• The Revolutionary New Science of Exercise and the Brain
By John Ratey, MD
All about the brain as a muscle.

Like all muscles, it grows with activity and shrivels (atrophies) with inactivity.

The more exercise and more INTENSE the exercise is the more the brain grows.
Inactive culture

Inactivity is killing our brains

As our brains wither, so does our motivation and therefore our bodies
Cross country runners.....excelling at exams

• Started experimenting
• College students
• Elementary students

• EEG’s: electroencephalogram
BDNF - Brain Derived Neurotropic Factor

• BDNF is a Neurotropin

• Neurotransmitters (Messengers) serotonin, epinephrine, dopamine
  Send out signals.
Neurotrophins build & maintain the cell circuitry that carry the SIGNALS.
MEMORY

• 1990’s

• Neuroscientists began figuring out the complexities of memory

  Learning a new word….nerve cells ready for a new circuit fire off a signal between each other. ATTRACTION. The word can be forgotten, but if practiced over and over, the connections get stronger

• Neuron – has synapses along dendrites (branches)- new dentrites - new synapses- more connections. Called synaptic plasticity

• BDNF promotes synaptic plasticity (changes)
BDNF is CENTER ATTRACTION

• Discovery ---- BDNF sprinkled onto neurons in petri dishes
• Cells sprouted new branches (dendrites) producing same structural growth needed for learning.

• Dr. Ratey --- “Miracle Gro for the brain”
Exercise elevates Miracle-Gro throughout the brain

Colleagues of Dr. Ratey experimenting with mice

First thoughts: BDNF found in motor-sensory areas – motor cortex or cerebellum.

Brain images of mice –BDNF was found in the HIPPOCAMPUS.

Hippocampus very necessary in learning process. Plus...

BDNF promotes stem cell exit from Hippocampus to build new cells.
What does this mean?

• Exercise sparks the whole learning process via BDNF
• PROVING.....
• DIRECT BIOLOGICAL CONNECTION BETWEEN MOVEMENT AND COGNITIVE FUNCTION

• This is how exercise became a major factor in neuroscience
Transfers short term to long term memory
Conflict resolution & decision making
Neurons dancing with activity!
HOW DOES THIS HAPPEN?

• Starts in the muscles moving during exercise. Blood pumping unleashes the reserved pools of BDNF.
cascade of hormones and events:

• At the same time...
  • Growth factor hormones are released into blood stream.
  • Pass the blood-brain barrier and hook up with BDNF to start neurogenesis.
  • Nerve cells bind together, become stronger.
  • Connectivity at cellular level makes the brain able to log in new information

• DIRECT LINK OF BODY TO BRAIN
• OR....CONNECTION OF EXERCISE TO BIGGER, BRIGHTER BRAIN
https://www.youtube.com/watch?v=idUnbwpsHQMa2c=ANyPxKp6Got36148FebaERdszV1r-bqzOAY-LrqN6JdBxN4WjhrLVh9MRWjsH-zmFiaw6DTduzo-xaGiQCSRvRb1uYtoLtHxcQ&spfreload=5
Since the passage of the **No Child Left Behind Act** in **2001**, 44 percent of school administrators admit that they've **cut physical education**.
Richard Simmons

• “No child left on his or her behind”
Idaho has no high school gym requirement.

Florida requires students to take two semesters of PE between grades nine and twelve.

South Dakota has no requirements whatsoever.

Nevada mandates gym in high school, but not in elementary.
Only six states - Illinois, Hawaii, Massachusetts, Mississippi, New York and Vermont - require gym classes to be provided at every grade level.
Michigan Curriculum Unit Design PE

• A physically educated person who participates in health-enhancing physical activity:
  
  • Demonstrates competence in selected motor skills.
  • Assesses, achieves, and maintains physical fitness.
  • Applies cognitive concepts in making wise lifestyle choices.
  • Exhibits appropriate personal/social character traits while participating in physical activity

**Outcomes for each grade level should be identified and assessed.**
• Physical education helps students develop the knowledge, fitness levels, motor skills, and personal and social skills to obtain the ultimate goal of a lifetime of physical activity and health.

• **All children, from pre-kindergarten through grade 12, should participate in quality physical education classes every school day.**

• A quality physical education program should include curriculum aligned instruction and assessment and an opportunity for all to learn.
PE Requirements in Petoskey Schools

• Elementary: two thirty minute classes per week.
• High School: one full credit which means one year.
Perfect policy to change into after-school activity

- Skateboards, rollerblades, and scooters are not to be ridden on school property. They must be properly stored in lockers during school hours.
When exercise is not a part of life
Sweating brings happiness and better grades!
Your Brain on Exercise

Getting Your Sweat On Can...

- Increase functional activity of the temporal lobe, which is responsible for storing sensory information.
- Improve learning and mental performance.
- Help prevent and treat dementia, Alzheimer's, and brain aging.
EXERCISE IS THE MOST POTENT AND UNDERUTILIZED ANTIDEPRESSANT
Random Words of Wisdom

WARNING
EXERCISE HAS BEEN KNOWN TO CAUSE HEALTH & HAPPINESS 😊
What can we do today?

• [http://resources.iom.edu/FNB/infographic/get60minutes.html?_ga=1.246462468.1471319382.1461250053](http://resources.iom.edu/FNB/infographic/get60minutes.html?_ga=1.246462468.1471319382.1461250053)
Lots of exercise=lots of BDNF=happy people