

Stress Ages Us

What is aging? Every cell divides. If they duplicated perfectly, then you would look and function just like your very young self. But as time goes on environmental influences (often our own choices of environment), break down a part of the gene cell division process that help keeps everything in tact during the division. Because this part of the duplication process, called the telomeres, gets corrupted, some of the cells genetic material is exposed and compromises the new cells. They age. Not because of time, but because of exposure. Our systems produce a sort of miracle grow for telomeres called telomerase, but stress decreases it's production.

A recent study did a correlation study between environmental stress and the length of telomeres. Telomeres keep the integrity of the cell in tact, and the longer they are, the better cell duplication we have. It found that both perceived stress and prolonged stress is associated with higher oxidative stress in the body (oxidation is like rusting of your cells); lower telomerase activity, and shorter telomere length. Women with the highest levels of perceived stress have telomeres shorter on average by the equivalent of at least one decade of additional aging compared to low stress women.

For full article: <http://www.pnas.org/content/101/49/17312>

Accelerated telomere shortening in response to life stress

Elissa S. Epel, Elizabeth H. Blackburn, Jue Lin, Firdaus S. Dhabhar, Nancy E. Adler, Jason D. Morrow and Richard M. Cawthon
PNAS 2004 December, 101 (49) 17312-17315.

CFR COMMENT - M. Krikorian

Epigenetics is the new wave of neuroscience referring to the ability of our DNA to alter what it instructs cells to do because of environmental influences. Scientist used to think this was not the case. Our experience as children influences our very gene expression. As adults, studies are now proving we can alter how our genes direct the building blocks of our physical and emotional life. Stress affects us by altering our biomechanics, hormonal axis and neuro-modulation. If we are stressed, we either tighten our muscles shutting down optimal movement pathways, or we become disengaged and don't track our movements with normal precision. By paying close attention, on purpose, in the moment (some call this mindfulness), we our biomechanical, physical proficiency, and become more emotionally robust to dampen the effects of environmental stress — physical and emotionally.

The principles of CFR help you boost your ability to understand how YOUR body works and influence its response to internal and external influences. This is now termed "mindfulness". Mindfulness studies have shown to:

- **Lower stress response**
- **Strengthen immune system response.**
- **Affect gene expression**
- **Increase emotional regulation**
- **Increase attention, focus and learning**

Use this link for mega-coverage of mindfulness and stress.

<https://www.ncbi.nlm.nih.gov/pubmed/19735238>

Rearing Without Endearing is Harmful

Finding's in a study by Weaver, et al, Mom's attention alters a certain gene's expression by uncoupling it from other genes — freeing it to produce more receptors in a part of the brain called the hippocampus. These receptors on the hippocampus monitor the chemical soup coursing through the blood. When the stress hormones are the levels of stress hormones and neurotransmitters coursing through the blood. The bountiful receptors read “enough” and direct the shut down of the stress chemical production. Neglected pups had fewer receptors in the hippocampus and so never got the message to stop the production of the stress chemical. They just kept on producing stress hormones, never really calming after an aggravating event.

Nat Neurosci. 2004 Aug;7(8):847-54. Epub 2004 Jun 27.

Epigenetic programming by maternal behavior.

Weaver IC1, Cervoni N, Champagne FA, D'Alessio AC, Sharma S, Seckl JR, Dymov S, Szyf M, Meaney MJ.

Humans Aren't Far from Mice (in a way).

A related work by McGowan, et al, studied hippocampal tissue in people that had committed suicide and been abused as a child versus people that had committed suicide with no history of child abuse. People that had been abused had decreased level of a those important receptors in the hippocampus that monitored levels of stress chemicals coursing through the blood. They were less able to regulate stress. The early life events caused the epigenetic changes, not the later events leading to the suicides. These results were similar to mice study and show the importance and effect of having proper nurture as a child.

Nat Neurosci. 2009 Mar; 12(3): 342–348.

Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse

Patrick O McGowan,1,2 Aya Sasaki,1,2 Ana C D'Alessio,3 Sergiy Dymov,3 Benoit Labonté, 1,4 Moshe Szyf,2,3 Gustavo Turecki,1,4 and Michael J Meaney1,2,5

The Epigenetic's of Obesity

In 2007, two out of three adults in the UK were overweight or obese. It is worse in the USA. Cardiovascular disease, type 2 diabetes as well as depression and immune system depression are associated with obesity. Poor nutrition can have consequences for later generations. There is a certain type of albino rat this has a "chilled-out" temperament making it easy to keep. Obese, type 2 diabetes Male rats on a high-fat diet and mated with ordinary diet females. The male pups were normal weight but had diabetes-type abnormalities. Many of the daughters had mis-regulating genes for metabolism. In another study, Male mice had a diet low in protein and high in sugar. They mated with normal diet females. Large number of their pups had metabolism gene abnormalities. There were also changes in the epigenetic modifications of the liver.

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Environmental Exposure and Epigenetics

A fungicide used in the wine industry (Vinclozolin) binds to the testosterone (male hormone) that is accessed for sexual development, sperm production and other male characteristics. The binding prevents testosterone from blocks the normal effect of the hormone. If pregnant rats are exposed to Vinclozolin when the male pups testes are developing, the offspring are born with testicular defects and have reduced fertility. The same effect is passed down for the next three generations.

Carey, N. THE EPIGENETIC REVOLUTION. 112