Exercise and the Brain

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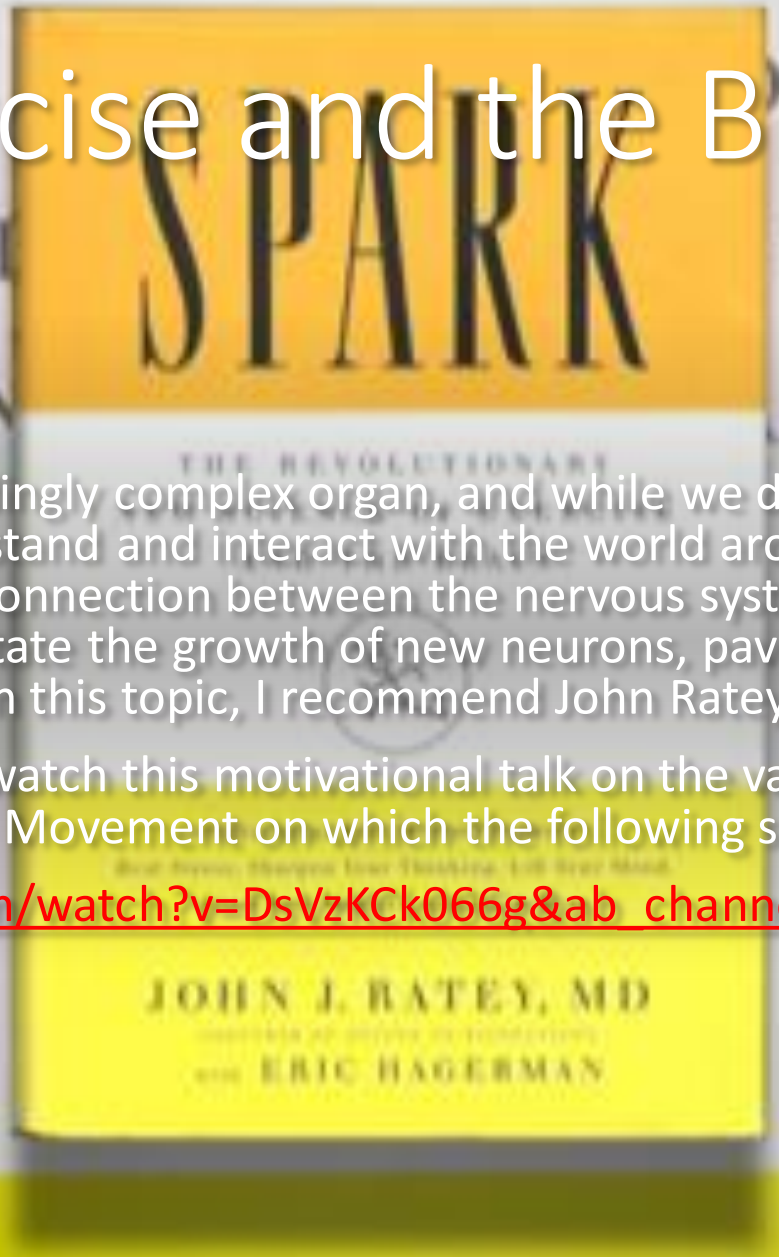
Exercise and the Brain



The human brain is an exceedingly complex organ, and while we don't fully understand it, it is what we have to use to understand and interact with the world around us. Research is showing that there is a very powerful connection between the nervous system and movement. Exercise has been shown to facilitate the growth of new neurons, paving the way for greater intelligence. For more on this topic, I recommend John Ratey, excellent book, *Spark*

Please click the link below to watch this motivational talk on the value of exercise as presented by Brain Power and Movement on which the following slides are adapted:

https://www.youtube.com/watch?v=DsVzKCk066g&ab_channel=WhatI%27veLearned

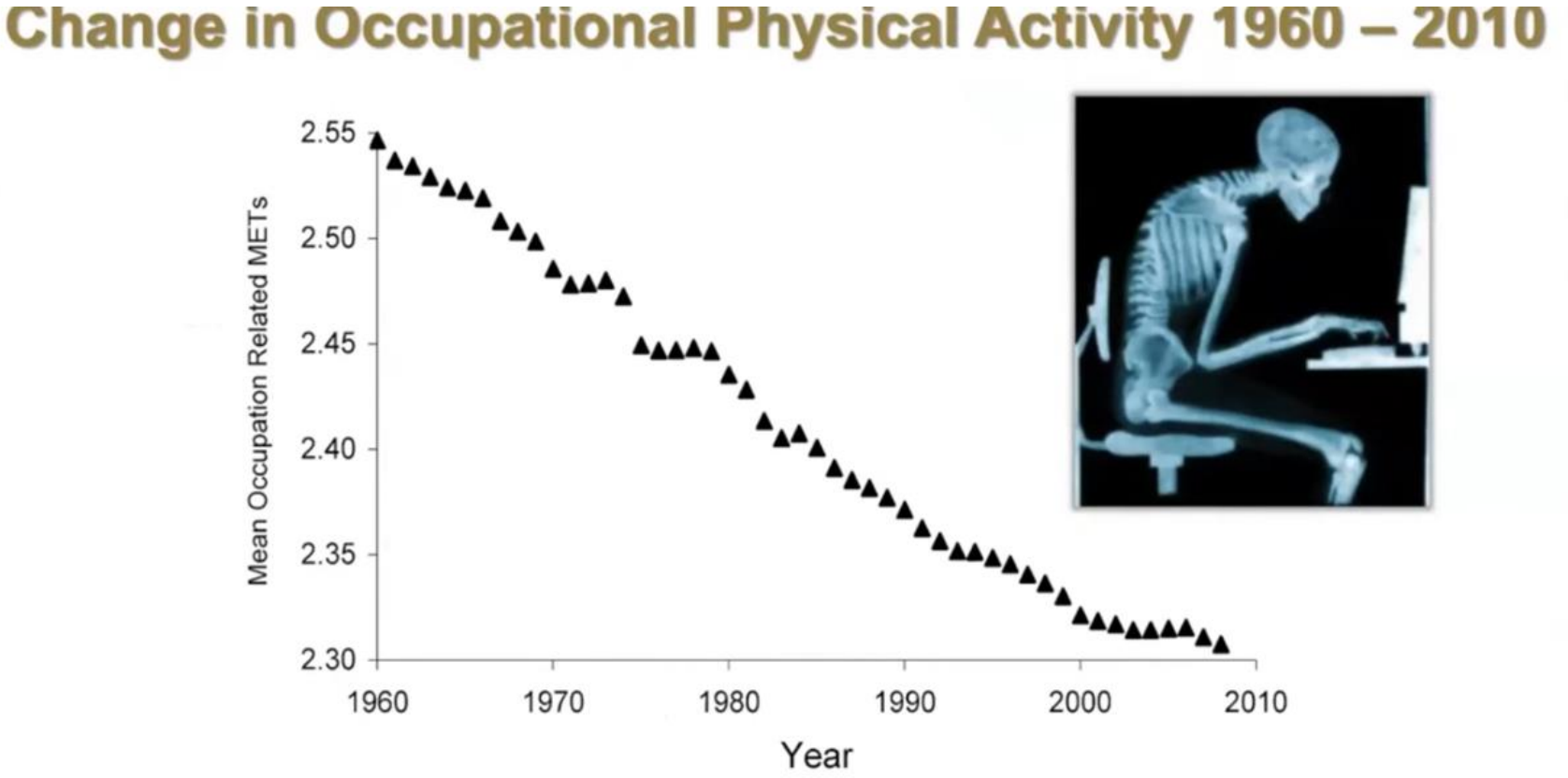
A sedentary, isolated, under-stimulated, poorly fed lifestyle kills you and this is sadly the norm for America today.

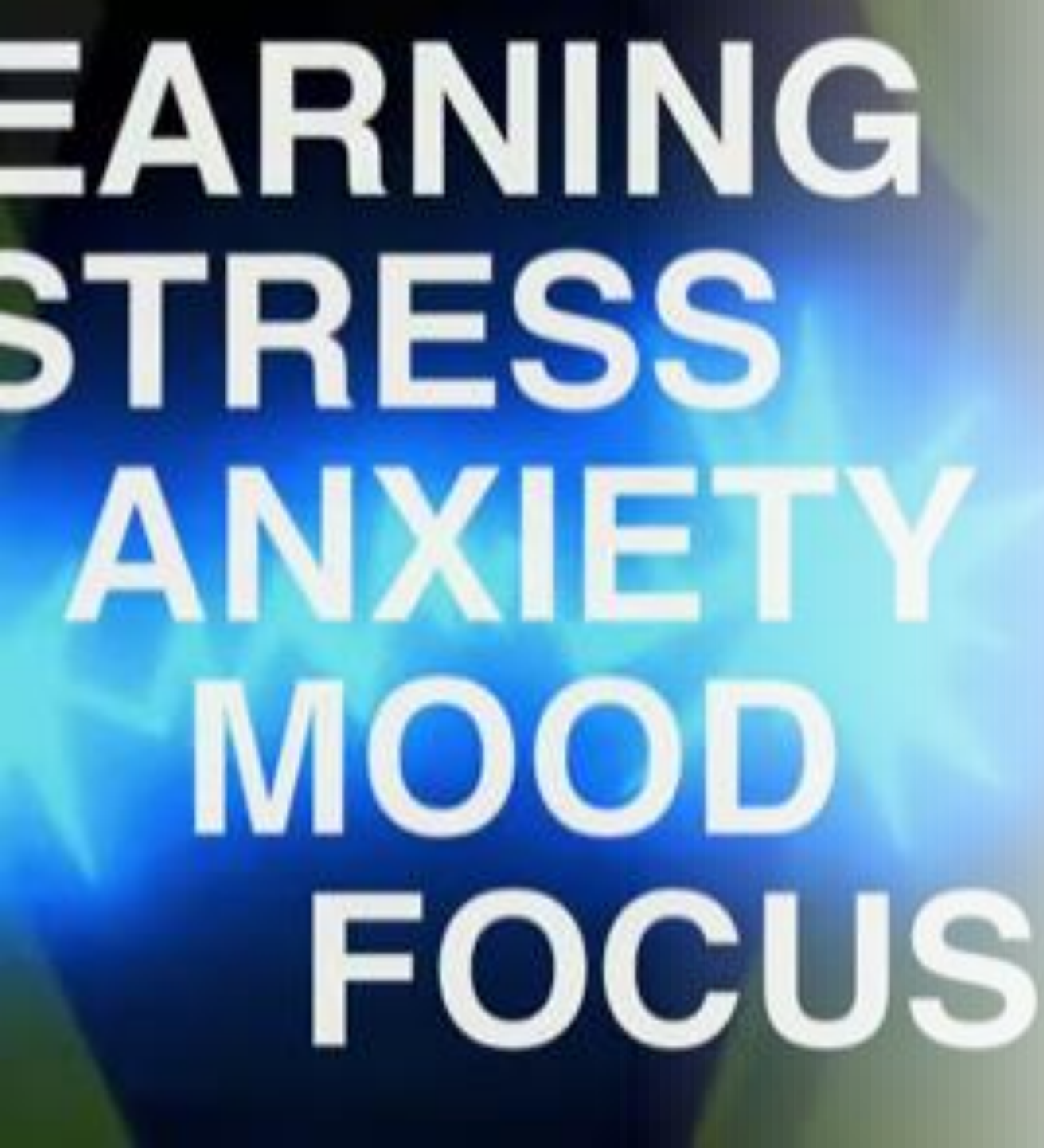
Lifestyle and Risk of Cognitive Decline & Dementia

- Behaviors ?
  - Sedentary
  - Poor diet
  - Social isolation
  - Low cognitive stimulation

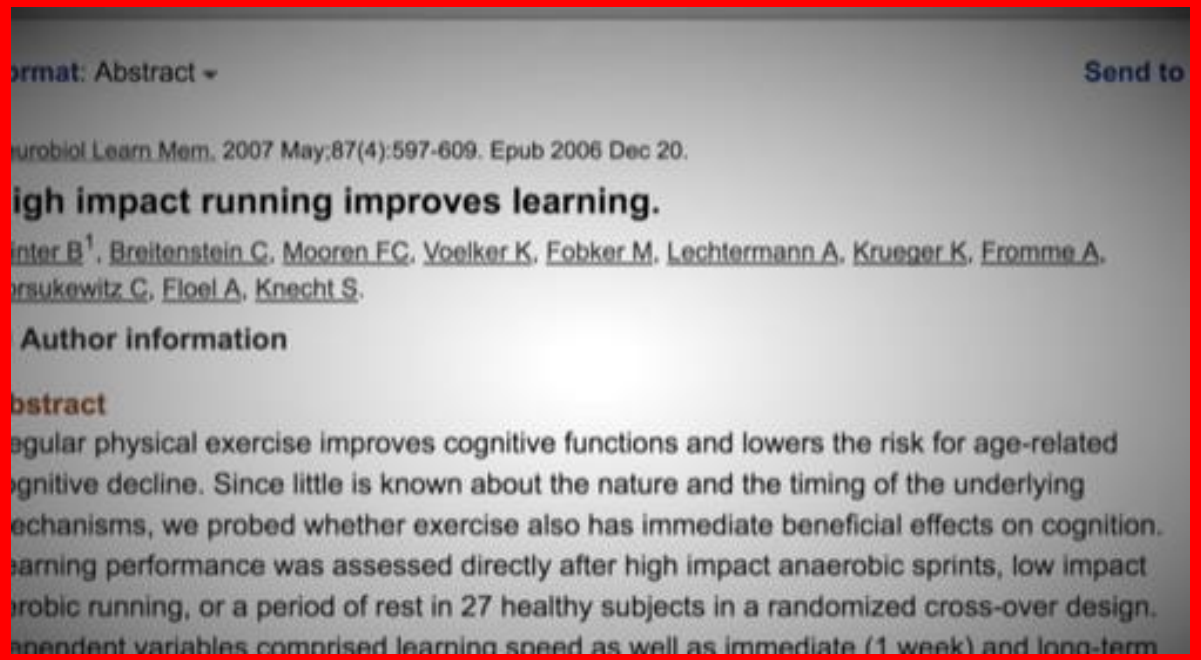
chronic exposure

Since 1960 we have become more like sloths.





More than just helping one lose weight, exercise improves these functins markedly



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urobiol Learn Mem. 2007 May;87(4):597-609. Epub 2006 Dec 20.

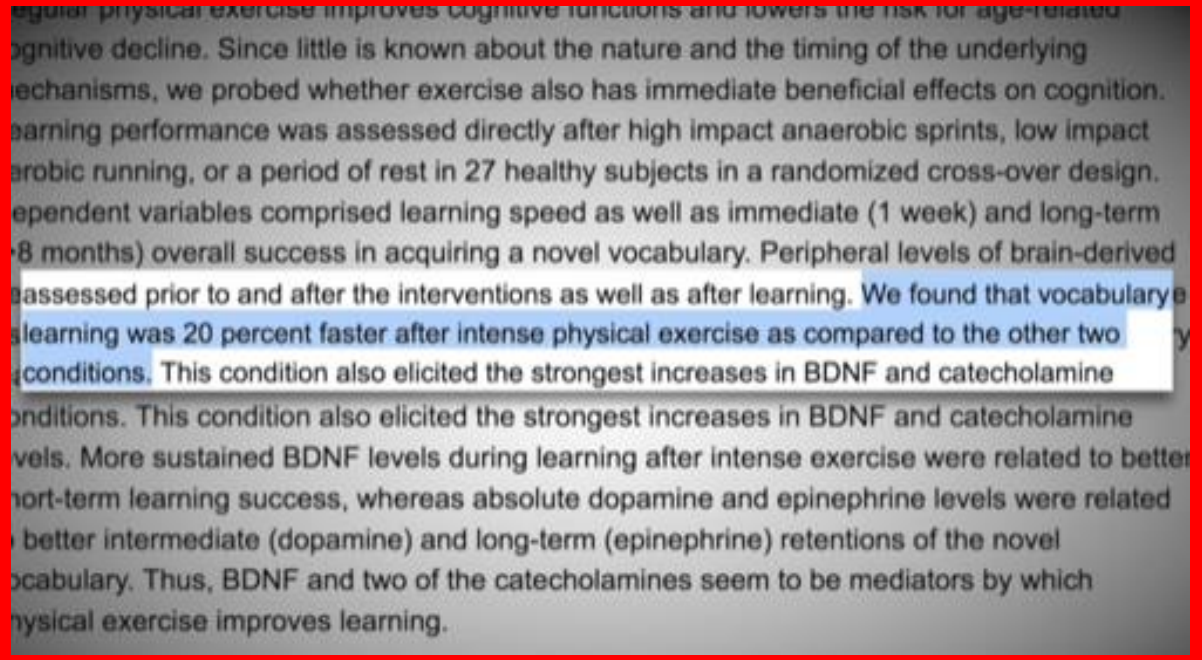
igh impact running improves learning.

nter B[1], Breitenstein C, Mooren FC, Voelker K, Fobker M, Lechtermann A, Krueger K, Fromme A, rsukewitz C, Floel A, Knecht S.

Author information

bstract

egular physical exercise improves cognitive functions and lowers the risk for age-related gnitive decline. Since little is known about the nature and the timing of the underlying echanisms, we probed whether exercise also has immediate beneficial effects on cognition. arning performance was assessed directly after high impact anaerobic sprints, low impact robic running, or a period of rest in 27 healthy subjects in a randomized cross-over design. ependent variables comprised learning speed as well as immediate (1 week) and long-term



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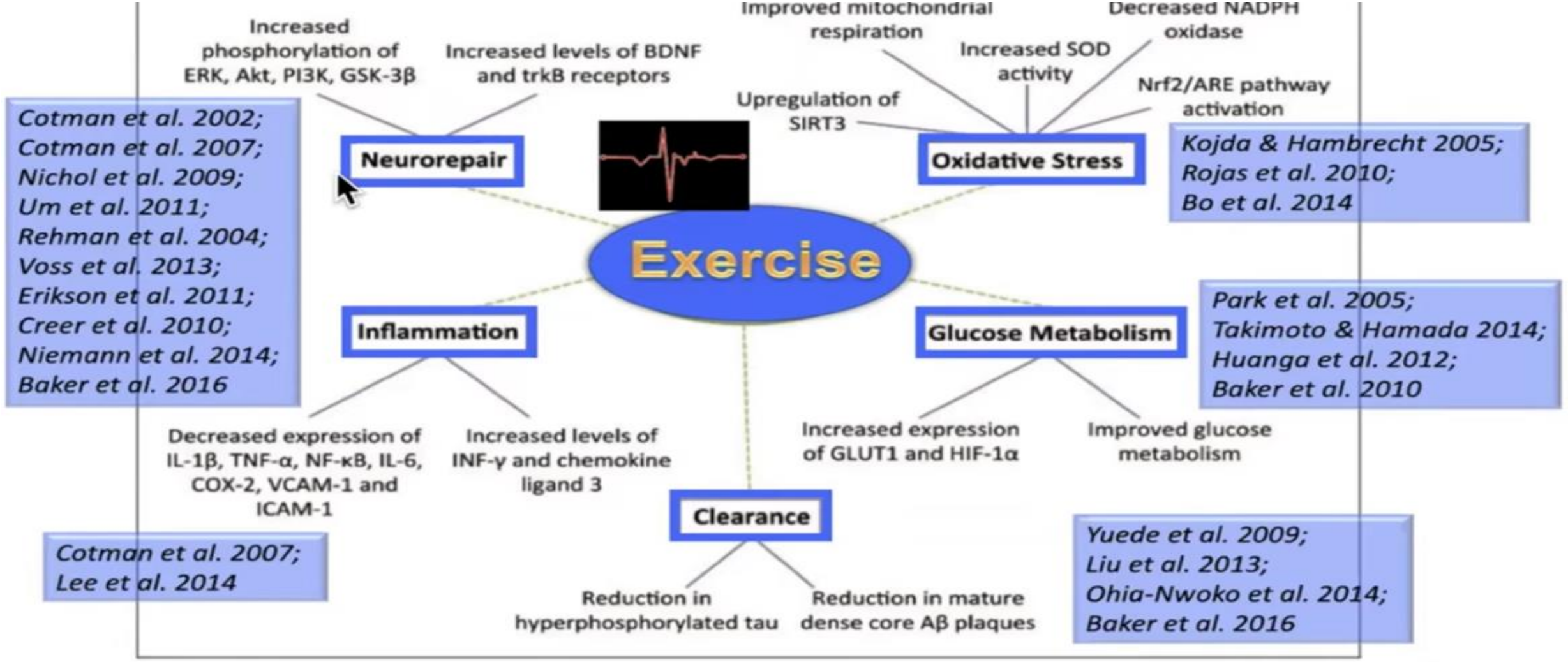
Studies show that learning is markedly improved

A summary of the research on the benefits of exercise on the body and brain.



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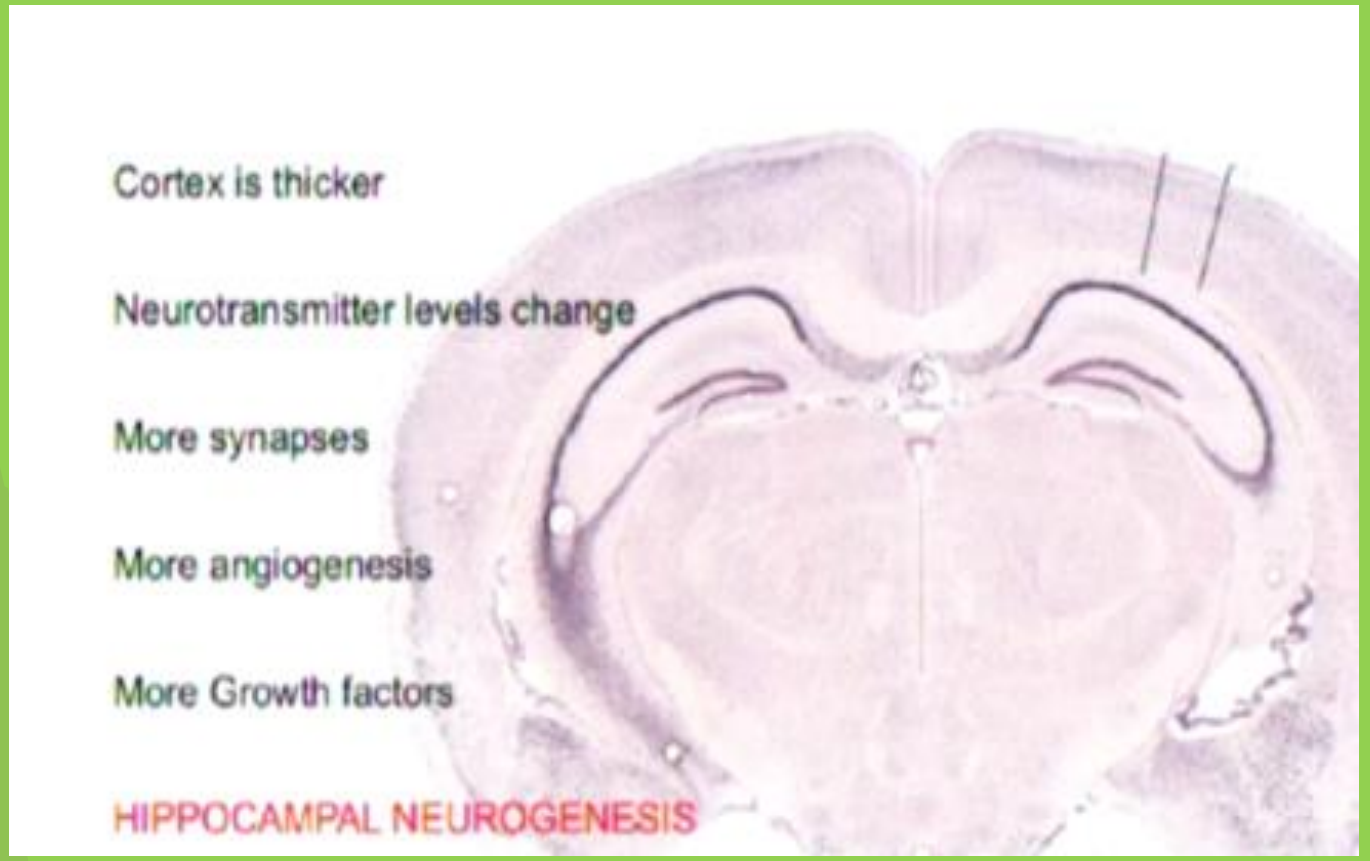
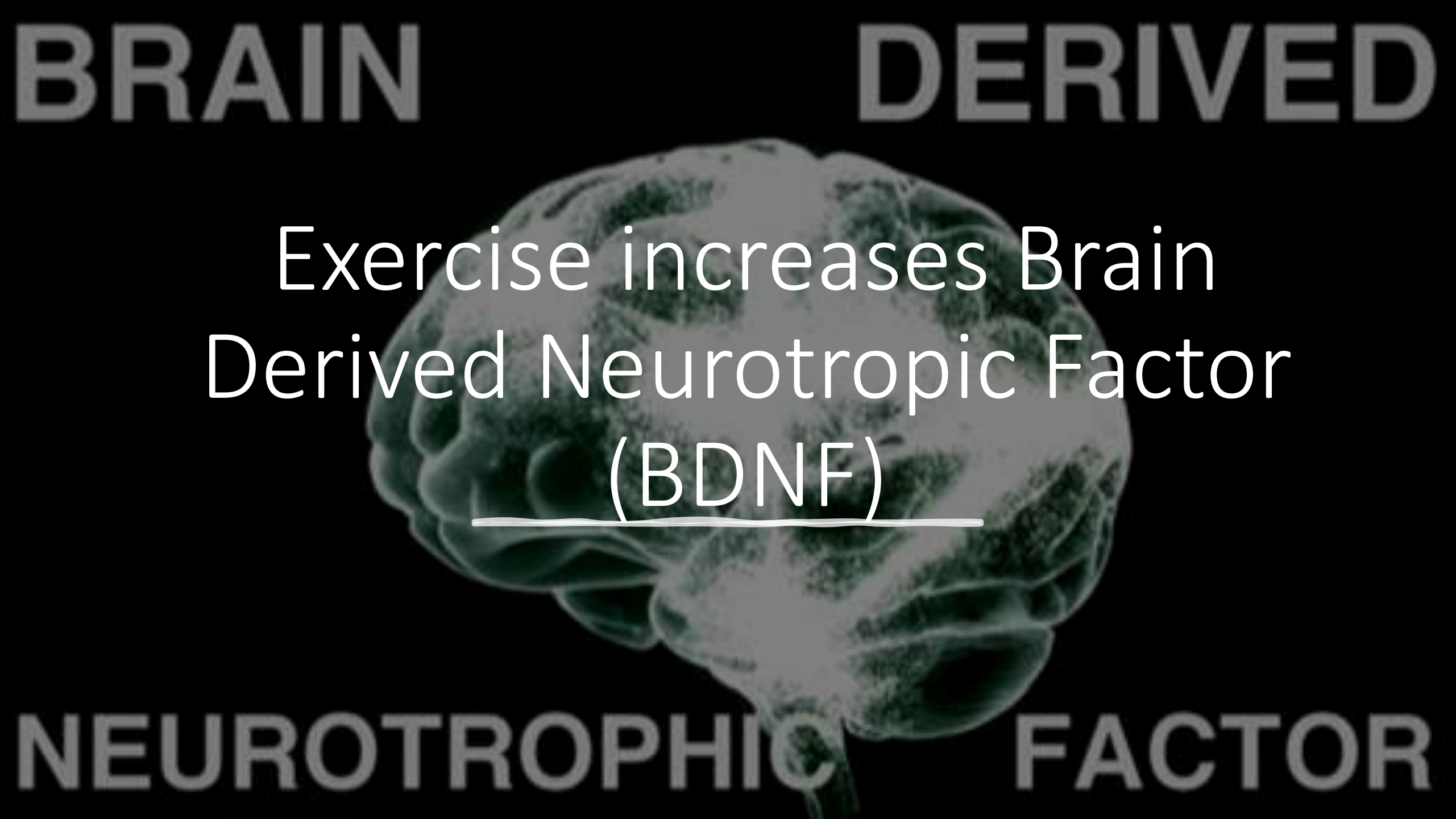
Brain Changes Due to Exercise

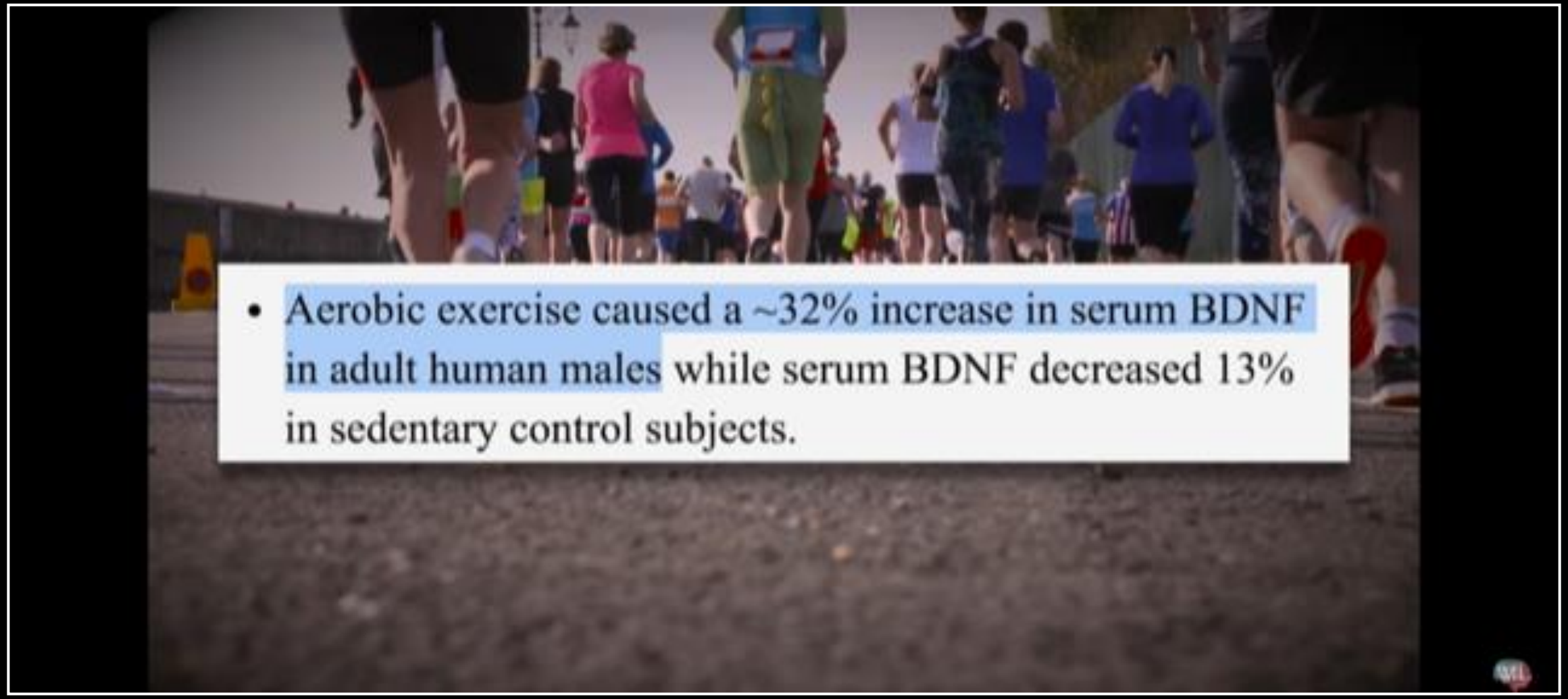
Most important, exercise causes significant neurogenesis in the hippocampus which is responsible for memory and newly discovered creativity .



The wonders of Exercise



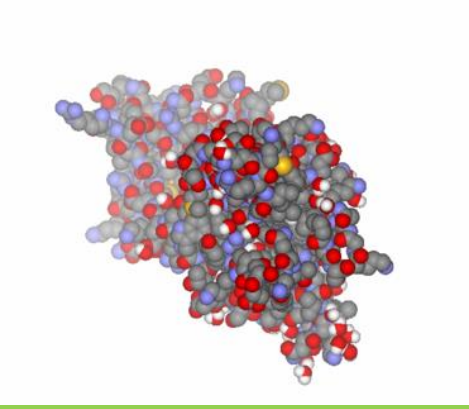
Exercise increases Brain Derived Neurotropic Factor (BDNF)



BDNF and Exercise

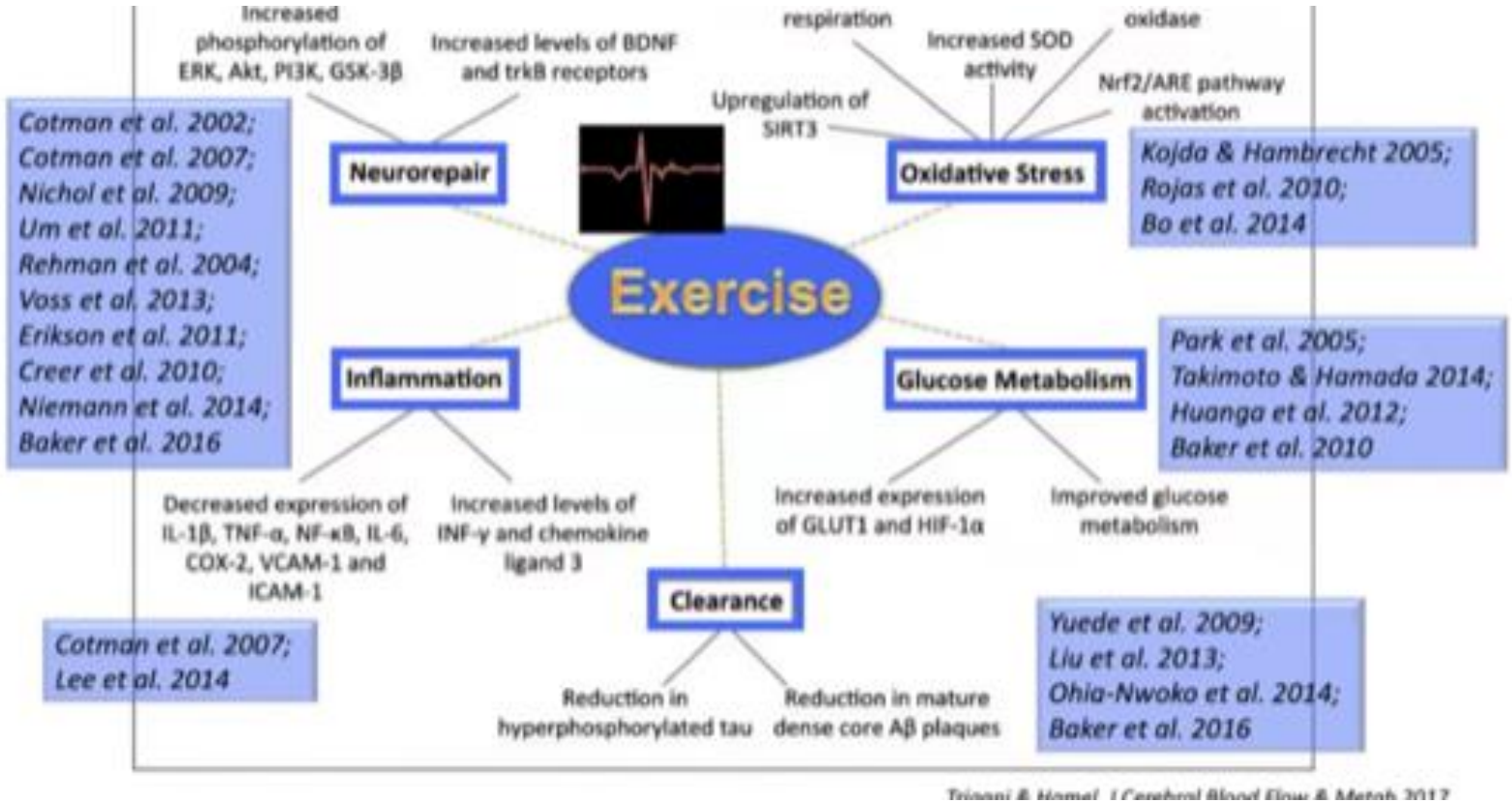
BDNF is good stuff!

Brain Derived Neurotropic Factor (BDNF)



- Brain-derived neurotrophic factor (BDNF) plays an important role in neuronal survival and growth, serves as a neurotransmitter modulator, and participates in neuronal plasticity, which is essential for learning and memory.
- BDNF was first isolated from a pig brain in 1982 by Yves-Alain Barde and Hans Thoenen.
- BDNF acts on certain neurons of the central nervous system and the peripheral nervous system expressing TrkB, helping to support survival of existing neurons, and encouraging growth and differentiation of new neurons and synapses.
- In the brain BDNF is active in the hippocampus, cortex, and basal forebrain—areas vital to learning, memory, and higher thinking. BDNF is also expressed in the retina, kidneys, prostate, motor neurons, and skeletal muscle, and is also found in saliva.
- BDNF itself is important for long-term memory.[17] Although the vast majority of neurons in the mammalian brain are formed prenatally, parts of the adult brain retain the ability to grow new neurons from neural stem cells in a process known as neurogenesis. Neurotrophins are proteins that help to stimulate and control neurogenesis, BDNF being one of the most active.

Movement grows the brain and sedentary behavior shrinks it. Panda bears used to have bigger brains but when they settled on eucalyptus leaves as their diet, they could just hang in a tree all day, eat, and not move much. As a result, their brain size has gotten smaller. So, the take-home is that a body that moves promotes a healthier brain.



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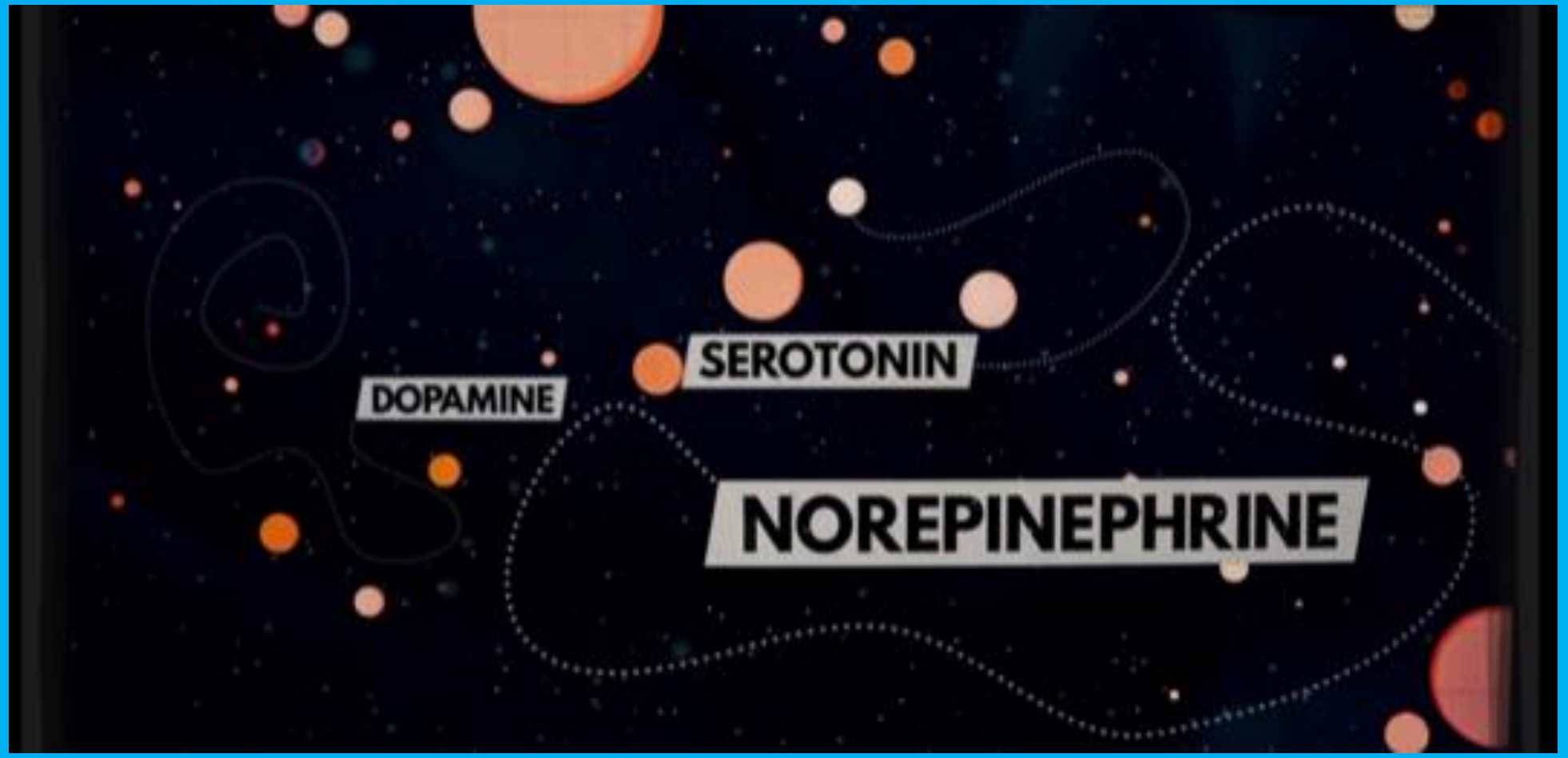
Exercise increases the big three neurotransmitters implicated in mood



Exercise and the Brain Research

In a study done at the University of British Columbia, researchers found that regular aerobic exercise, the kind that gets your heart and your sweat glands pumping, appears to boost the size of the hippocampus, the brain area involved in verbal memory and learning. Resistance training, balance and muscle toning exercises did not have the same results.

The finding comes at a critical time. Researchers say one new case of dementia is detected every four seconds globally. They estimate that by the year 2050, more than 115 million people will have dementia worldwide.

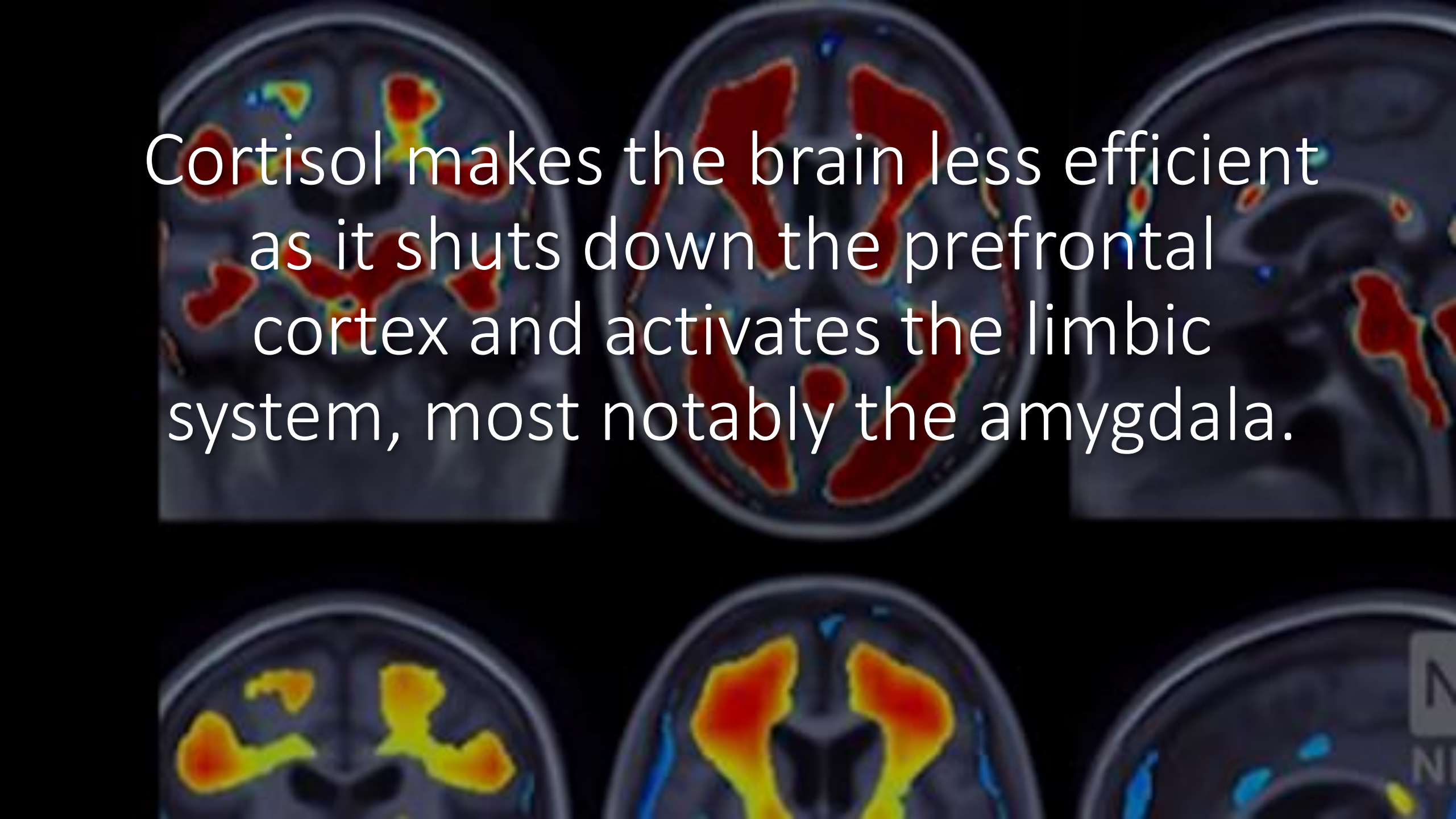
Exercise helps memory and thinking through both direct and indirect means.

The benefits of exercise come directly from its ability to reduce insulin resistance, reduce inflammation, and stimulate the release of growth factors (BDMF) chemicals in the brain that affect the health of brain cells, the growth of new blood vessels in the brain, and even the abundance and survival of new brain cells.

Harvard Health Publishing
HARVARD MEDICAL SCHOOL

Cortisol and health – good for us when we need to be on guard but very bad when it hangs around in or bodies for too long.

Too much cortisol for too long, cause metabolic syndrome and makes us fat. We gain weight even when we eat little because it makes the brain think that we are in danger, and we need to conserve energy in the form of fat.



Cortisol makes the brain less efficient as it shuts down the prefrontal cortex and activates the limbic system, most notably the amygdala.

Danger increases cortisol and exercise decreases it.