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Weight loss is a multi-billion dollar industry affecting millions of people each year. And it's no surprise that most of the collective thought about how to lose unwanted weight centers around the topics of food and exercise. After all, people who tend to eat healthier foods and exercise more stand a better chance to lose weight than those who don't...that's just common sense, right? While there is truth in this line of thinking, recent advancements in genetic science are showing us that there is much more to the story. As it turns out, we now know that an individual's ability to lose weight is very affected by that individual's unique genetic profile.

Most people are aware that our genes determine things like our eye color, hair color and whether or not we have dimples. But our genes also reveal many things about our health, including how our bodies process foods and fuel our movements. In particular, there are seven components of weight loss that are specifically influenced by our DNA. By analyzing these particular genetic segments, it is then possible to develop a weight loss program that is designed for a person's unique genetic profile. This process—collecting and analyzing DNA, and developing recommendations based on what it reveals—is what Genetic Direction does, and it has the potential to change some long held beliefs about weight loss. So, let's take a deeper look at these seven components and the particular genetic sequences that influence them.

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### Your genes determine:

- 1 If your body is resistant to losing weight
- 2 How well your body is able to process carbohydrates in your diet
- 3 How much body fat you can lose through cardio exercise
- 4 How well your body is able to effectively absorb folate (a B-complex vitamin)
- 5 How sensitive your body is to the amount of fat in your diet
- 6 How your body responds to strength training
- 7 How sensitive your body is to the amount of protein in your diet

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### Your genes determine if your body is resistant to losing weight.

**Specific Genes Analyzed: FTO, TCF7L2, MTNR1B, PPARG, BDNF, ABCB11**

These genes have all been shown in studies to have significant associations with a person's ability to lose weight and keep it off. Several large studies have shown that people who participated in intensive and long-term diet and exercise programs exhibited significantly different weight loss responses based upon their genetic profile. Those people who carried the most "unfavorable" pairs of genes lost weight with the diet and exercise program—but they tended to lose less weight compared to other participants who had fewer, or who did not carry the "unfavorable" genotypes. Also, after completing the diet and exercise program, people with more of the 'unfavorable' genes were also likely to regain some of the weight that they had lost.

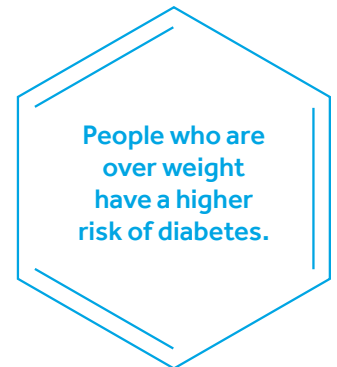
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### Your genes determine how well your body is able to process carbohydrates in your diet.

2

**Specific Gene Analyzed: IRS1**

This gene has been shown to be associated with a person's insulin sensitivity and the effects of carbohydrates in the diet. Insulin is a hormone produced by the body that helps cells take in glucose, or sugar, that is present in the blood after the digestion of carbohydrates in foods. All cells use glucose for fuel, and brain cells and red blood cells use glucose as a primary source of energy. If cells have trouble absorbing blood sugar, the body releases greater amounts of insulin to help. Increased amounts of insulin can lead to insulin resistance. People who are overweight and/or physically inactive are at higher risk of insulin resistance and the condition can lead to diabetes, or uncontrolled high blood sugar. Greater amounts of insulin released can also encourage fat storage.



Since carbohydrate intake triggers insulin release, many people assume that eating more carbs is not healthy and can lead to body fat and weight gain, as well as diabetes. But the relationship is not that simple: many people who eat a high carbohydrate diet are not overweight and do not have diabetes. The type of carbs consumed, as well as other foods in the diet and physical activity levels, can all play a role. But IRS1 influences insulin resistance and the body's response to carbs in the diet. One long term study found that people with a variant of this gene who ate a high carbohydrate, low fat diet that consisted of high fiber, whole plant foods, as opposed to processed, lower fiber carbs, had greater insulin sensitivity—and lower levels of insulin and insulin resistance—and experienced greater weight loss compared to a lower carb, higher fat diet.

3

### Your genes determine how much body fat you can lose through cardio exercise.

**Specific Genes Analyzed: ADRB2, LPL**

These genes have been shown to have significant associations with a person's ability to lose fat from a regular program of cardio exercise. A large study investigating these genes put sedentary men and women on a 20-week endurance exercise program. They exercised on a bike 3 times per week, starting at a moderate intensity for 30 minutes per session over the first few weeks. They built up to a longer, slightly harder workout that lasted 50 minutes for



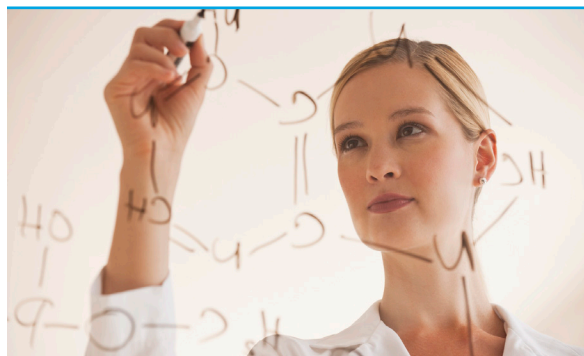
the last 6 weeks. Men in the study did not appear to have a different response based on their genotype. However, women who carried the most “unfavorable” genotypes lost fat from the exercise program—but they tended to lose less fat compared to other participants who did not carry the “unfavorable” genotypes.

Even though some fat loss was seen with the 3-days-per week regimen in this study, for significant decreases in body fat that also result in weight loss, the genetic makeup of the individuals ultimately determined how much weight was lost. Regardless of a person's genotype, physical activity is a positive and necessary health factor and should be a part of any person's weight loss routine. Two frequently cited guidelines for physical activity include: the 2008 Physical Activity Guidelines from the Department of Health and Human Services which recommend 300 minutes or more per week of moderate to intensive physical activity, and The American College of Sports Medicine recommendation of doing at least 200 to 300 minutes of exercise per week, or burning at least 2,000 extra calories per week from exercise.

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### Your genes determine how well your body is able to effectively absorb folate.

**Specific Gene Analyzed: MTHFR**



This gene has been shown to have significant associations with a person's folate, or vitamin B9, status. Folate plays many important roles in the body, including acting as a coenzyme in DNA creation and in energy metabolism reactions. Folate also plays a role in biochemical processes that affect the metabolism of an amino acid, homocysteine. One gene associated with

this gene is associated with enzyme activity that can lead to higher levels of homocysteine. Since homocysteine is a risk factor for heart disease, high levels may be of concern. Low levels of folate can also lead to anemia.

5

### Your genes determine how sensitive your body is to the amount of fat in your diet.

**Specific Genes Analyzed: PPARG, TCF7L2, APOA5, CRY2, MTNR1B, PPM1K**

These genes have all been shown in studies to have significant associations with how sensitive people are to eating a diet high in fat. In other words, these studies showed that the amount of fat in the diet affected how much weight individuals lost from a lifestyle intervention depending on the genotype at these genes. One study found that those people with an “unfavorable” genotype were more likely to have more body fat, a larger waist size and a higher BMI the more fat they ate, compared to others without the same genotypes. Another study found that people with a protective genotype appeared to be able to consume greater amounts of fat, but without exhibiting higher BMIs. Another study found that people who went on a low-calorie diet that was higher in fat lost less weight if they had an “unfavorable” genotype.



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### Your genes determine how your body responds to strength training.

**Specific Genes Analyzed: NRXN3, GNPDA2, LRRN6C, PRKD1, GPRC5B, SLC39A8, FTO, FLJ35779, MAP2K5, QPCTL-GIPR, NEGR1, LRP1B, MTCH2, MTIF3, RPL27A, SEC16B, FAIM2, FANCL, ETV5, TFAP2B**

These genes have all been shown to have significant associations with a person’s ability to improve their body composition and decrease their body fat percentage from resistance exercise. Resistance training, or weight training, improves strength and the amount of muscle a person

**When you are trying to lose weight, it is very important to include resistance training in your routine.**

has. Weight training can also reduce the percentage, and sometimes amounts, of body fat. An improved body composition, which is a higher proportion of muscle to body fat, contributes to a leaner look and, potentially, a greater amount of calories burned each day.

People with the more “favorable” genotype in a large study experienced an improved ability to lose weight and reduce their body fat percentage with resistance training. Those with the “unfavorable” genotypes showed a decreased ability to lose weight and reduce body fat percentage from resistance training. When you are trying to lose weight, it is very important to include resistance training in your routine, so that you can minimize or prevent the loss of muscle mass that typically occurs with weight loss.

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## Your genes determine how sensitive your body is to the amount of protein in your diet.

### Specific Gene Analyzed: FTO

This gene has consistently been shown to be associated with body fat mass and BMI. One large study found that people with the “unfavorable” genotype who dieted lost more weight, body fat



and fat in the torso if they ate a moderate-to-high protein diet (25% of total daily calories) compared to a lower protein diet (15% of total daily calories), regardless of fat and carbohydrate distribution. However, they also lost more non-fat mass—which includes muscle—with the weight loss.

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## Conclusion:

As you can see, adopting a diet or exercise program without understanding your specific genotype is akin to “flying blind.” It doesn’t mean that you won’t experience weight loss – there is definite truth in the years of research that have resulted in today’s known best practices for healthy eating and physical activity. But genetic science does suggest that diet and exercise programs can be enhanced and optimized when they are based upon a proper understanding of a person’s specific genotype. The only way to know is to have your DNA tested so that you can see what these genes say about you. Genetic Direction can help — when you purchase GxSlim, our groundbreaking, science-based weight loss solution, you will get a comprehensive report detailing your genotype in these seven areas. Then, our professionals will put together a set of recommendations that will help you achieve your goals, based exclusively on your genetic results. Today, it is possible to understand and act upon the weight loss roadmap that our bodies naturally give us. Let Genetic Direction chart it for you.

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