



The Body Tells Our Story

Epigenetics Research is Revealing
the Physiological Mechanisms Involved
in Our Family History and Trauma

By Susan Steiner, OTR/L, CST-D

Epigenetics is the study of changing genetics without actually touching the genes.

TIME TO READ: 9 MIN

WE ALL ENTER these professions to make a difference in people's lives, with the goals of decreasing pain and inflammation, increasing mobility, normalizing the autonomic nervous system, and improving the overall well-being of our clients. In our work, the variety of techniques we use, from subtle touch to deep work, affects the structures of our clients' bodies. Through countless hours of practice, we have all witnessed the intangible, yet present, correlation between our clients' past experiences and history with their current health and habits.

So many times, we have heard our clients say, "Everyone in my family has stomach problems and lower back pain, so I guess that is the reason I have it. It is in the family genes. I am just destined."

Sometimes we like to blame our parents. Perhaps the truth is more complicated. Perhaps history can be carried in our bodies.

Scientific research is beginning to reveal the physiological mechanisms involved in our family history and trauma. One of the emerging fields within biology is epigenetics, the study of changing genetics without actually touching the genes. "Epi" comes from the Greek word meaning over, above or outer. The research looks at gene expression — how genes can be switched on and off — rather than the alteration of the genetic code.

The Past, Now

There is compelling research that identifies how gene expression can be altered by emotional trauma from past generations. Environmental trauma

can also affect gene expression. (The environment is considered to be both one's current life experiences with residual emotions, as well as traumatic experiences of past generations.) Current research is exploring the concept that genes as we inherit them may not control our destiny — if we take steps to change the environment surrounding the genes.

"Data emerging from the world's behavioral epigenetics laboratories support the idea that a person's genes alone cannot determine if, for example, he or she will end up shy, suffering from cardiovascular disease, or extremely smart," wrote David S. Moore, PhD, in his article, "Behavioral Epigenetics." "Among the environmental factors that can influence genetic activity are parenting styles, diets and social statuses."

Here is a simplified explanation of epigenetics (for more information on what epigenetics is, visit whatisepigenetics.com):

- Our bodies are made up of cells that contain our chromosomes.
- Chromosomes are made up of strands of DNA, or deoxyribonucleic acid.
- DNA is composed of four bases: adenine, guanine, cytosine and thymine. They organize differently as they create the rungs of the ladder of the double helix.
- DNA informs what cells should do and how to grow.
- A segment of the DNA sequence is

known as a gene. Genes tell the cells how to function and what traits to express. This information is passed down from the parents, as well as influenced by previous generations.

A Look at the Research

Let's take a look at recent research on epigenetics.

- A team of researchers at Emory University explored the concept of inherited trauma through an experiment with mice. In this 2014 study, while mice were being administered electric shocks, they were also presented a cherry-like chemical scent, acetophenone, conditioning the smell with the fear response. The next generation of mice was conceived by in vitro fertilization and had no contact with their parents.
It was found that in two successive generations, the mice had a similar fear response when exposed to this cherry scent with no previous experience of the scent or electric shock. The control study of mice whose parents were not conditioned to this fear response did not show any behavioral or chemical change when exposed to the cherry scent. This study suggests that the sensory environment of parental experiences can affect the sensory nervous system and neuroanatomy of future generations.¹
- Children of parents who have been

1 Dias, BG, Ressler, KJ. Parental olfactory experience influences behavior and neural structure in subsequent generations. *Nature Neuroscience*. 2014;17(1):89–96.

through traumatic experiences can have certain behavioral patterns. New research explores the physiological mechanisms embedded in these behavioral patterns. Rachel Yehuda, PhD, is a professor of psychiatry and neuroscience and the director of the traumatic stress studies division at the Mount Sinai School of Medicine. She has done numerous research studies focused on the epigenetic influence on children from mothers who experienced trauma.

One of her early studies, 2005, explored the effects from the World Trade Center attacks of Sept. 11, 2001. She looked at women who were pregnant at the time of the event and who were subsequently diagnosed with PTSD. They noted low cortisol levels as one indicator of prolonged stress. Yehuda then looked at the infants born to these

mothers. Her findings demonstrated that low cortisol was present early in the course of their children's development. Since low cortisol levels are particularly associated with the presence of maternal PTSD, the findings suggest the involvement of epigenetic mechanisms.²

- Yehuda's 2008 research study, Transgenerational Transmission of Cortisol and PTSD Risk, looked at cortisol levels in the children of Holocaust survivors. Investigators compared children of Holocaust-exposed parents with PTSD to those children of Holocaust-exposed parents without PTSD. The findings revealed the children of the Holocaust survivors with PTSD had lower cortisol levels than the other group.³
- Yehuda's 2015 research with children

of Holocaust survivors revealed epigenetic alterations were evident in both exposed parents and their children, even when the trauma happened preconception. This idea provides potential insight into how severe psychophysiological trauma can have intergenerational effects.

Her research looked at a particular marker for gene suppression called methylation, specifically whether Holocaust exposure had an effect on FKBP5 methylation. (FKBP5 is a stress-responsive gene.) This was observed in exposed parents as well as in their offspring.⁴ DNA methylation suppresses gene expression when a methyl group is added to cytosine or adenine of DNA. Therefore, the gene information cannot get transcribed to the cells correctly.⁵

2 Yehuda, R, Engel, SM, Brand, SR, Seckl, J, Marcus, SM, Berkowitz, GS. Transgenerational effects of posttraumatic stress disorder in babies of mothers exposed to the World Trade Center attacks during pregnancy. *The Journal of Clinical Endocrinology & Metabolism*. 2005;90(7):4115-4118.

3 Yehuda, R, Bierer, LM. Transgenerational transmission of cortisol and PTSD risk. *Progress in Brain Research*. 2008;167:121-135.

4 Yehuda, R, Daskalakis, NP, Bierer, LM, Bader, HN, Klengel, T, Holsboer, F, Binder, EB. Holocaust exposure induced intergenerational effects on FKBP5 methylation. *Biological Psychiatry*. 2016;80(5):372-380

5 DNA methylation. (2015, September 11). Retrieved from simple.wikipedia.org/wiki/DNA_methylation.

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One gift we can offer our clients is to address their state of stress.

- A Dutch–U.S. research project published in 2008 followed the epigenetic data of children who were in utero during the long-term traumatic event known as The Dutch Hunger Winter. In Nazi-occupied Netherlands, the famine lasted for six months in 1944 and 1945. During this time approximately 20,000 people starved to death and some 4.5 million were drastically undernourished.

Scientists studied the genetic markers of 422 people who were in utero during the famine and compared this information to their siblings who were not exposed to distress while in utero. The study found that DNA methylation had made changes near six genes that control metabolism and cell differentiation during development. It appears that the prenatal stress of the famine turned off some genes of these children, creating health conditions that affected their metabolism.

It was noted that these people had an increased incidence of obesity, type II diabetes, schizophrenia and other chronic health problems, correlating in utero trauma with later adult health issues.^{6,7}

- A 2018 study, “Touch and Affect: Analysing the Archive of Touch Biographies,” is based on material from touch biographies written by

ordinary Finnish people of various backgrounds. In their accounts, authors narrate their lives through the ways in which they have touched, have been touched, experienced touch and been socialized to touch.

The authors said, “The way we feel about being touched — and the way we touch others — are shaped by our personal and generational affective history. Touch inequalities, too, are often transmitted through generations.”

Using the Information

Science is in the infancy of epigenetic research, so how do we filter this knowledge into our lives and our practice with clients? The first step is to upgrade our inner environment. Lifestyle choices will affect epigenetics.⁸ With these changes, we heal at a cellular level.

John Douillard, DC, leader in natural health and Ayurvedic medicine, said, “If your environment can change your genetic expression, then it seems wise to surround yourself with a healthy environment rich in peace, love and joy rather than stress, violence and exhaustion.”⁹ This is the foundation for changing our inner health. Yet, stress is an epidemic in our culture. This hyper-arousal state affects all our systems, including heart rate, digestion and brain chemistry. Over time, hyper-arousal creates a chemical signature that can become addictive.

Also, as we design our practices to meet the needs of our clients, consider incorporating wellness questionnaires that include lifestyle choices, stress levels and parental history. Learn the medications of your clients. (It is interesting to note that there are many pharmaceutical studies being done that address DNA methylation and gene expression, either silencing or expressing genes to reverse a disease process.)¹⁰

One gift we can offer our clients is to address their state of stress. We become aware of this information by asking open-ended questions, carefully listening and recognizing the tone of their tissue. As we work physically and energetically with our clients, we help them relax. By lowering stress levels, your client achieves more alpha and theta brain waves during the session. This brain state allows for sympathetic and parasympathetic nervous systems to balance. The autonomic nervous system can now do what it is meant to do: build, create growth and repair the cells.

Connected in the Field of Energy

Emotions also create a chemical signature in our brains that directs our nervous system. Each time we think of a stressful emotional event, such as one invoking guilt, anger or grief, it stimulates our neural chemistry as if it is currently happening.

6 Hale, T. Effects of the WWII Dutch Famine can still be seen 70 years later in the genes of the next generation. IFLScience. 2018. Retrieved from iflscience.com/health-and-medicine/effects-of-the-wwii-dutch-famine-can-still-be-seen-70-years-later-in-the-genes-of-the-next-generation.

7 Tobi, EW, Sliker, RC, Luijk, R, Dekkers, KF, Stein, AD, Xu, KM and Biobank-based Integrative Omics Studies Consortium. DNA methylation as a mediator of the association between prenatal adversity and risk factors for metabolic disease in adulthood. *Science Advances*. 2018;4(1).

8 Alegria-Torres, JA, Baccarelli, A, & Bollati, V. Epigenetics and lifestyle. *Epigenomics*. 2011;3(3):267–277.

9 Douillard, J. Inherited stress (Samskaras) explained by epigenetic science. *LifeSpa*. 2019. Retrieved from <https://lifspa.com/stress-carried-generations>.

10 Mason, LE. Epigenetics and Drug Discovery. Technology Networks Group. 2018. Retrieved from [technologynetworks.com/drug-discovery/articles/epigenetics-and-drug-discovery-306821](https://www.technologynetworks.com/drug-discovery/articles/epigenetics-and-drug-discovery-306821)

Our beliefs and emotions impact our electromagnetic field, which affects our biology.

In order to support our clients, we first must explore, accept and release our own emotional patterns by doing our own personal work. Then we are more aware of emotional states and are better prepared when our clients express themselves emotionally. There are many therapeutic modalities that support individuals with a history of trauma. Having a team of professionals to refer to is important for all bodywork therapists. A team approach for some clients is necessary.

For those of you who work with the subtleties of touch, you understand how we are all connected in the field of energy. Our beliefs and emotions impact our electromagnetic field, which affects our

biology. Through meditative practices, we create a coherent electromagnetic field around us, which is paramount for changing our physical structures. The more coherent our personal energy field, the more we can influence change in our clients.¹¹

My mentor, the founder of Upledger CranioSacral Therapy, John E. Upledger, DOO, OMM (1932–2012), taught us to include the dimensions beyond biochemistry. He lived by this quote from German physician Rudolf Virchow: “The absence of proof is not the proof of absence.” I encourage you to stay open to all aspects of research. Science is catching up to us. **M**

With 40 years as an occupational therapist, Susan Steiner, OTR/L, CST-D’s professional career included early childhood development, sensory integration and manual therapy. Early in her career, she was searching for a modality that would blend science and psychology. She became passionate about CranioSacral Therapy and SomatoEmotional Release with Upledger Institute International (upledger.com), on whose behalf she wrote this article.

11 Dispenza, J. *Becoming Supernatural: How common people are doing the uncommon*. Carlsbad, California: Hay House, 2017.

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