Book Reviews

Feed Your Genes Right
by Jack Challem
John Wiley & Sons, NY, 2005
Hardcover, 272 pages

The latest work by veteran health writer Jack Challem is worth buying for the recipes, and perhaps for the nutritional advice, depending on the reader's sophistication. This book is designed for the general public. It is clearly written, well-referenced, and fairly devoid of technical jargon. It introduces the reader to the idea of modifying genetic expression through nutrition, but it lacks the specifics that a health professional could fruitfully employ in a clinical setting.

To be sure, there are some specifics. The consequences of MTHFR and VDR polymorphisms, and what to do about them, are discussed quite adequately. Mainly, however, the nutritional advice is of a more general kind. The author has chosen to emphasize the nutrigenomic similarities among people, rather than the differences. This has led him to emphasize the universal aspects of good nutrition and supplements, rather than specific prescriptions for individual genetic variations. To illustrate the point: the evolving relationship between dietary ratios of omega-3 to omega-6 fatty acids is mentioned at least three times in the text (kindly given to me in electronic form by the author), but "single-nucleotide polymorphism" and "SNP" are not to be found.

Feed Your Genes Right revisits terrain explored by Jeffrey Bland in his 1999 book, *Genetic Nutritioneering* (Keats, Lincolnwood, IL), but covers it more successfully because the field of nutrigenomics (or nutrigenetics, as I prefer to call it) has matured considerably in the intervening six years. More single-nucleotide polymorphisms (SNPs) have been identified. Nutrigenetic testing is available to the public. Specific nutrigenetic prescriptives have been worked out for many common SNPs. It is no longer necessary to fall back (as Jeff Bland had to) on general advice for gene-based problems, the identification of which depends, after all, on individual deviations from the normal.

Thus, I feel that Challem did not adequately exploit the potential to offer fairly detailed protocols for an array of specific genetic problems. However, to have done so would have rendered the book lengthy and pedantic, with large portions of little interest to the average reader. The general good health recommendations might have gotten lost among an information overload; unfortunate because it is the universal gene-nutrient interactions that, as Challem confided to me, "get to the heart of orthomolecular medicine." Maybe so, but orthomolecular medicine succeeds to the extent that it identifies and compensates for individual (and detrimental) differences among humans. Nutrigenetics makes this process more feasible than it ever has been.

Feed Your Genes Right begins with a foreword by Kilmer S. McCully, M.D., the man who serendipitously noticed the relation between homocysteinuria and arteriosclerotic vascular disease. There are four parts, each consisting of two or three chapters. Chapter titles include *Conflicts between Ancient Genes and Modern Foods, Nutrients that Enhance Energy Production, Nutrients that Make and Repair DNA, Nutrients that Protect DNA from Damage, Dietary Guidelines for Feeding Your Genes Right, and Nutritional Recommendations for Specific Diseases.* The book contains an index on genetic and nutritional testing, and another on resources for additional information. More can be found at www.feedyourgenesright.com.

The appendix on genetic and nutritional testing is noteworthy for a few omissions. Although Great Smokies Diagnostic Laboratory and Genelex are mentioned as offering nutrigenetic testing, Integrative Genomics is not. Great Plains and Metametrix laboratories are missing from the short list of nutritional testing labs,

although both offer extremely useful organic-acids assays (also missing from the lineup of helpful lab tests). On the positive side, ISOM, ACAM, and American Association of Naturopathic Physicians are identified as referral sources for nutritionally-oriented physicians.

The author has uncritically embraced the somatic-mutation theory of aging: "...aging reflects widespread damage to large numbers of different genes, ultimately leading to a widespread cessation of activity." This has led him to conclude that aging can be counteracted by nutritional means. However, several lines of evidence, all of which involve ionizing radiation (which causes genetic damage), undermine the theory and thus the conclusion. Modest (or even high) radiation doses can actually increase lifespan. More likely, aging follows from a different sort of genetic instability, namely the loss of repetitive DNA sequences (Strehler, 1998); examples are shortening of telomeres and loss of DNA that codes for ribosomal RNA.

Mitochondria, their energetics, and their DNA are quite well discussed in Chapter 4, which among other things mentions the exciting work of Tory Hagen and his associates at the Linus Pauling Institute on restoring mitochondrial functionality with alpha lipoic acid and coenzyme Q_{10}. Whether mitochondria cause aging changes or merely reflect the aging of their cellular environment (the view I favor), the discussion is interesting, and the conclusions are practical.

I would have welcomed some discussion of single-nucleotide polymorphisms affecting detoxification enzymes, especially the CYP series. Individual differences in detoxifying drugs are a major factor in deaths and other adverse outcomes of pharmacologic therapy. Some attention could also have been paid to vitamin A as a differentiation-inducing agent, and to turmeric as an anti-inflammatory and antioxidant phytopharmaceutical.

Although the central metabolic role of vitamin B_3 is repeatedly acknowledged, dosage recommendations are not proportional to human requirements for the vitamin. That is, if the daily values for B_1 and B_2 are about 1.5 mg, and that for B_3 is 20 mg, then it makes no mathematical sense to recommend nearly equal doses: 10 to 50 mg of B_1 and B_2 with 10-75 mg of B_3 in one context, and 50 to 100 mg of each in another.

The author's assessment of the health-insurance industry is rosier than mine. I doubt whether early detection of potential disease, and inexpensive measures to head it off, will gladden the hearts of executives whose profits depend on charging high premiums. Those, in turn, demand the persistence of dreadful end-stage diseases and costly medical treatments. Just as orthomolecular medicine has, thus far, failed to change the course of the medical mainstream, nutrigenetics is unlikely to do so, for similar economic reasons.

Aside from the few shortcomings that I have listed–and they may not be perceived as such by everyone–this book is an easy-to-read introduction to a new era in medical science. As such, it will serve your patients well; and if, as a practitioner, you are not already offering nutrigenetic services to them, perhaps it will open your eyes to an expanding range of possibilities.

–Richard P. Huemer, M.D.
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References

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The author responds:

I share Richard Huemer's curiosity about the details that nutritional genetics testing might reveal, as well as their implications for health and disease. Unfortunately, we are awash—and drowning—in health and medical information. Genetics and nutrigenetics are already giving way to proteomics and metabolomics. As the details of our health become more complex, it will become increasingly difficult to sift through vast amounts of information to determine what is meaningful to physicians and patients.

Clinicians can certainly test for a few dozen nutritional genetic polymophisms, but the present situation is akin to the old Wild West, with the technology currently being able to test only a fraction of our genes for their nutritional implications. I recently discovered that testing was the easy part. Interpreting the results was far more difficult, with each of my several polymorphisms being associated with dozens of diseases. Rather than being causes of anything in particular, these "associations" suggested the greater influence of nongenetic factors, such as diet, lifestyle, stress, and exercise on gene expression. However, as I pored over my test results, I realized I had been doing the right things in terms of my own diet, supplements, and lifestyle. For example, I didn't need a nutritional genetic test to tell me that I had a tendency toward insulin resistance. Nor did I need anyone to tell me that I could modify those risk factors. Simple blood tests have confirmed that my glucose and insulin levels are far better than those of the typical person with or without polymorphisms.

Given the incredible complexity of nutritional genetics, there is a compelling need to simplify information into practical advice. Not doing so will add confusion instead of clarity. Another battery of tests is always great, but there are limits to what insurers will pay for or what patients will pay for out of pocket. Will a test for MTHFR polymorphisms really indicate much more than a simple test for homocysteine, especially when either inadequate folate or a polymorphism will elevate homocysteine and produce the same disease risks?

In my mind, virtually everyone would benefit from vitamin supplementation. This is what Bruce Ames recommended at a recent nutrigenomics conference, though his dosage recommendations (a once-a-day type supplement) were far more conservative than what I recommend in *Feed Your Genes Right*. Supplementation can completely offset most deleterious polymorphisms and improve to some extent even the most serious genetic disorders. Henry Turkel, Kent MacLeod, and others have shown that this is possible, at least to some extent, in Down syndrome. If the course of this disastrous genetic disorder can be modified, what cannot be?

Given all this, I chose to focus on the basics, not the complexities in *Feed Your Genes Right*, though the basics can be pretty complex when you delve into the biochemistry. For example, folic acid and other B vitamins are needed for one-carbon metabolism, which feeds into the synthesis and repair of DNA (as well as neurotransmitters, and many other substances normally present in the body). In other words, all genes depend on nutritional substrates, not just those with polymorphisms. I discuss mitochondrial nutrients for their established therapeutic benefits, as well as their role in generating ATP for DNA molecules and adenine rings for DNA structure. Then I review the well-established roles of antioxidants in preventing DNA damage, as well as some intriguing research on how they affect gene expression.

I believe that ongoing nutritional genetics research will eventually show that each of us is replete with SNPs (single-nucleotide polymorphisms)–it's just the nature of biology. While the science of nutritional genetics is fascinating, it will be years until the three billion nucleotides of our nutritional genome–and the nucleotides' inestimable interactions–are mapped. In fact, the emerging picture suggests still greater complexity and that

the real future may lie in epigenetics–how nutrients and other factors influence gene expression without altering the gene. In light of all this research, a simplified approach, rooted in the basics of orthomolecular nutrition and medicine, is necessary to apply this knowledge today and in the future. Ultimately, the research on nutritional genetics will re-confirm the importance of nutrition over genetic inheritance. I think *Feed Your Genes Right* provides a framework, with an important perspective for both physicians and patients.

–Jack Challem
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