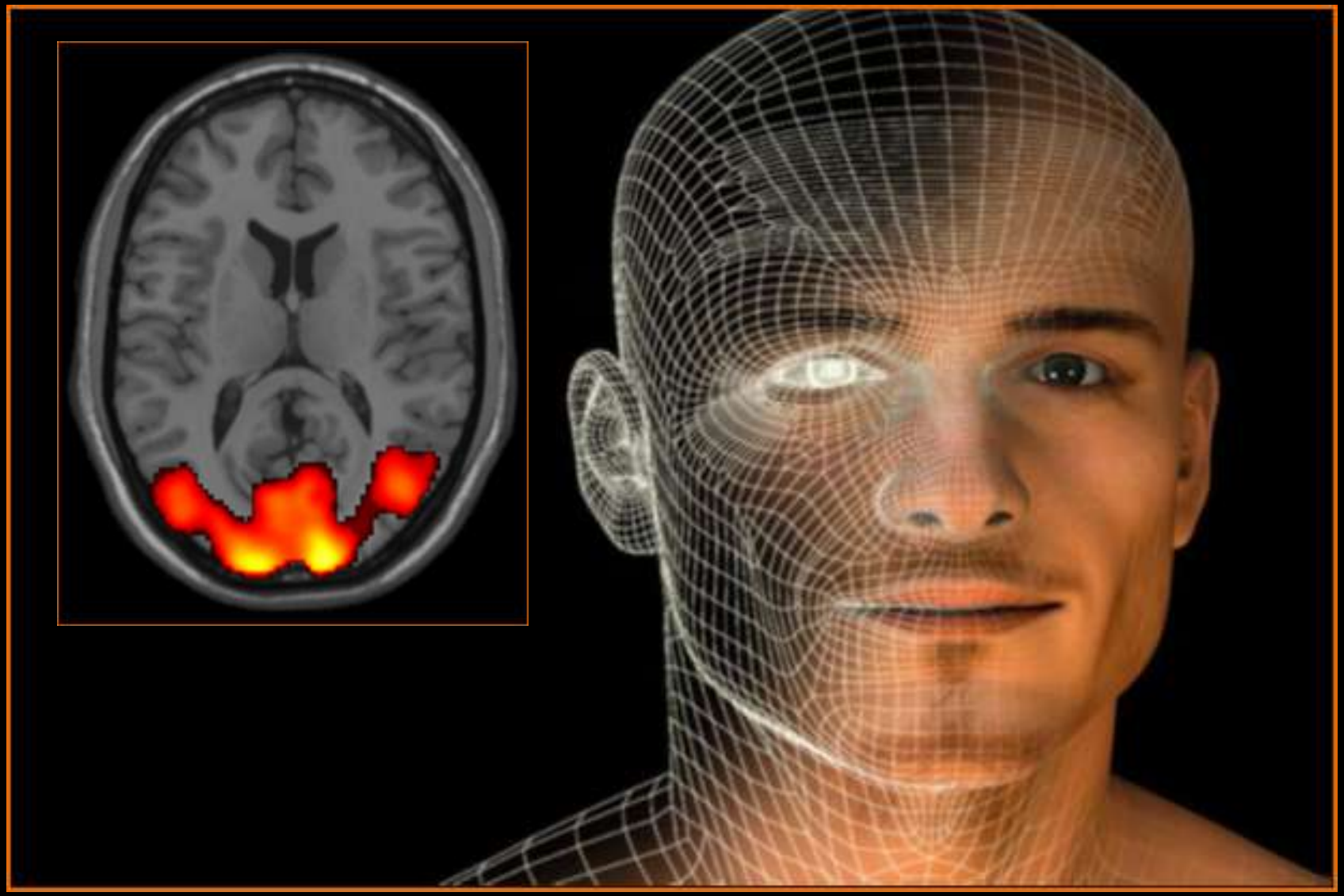


Transition to deep sleep

Lost REM



8 HOURS OF SLEEP



Visual Cortex Energy Drain

READ

INTERNET

Rest means Rest…

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

Dr. Gary Small / UCLA / Courtesy to The Chronicle

Nearly 2/3 of brains activity

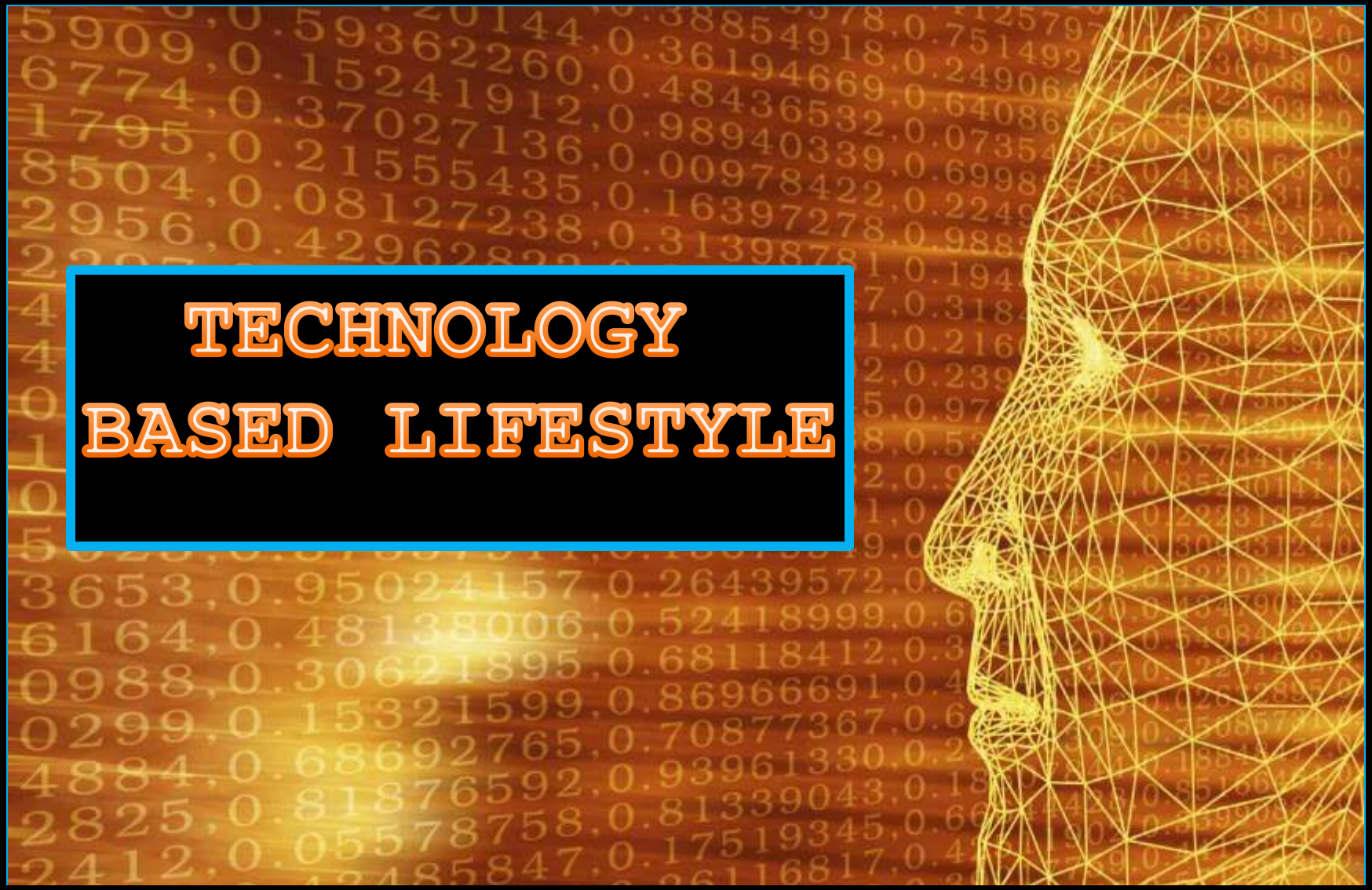
Biggest Drain

ABILITY TO TRACK AND FOLLOW MOVING OBJECTS

ABILITY TO DETERMINE DEPTH BETWEEN OBJECTS

THE ABILITY TO DETERMINE THE SPEED OR VELOCITY AT WHICH AN OBJECT IS TRAVELING

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



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

Life of an Athlete

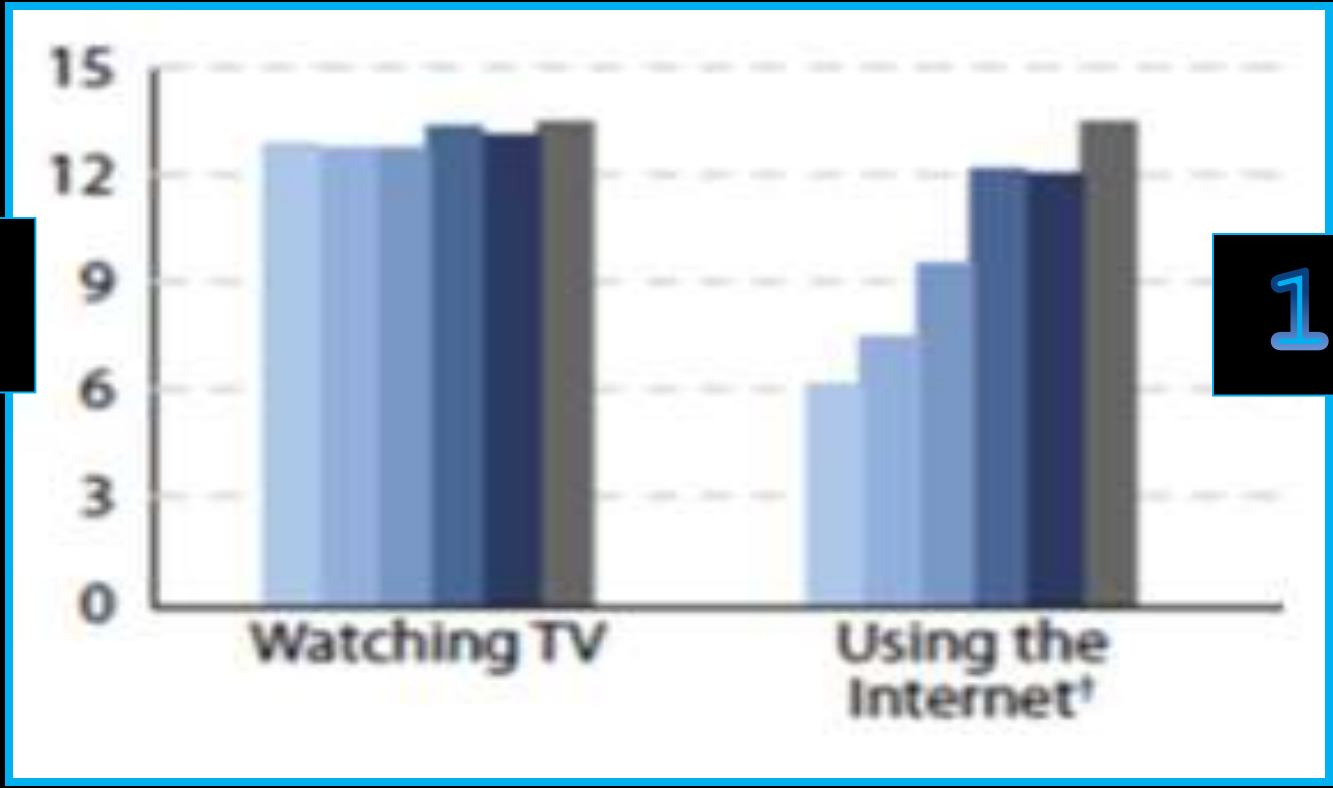
STRESS
TIME LOSS
CNS FATIGUE
RECOVERY DELAYS
METABOLISM CHANGES
LOSS OF FOCUS

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

13 HRS

13 HRS

5%



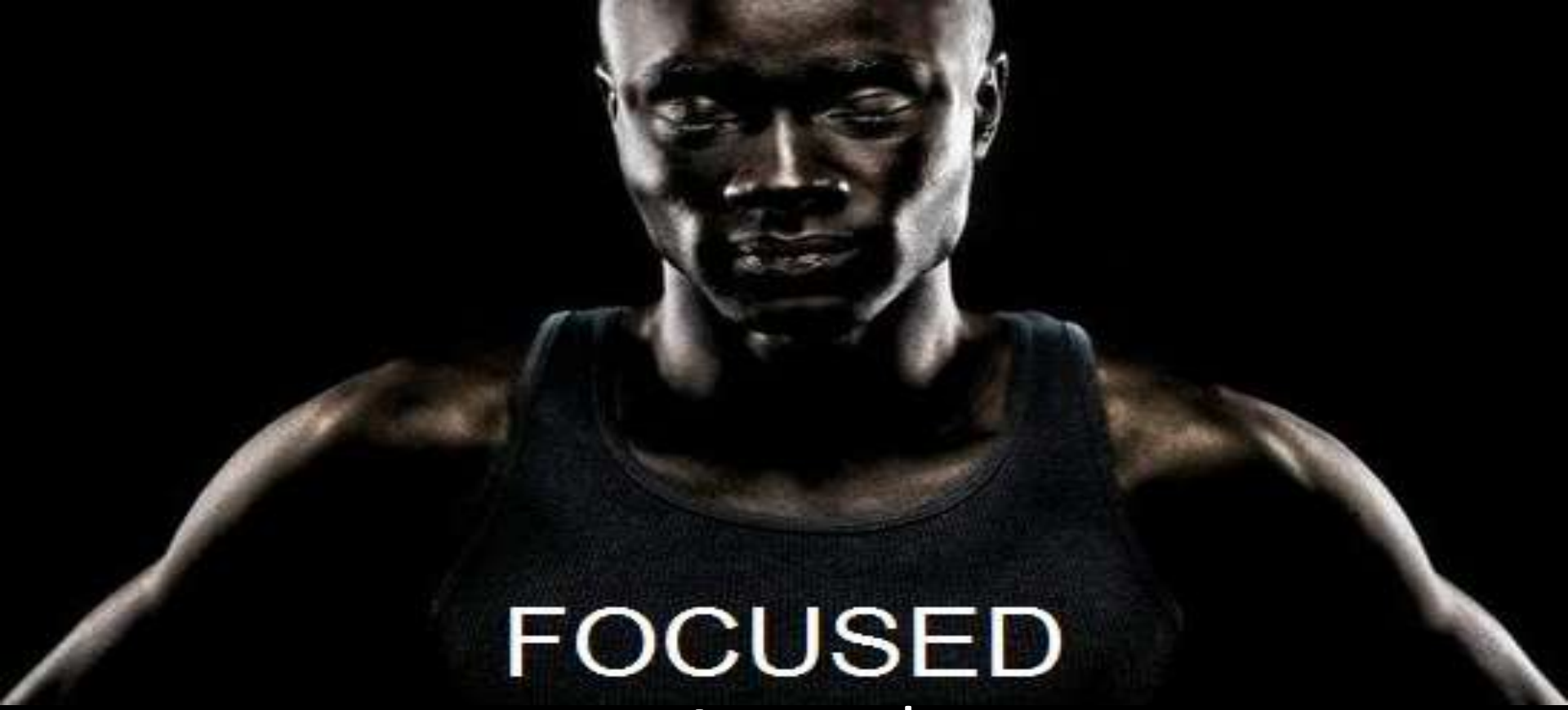
121%

INCREASE IN TV AND INTERNET TIME IN LAST FIVE YEARS

26 HOURS PER WEEK

+10-15-20 Hours


facebook
wasting athletes time since 2004



Arousal

Processing

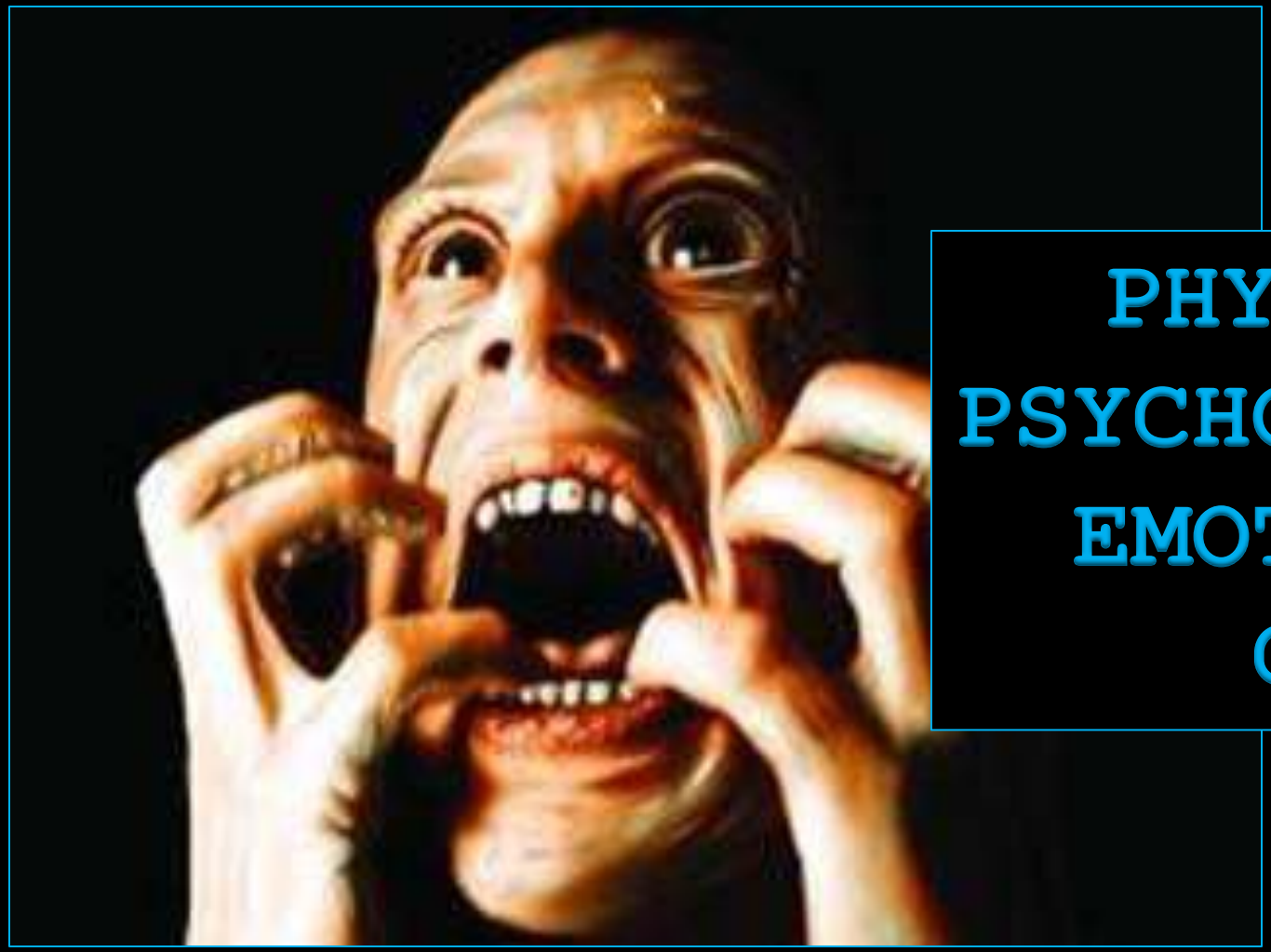
Reaction

Balance

Muscle Memory

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

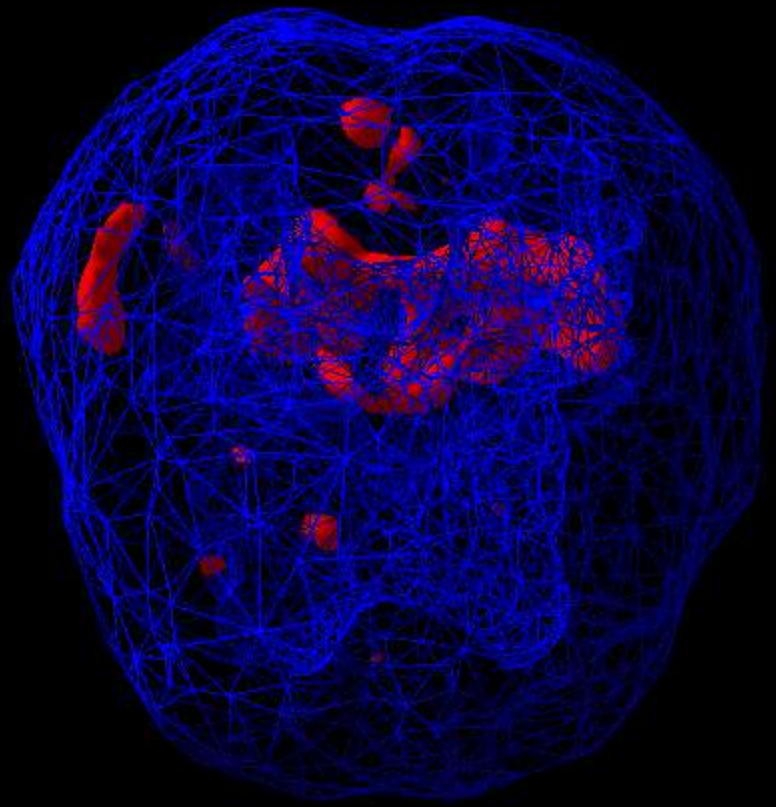
ENERGY DRINKS



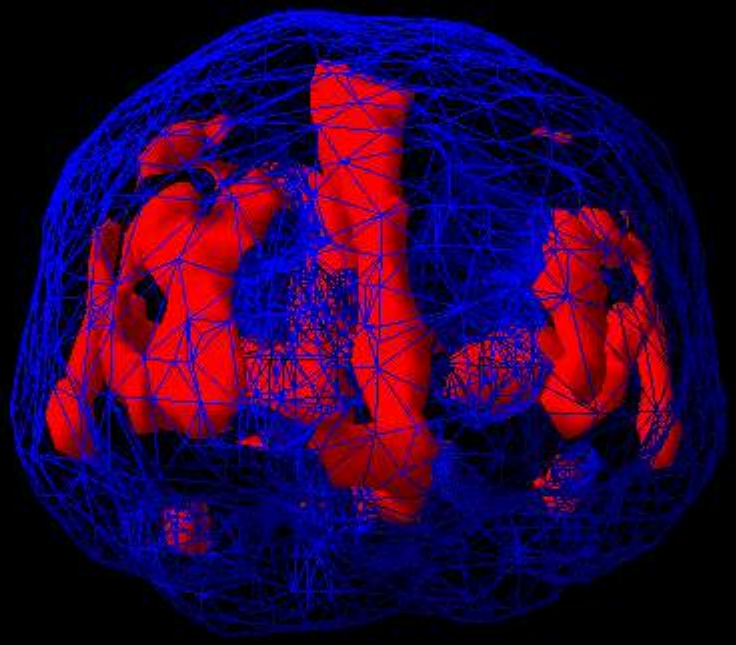
PHYSICAL
PSYCHO-SOCIAL
EMOTIONAL
CNS

STRESS

CALM



STRESS



WORRIED

% TOTAL ENERGY EXPENDITURE

If we can limit the expenditure of energy during the waking hours we can build energy reserves for high level physical /mental activity. Much of this can be utilized in CNS readiness!

Wasting Energy

Monitoring STRESS and RECOVERY

JOB STRESS
RELATIONSHIP STRESS
FAMILY STRESS
PHYSICAL STRESS
EMOTIONAL STRESS
METABOLIC STRESS

TV VIDEOS
TEXTING
FACEBOOK
SOCIAL LIFE
AFFILIATIONS
ACADEMICS

READINESS TO TRAIN/COMPETE

Poor recovery	**Moderate recovery**	**Good recovery**
Increased risk of overtraining	Easy training recommended	No risk of overtraining

FIRSTBEAT


omegawave™

2:1

AWAKE STRESS

ASLEEP RECOVER

16 HOURS 8 HOURS

DAILY STRESS

LIFESTYLE AND RECOVERY

The single most overlooked aspect of athlete failure is issues related to recovery…

24 HOURS

BODY RECOVERY

BODY MUST BE RESTED WHEN YOU TRAIN

The CNS takes much longer to recover than the heart lungs and muscle systems…

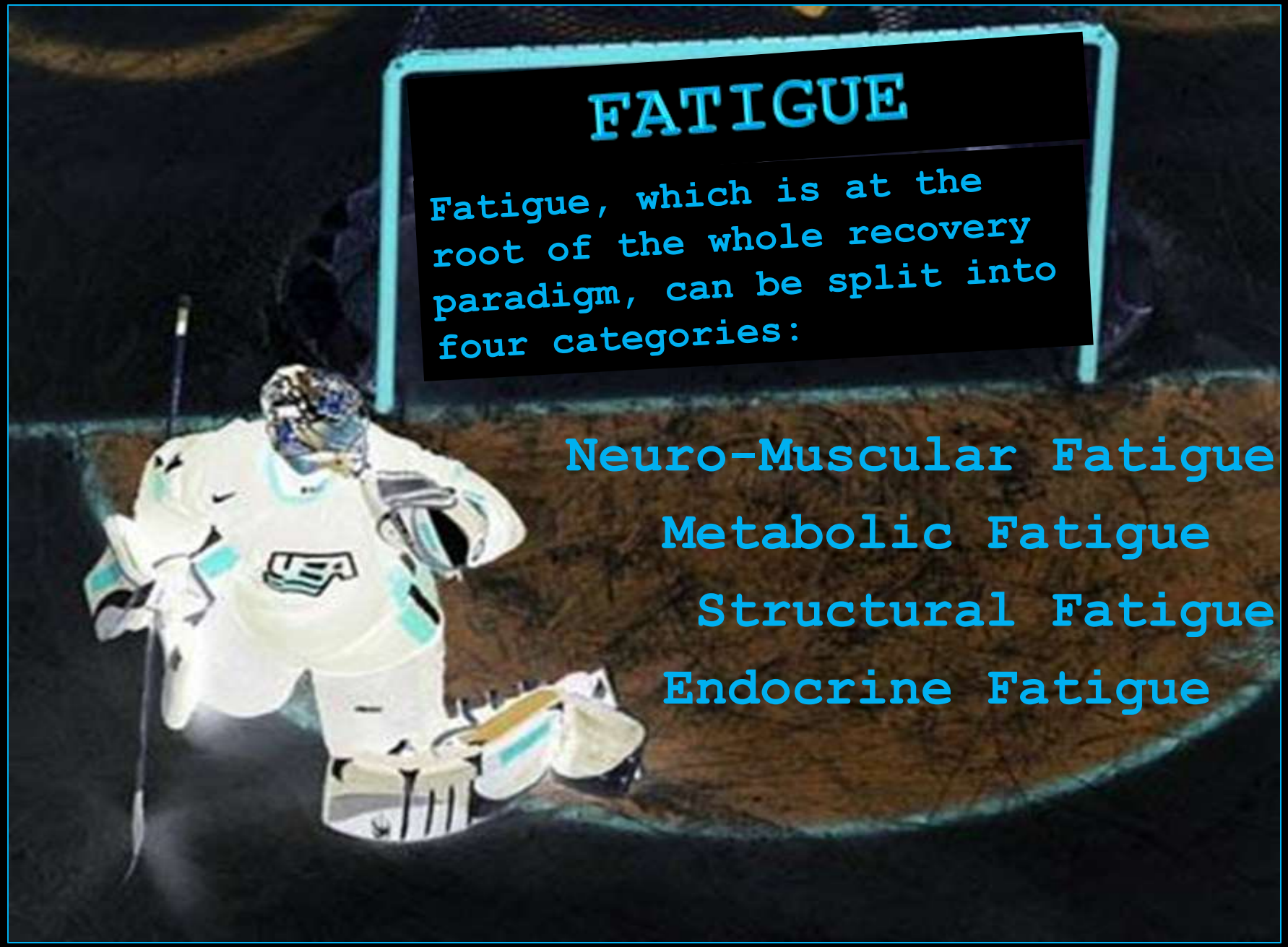
48 HOURS

24 HOURS

RECOVERY

HOUR 1	70%
HOUR 8	20%
HOUR 24	10%

DYNAMICS OF RECOVERY AND TIME


FATIGUE
Fatigue, which is at the root of the whole recovery paradigm, can be split into four categories:
Neuro-Muscular Fatigue
Metabolic Fatigue
Structural Fatigue
Endocrine Fatigue

The first hour

During the first hour after a workout the majority of recovery takes place and training effect is maximized.

The single most critical factor in training effect taking place or not…

POST TRAINING NUTRITIONAL RECOVERY

CARBS

Carbohydrate functions:
Replenish muscle glycogen
Spike insulin secretion
Reduce cortisol (stress hormone)

PROTEIN

Protein functions:
Reduce muscle damage
Build fitness infrastructure
Accelerate Growth Factors

WITHIN MINUTES

The highest rates of nutrient uptake occur during the first 10mins after training .

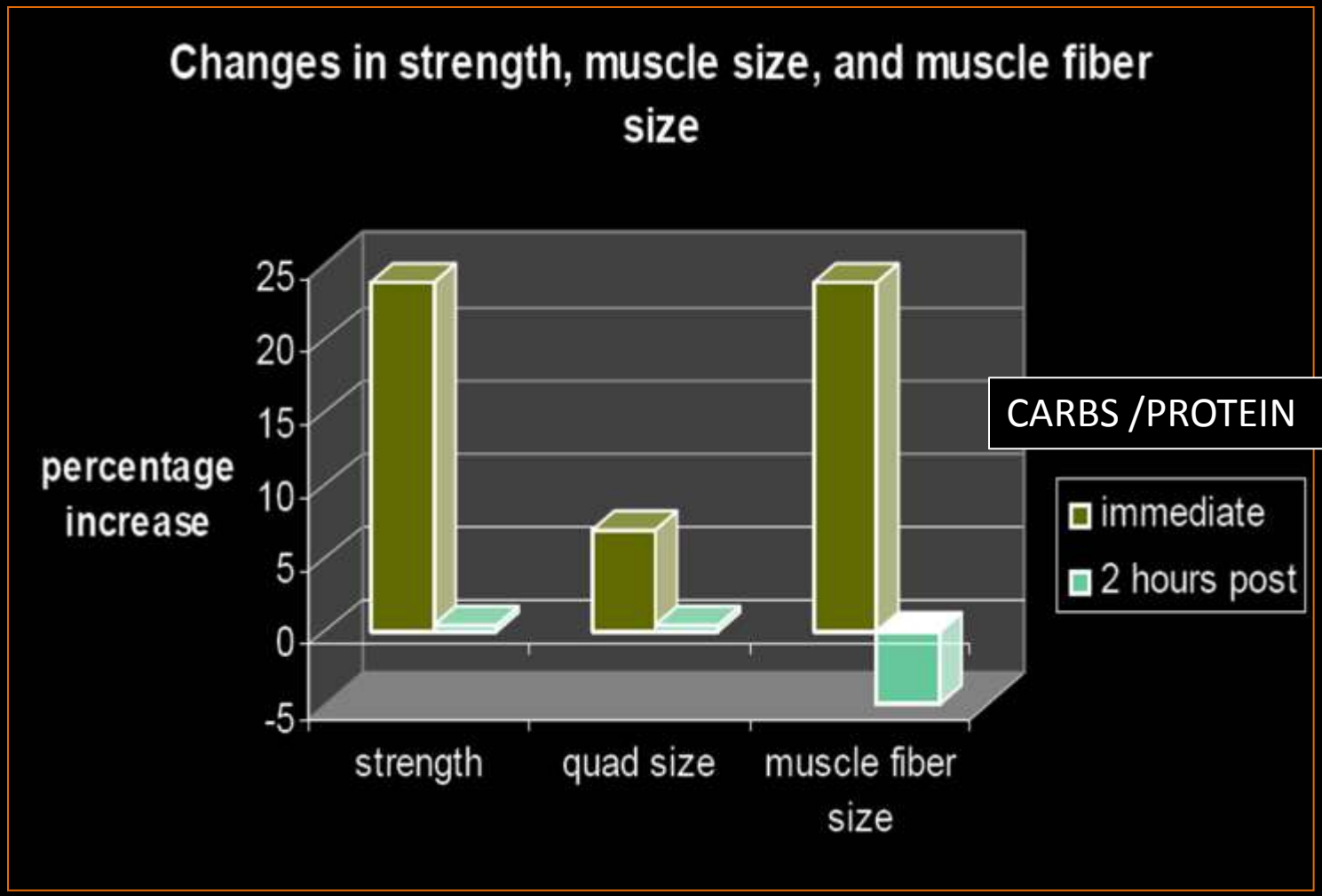
This is because all the nutrient transport and storage mechanisms become switched on thus increasing the body's absorption rates. The nutrients that are required are glucose (from Carbohydrate) and amino acids (from Proteins).

THE QUICKER THE BETTER

PROTEIN

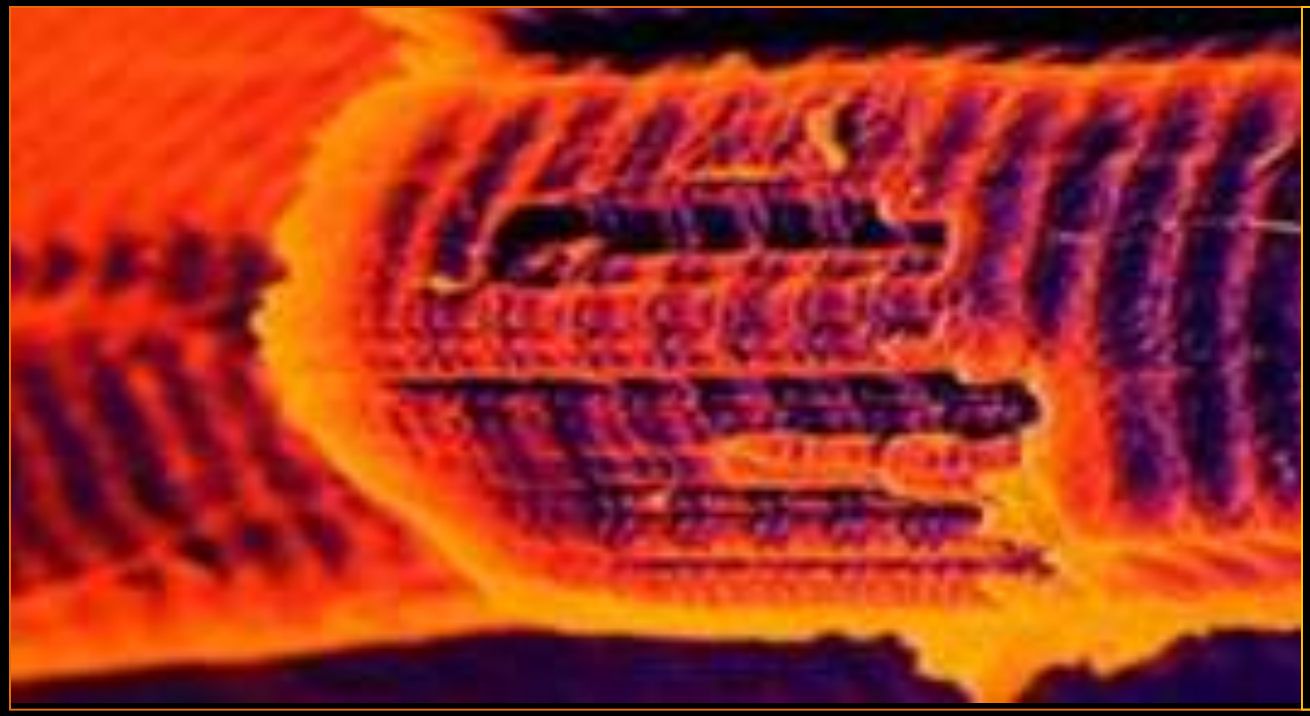
Protein blunts negative effects
Accelerates positive factors in muscle

Fast Protein Critical



CARBS /PROTEIN

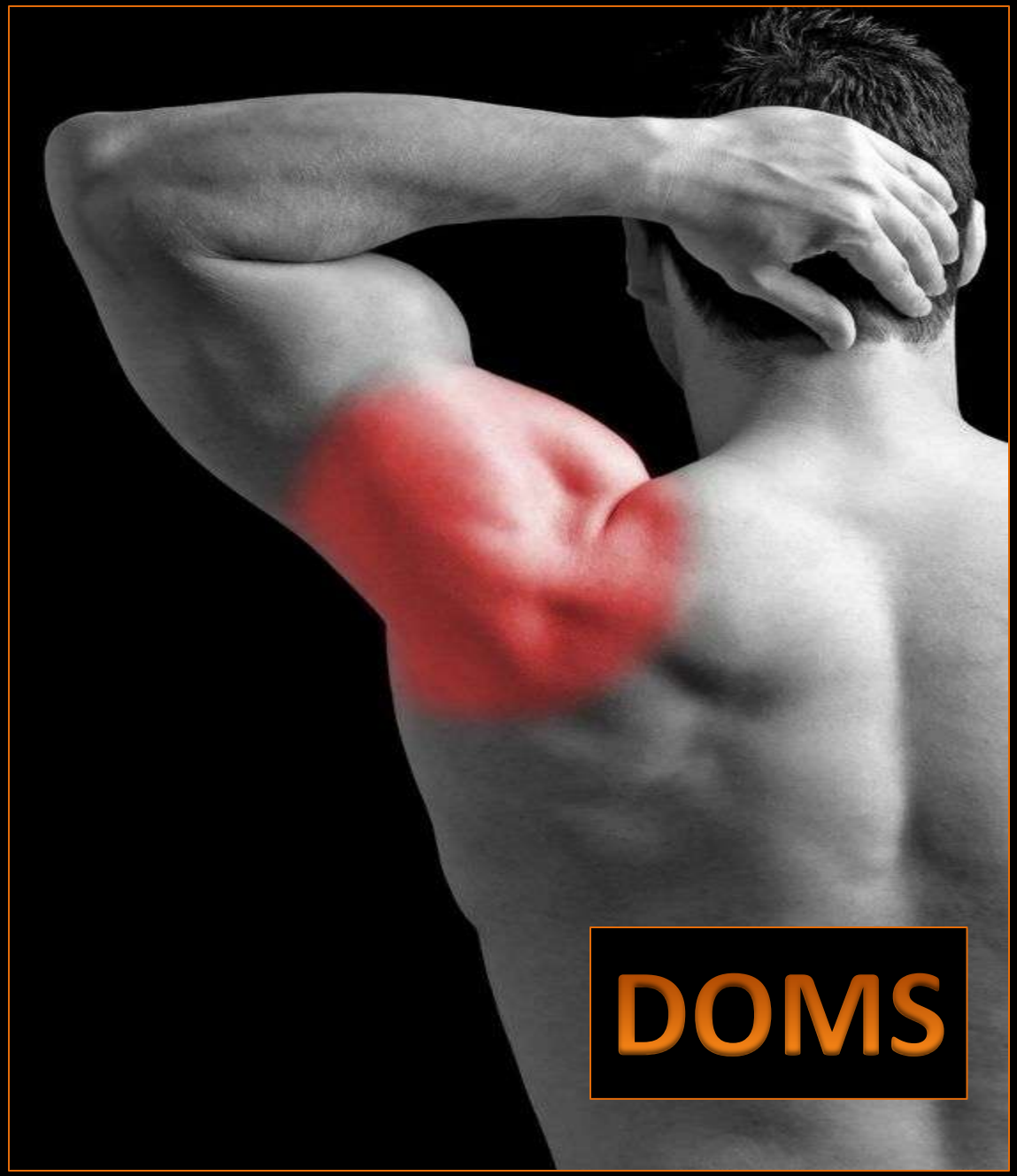
Don’t Wait



There is muscle damage from any kind of physical activity

The higher the intensity the greater the damage

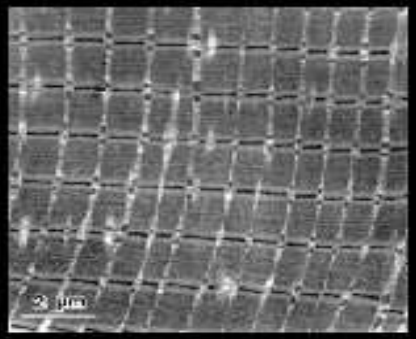
MUSCLE DAMAGE



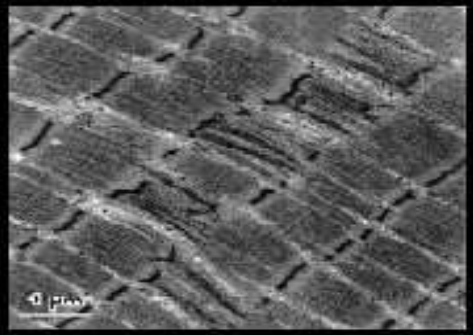
Soreness after training

1-3-5-7 hours post workout

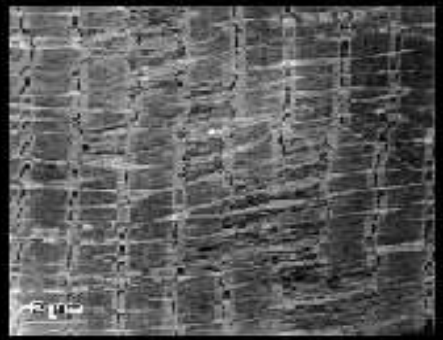
No Pain
No Gain



rested muscle

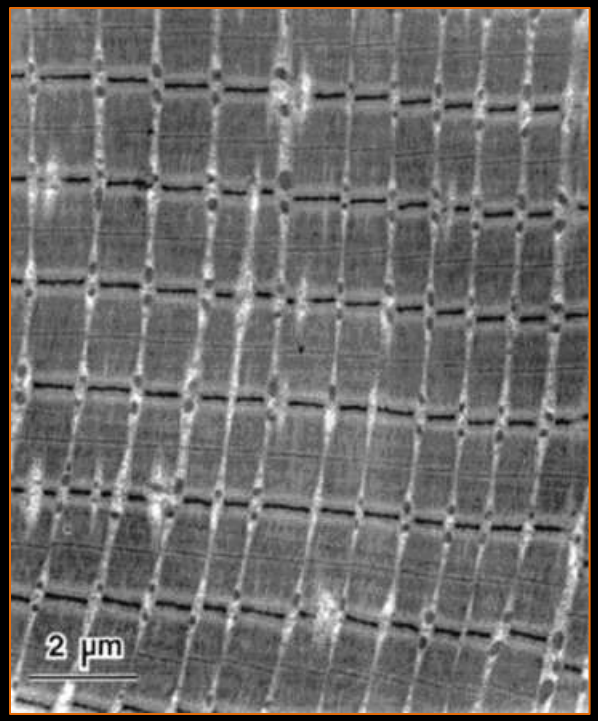


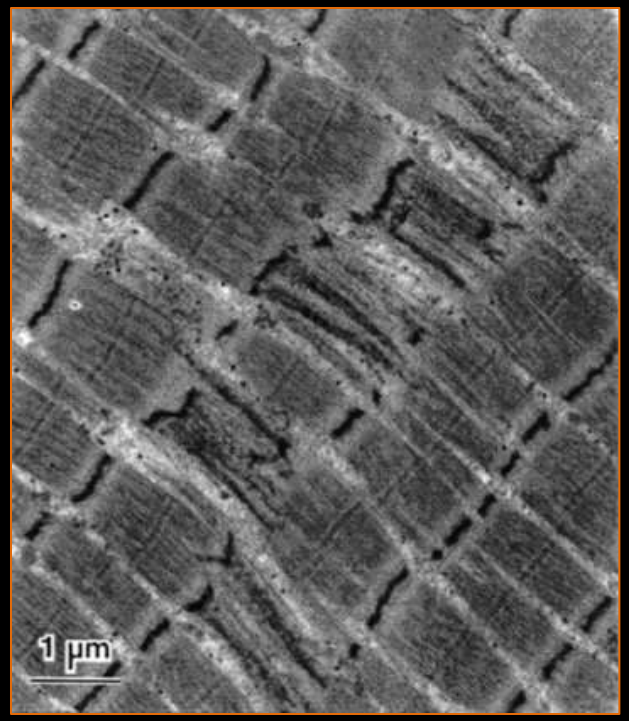
moderate damage



extreme damage

TRAIN SMARTER

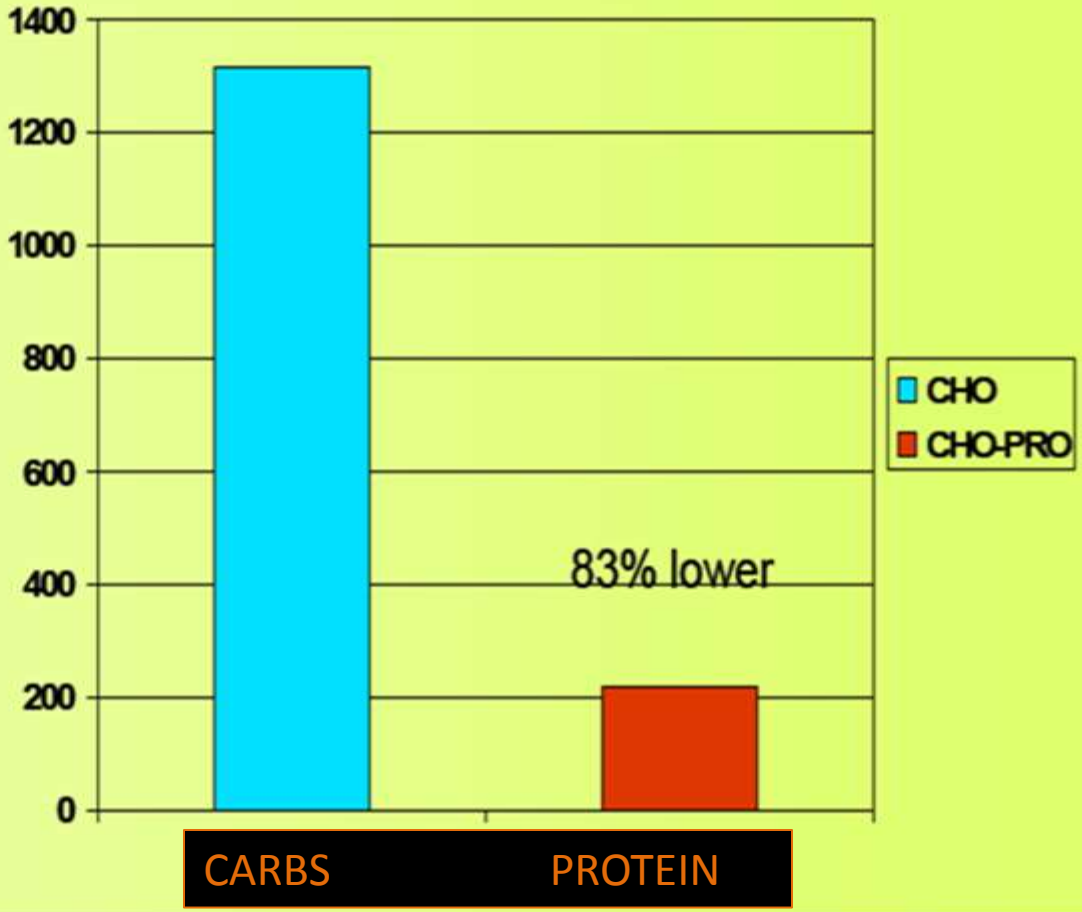




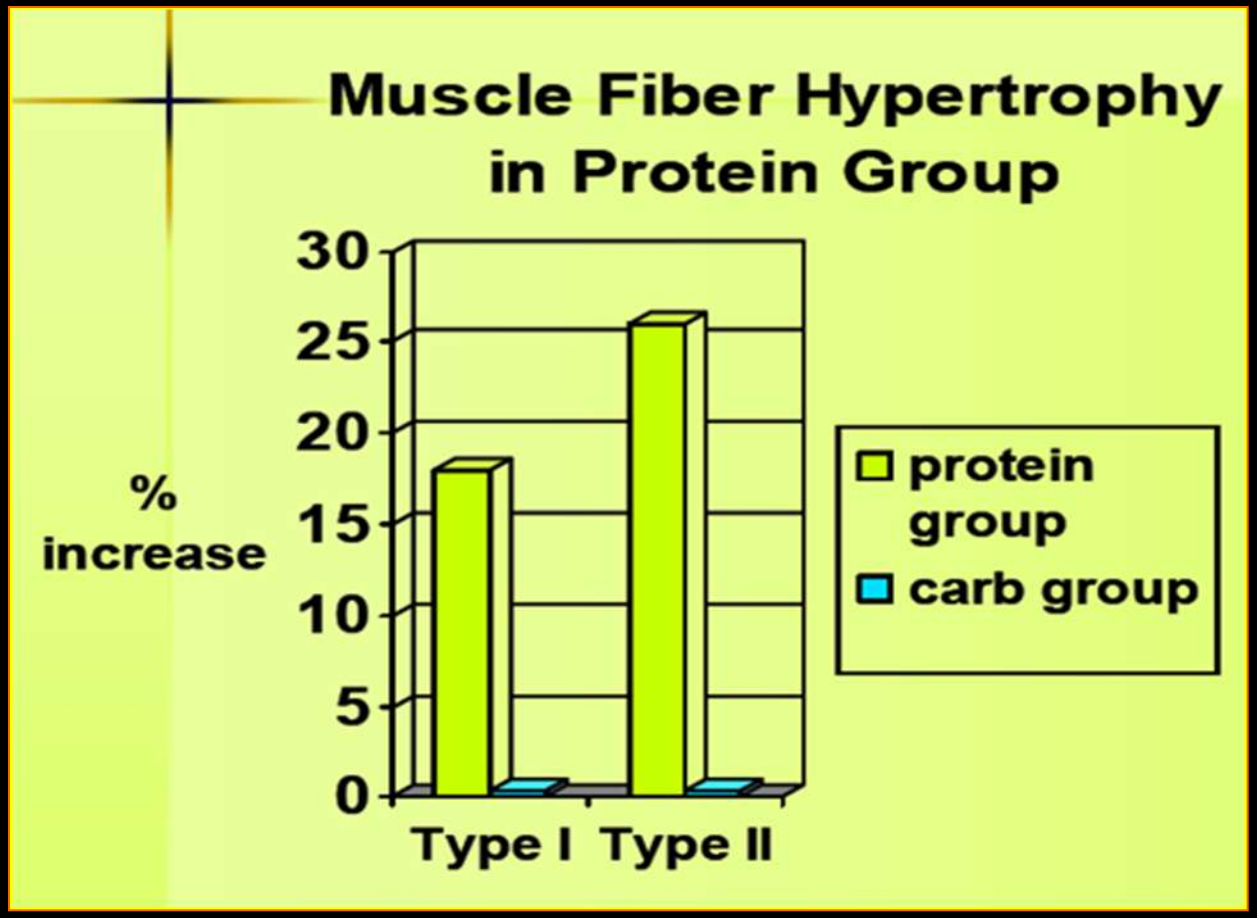
NORMAL MODERATE EXTREME

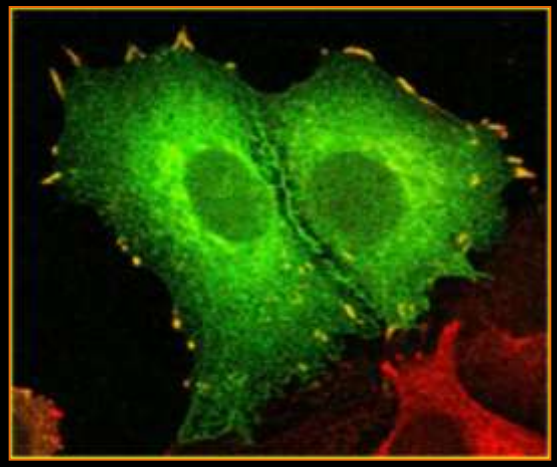
Muscle Damage

CARBS AND PROTEIN AFFECT ON MUSCLE DAMAGE



How sore do you want to be?





NEW MASS

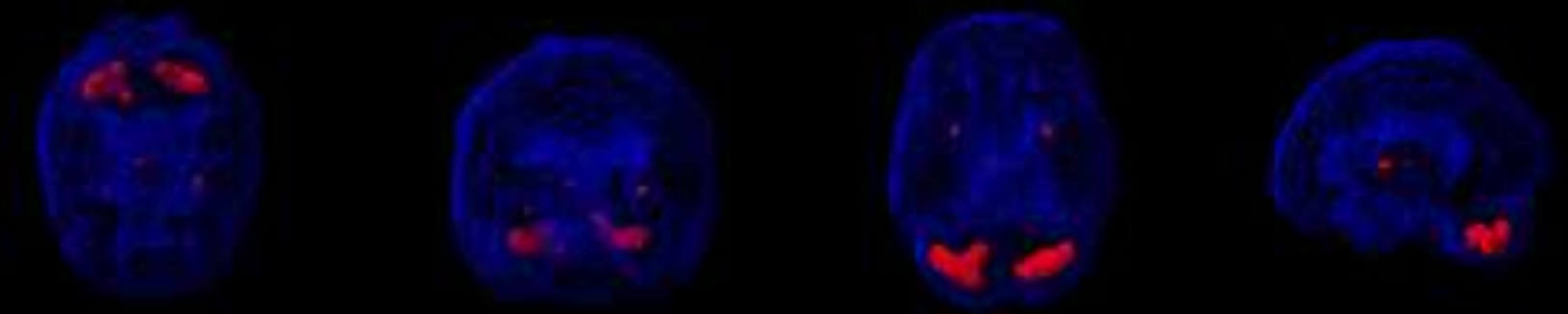
Muscle Protein Synthesis

What's this?

DAMAGE

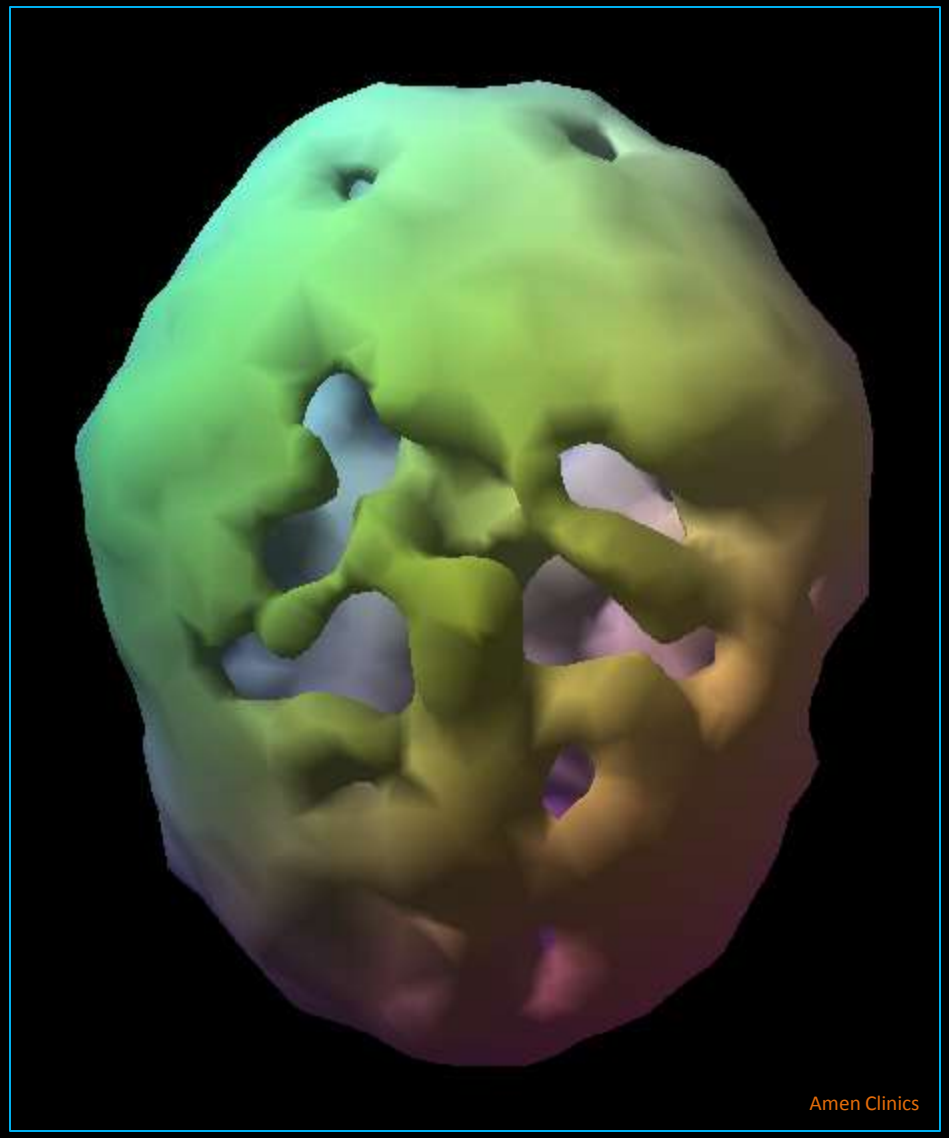
Amen Clinics

Single Photon Emission Computerized Tomography



ACTIVITY

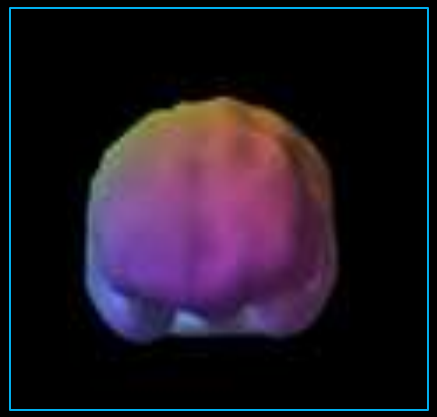
SPECT

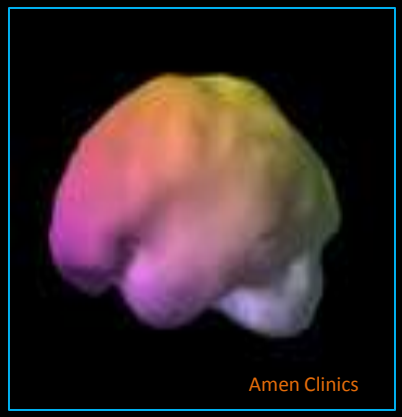


We now have indisputable evidence of systemic damage and cumulative damage.

BRAIN SCIENCE ADVANCES

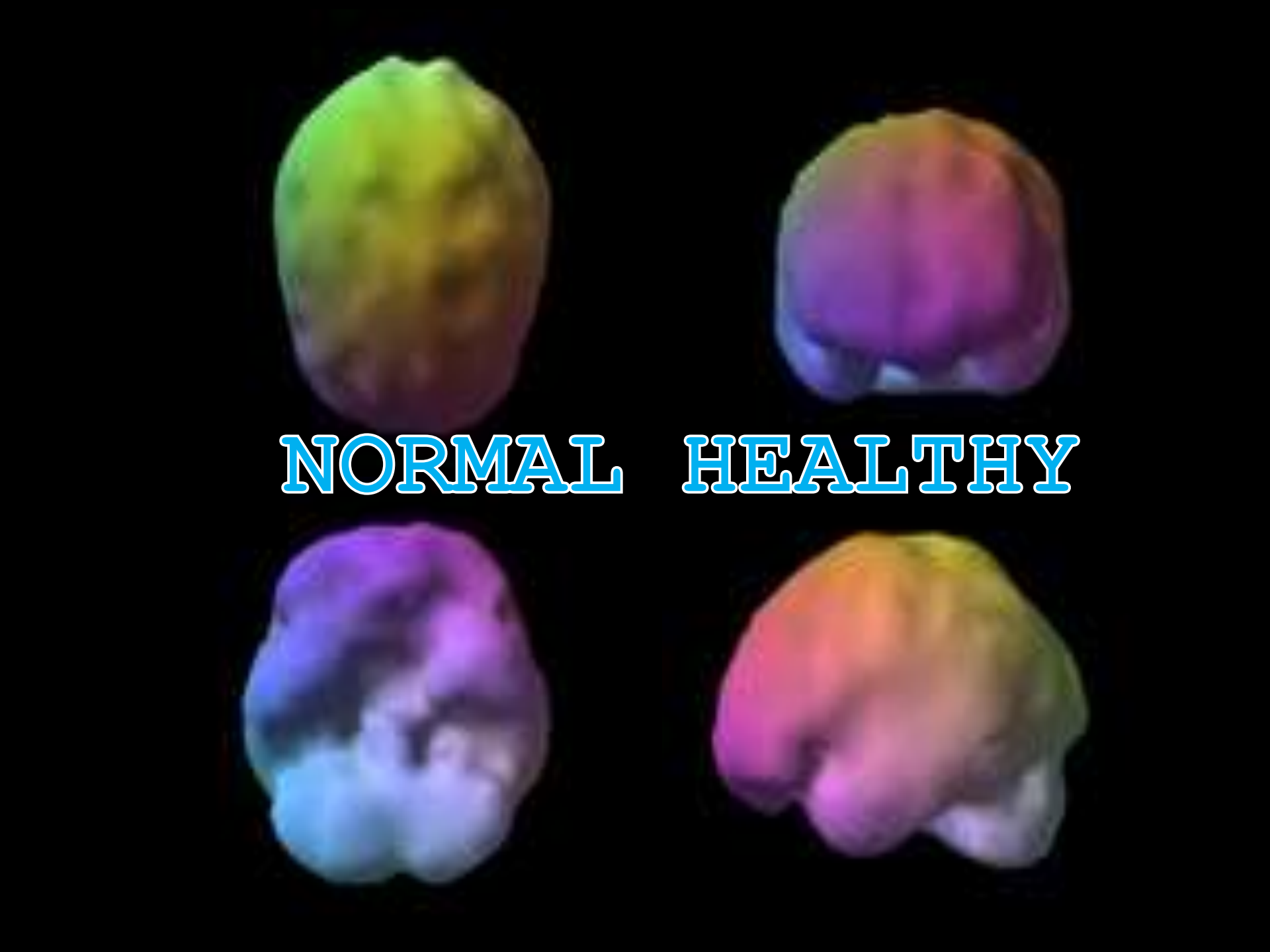
TOP	FRONTAL	BOTTOM	SIDE

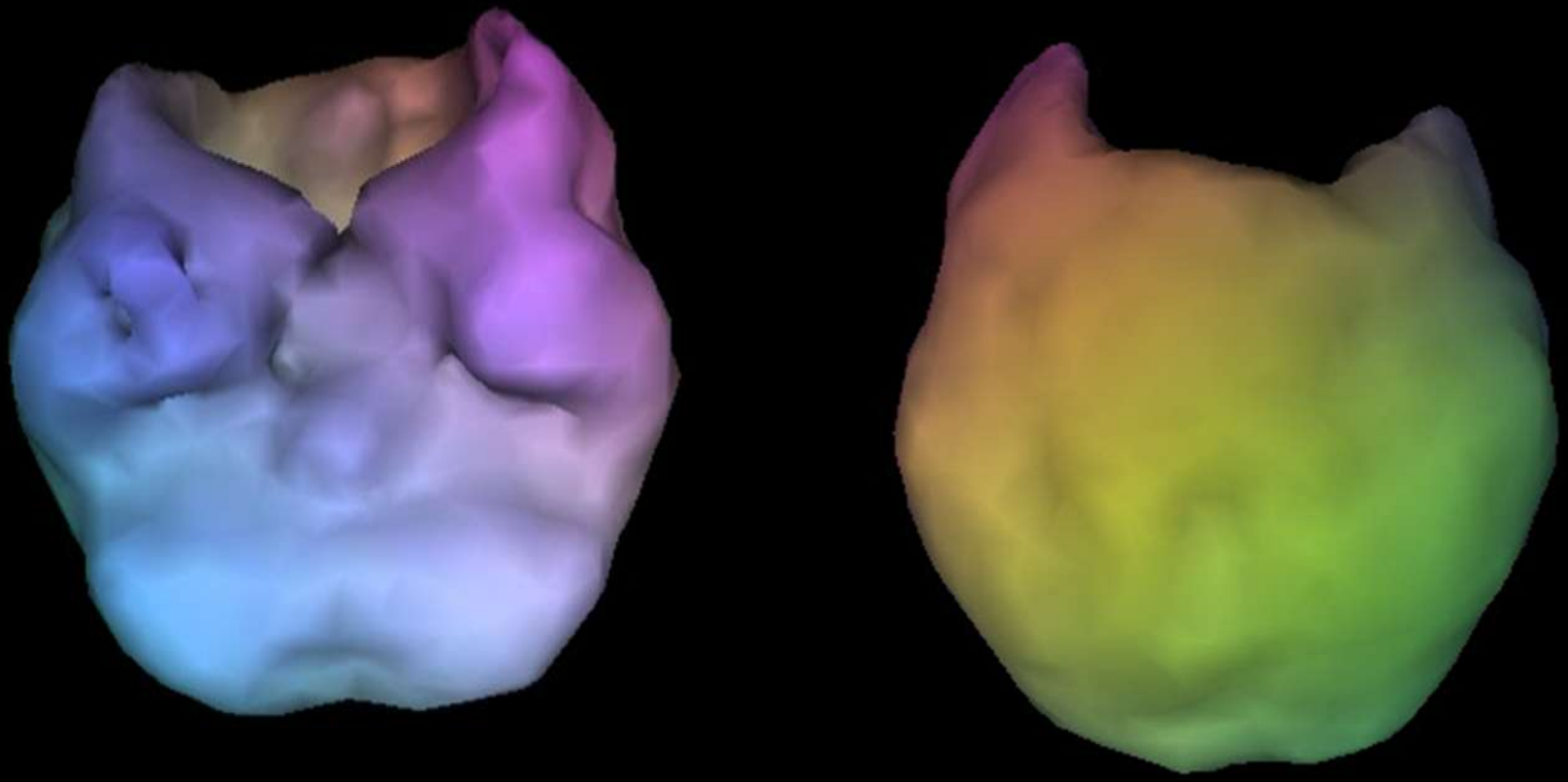


NORMAL

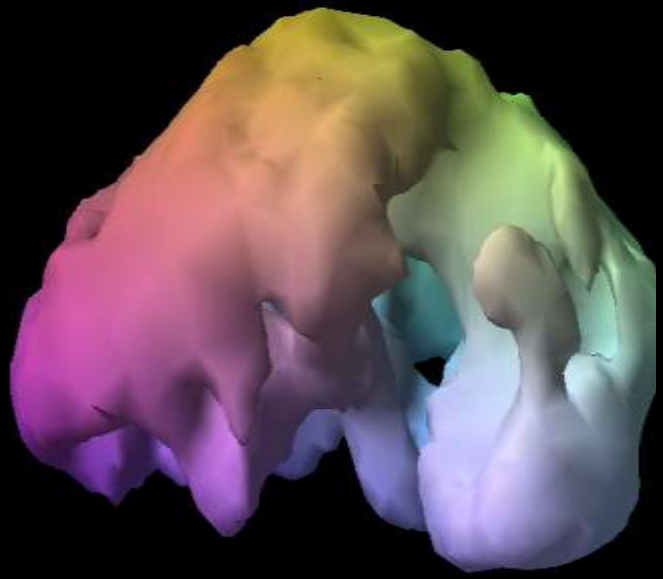
HEALTHY

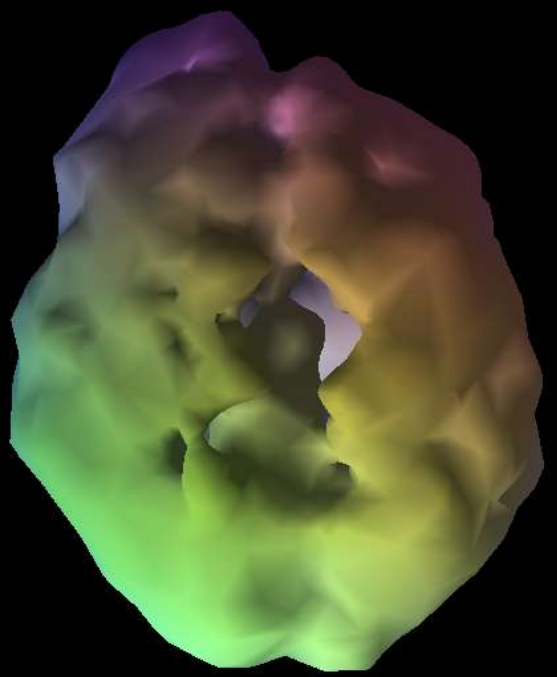

NORMAL HEALTHY

Severe Brain Injury

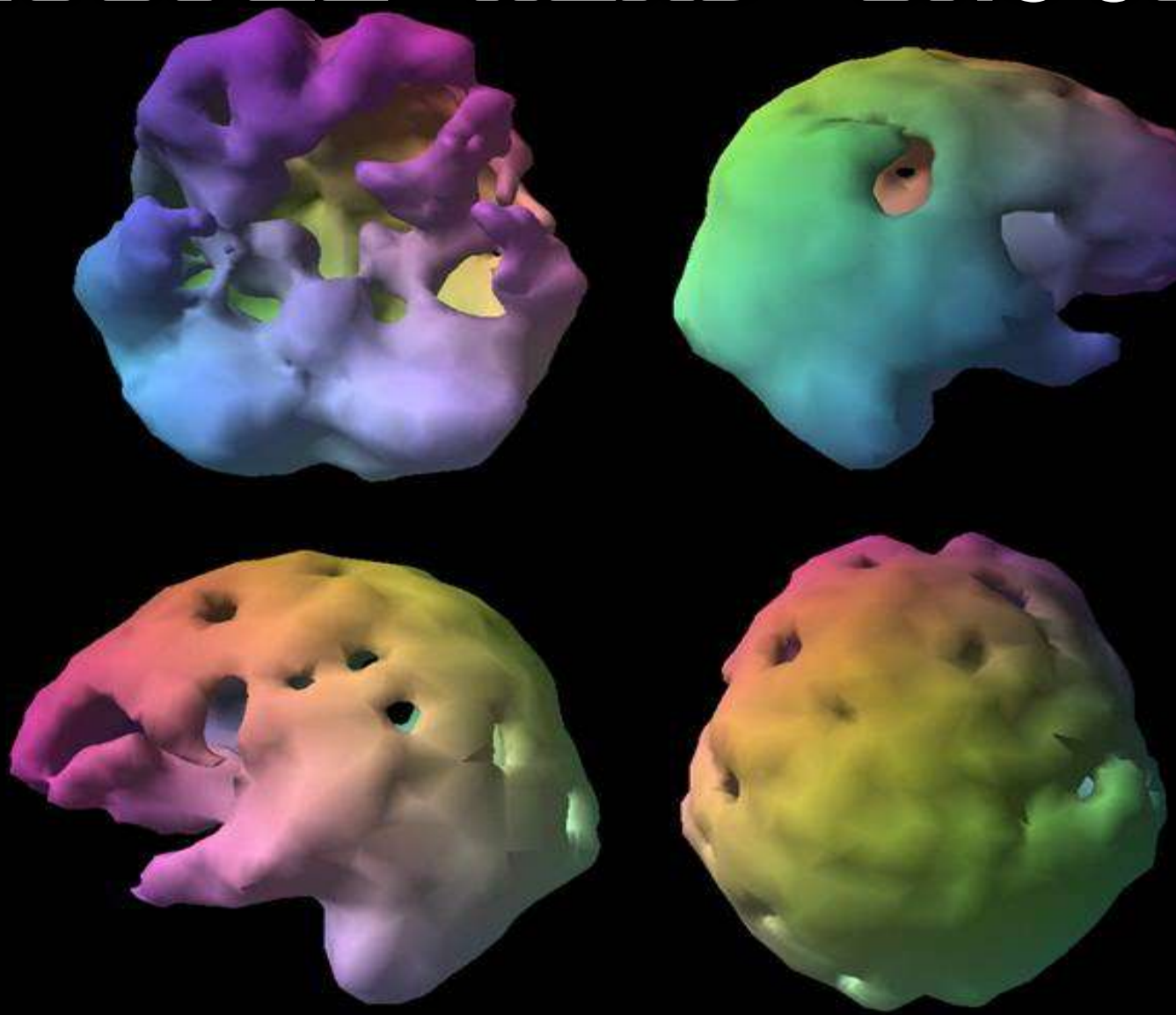


NFL NHL BRAIN INJURY STUDIES





MULTIPLE HEAD INJURIES



PERFORMANCE DEBILITATING

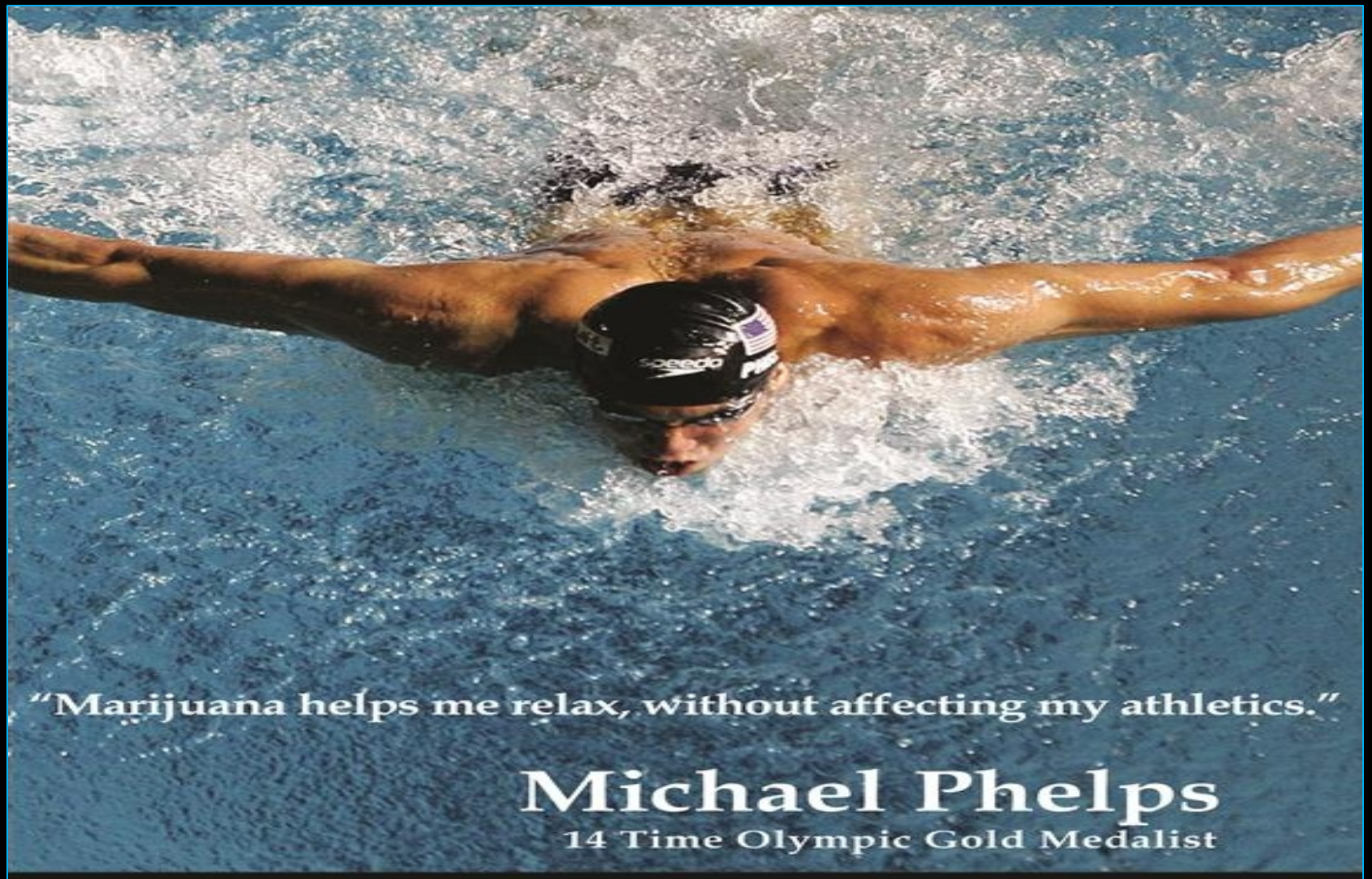
DRUGS


THE NEXT TOM DELAY?
JOE ALLEN IN ISRAEL
STONED BABY BOOMERS
American
REBEL
He speaks his mind — and apologizes later. He loves to party — and doesn't care about winning. Yet BODE MILLER is poised to strike Olympic gold. On the slopes with skiing's bad boy
By Bill Saporito


POSTED AT
DRUNK IN COLLEGE


the Superficial


CANADA



Marijuana: Inspiring successful Americans since 1776.

Get the facts about Marijuana. For more information, please contact:

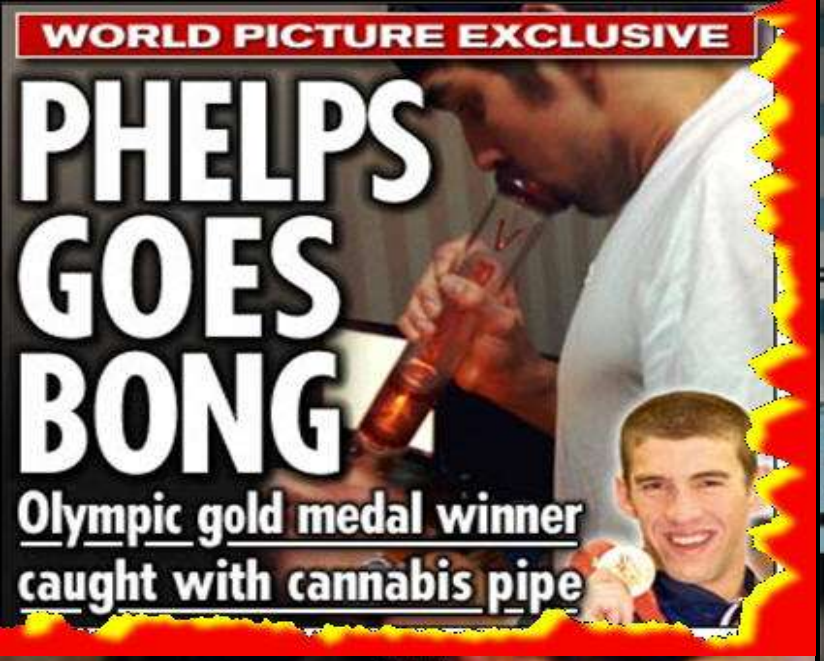
Ad Council

ASA

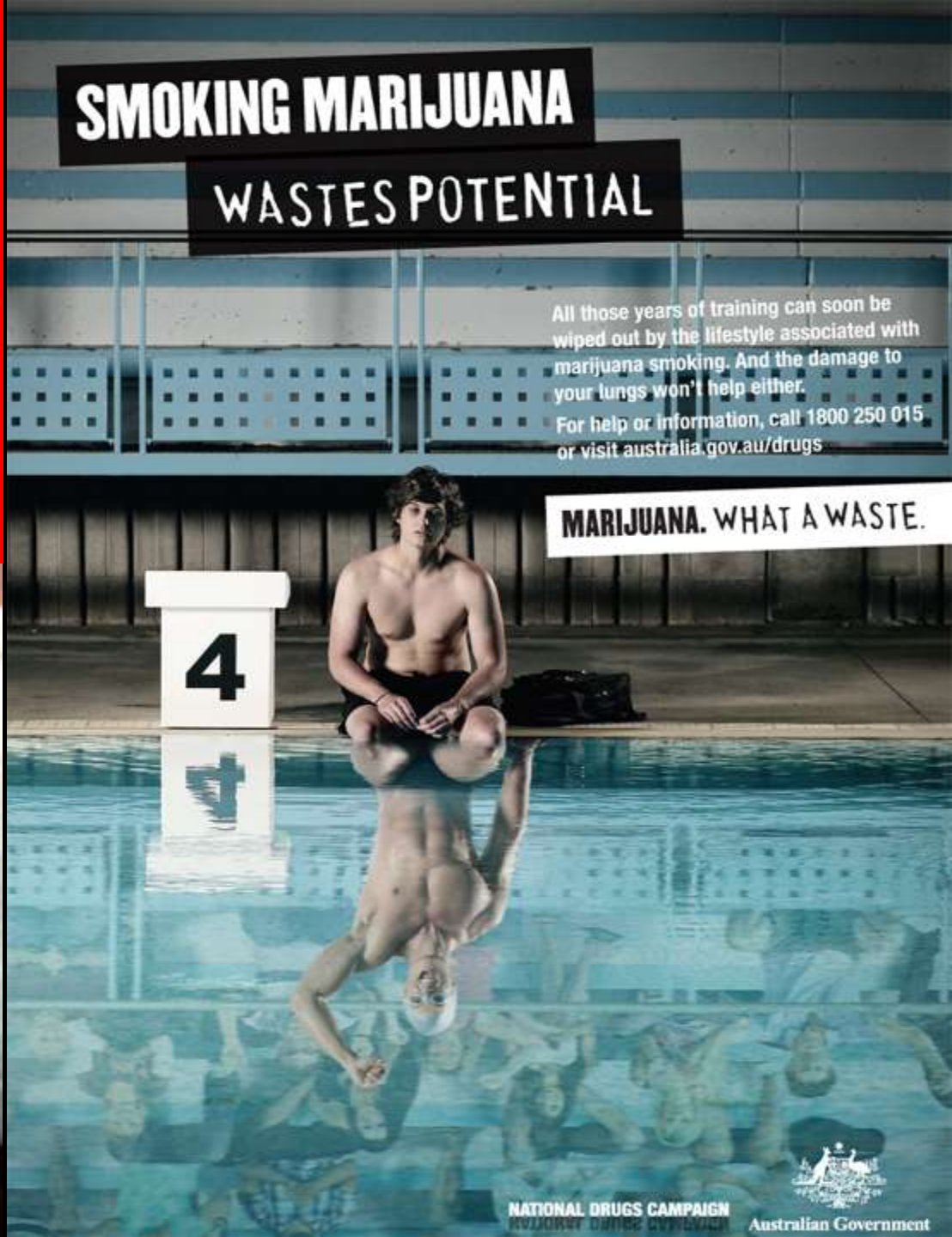
MPP
Marijuana Policy Project

NORML

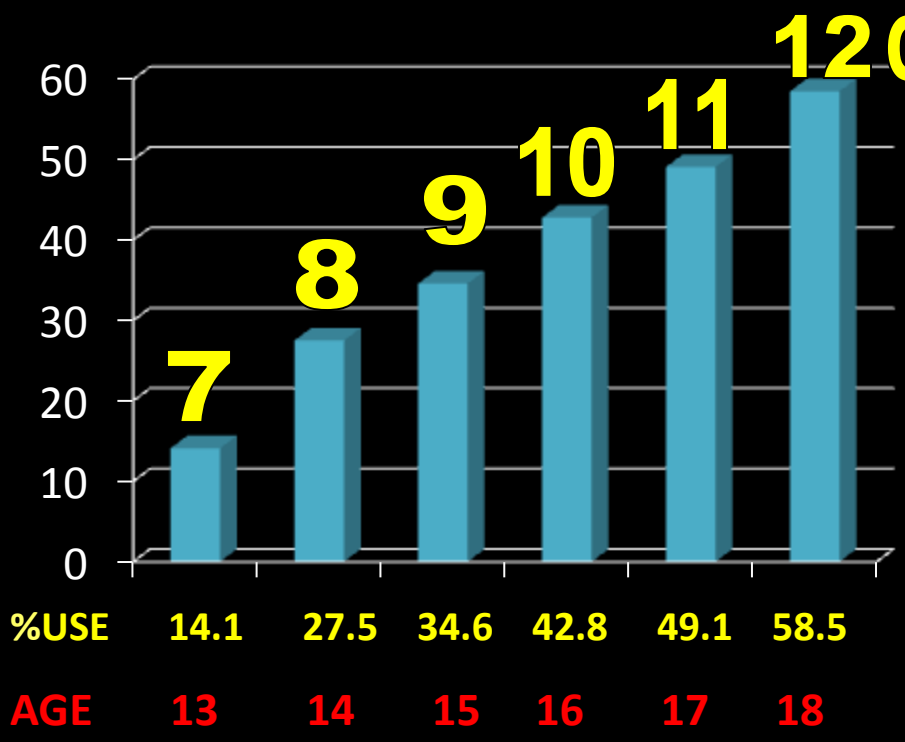
The Hemp and Cannabis Foundation
Legalize. Regulate. Educate.


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


Advertisement
14 OLYMPIC GOLD MEDALS.
37 WORLD RECORDS.
2 AWESOME LUNGS.
Unlike heavy tobacco smokers, heavy marijuana smokers exhibit no obstruction of the lung's small airway. That indicates that people will not develop emphysema from smoking marijuana.
For more information visit clubfbi.com/marijuana
Don't let the government fool you
LEGALIZE MARIJUANA

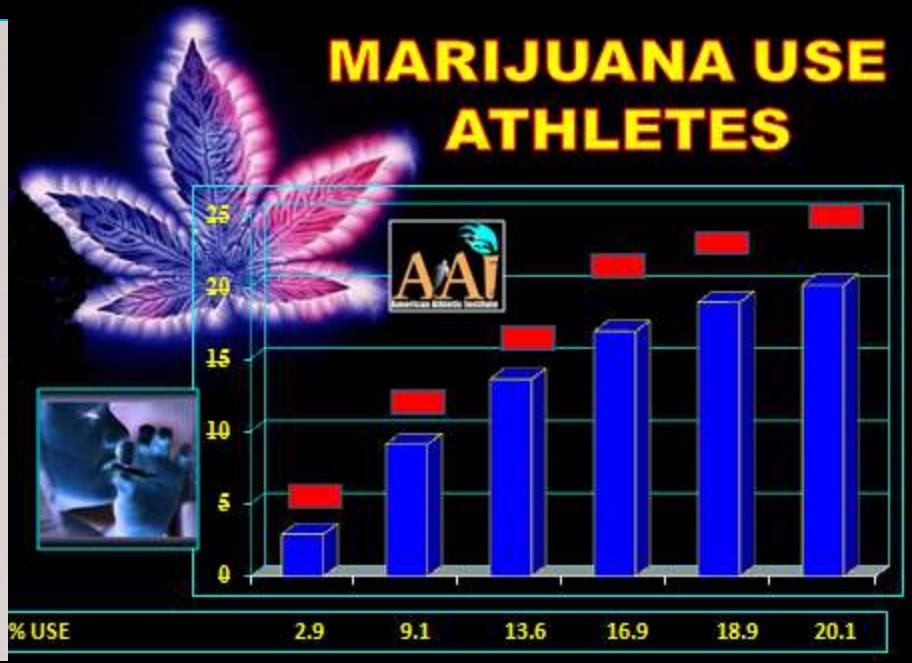

SMOKING MARIJUANA
WASTES POTENTIAL
All those years of training can soon be wiped out by the lifestyle associated with marijuana smoking. And the damage to your lungs won't help either.
For help or information, call 1800 250 015 or visit australia.gov.au/drugs
MARIJUANA. WHAT A WASTE.
4
NATIONAL DRUGS CAMPAIGN
Australian Government

JR. ATHLETES REPORTING ALCOHOL USE DURING SPORT YEAR



ALCOHOL USE ATHLETES

Middle School – High School



Middle School – High School

Lifestyle choices begin early in athlete populations. They are in independent situations from a much earlier age and are influenced much more by pack mentality…

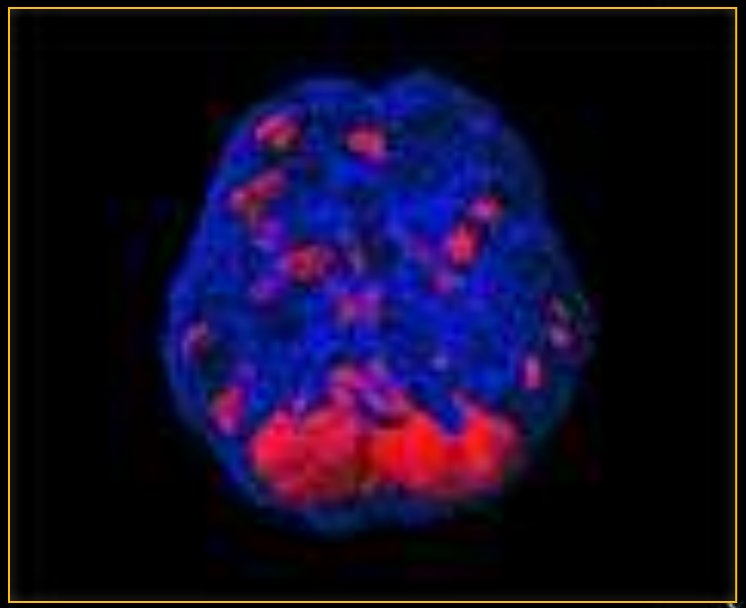

83% ALCOHOL
NCAA
Social Drugs
27% MARIJUANA

Brain Activity Alcohol

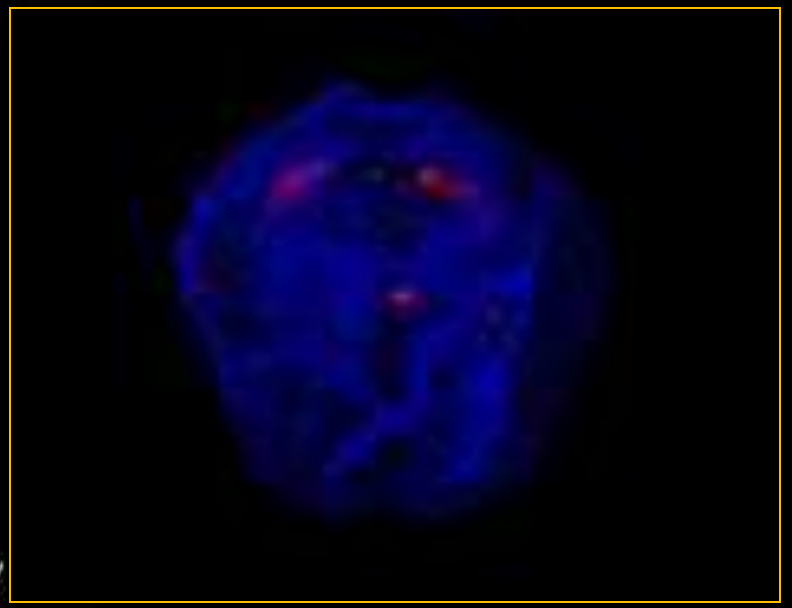
Not under influence

Intoxicated

Brain Activity Marijuana

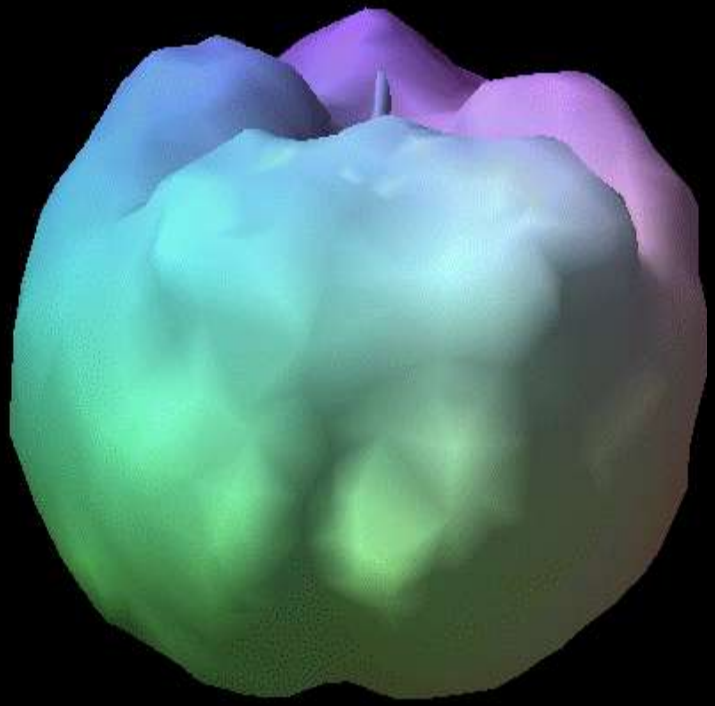


Not under influence

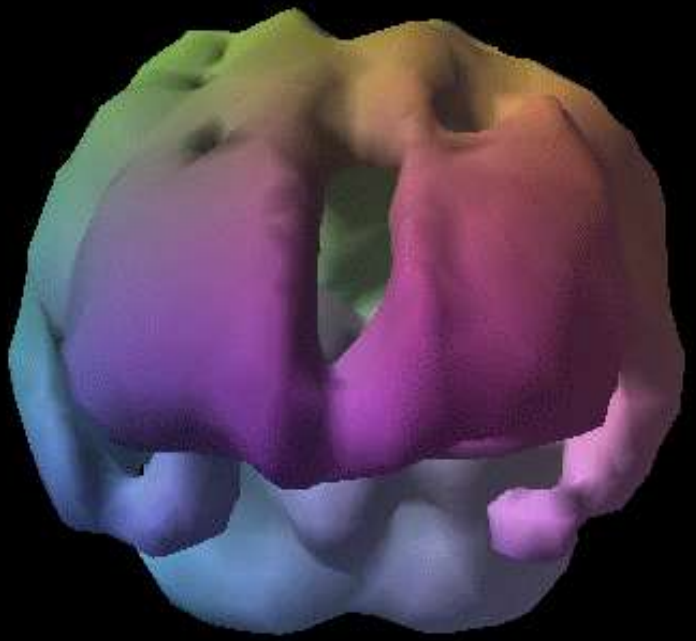


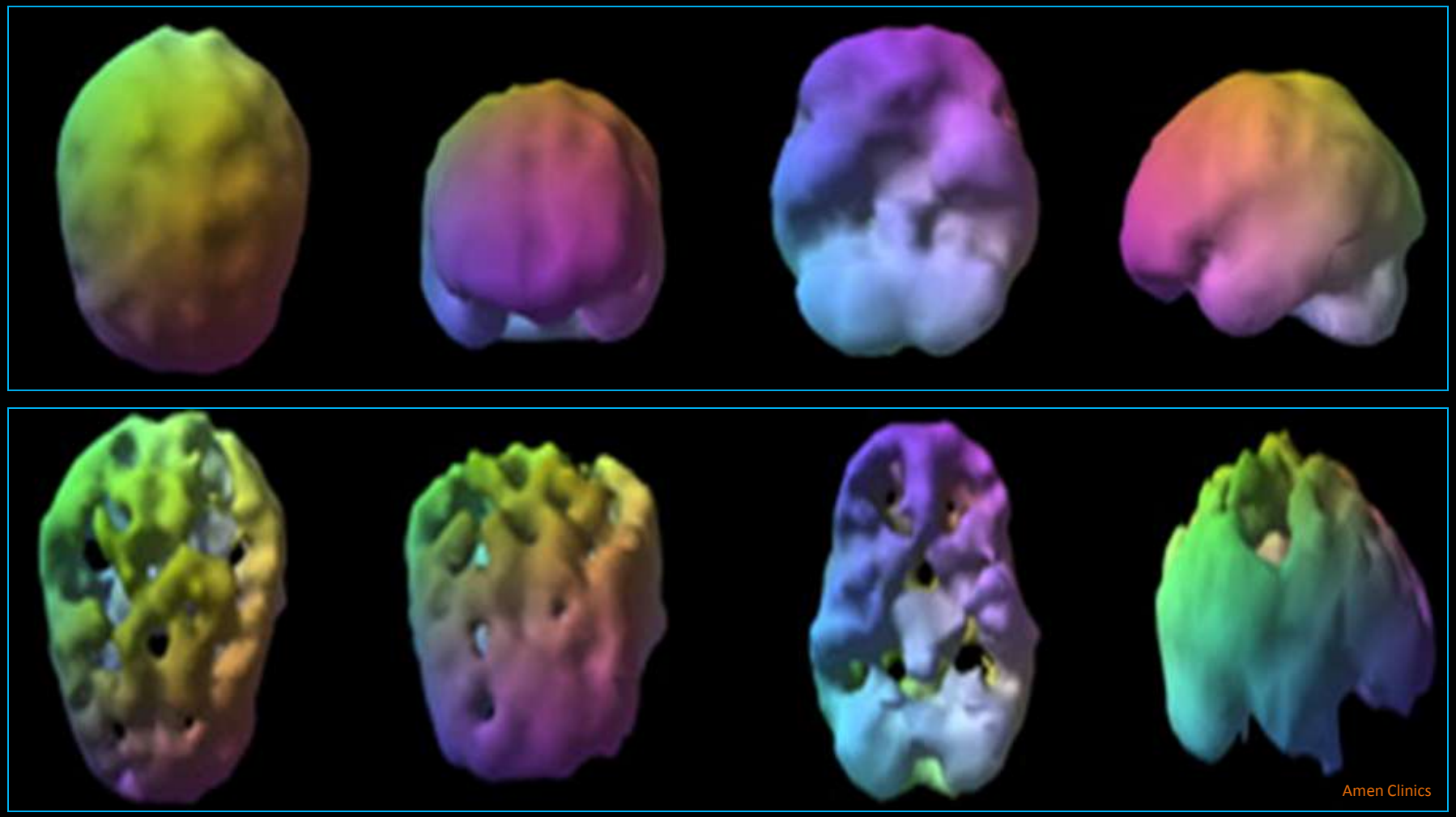
Stoned

Healthy



Marijuana





Take your chances

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

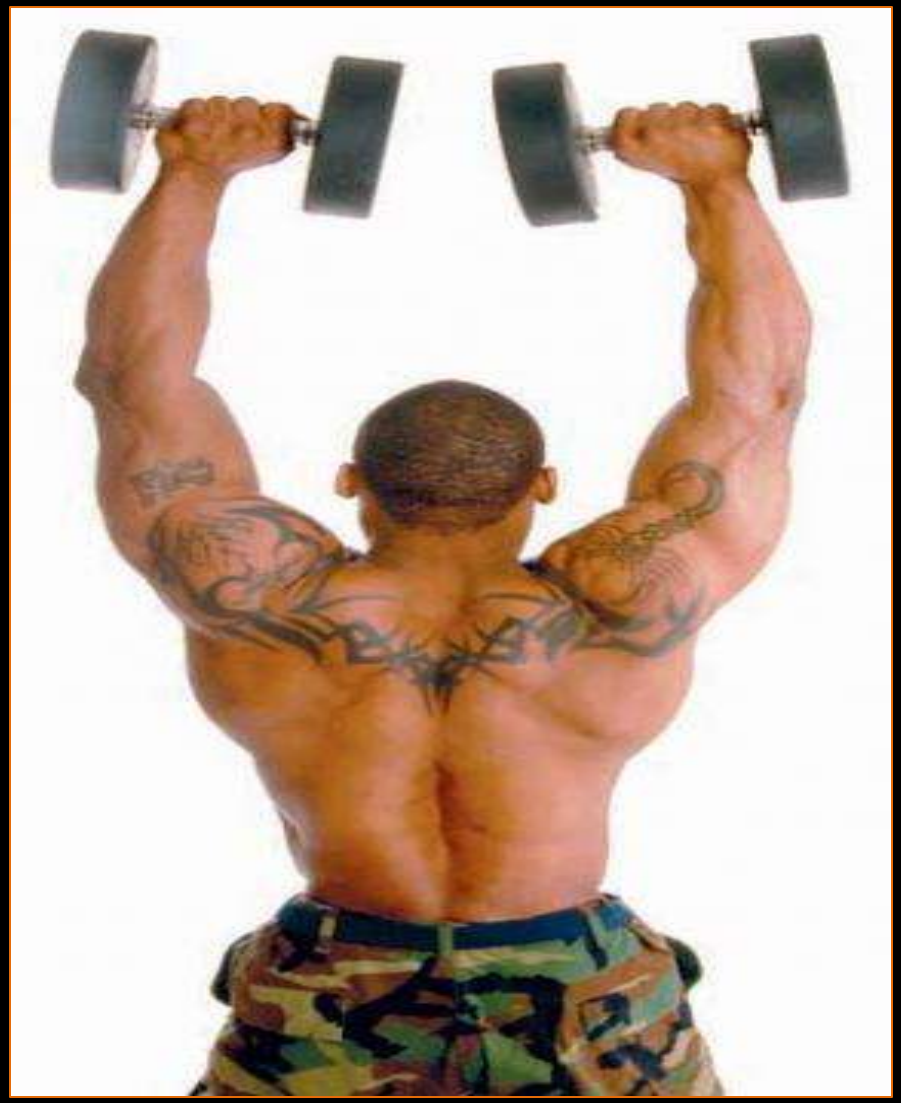
Maximum Results for your effort!

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

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.

Life of an Athlete

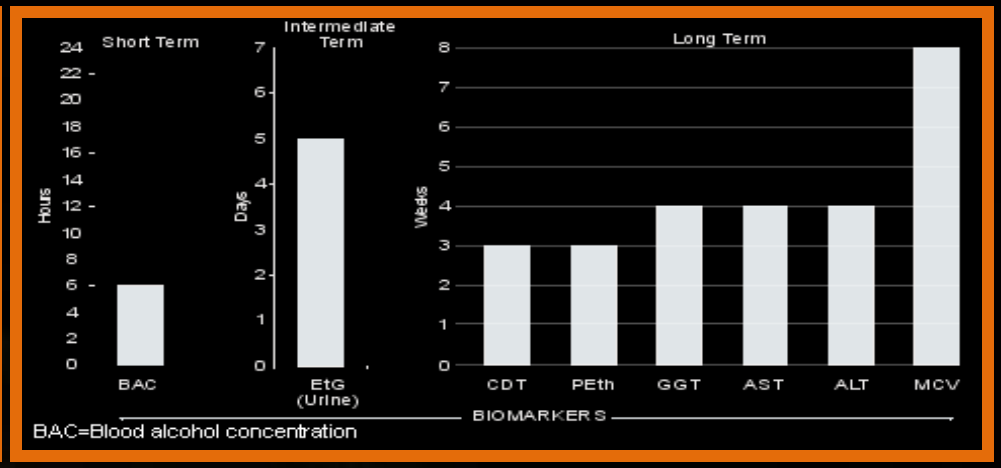
10x 20x 30x

ALCOHOL>ACETALDEHYDE

The smallest of measures

IN URINE

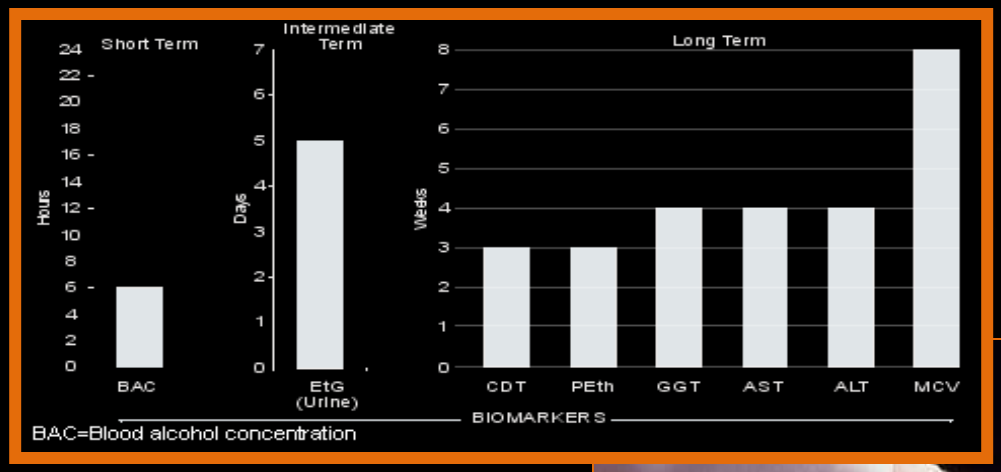
(0.02%) non-oxidative pathway produces ethyl glucuronide (EtG), which is excreted in the urine.



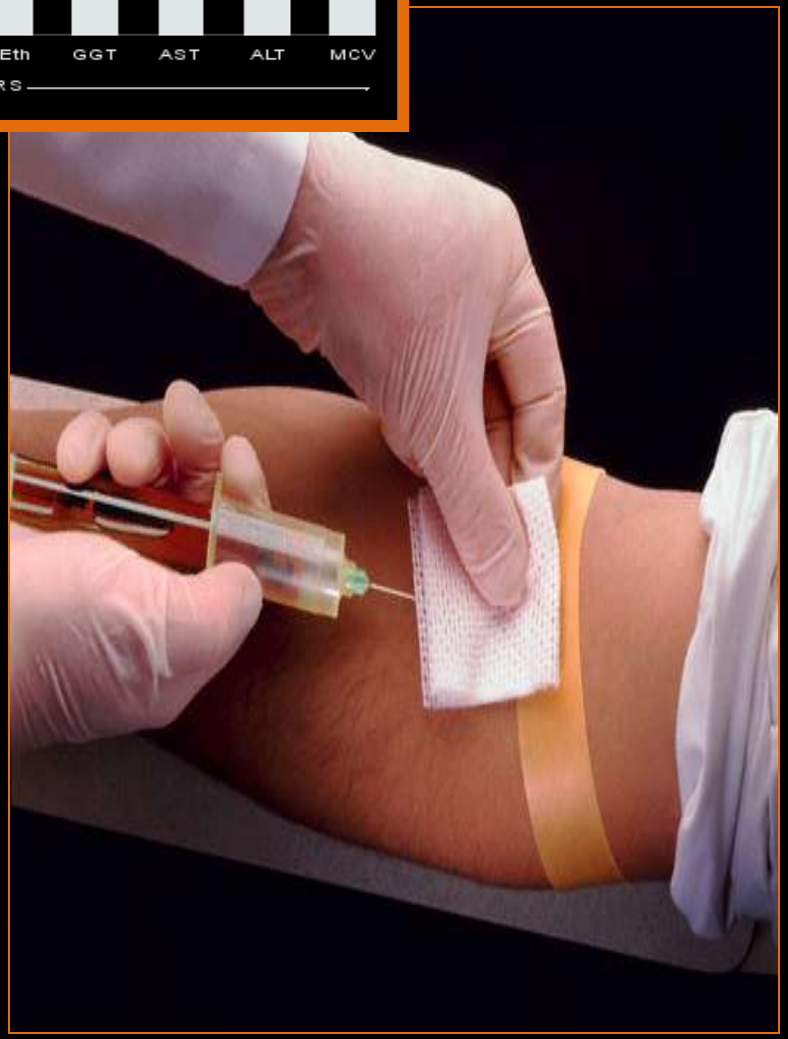
Windows of Assessment for Various Alcohol Biomarkers

4-5 DAYS

80 HRS.



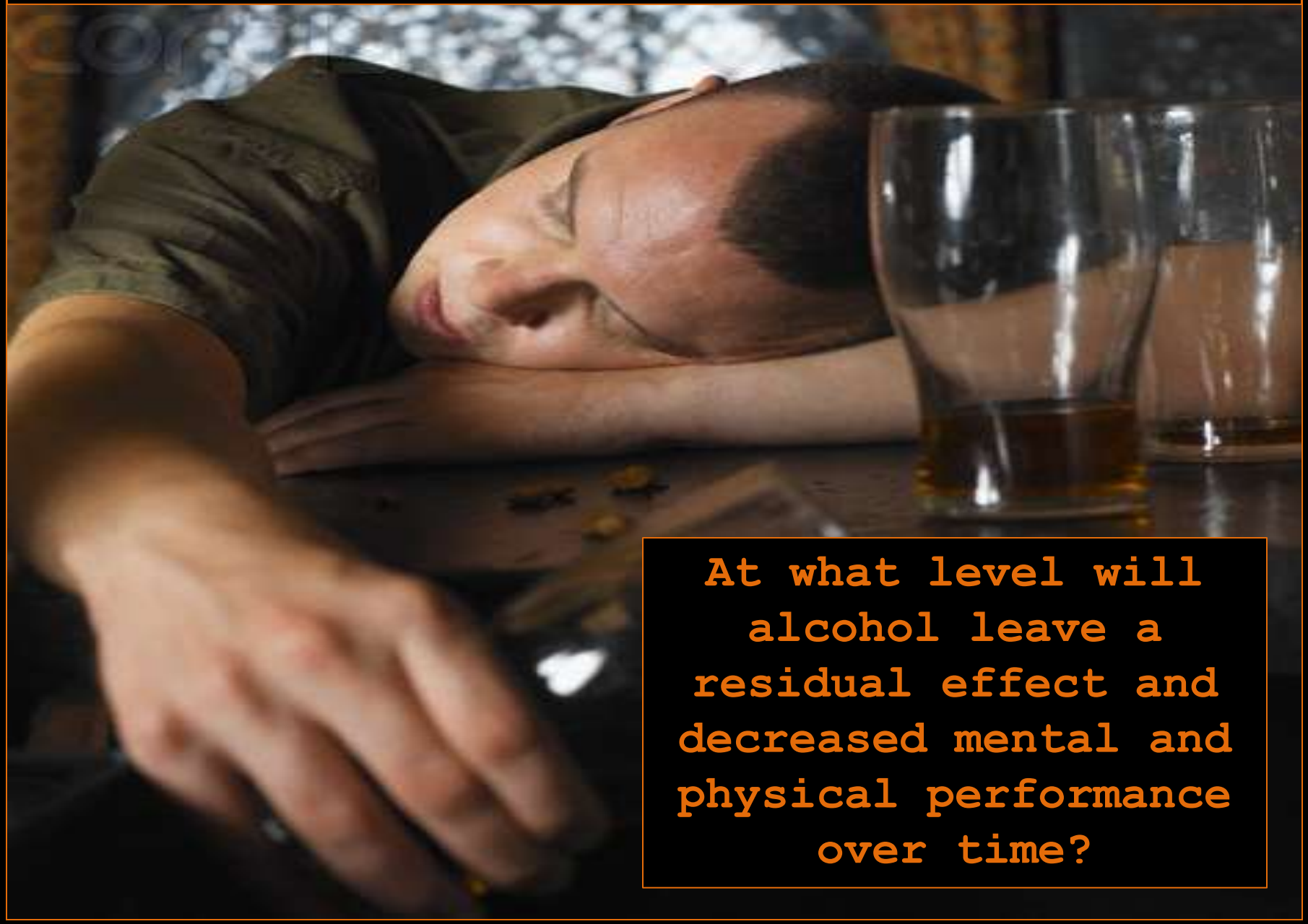
IN BLOOD



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

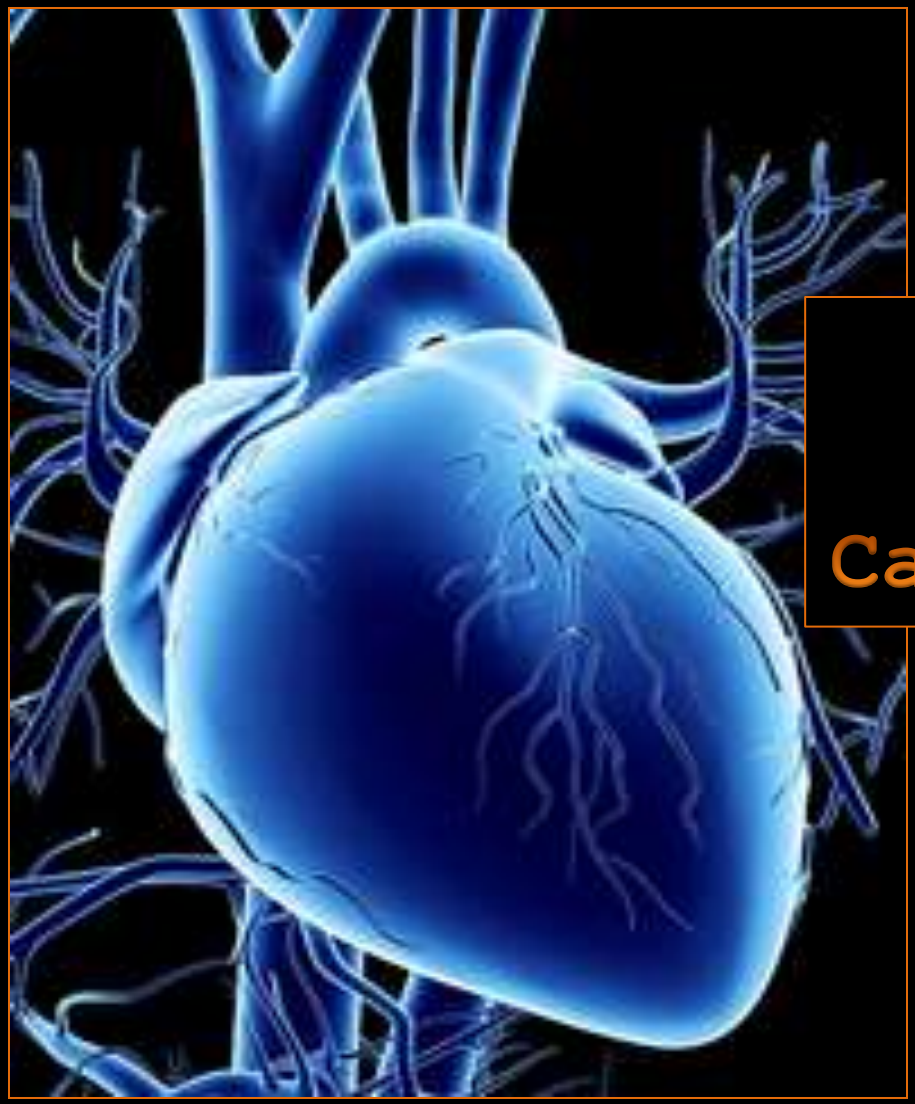
RESIDUAL EFFECTS

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



Cardiac Output
Stroke Volume
Cardiac Arrhythmias

HEART FUNCTION

< O2

>CO2

< VE

LUNG FUNCTION

HRV

HEARTRATE VARIABILITY

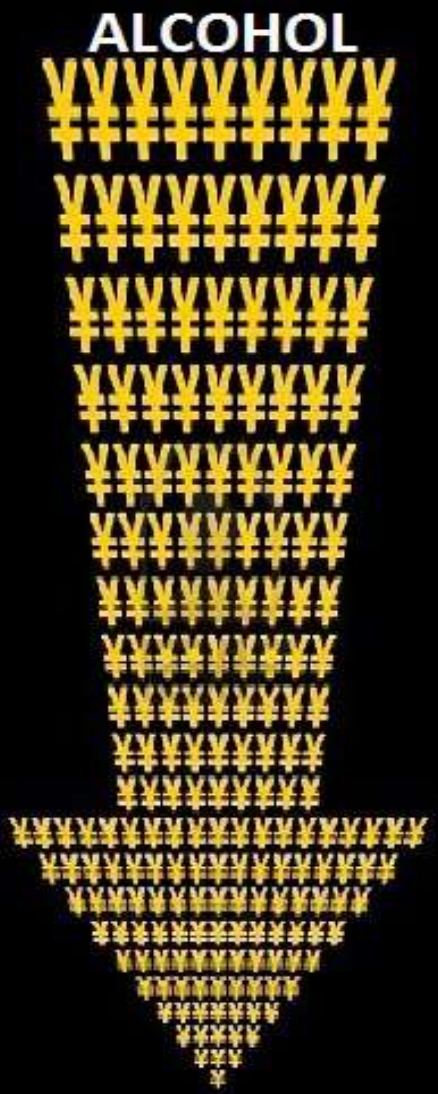
TRAINING HORMONES

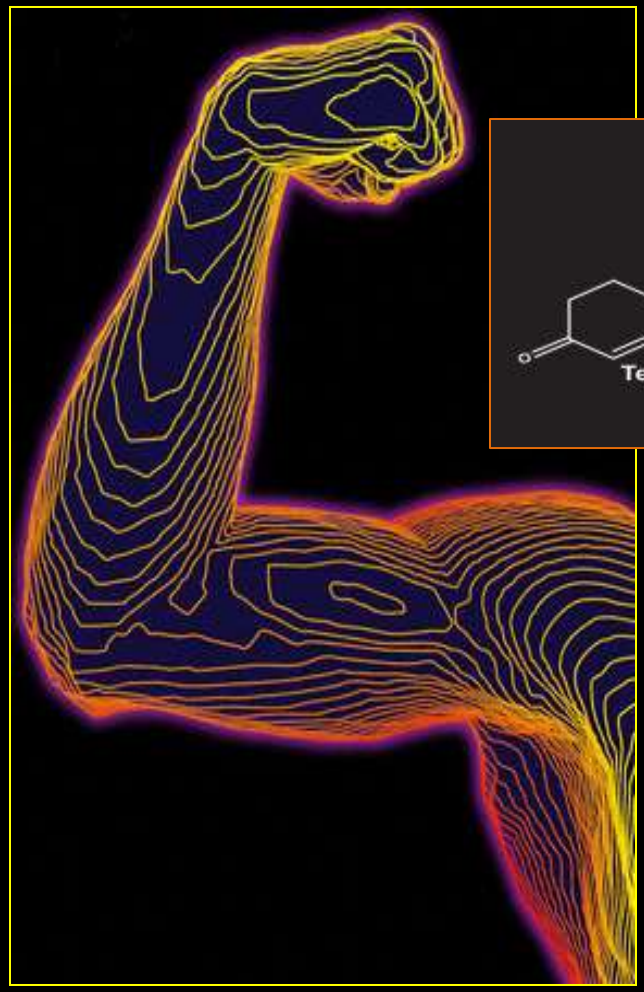
Studies of athlete drinkers have shown that alcohol directly suppresses testosterone levels.

The more you drink, the worse it gets.

And it's not just at the time you are drinking.

The biggest hit comes later, and spills into the following days...





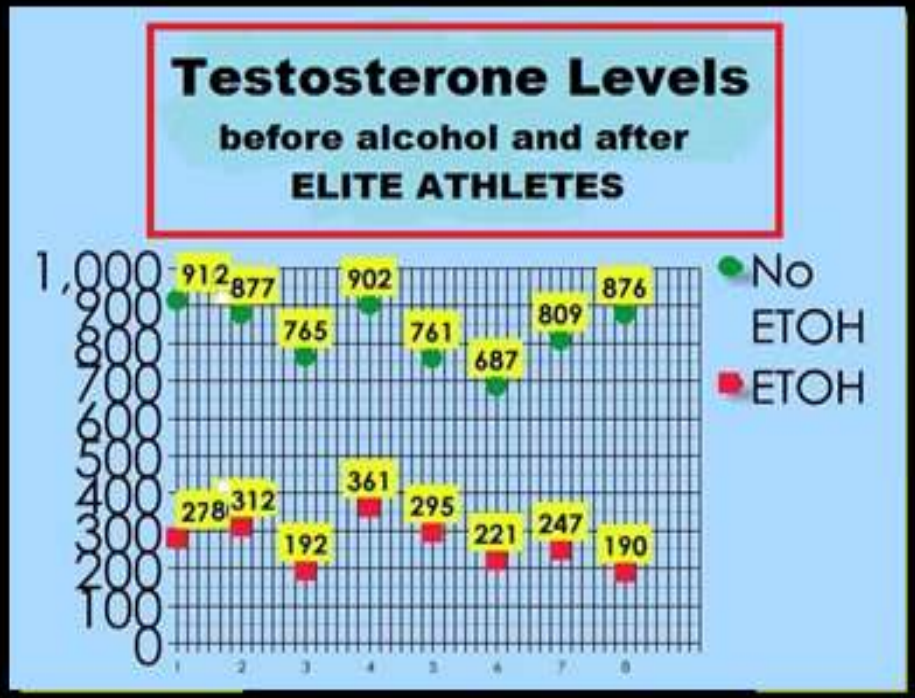
Heavy maximal level training followed by excessive alcohol consumption can result in hormonal disruptions for up to 96 hours (4 days)

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…

It happens fast



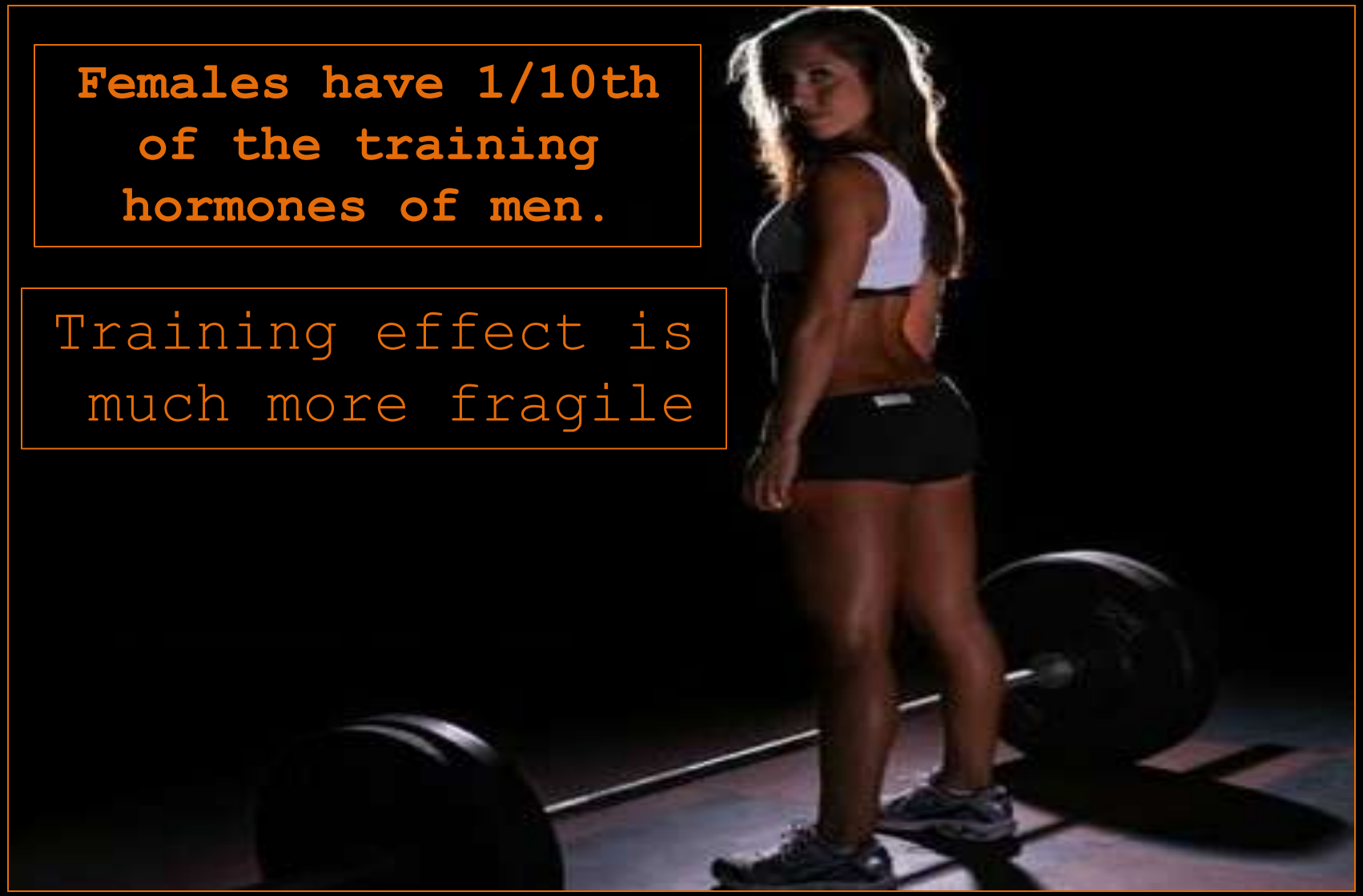
TESTOSTERONE

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

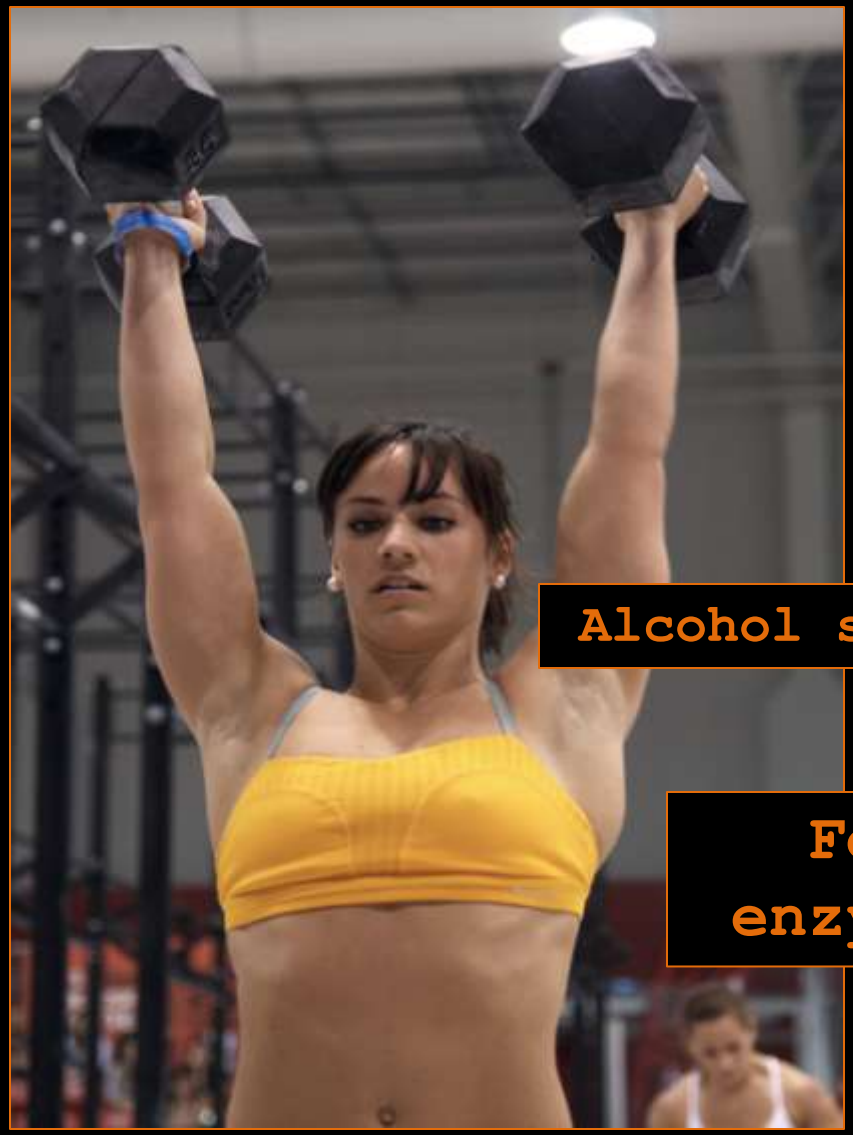
Alcohol And Testosterone

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

Training effect is much more fragile



Female Training Effect



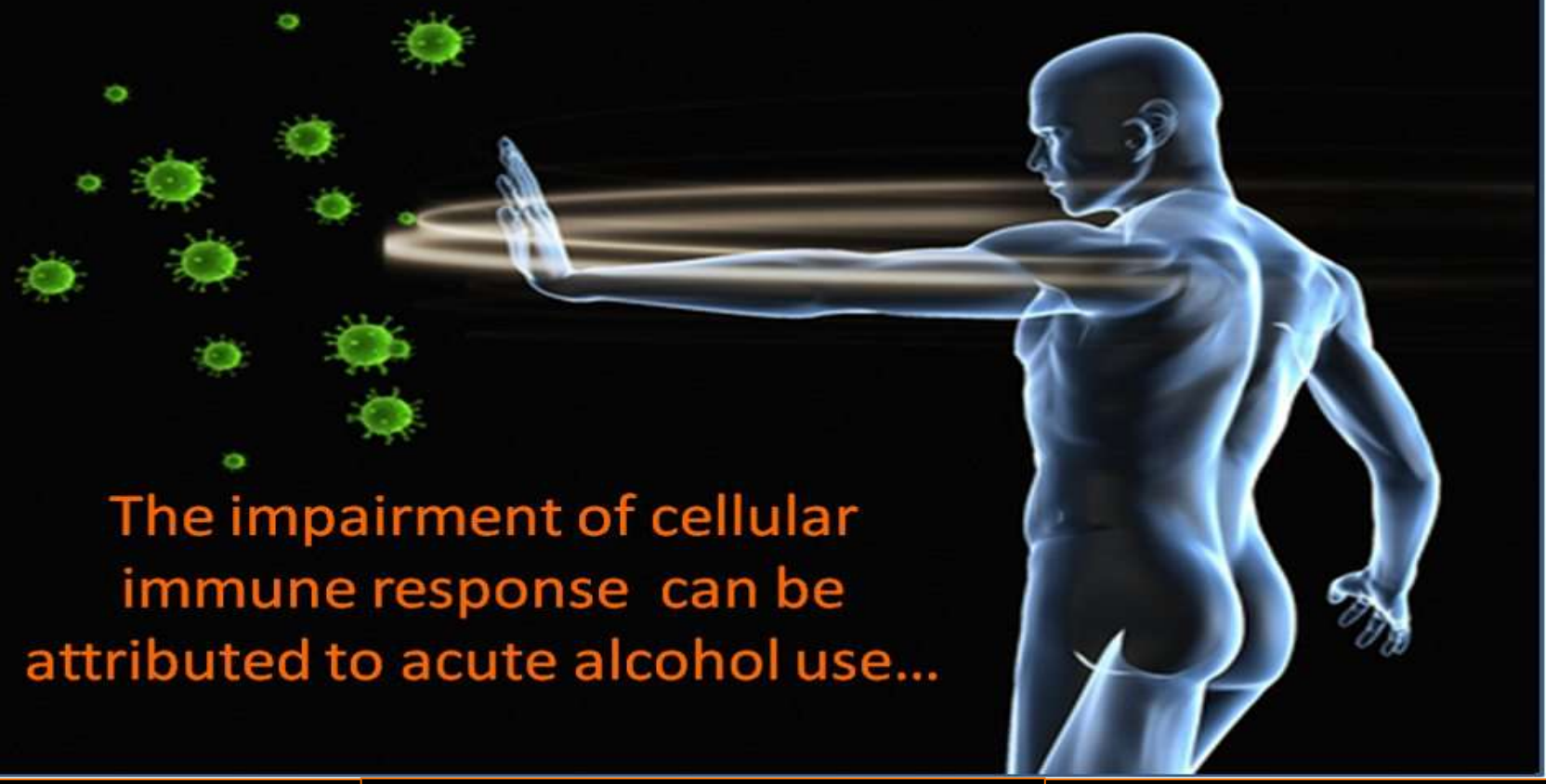
Alcohol stays in the female body longer

Females have less of the enzymes to breakdown alcohol

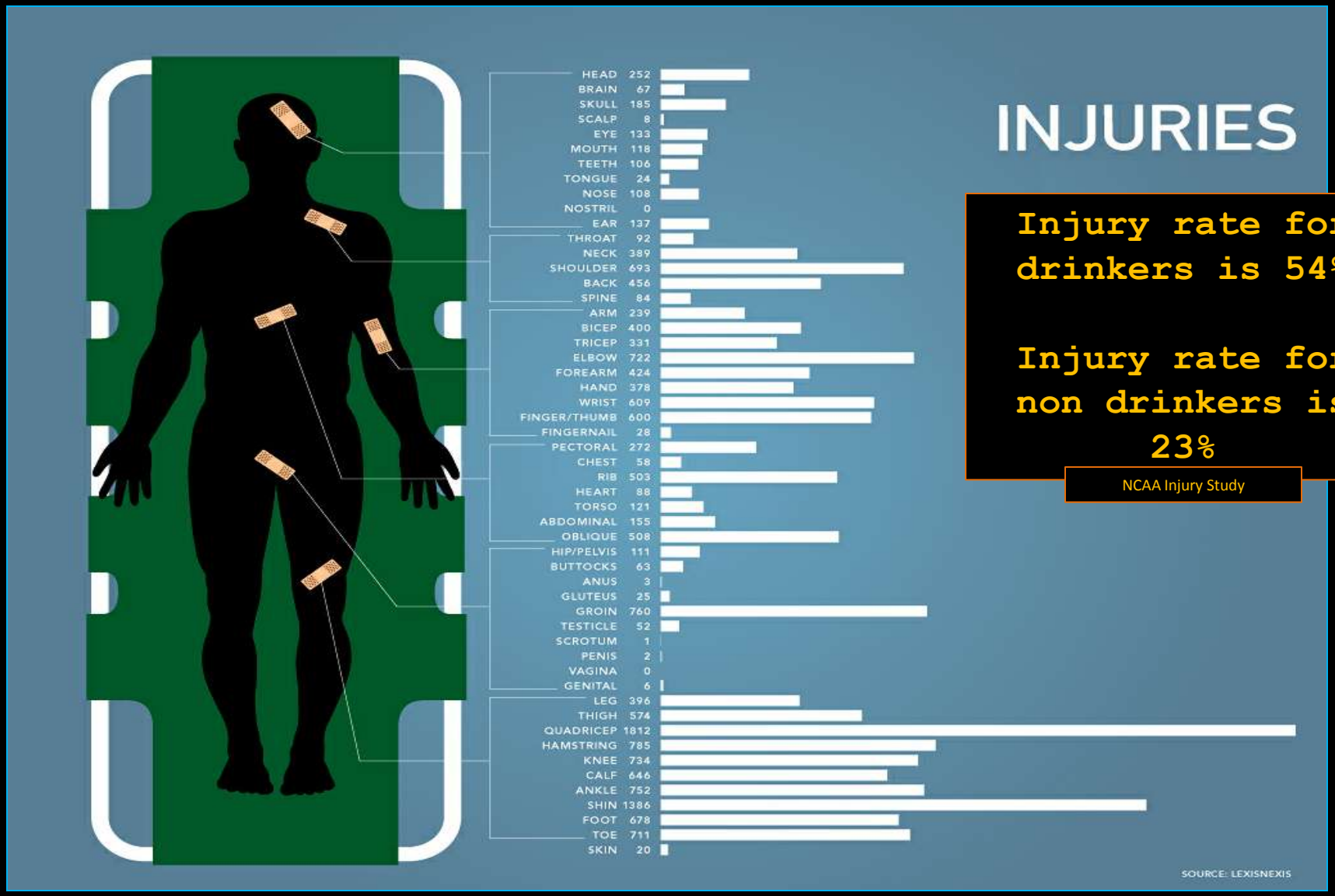
Alcohol>affects on females

Alcohol and Sickness

Life of an Athlete



Sickness



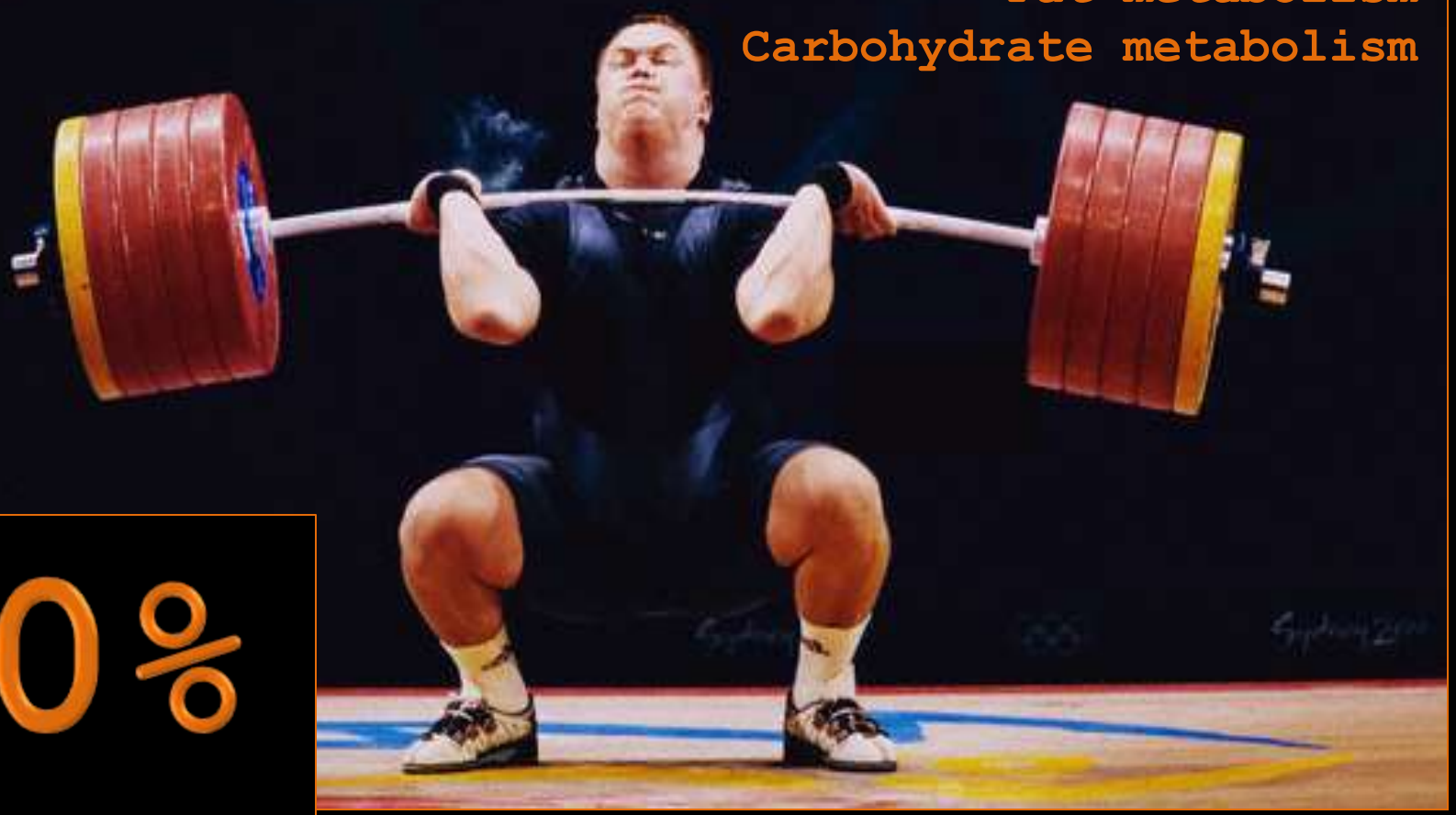
Injury rate for drinkers is 54%

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

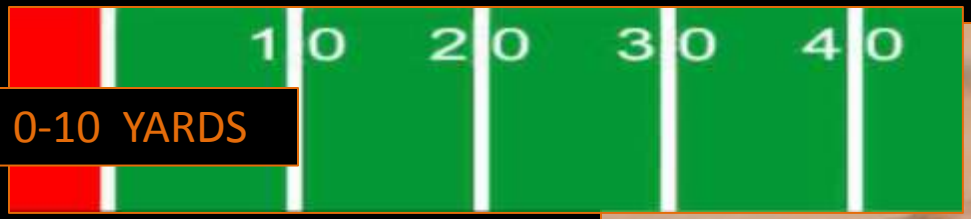
<11%

EXPLOSIVE POWER

POWER ENDURANCE

<6%

ACCELERATION SPEED



0-10 YARDS

<8%

START UP SPEED

0-5 yds.

<8%

LATERAL SPEED

<6.96%

ENDURANCE

FAT BURNING DECREASED

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

Just a mere 24g (less than one ounce) of alcohol consumption showed whole-body fat oxidation (the rate at which your body burns fat) decreased by a whopping 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

American Athletic Institute study, 2010

Prevention Network

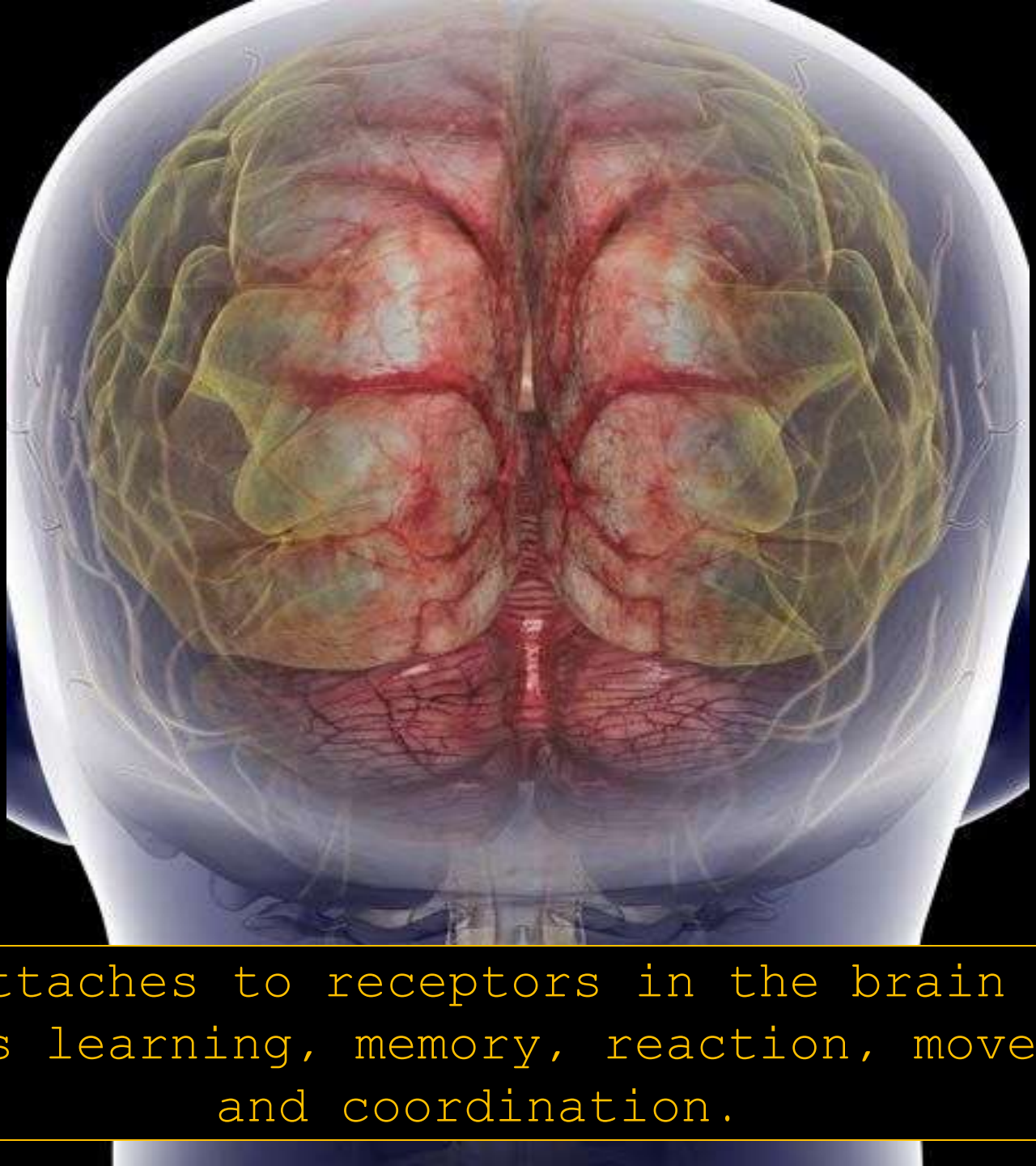
OCSS

www.PreventionNetworkCNY.org 315-471-1359

design: Gregory Daly

WEED UNKNOWNS

BRAIN

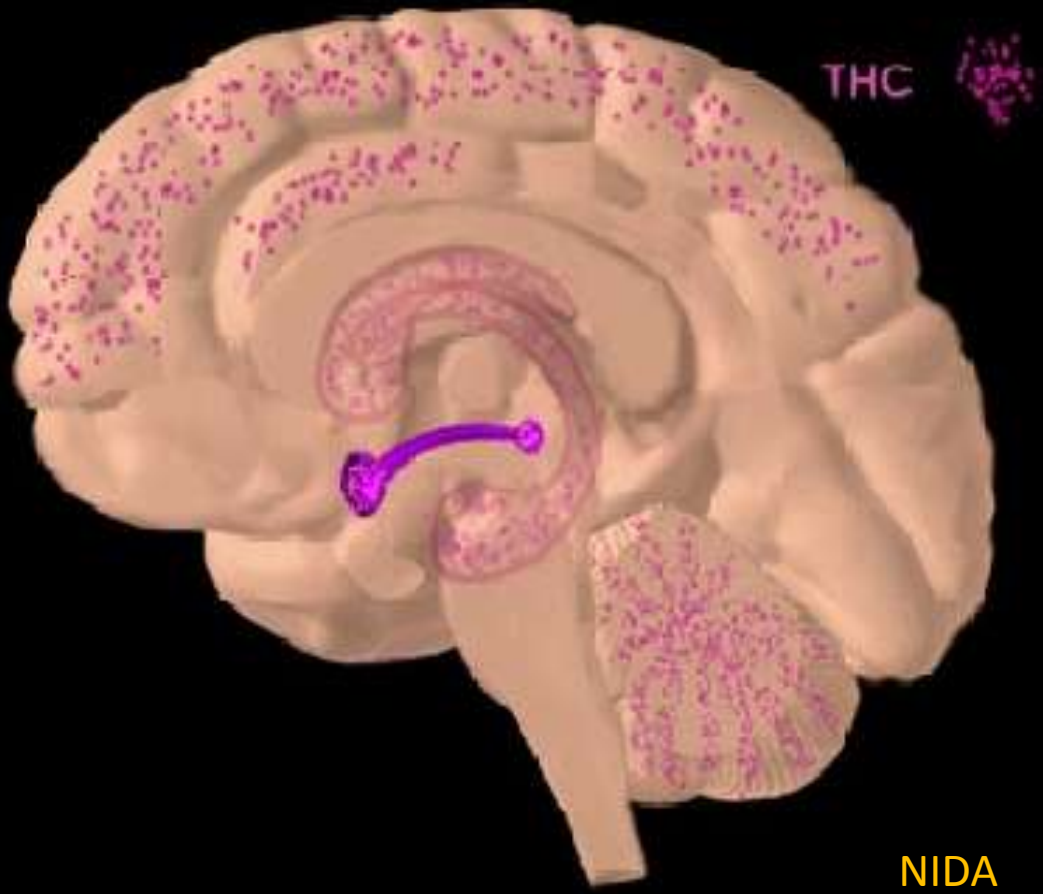


THC attaches to receptors in the brain and impacts learning, memory, reaction, movement and coordination.

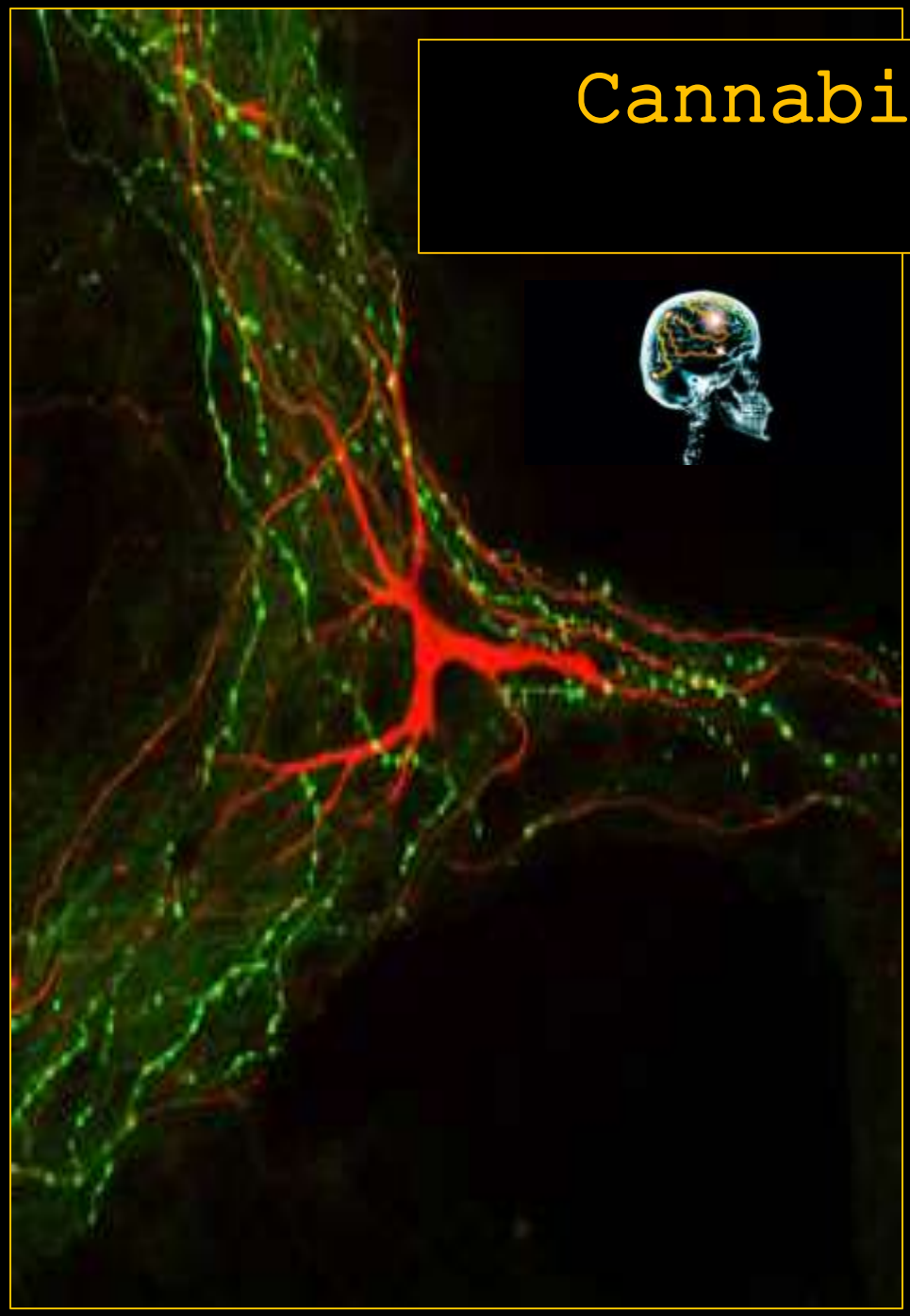
Receptors

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



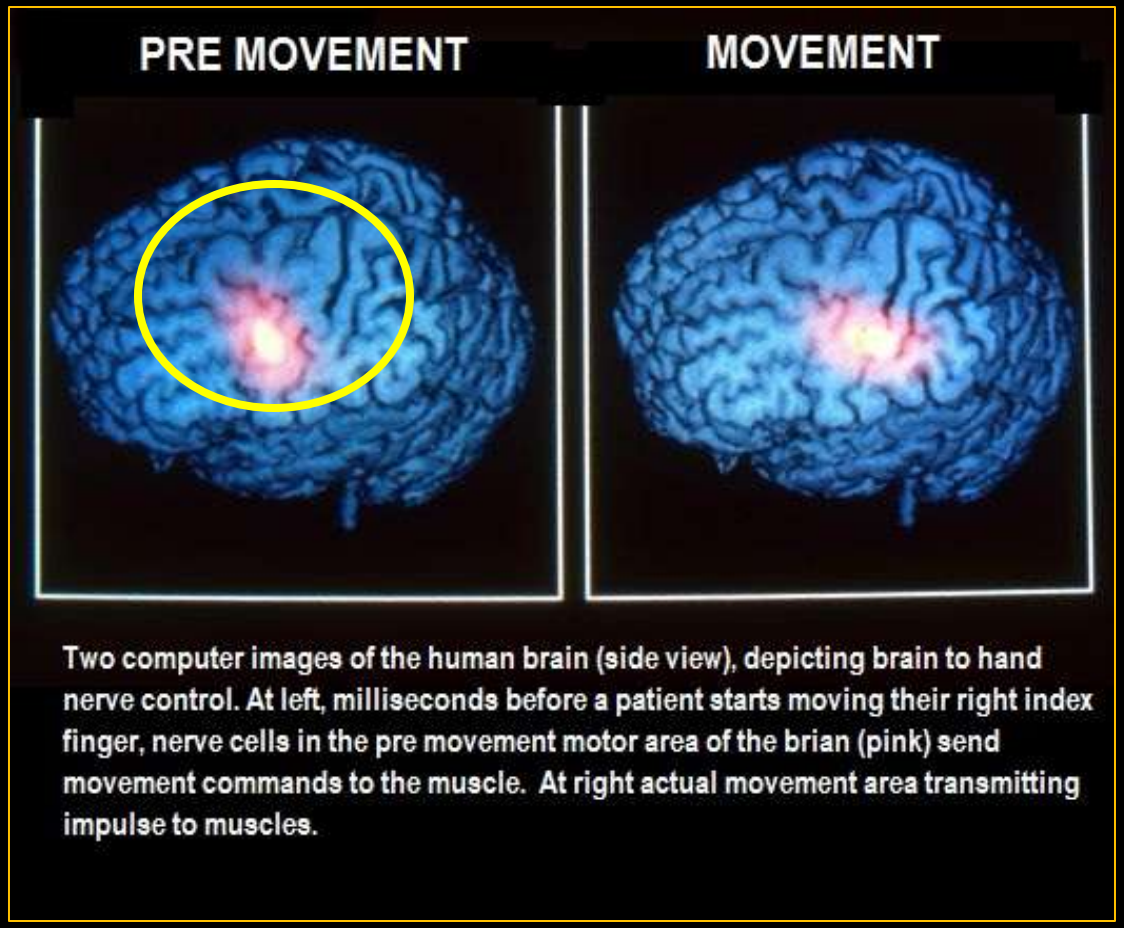
Cannabinoid Receptors in Brain



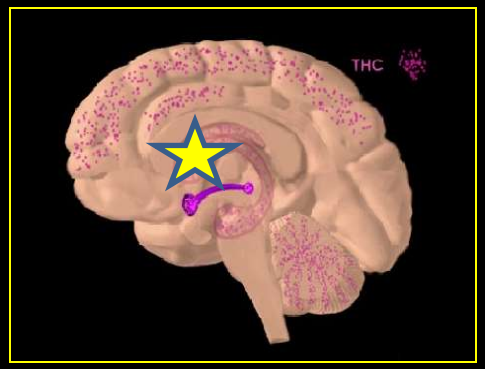
memory

cognition
reward
sensory perception
emotions
motor control
movement memory
coordination

Pre Movement-Movement



Two computer images of the human brain (side view), depicting brain to hand nerve control. At left, milliseconds before a patient starts moving their right index finger, nerve cells in the pre movement motor area of the brian (pink) send movement commands to the muscle. At right actual movement area transmitting impulse to muscles.

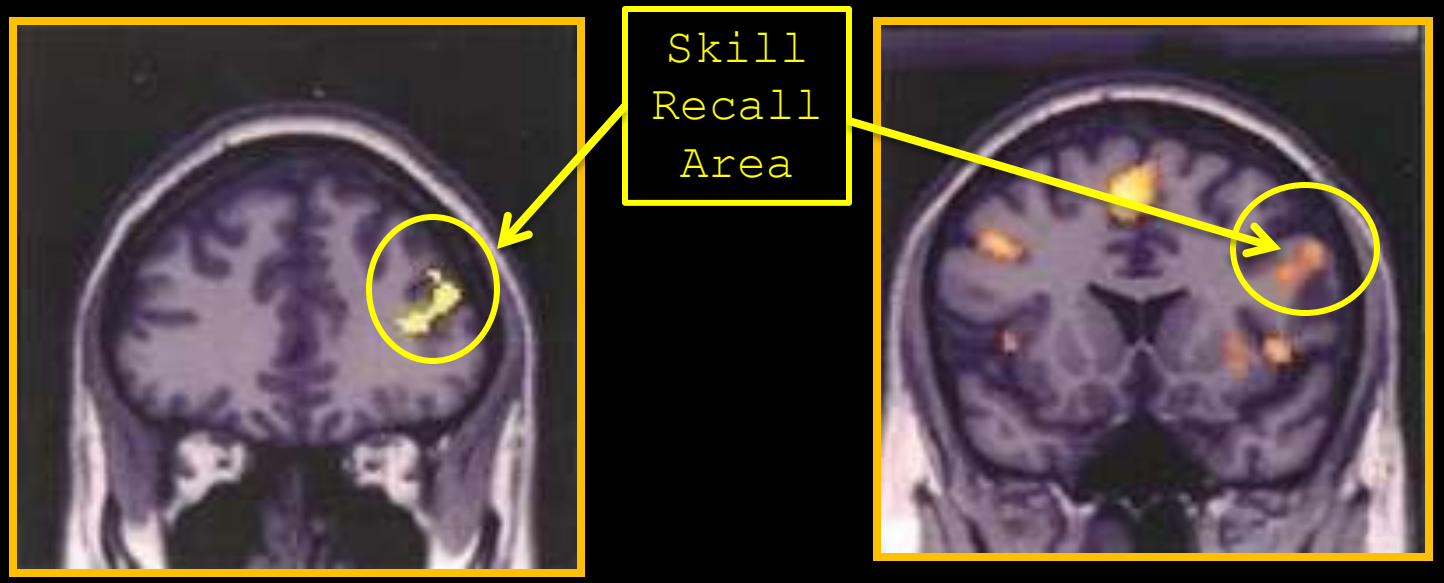


LOCATOR

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

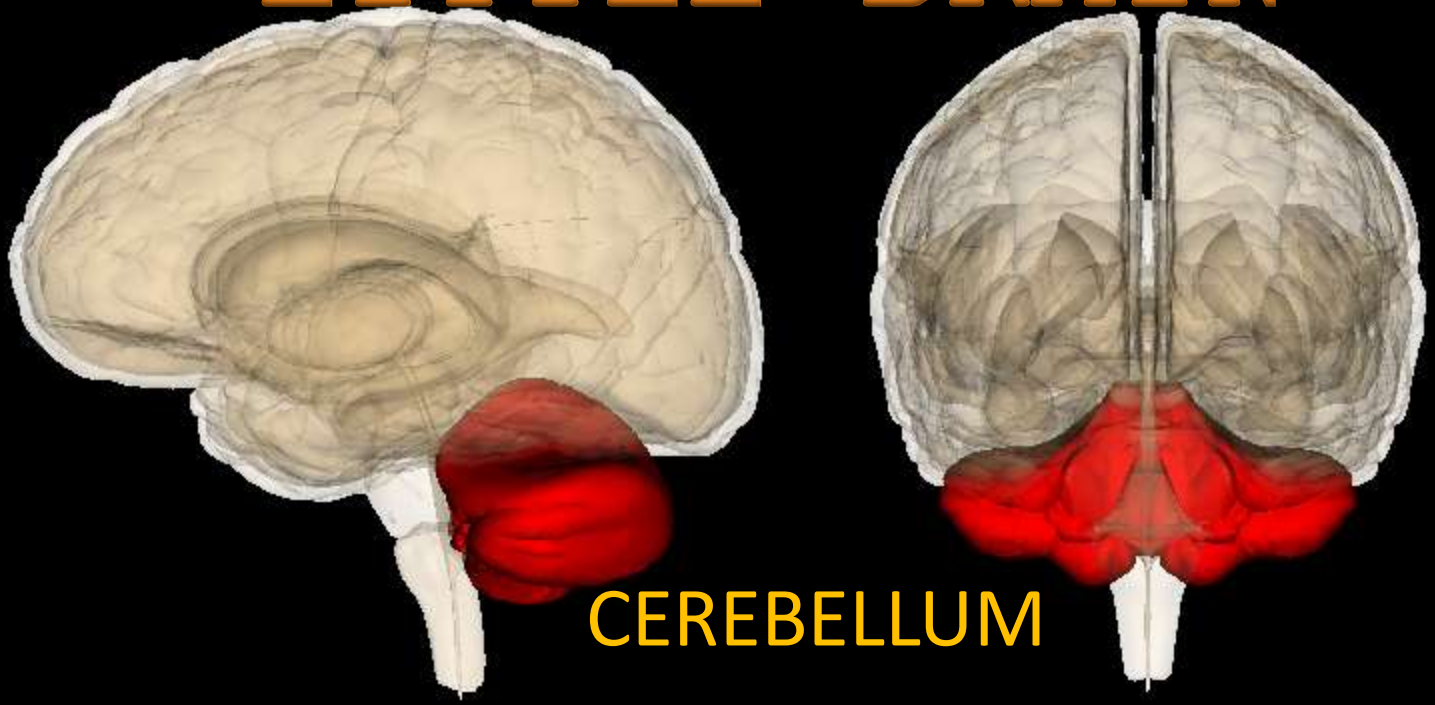
Cannabinoid Receptors
'hot-spots'

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

Brain
Liver
Pancreas
Kidney
Skin
Prostate
Cervix
Testes

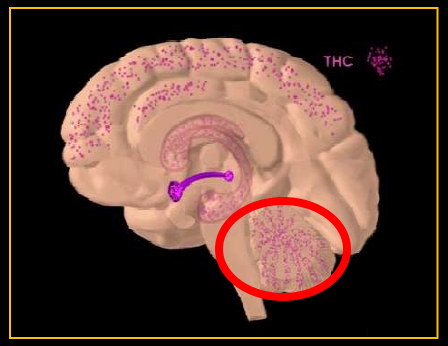
B
O
D
Y

LITTLE BRAIN



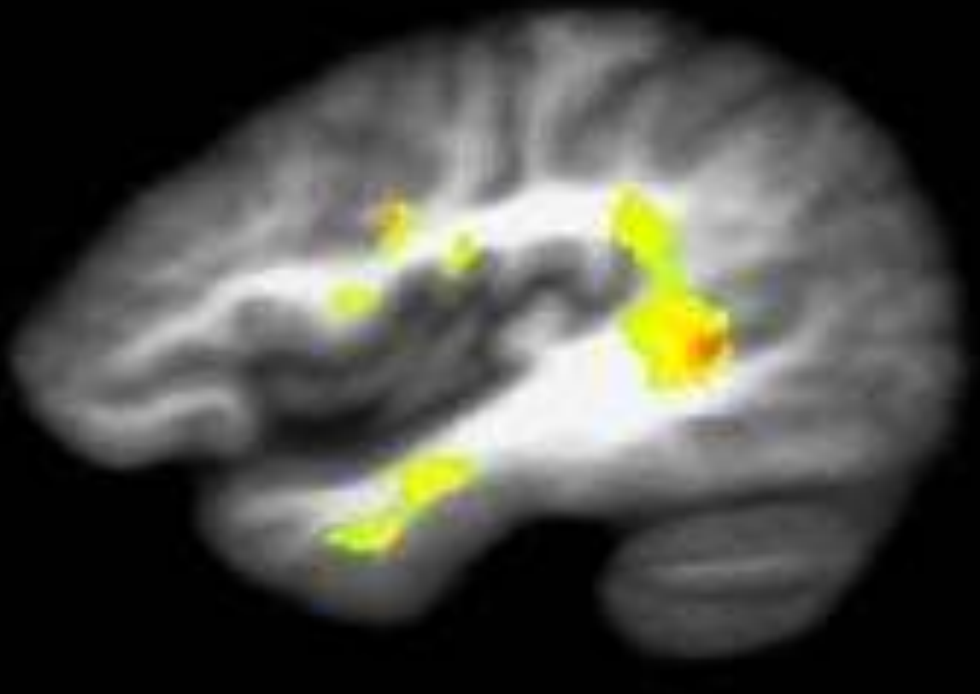
CEREBELLUM

Coordination

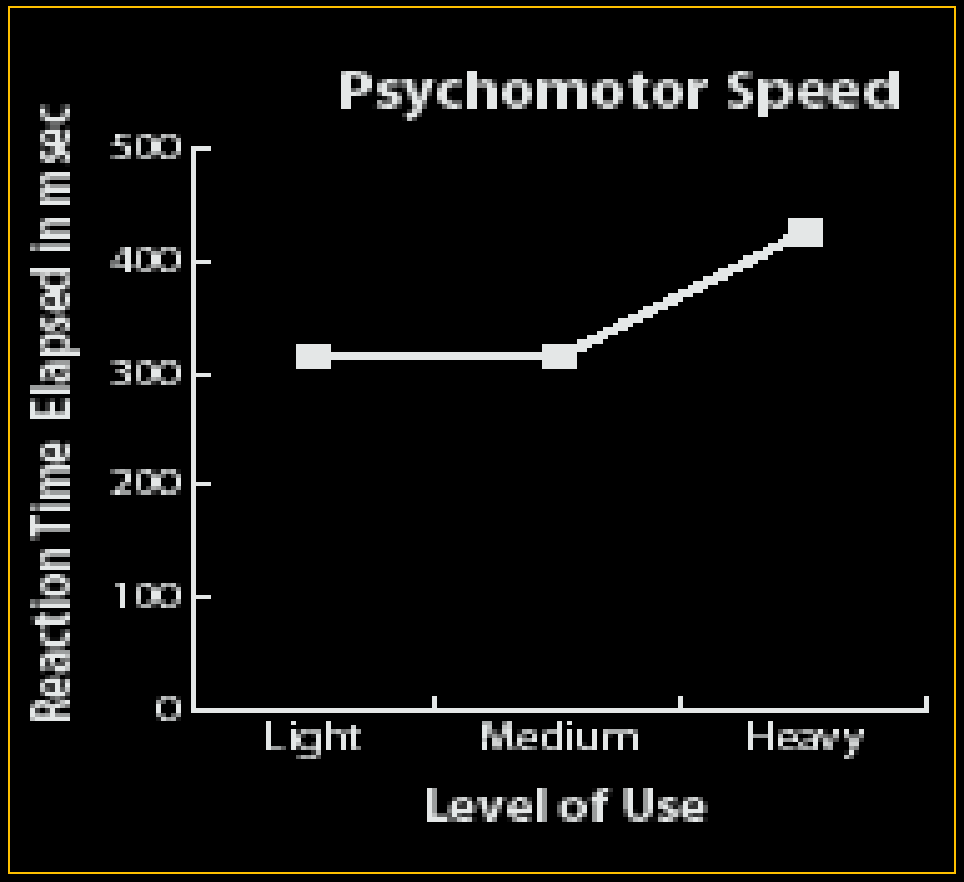


- Equilibrium
- Balance
- Muscle tone
- Ability to perform rapid alternating movements

THINK



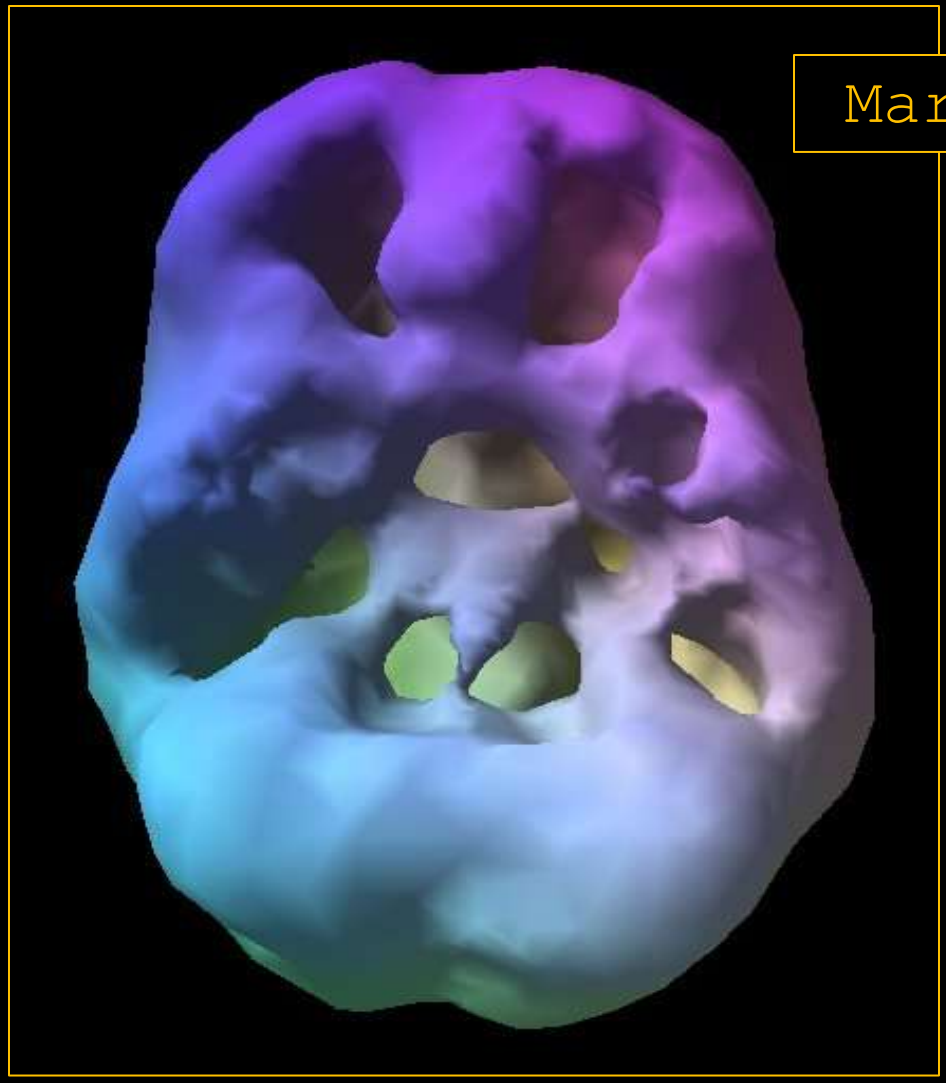
WEED and REACTION



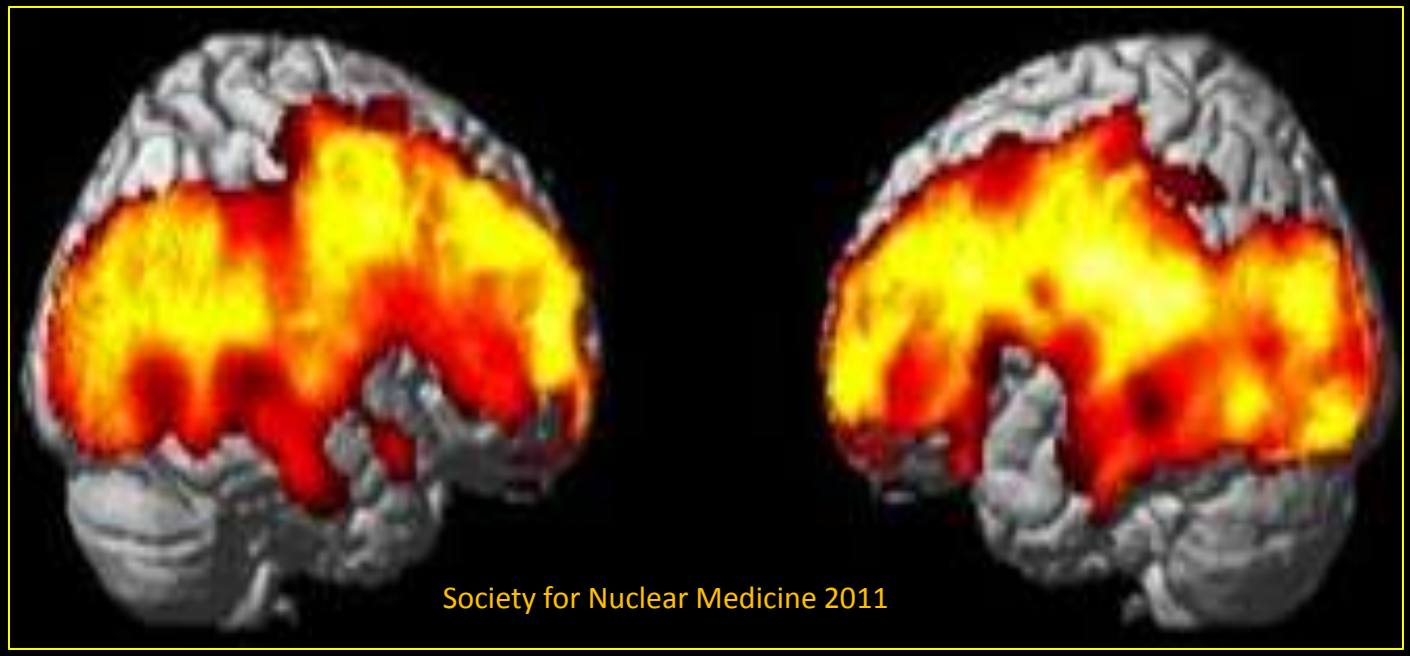
Average in the .300-.450msec range.

*Highly functional trained athletes have faster reaction times

Marijuana Regular User



SPECT Scan Amen Clinics



Brain scans showing CB1 receptor down-regulation in the cortex of the human brain (red and yellow color)

Marijuana smokers show a decrease in cannabinoid receptor activity, which correlates with the number of years of cannabis smoking.

The deficits are reversed after just 4 weeks of abstinence…

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