New research shows how nutrition can help prevent certain diseases.

Can Food Change Your Genes?

By Dr. Mark Hyman
Published: March 19, 2006

A new field of medical science is showing that nutrition may eliminate disease by changing our very biochemistry. PARADE asked Dr. Mark Hyman—a leading practitioner in nutrigenomics, which studies the relationship between food and genes—to explain how four common conditions can be cured before they cause lasting damage.

In the future, a drop of your blood placed on a special DNA chip will predict the diseases that lie dormant in your genes. Your doctor will then suggest a personalized set of lifestyle and dietary changes, as well as pharmaceutical recommendations. These changes will "turn off" the genetic trigger in your cells that beginsthe process of disease. Medicine will be able to deal with disease at the roots, rather than at the branches. That future is not far away. Already, research in genetics is proving that it is possible to prevent as well as reverse chronic conditions that lead to disease and disability.

All of us are susceptible to certain illnesses because of our family histories—that is, our genes. But the field of nutrigenomics is demonstrating that, if we alter our diets and lifestyles early enough, our genes do not have to be our destiny. Take, for example, the following four conditions. Millions of Americans have a genetic predisposition eventually to develop one or more of them. But by changing our diets and lifestyle now, those genes will not be expressed. The conditions will be cured before they ever appear.

Insulin resistance: 'the obesity disease.'

A diet of refined sugars and carbohydrates—such as bread, white rice and flour products—leads to a rapid rise in blood sugar and a spike in insulin (a hormone that controls the metabolism of carbs). Over time, you can become resistant to insulin's good effects and thus need more to do the same job. Insulin resistance is a major cause of weight gain, heart disease, cancer and dementia, and it often leads to diabetes. It also causes hidden inflammation throughout the body, which, like a smoldering fire, damages our cells and organs and accelerates most of the diseases of aging.

You may have insulin resistance if you have a family history of abdominal obesity, diabetes, gestational diabetes, early heart disease, high triglycerides or low HDL cholesterol. If you do, discuss with your doctor whether you should take a glucose-tolerance test, which measures both glucose and insulin levels.

What you can do. Reacquaint yourself with the diet to which our bodies are best adapted biologically. We can prevent or reverse insulin resistance by eating unprocessed food—fruits and vegetables, beans, nuts, seeds and whole grains. Include in your diet wild fish such as small salmon, sardines and herring. Avoid foods with added salt. Stay away from highly processed foods, particularly those containing high-fructose corn syrup and hydrogenated fats. This diet will "turn off" the genes that promote insulin resistance, obesity and inflammation and turn on the genes that restore weight and metabolism to normal for most people.

Folic acid deficiency: not just a problem for pregnant women.

The gene that increases the need for folate (or folic acid) affects up to half of Americans. Inadequate levels of folate can lead to dementia, many cancers, heart disease, osteoporosis, birth defects, autism and depression.

You may have folate deficiency if you have a family history of heart disease, dementia, breast, colon or cervical cancer, spina bifida, Down syndrome or depression. Discuss with your doctor whether to take a blood test that measures homocysteine levels, which can identify folate deficiency. (When folate is low, levels of homocysteine rise.)

What you can do. Eat a diet rich in folic acid. Good sources include dark-green leafy vegetables—such as spinach, collards, kale and arugula—whole grains, asparagus and beans. Coffee, alcohol and smoking deplete folate and raise homocysteine levels.

About 800 mcg (micrograms) a day of folic acid is sufficient for most people. Vitamins B6 and B12 also are recommended to keep homocysteine at an ideal balance.

Low vitamin D: a result of lives spent indoors.

It's well known that vitamin D is important for bone health, but that's just the beginning. Recent research has linked vitamin D deficiency to conditions as diverse as colon, prostate and breast cancers, multiple sclerosis, type 1 diabetes, heart disease, autoimmune diseases, Graves' disease, seasonal affective disorder (SAD) and osteoporosis.

While our ancestors were foraging and hunting, their skin produced the equivalent of nearly 10,000 IU (international units) of vitamin D a day. Now, when many of us spend most our days indoors, our bodies produce dramatically less: Even the average multivitamin contains only 400 IU— and many people don't even get that much. One recent study found that 40% of Americans were deficient in vitamin D. Plus, as we age, deficiency increases: 70-year-old skin produces only 25% of the vitamin D of 20-year-old skin.

Increased vigilance against overexposure to the sun's UV rays —which stimulate the skin to produce vitamin D—also has made it more difficult to get enough of this important nutrient. Sunblock prevents its production by the skin.

You may have vitamin D deficiency if you are dark-skinned. Your melanin may prevent absorption of ultraviolet radiation, which helps the body manufacture this vitamin. There is a blood test for vitamin D deficiency.

What you can do. Dr. Michael Holick, professor of medicine and physiology at the Boston University School of Medicine and a pioneer in the study of vitamin D, recommends taking up to 2000 IU a day. Dietary sources include oily fish such as wild salmon, mackerel and sardines, but supplements are essential.

Gluten sensitivity: the great masquerader.

Most of us eat large quantities of gluten, which is the protein found in such grains as wheat, barley, rye, spelt and oats. But 30% of Americans may develop some form of sensitivity to gluten. That's because they carry the genetic marker for celiac disease, which is an autoimmune disorder related to the consumption of gluten. (About 1% of our population has active celiac disease.)

This condition is dramatically underdiagnosed because it masquerades as many other diseases, including nearly all inflammatory and autoimmune diseases, arthritis, irritable bowel syndrome and other digestive disorders, anemia, osteoporosis, cancers, neurologic disease, depression, migraines, infertility, liver disease and more.
You may have gluten sensitivity if you have a family history of celiac disease, irritable bowel syndrome, autoimmune diseases or thyroid diseases. If you have any of the above, ask your doctor for a blood test for celiac disease and gluten sensitivity.

What you can do. If you test positive for gluten sensitivity or celiac disease, a gluten-free diet usually will completely relieve the symptoms. Many gluten-free products can be found in health-food and specialty stores.

What I've offered here is only a taste of the potential for nutrient therapy to prevent disease and create good health. Remember, more important than the genes you inherit from your parents are the habits of theirs that you repeat. What you eat, how you live and how you handle stress all have an impact on your risk of disease, because these lifestyle habits influence how your genes function. Follow the basic laws of biology and nature by nourishing your body, mind and spirit with the right ingredients (food, vitamins, minerals, water, air, light, love, sleep and exercise), and you will thrive.

Note: The dosages I've recommended are higher than the current recommended daily allowances (RDA), which are based on the minimal amount needed to prevent deficiency diseases. However, research in nutrigenomics indicates that our needs may be much higher to prevent and reverse the diseases and to promote optimal health. Discuss with your doctor any questions you have about these conditions.

Dr. Mark Hyman is the editor of "Alternative Therapies in Health" and co-author of "Ultraprevention." His new book, "Ultrametabolism: The Simple Plan for Automatic Weight Loss," (Scribners) is out this month.