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DNA Testing for a Personalised Diet

By Anastasis Tzanis DipION

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What if I was to tell you that there is a process in your body responsible for repairing your DNA. Would you be interested in optimising this process by adopting some basic dietary habits?

Introduction to Methylation

The process I am referring to is called methylation and the statement above doesn't pay justice to how important it is for our wellbeing. Methylation is responsible among other things for the building of DNA bases, the production of neurotransmitters (including adrenaline and melatonin), the metabolism of estrogen and detoxification of endogenous and exogenous toxins. Methylation is nothing more than the addition of a methyl group (a carbon atom with three hydrogens attached) to a substrate or the substitution of an atom with a methyl group. At this point let me remind you that there is no molecule in the human body (including fats, proteins, carbohydrates, neurotransmitters, hormones) that doesn't contain carbon atoms. Why would the body then have such a complicated process for the transfer of something so widely available? The importance of methylation for public health gained publicity the first time in the mid-1960s when scientists started investigating the role of folic acid supplementation in the reduction of Neural Tube Defects (NTDs) .[1 2] The second time methylation came into fashion was in the beginning of the 21st Century when scientists started questioning the benefits of folic acid[3 4] and highlighting its potential link with cancer [18]. Sadly enough even today thousands of women are prescribed 500mgr of folic acid when planning to get pregnant. So what happened between these two points in history that changed our view? The answer lies in nutrigenomics, the field that analyses how food interacts with our DNA.

The role of DNA

The sequencing of the human genome gave the scientific community the key to the largest toy-land they could every dream of: 19,000 genes present in the human genome potentially having the answers to all man's problems. Scientists, and journalists aside, time and again celebrate the discovery of another genetic SNP (Single Nucleotide Polymorphism) found to "cause" a chronic disease. Having a SNP in a gene means that this gene has an uncommon combination of alleles when compared to the rest of the population. We all have hundreds of SNPs. Among the hundreds of SNPs researched at the moment some have got disproportionate amount of publicity. BRCA2 gene linked to breast cancer disease, APOE4 linked with Alzheimer's and MTHFR associated with impaired methylation are the three most popular ones. So do these genes determine our chances for developing breast cancer, Alzheimer's disease or hormonal dysregulation? The answer is no.

Playing music with your DNA

If we were to draw a parallelism between music and genetics; the assumption that all humans have the same genes in their DNA would be the equivalent of everybody having the same songs in their iTunes library. In that case having a SNP is the same as having a rare edition of a particular song. While some of the "limited edition" songs will sound horrible, some others will be better than the original soundtrack. Some SNPs will predispose us to a disease under certain conditions while others will give us a genetic advantage for survival. Now when it comes to composing a playlist you can play whatever songs you want. Similarly you have control over which genes are expressed and which are silenced. That is determined by your lifestyle (food, exercise, thoughts) and environment. Nutrigenomics is the field of science trying to understand how food expresses or silences genes. It was within the field of nutrigenomics that SNPs in two variants (C677T and A1299) of the MTHFR gene were found. MTHFR is a gene involved in methylation and SNPs of that gene have been shown to slow down a step in the methylation process. Ap-

Anastasis Tzanis

proximately 45% of the general population is estimated to have at least 40% lower capacity in carrying the function of the MTHFR enzyme.[5]

Action plan

The first step prior to adopting any changes is to identify your current level of health and then set realistic goals. As the implications of methylation are far reaching I would advise you to work through the following steps with a healthcare practitioner experienced in both functional testing and genetics.

1. For reasons that go beyond the scope of this article before optimising the methylation function it is important to secure gut health, pathogen elimination, good mitochondria and cell membrane integrity and good weight management.

2. The two most relevant lab tests to be performed are a DNA sequencing test and a methylation profile panel. The first one will show your hereditary predisposition (what songs you have in your iTunes) and the second is determining the current status of some major biochemical markers involved in the methylation process (what your playlist currently sounds like).

3. Based on the test results and your symptoms you will be able to identify deficiencies in the main substrates necessary for methylation. Inadequate levels of protein, low folate, vitamin B12, B6 and Magnesium levels can all inhibit optimal methylation. With the same token excess presence of the above nutrients can also have negative effects downstream if the body is not ready to process the products of methylation. While each individual has different needs for which supplementation and regular monitoring might be necessary, it is safe to say that we can all improve our methylation function by consuming daily, uncooked green leafy vegetables and moderate amount of protein. Start doing that and see your health improving on DNA, organ and system level.

Anastasis Tzanis DipION *is a registered Nutritional Therapist and a Nutrigenetics Counselor specialising on the increase of energy levels and support of mental health.*

He believes that we are now living in a very exciting era for nutritional science. Having left behind the model where food is energy, we now know that food is information. Having access to enormous amount of research (examining the interaction of food with our DNA) for the first time in history we have such a deep understanding and control over our gene expression and sequentially our health.

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