Gene therapy: available now!

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The above title automatically leads one to think of a technologically advanced and pricey new therapy. Patients would flock to our center in search of the latest and most innovative of therapies. In truth, gene therapy *is* available; it is available to everyone, every day, and it does not cost as much as one would think. Every time you eat, you are sending a message to your genes as to how they should best express themselves at that moment.

When the work on the Human Genome Project was completed in 2003, scientists were quite surprised to find that we each have only approximately 25,000 genes. Since the Nobel Prize-winning work of Stanford's George Beadle and Edward Tatum in the 1940s, which showed that specific genes were associated with specific enzymes, geneticists figured that we would have at least 100,000 genes to account for the known 100,000 proteins. Not only were scientists surprised to find so few genes, but they also found that all humans are approximately 99.9% the same genetically! Why, then, are we all so different?

It turns out that our amazing genetic book of life is like a "flexible blueprint." It will adapt in response to the environment around it, doing the best it can whether you use Twinkles and diet sodas as the building blocks or vegetables, fruits, nuts, seeds, and grass-fed meats.

The process of natural selection is one way in which we adapt to our environment. Epigenetics is another way in which we adapt to the environment even more rapidly, with processes such as methylation shutting down certain parts of the genome and acetylation opening up others in response to the environment. This provides differential genetic expression not only in ourselves, but also in our children and grandchildren.

Methylation can go awry when we don't have enough B vitamins. It also can go awry in a background of inflammation

(think obesity). It is a hugely important process. For example, a tumor promoter may be hypomethylated (therefore no longer turned off), leading to promotion of a cancer. A tumor suppressor may be hypermethylated (turned off) and become nonfunctional, also promoting a cancer.

In 1932, pediatrician Robert Pottenger, MD, did a very important experiment in cats, documenting the dramatic effects of nutrition not only to the proband generation but to successive generations as well. One group of cats was fed a diet of 2/3 raw meat and 1/3 raw milk and cod liver oil; the other group received 2/3 cooked meat and 1/3 raw milk and cod liver oil. Obviously, in nature, raw meat is what cats have evolved to eat.

The cats who ate raw meat and their next three generations were robustly healthy, with full-term litters averaging five kittens per litter. The cooked meat group, on the other hand, along with the next three generations, experienced a number of problems. Many cats died in labor and didn't lactate well. The cats were also prone to infections, allergies, and arthritis. Within a few months of being on a cooked-meat diet, the cats developed infections in their mouth and lost teeth. The differences were startling, just because of that one change in the diet.

Pottenger's cat experiments demonstrated the profound impact of diet on genetic expression. After all, the genes didn't change; the environmental input changed, leading to a different expression of the genome.

Similarly, worker bees and queen bees share the exact same DNA. Because the queens are fed royal jelly, their phenotype is significantly different.

Food provides information to our genes that can affect DNA repair, micro RNA expression, hormone regulation, apoptosis, cell differentiation, carcinogen metabolism, and cell cycling. So yes, gene therapy is available, every day, whenever you eat and drink.

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