

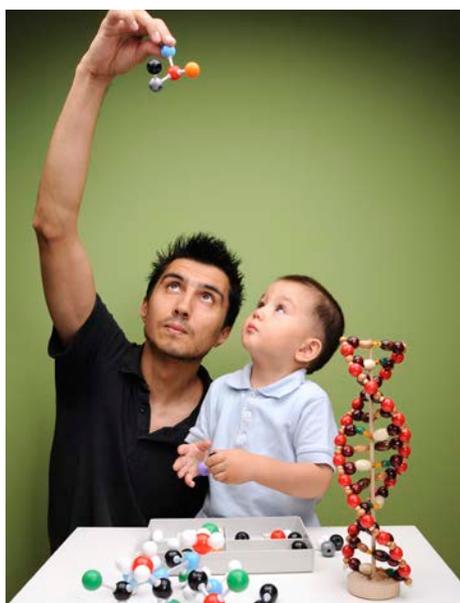


SMALL MOLECULE TECHNOLOGIES, INC.

MOLECULES & HEALTH

HEALING THROUGH MODERN SCIENCE • A PUBLICATION BY SMALL MOLECULE TECHNOLOGIES, INC.

Aging, Glycine, and Epigenetics

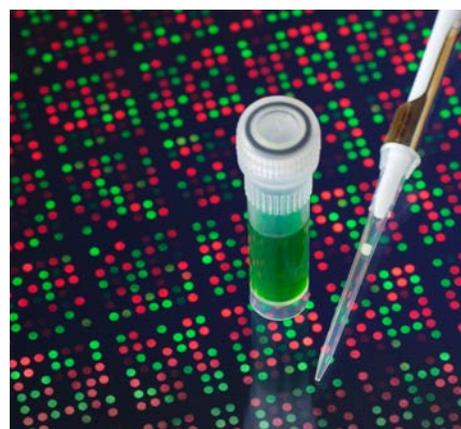


What if you could alter your DNA to improve your chances of living a long and healthy life through simple dietary choices? We frequently hear the debate about nature versus nurture that asks the question if we are more a product of our genetic code or the environment that we live in. When DNA was first discovered and the science of genetics began, it was thought that a person's genetic code functioned somewhat independently of the environment. Basically, you are what your genetic code says you are and nothing can change that. This concept holds true for many traits such as the color of your eyes and hair, but as we understand more about

genetics, we are beginning to learn that our environment and diet may have more effects on our genes than first thought.

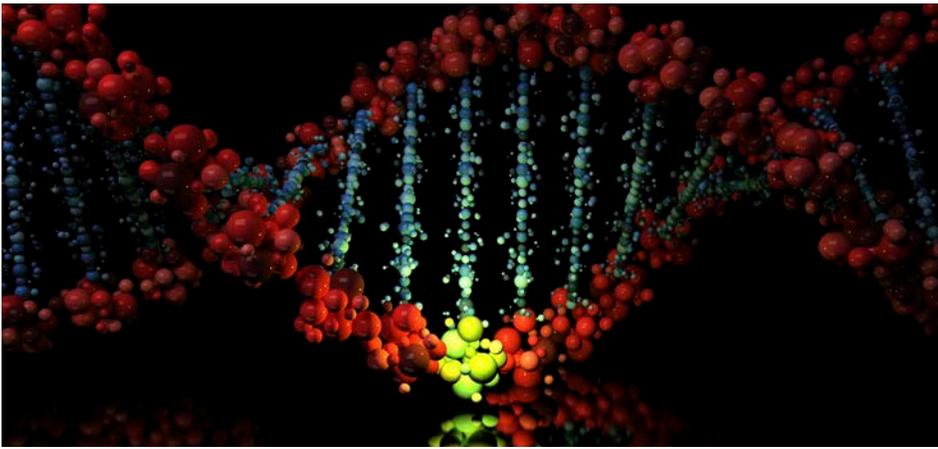
Take cancer as an example. We know that someone can be born with a set of genes that all but guarantees they will develop a certain type of cancer. But we also know that some environmental factors such as cigarette smoke, air pollution, chemical exposures, and ultraviolet radiation from sunlight or tanning beds can increase a healthy person's risk of cancer by modifying (mutating) our DNA. In the first case, a person starts with "unhealthy" DNA and gets cancer, while in the second case a person starts with "healthy" DNA that later becomes unhealthy, still resulting in cancer.

But now, our understanding of



genetics and the interplay with our environment has progressed even further into a field of study called epigenetics. Epigenetics describes how certain factors can alter the way our genes are expressed by turning them on and off through reversible but heritable mechanisms.¹ Gene expression can be altered by factors produced naturally in your body, such as hormones or metabolic waste products, but can also be altered by environmental factors such as your diet and exposure to stress. So a person that has "healthy" DNA has some genes that can help fight cancer and others that can cause cancer, and their health is dependent on which of those genes are turned on or turned off.

To better illustrate this, consider sunlight, skin cancer, and Vitamin D production. Ultraviolet light



from the sun can cause oxidative stress and damage to the DNA in your skin cells, increasing your risk of developing skin cancer. This is an example of a mutation that directly alters the genetic code. But ultraviolet light also interacts with your skin cells in a positive way, stimulating the production of Vitamin D. Vitamin D is an important epigenetic factor playing a role in the expression of over 900 genes including some that boost your innate immune system.^{2,3} This epigenetic effect is reversible and entirely dependent on the amount of Vitamin D in a person's blood stream. If you have enough Vitamin D certain genes are turned on and your immune system works well. If you don't have enough Vitamin D, certain genes are turned off and your immune system doesn't work as



well. Regardless, your DNA is still perfectly intact and your original genetic code is unmodified.

Glycine and Aging

So what does this have to do with aging and glycine? For many years we have thought that aging and many diseases are a result of an accumulation of irreversible mutations of your DNA. However, new research has shown that aging may not only be a result of accumulated genetic mutations, but is likely also dependent on epigenetic expression within the cell. More simply put – our DNA can be perfectly fine and free of mutations, but either the wrong parts of it are turned on or the right parts are turned off, resulting in aging and other disease processes.

Specifically, researchers have determined that there are a couple of key genes involved in the production and utilization of an important amino acid called glycine that significantly contribute to aging.⁴ When these genes are turned off, the cell is starved of glycine and this causes problems in how the cell creates certain proteins. This disrupts many cellular processes resulting in impaired cellular respiration, metabolism, and

longevity. When they provided the cells with adequate glycine, it actually reversed the signs of cellular aging and returned the cells to a healthy and “younger” state. One reason this discovery is especially exciting is that while genetic mutations are very hard to correct, improving epigenetic expression can be relatively easy through simple and safe dietary and lifestyle modifications.

At Small Molecule Technologies, we recognize the important role that certain nutrients like glycine play in cellular and mitochondrial health. That is why glycine was included as a key ingredient in our patented Olivamine 10 Max formula. Our research has shown that the precise balance of nutrients in Olivamine 10 Max is capable of improving cellular antioxidant capacity and longevity through epigenetic regulation of key anti-aging genes and proteins including FOXO3A, MnSOD, and glutathione.^{5,6} When we remove any single ingredient from the Olivamine 10 Max formula, we do not see the same results, proving that it is the precise balance of all Olivamine 10 Max ingredients, including glycine and hydroxytyrosol from olive leaves, working together to produce cellular healing.



In addition to Olivamine 10 Max, we include many other nutrients and polyphenols such as EGCG from green tea, trans-resveratrol from grapevines, curcumin from turmeric, sulforaphane from broccoli, and Vitamin D that have been shown to have favorable epigenetic effects by positively influencing genes involved in immune function, inflammatory responses, stress responses, neurotransmitter production, and much more.⁷ It is exciting to know that

the nutrients you provide your body can have such dramatic effects on improving your health, even potentially reversing some of the effects of disease and aging on a genetic level. Our increasing understanding of epigenetics is helping to identify some of the important tools that our bodies are equipped with and how we can effectively utilize those tools with safe and natural targeted interventions



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About the author: Kyle Hilsabeck, PharmD., is the Vice President of Pharmaceutical Affairs at McCord Holdings and licensed by the Iowa Board of Pharmacy. He completed bachelors degrees in biology and biochemistry at Wartburg College before earning his Doctorate of Pharmacy from the University of Iowa College of Pharmacy. Upon graduation, he completed a community pharmacy practice residency through the University of Iowa where he focused primarily on nutritional aspects of care including the use of vitamin, mineral, and herbal supplements. He has taught courses for the University of Iowa College of Pharmacy on vitamins, minerals, herbs, and nutritional supplements and given many presentations on the subject as well. He has a passion for improving patient care specifically with regards to the safety and quality of the nutritional supplements and health information people use.

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