Brains Circuitry

Your brain has an electrical equivalent that functions just like a computer and so much more!!!

Life of an Athlete
Human Performance Project
Video
The total surface area of 100 billion neurons is equivalent to four (4) full size football fields.
Brain tissue the size of one grain of salt = Content of 25,000 HD DVDs

SALT

Memory Capacity
The brain seems to be able to build up energy deficits or energy reserves over several days and will function at that level.
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 brain (pink) send movement commands to the muscle. At right actual movement area transmitting impulse to muscles.
Reaction Time best indicator of CNS Recovery/Readiness

Sending Signals
How fast you send the signal?

SENSORY MOTOR
Normal Humans

.215 - .362 Sec.
SLEEP

The Importance of SLEEP in Mental and Physical Performance
6 Hours 14 Minutes
4-6 Hours
Average sleep for most athletes
27% < 6 HOURS  17% 8 HOURS

SLEEP

There is no way to overcome the deficits of lost sleep. Nightly REM sleep is the only way to reboot, reenergize and restore the brain and CNS to levels for optimal performance.
8.0 hours ALERTNESS <30%

SLEEP
Just a decrease of 1.5 hours of normal sleep time can result in a 30% drop in alertness.

6.5 hours

Life of an Athlete
Twenty four elite athletes reaction time to visual stimulus rested:

.186 Sec.

Twenty four elite athletes reaction time no sleep overnight:

.246 Sec.
The more you sleep the better you perform
Universal + effect on performance
All stats improve in competition level performance
All improve in measured core battery of tests
Most personal bests/records set

Sleep is an absolute predictor of performance in any sport!

Cheri Mah
Participants in a study on the elite Stanford University NCAA men's and women's swimming teams illustrates the magnitude of sleep as a performance predictor.

For the first two weeks of the study, the students maintained their usual sleep-wake pattern. The athletes then extended their sleep to 10 hours per day.

Athletic performance was assessed after each regularly scheduled swim practice. After obtaining extra sleep, athletes swam a 15-meter sprint 0.51 seconds faster, reacted 0.15 seconds quicker off the blocks, improved turn time by 0.10 seconds and increased # of kicks by 5.0 kicks.
"It is interesting to note that many of the athletes in the various sports I have worked with, including the swimmers in this study, have set multiple new personal records and season best times, as well as broken long-standing Stanford and American records while participating in this study," she said.
Sleep
Now Clearly a Predictor of Performance

Without any question the brain and central nervous system play the most significant role in optimal physical performance. Every movement emerges from brain, CNS impulses. For an elite athlete, the CNS controls every aspect of performance potential, including function of skills, biomechanical aspects, the firing sequence of muscles during activity, reflexes and reaction and countless interrelated physiological functions, including both the central system (brain and lung) 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.
Don't fight it... SLEEP

To train and compete at a high level you need regular sleep cycles. That means you need to go to bed at wake at the same time every day... Even on weekends. Your body gets used to many physiological responses during sleep and they happen at critical times during the night. Sleep includes muscle restorative phases, organ restorative phases and brain and CNS restorative phases. If you have random sleep patterns, these responses will be random. Critical recovery and adaptation occurs based on these cycles. In the recent Stanford Sleep Studies it was proved that the more you sleep the better you perform.
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
You need 1 1/2 - 2 1/2 hours of REM
You need 8 hours of total sleep to get it
TOTAL SLEEP: 8 HOURS
ACCUMULATED REM: 1 $\frac{1}{2}$ - 2 $\frac{1}{2}$ HOURS

4-6 HOURS
40-54 MINS
Sleep vs. No Sleep

Blood Flow in Brain

8 hours sleep vs. No sleep

Nasa
8 HOURS OF SLEEP

Hours of sleep:
1 1 1/2 - 2 1 1/2 HOURS

REM sleep stages:
NREM sleep stages:
Awake

Sleep position shifts
Transition to deep sleep
Lost REM

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

You are asleep but your CNS is not recovering!

The Five Stages of Sleep (One Full Cycle)

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!

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Q: When you pass out do you still have REM sleep?

A: An unfortunate effect of alcohol is the disruption of sleep patterns. This disruption can lead to restless sleep and affect sleep problems, which can cause fatigue, memory, irritation and other defects the following day.

2:27

1:31

:58

:31

None  2  4  6
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
90-120 mins > asleep

1 1/2 - 2 1/2 HOURS

HGH

REM

REM

REM

Sleep position shifts

Awake

NREM sleep stages

1

2

3

4

Hours of sleep

1 2 3 4 5 6 7

8 HOURS OF SLEEP
Sleep early... Lots of HGH

releases during the earlier hours of the night than during the later hours. Thus, sleep schedules are:

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

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After you left, I bought about three tubs of the whey protein and had it all gone in a couple of weeks. I started the year at 134 and now I weigh 158. Would to say thanks for everything you've show us and getting the opportunity to listen to you speak was awesome. We have a game tonight so we're going to bring home a win!

Knocking back 40 grams of protein before bed can boost muscle growth while you sleep by 23 percent, according to research in Medicine & Science in Sports & Exercise. "Look for protein powders high in whey/casein, which digests slowly to provide a steady stream of protein". When you release HGH and growth factors at night, there is sufficient fast protein available to convert to new mass and repair damaged mass.

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During an athletic competition,

Your eyes process more than 120 million bits of information every second.

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

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
Rest means Rest...

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

Nearly 2/3 of brains activity
Attention Focus Shifts

14-second Attention Span of Electronic Multi-taskers

New research has discovered that people who watch television while operating a laptop, cannot give either one of them full attention. In a half hour experiment, attention switched between the two devices almost every 14 seconds. Boston College has published its findings in Cyberpsychology, Behavior and Social Networking and confirmed that, as expected, teenagers were easily distracted: average switching between the two devices 120 times in under twenty eight minutes, proved what many people have thought about the concentration abilities of young people. Focus adn attention span is dwindling in this generation of youth!

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120X in 28 minutes
I-net Generation
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 used late into the night disturb your entire physiological processes, many that you need for sport!

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!

Set a time so your body can get into a Bio-Rhythm...

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

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Blue Light

Prevents Brain Shutdown
BLUE LIGHT IS EVIL FOR ATHLETES

Blue light is integral to our health—in the correct amounts. When we’re exposed to levels of anything in excess (or too little) of what we would have experienced for the bulk of our evolutionary history, problems arise. Blue light regulates our secretion of melatonin, the sleep hormone. Exposed to blue light, we limit the production of melatonin, and we stay alert and awake; in the absence of blue light, melatonin production ramps up, and we get sleepy. This system worked quite well for a long time. Reddish light from fire (our former primary source of nighttime illumination) has little to no effect on melatonin production, so sleep wasn’t disrupted when we relied on fire. These days, though, we’re subject to a steady barrage of blue light. During the day, blue light (natural or unnatural) isn’t much of a problem because we’re supposed to be awake, but at night, when we’re “supposed” to be getting ready to sleep, we tend to sit in front of blue light-emanating appliances, and our sleep suffers for it. We minimize our release of melatonin and stay alert and stimulated rather than becoming sleepy. Use of blue light after dinner is a bad idea for athletes who want to sleep and recover and release HGH and get REM to reboot the CNS and brain for your workout or competition tomorrow.

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Delays brains transition from wake state to sleep
Blue Light Tips for Athletes

Evening blue light is problematic, and there 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 (alarms, 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)

Blue light keeps you awake and throws off your Bio-rythym!

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Limit blue light at night
Avoid Blue Light and total darkness
f.lux options

Change to PINK

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INCREASE IN TV AND INTERNET TIME IN LAST FIVE YEARS

13 HRS

Watching TV

Using the Internet

121%

5%

26 HOURS PER WEEK
facebook
wasting athletes time since 2004
There is no way to make up for the deficits of lost sleep with stimulants.
What’s this?