Genetic Markers for Personalized Weight Management

A significant new breakthrough towards personalized medicine is now available for you to take advantage of! Your gene patterns can help determine what type of dietary composition would work best to help you achieve/maintain your healthy weight goal.

At the Center for Optimal Health, we design health optimization programs according to individual needs and body constitution. The availability of genetic testing in the area of weight management, nutritional needs assessment and heart health allows us to go even further in personalizing recommendations to maximize our effectiveness in supporting your health and wellbeing.

New data presented in March 2010 by Dr. Mindy Dopler Nelson (Stanford University) at the Cardiovascular Disease Epidemiology and Prevention and Nutrition, Physical Activity, and Metabolism 2010 Conference in San Francisco provided some early evidence that the secret to weight loss might lie in DNA and that the best way to shed excessive pounds is to diet according to genotype.

In the original A TO Z study, 311 women were randomized to one of four popular diets. Ranging on a continuum from low carbohydrate to low fat, they were the Atkins diet, the Zone diet, the LEARN diet, and the Ornish diet. On average, the women lost weight on all four diets; the only significant difference was that they tended to lose somewhat more weight on the Atkins diet than on the Ornish diet (JAMA 2007;297: 969-77). Within every diet group, though, some of the women lost more than 30 pounds and kept it off for over a year," said Gardner. "And some of the women gained more than 10 pounds. Within every diet, the range is at least 40 to 50 pounds. Between the different diets, the weight loss difference was just a few pounds, yet within the group, the difference is much larger. This is actually much more interesting than the difference between groups. How can the responses to the same diet be so different?

In attempt to answer this question, Interleukin Genetics approached Stanford researchers and suggested they use the company's proprietary SNP test to assess responders and nonresponders to particular diets. In previous studies, the company had found polymorphisms in three genes—fatty acid binding protein, PPAR-gamma, and the beta-2 adrenergic receptor— that appeared to predict a person's response to diets. Among the 133 women from the original study who agreed to provide DNA samples from swabs of the inner cheek, 31 had been in the Atkins group, 32 in the Zone group, 34 in the LEARN group, and 36 in the Ornish group. There were no statistically significant baseline differences among the groups in measures such as body mass index, blood pressure, or levels of cholesterol, insulin, and glucose. The company's test showed that 79 of the women had genotypes designated as low-carb appropriate, and 54 had genotypes designated as low-fat appropriate. The interaction between genotype and diet was statistically significant, with striking differences among the women in the lowest-carb and lowest-fat diets. Women assigned to a genotype-appropriate diet lost 5.3% of their body weight compared with just 2.3% among those not matched to genotype ($p=0.005$). Among the women on the Atkins diet, those designated as low-carb appropriate lost an average of just under 6 kg during 12 months, while those designated as low-carb inappropriate lost about 1 kg. Among the women on the Ornish diet, those designated as low-fat appropriate lost an average of more than 6 kg during 12

months, while those designated as low-fat inappropriate lost an average of about 1.5 kg. Thus, in each of those groups, women who had been randomized to what was designated as the appropriate diet lost about five times as much weight as those randomized to the apparently inappropriate diet. Among women on the Zone or LEARN diets, which involve intermediate levels of carbohydrates and fat, women with low-carb and low-fat genotypes did not have statistically significant differences in weight loss.

In addition to providing guidance for appropriate diet composition, the genetic testing offered by the Center for Optimal Health also sheds light on the exercise requirement to best enhance metabolism. ADRB2 and ADRB3 polymorphisms respond differently to differing amounts of physical activity.

Glossary

SNP (Single Nucleotide Polymorphism): Polymorphism is a genetic sequence with two of more alleles. in at least one population. (An allele refers to a member of a pair of a gene. At the DNA level, different alleles have different base sequences.) A single base-pair change is referred to as a SNP (Single Nucleotide Polymorphism). A SNP has at least a population frequency of at least 1 percent.

FABP2 (Fatty Acid Binding Protein-2): protein found in small intestine epithelial cells where it strongly influences fat absorption.

PPARG (Peroxisome Proliferator-Activated Receptor-Gamma): protein abundantly expressed in fat cells and plays a key role in the formation of fat cells.

ADRB2 receptor (Beta-2 Adrenergic Receptor): protein involved in the mobilization of fat from the fat cells for energy in response to hormones called catecholamines (adrenaline, noradrenaline, and dopamine).

ADRB3 (Beta-3 Adrenergic Receptor): protein involved in the regulation of fat breakdown (lipolysis).