Diet Report

OPTIMAL HEALTH FOR LIFE

GENE MATRIX

GENOTYPE REPORT

NAME	NGx Sample
DATE OF BIRTH	1/1/1900
REFFERRING PRACTITIONER	
DATE REPORTED	20 February 2023
ACCESSION NUMBER	DNA013992ZA

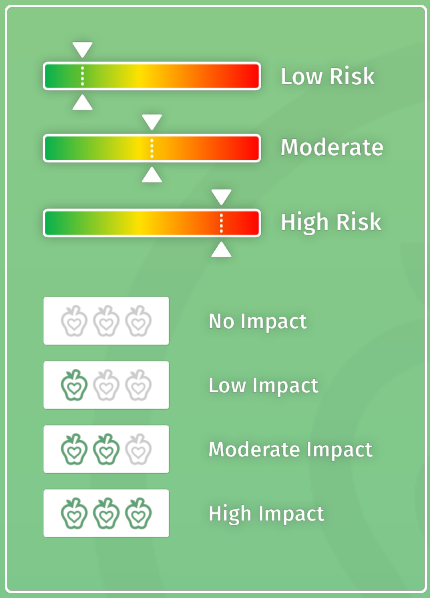
HOW TO READ THIS REPORT

This genetic report contains two primary pieces of information:

- **Based on our analysis of your genes we have calculated your score to determine which of the three possible diet plans (low fat, low carb, and Mediterranean) is likely to be the most effective for you.**
- **Once you have established the optimal diet type, there is scope for further personalization by considering the genetic contribution of relevant diet and lifestyle factors.**

We consider four primary diet and lifestyle factors: exercise, obesity risk, sensitivity to carbohydrates and sensitivity to saturated fats.

In crafting the ideal diet type, take particular note of the lifestyle categories showing medim or high risk.



When devising a diet plan, pay special attention to the medium and high risk lifestyle factors. A brief explanation of these lifestyle factors is given below:

OBESITY RISK
This gives some indication of the likelihood that you may gain weight easily, but find it more difficult to lose weight than those around you.

SATURATED FAT
Individuals differ in their response to the quantity and quality of fat in their diet. Your genes may influence how you absorb fat, as well as your ability to burn up fat.

CARBOHYDRATE
Research has clearly shown that individuals respond differently to carbohydrates in the diet. For some, reducing carbohydrate intake improves weight loss and prevents weight gain.

EXERCISE
Exercise is an important part of weight loss, but some individuals require higher exercise intensities and greater time spent exercising to mobilize their fat stores. It is importatnt to understand the controbution of exercise in your weight management plan.

SUMMARY OF YOUR PERSONALIZED WEIGHT MANAGEMENT PLAN

YOUR DIET PLAN

A MEDITERRANEAN DIET is the best possible plan for you to manage your weight.

YOUR EXERCISE PLAN

A VERY HIGH INTENSITY exercise program that includes 30 MET HOURS a week.

BACKGROUND TO THE ANALYSIS

Nutrigenomics Test Lab received your swab sample and used special molecular techniques to amplify your DNA for further analysis.

This process, called the Polymerase Chain Reaction (PCR), copies the DNA of your genes many times over, so that we can generate sufficient quantities to analyze your genetic material. We then identify unique DNA sequences in some of your genes. Certain changes (polymorphisms) in these genes have been studied in detail, and evidence has emerged that correlates these polymorphisms with an individual's weight management and response to diet and exercise intervention. Having identified the presence or absence of these polymorphisms, we are able to qualitatively assess particular areas of intervention for improved weight management related to the specific genes. To make a holistic assessment of weight management, environmental factors (diet and lifestyle) and previous medical and weight history need to be considered in conjunction with the accompanying genetic profile.

We therefore strongly recommend that these results be discussed with an accredited health professional.

In the following pages you will find a table of your genetic results, and an explanation of these results and associated impacts including diet and lifestyle recommendations.

GENETIC RESULTS

Area of Activity	Gene Name	Genetic Variation	Result	Gene Impact
Absorption and metabolism	ADRB2	46A>G (Arg16Gly)	G/G	
	APOA5	-1131T>C	A/G	
	FABP2	Ala54Thr	C/C	
	PPARG	Pro12Ala	C/G	
Carbohydrate responsiveness	ADRB2	79C>G (Gln27Glu)	G/G	
	ANKK1	Taq1A A1/A2	G/G	
	SLC2A2	Thr110Ile	C/C	
	TAS1R2	Ile191Val	A/G	
Circadian rhythms	CLOCK	3111T>C	A/G	
Exercise responsiveness	ADRB3	Trp64Arg	T/C	
Fat metabolism, obesity and satiety	APOA2	-265T>C	A/A	
Fat storage	PLIN1	11482G>A	A/A	
Inflammation Diet	TNF	-308G>A	G/G	
Regulation of energy intake	FTO	rs9939609 T>A	A/A	
	TCF7L2	C>T	C/C	
Regulation of metabolism and feeding behaviour	MC4R	V103I	T/T	

WEIGHT MANAGEMENT PRIORITIES

Four diet and lifestyle variables have been analyzed for the role they play in your weight management. Based on your Best Possible Diet plan and the contribution of the weight management variables below, you will be able to customize a weight loss program best suited to your needs.

The graphs below give an indication of the significance of each diet and lifestyle variable. From this, you will be able to see which factors need the most attention.

Obesity Risk

You scored in the medium range for obesity risk. You may gain weight easily and may not lose weight as quickly as others, but by following the best diet possible combined with adequate exercise, you will reach and maintain your goal weight.

Saturated Fat

The good news is that you scored in the low risk range for saturated fat. According to your gene results, your intake of saturated fat is not likely to increase your risk for weight gain.

Carbohydrate

You scored in the low range for carbohydrate. Therefore, it is possible that your carbohydrate intake will not impact your ability to lose weight provided it is part of the best diet possible for you.

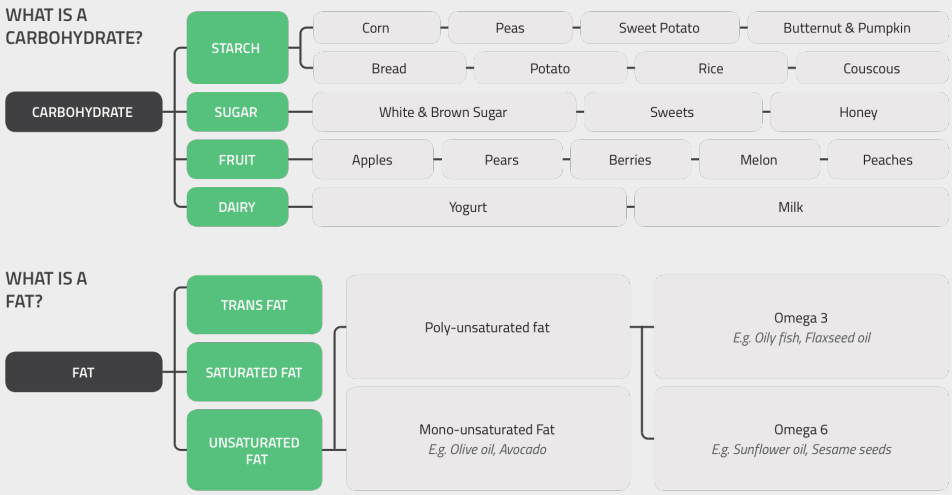
Exercise

You scored in the high range for exercise, meaning you do not effectively mobilize fat stores in response to exercise. To benefit from the fat burning capabilities of exercise, you will need to follow a VERY HIGH MET HOURS exercise plan.

DIET PLAN PRINCIPLES

MEDITERRANEAN DIET

The Mediterranean food patterns are typical of Crete, Greece and Southern Italy in the early 1960's. The term is closely tied to traditional areas of olive cultivation in the Mediterranean region more than 30 years ago and not to the urbanized diet eaten in those countries today. Several studies have established the health benefits of the Mediterranean diet in reducing the risk of metabolic syndrome, type 2 diabetes, cardiovascular diseases, and some neuro-degenerative diseasese and cancers. In addition, it has been shown to be an extremely effective eating plan for weight loss.



THE DIET IS BEST DESCRIBED AS:

- Rich in plant foods (whole-grain cereals, fruits, vegetables, legumes, tree nuts, seeds and olives)
- Extra virgin olive oil is the principle source of added fat
- High to moderate intakes of fish and seafood
- Moderate consumption of eggs, poultry and low fat dairy products (mainly cheese and yogurt)
- Low consumption of red meat
- Moderate intake of alcohol (mainly wine during meals)
- In addition all foods in this plan should be as fresh as possible, minimally processed, local and seasonal whenever possible.

YOUR EXERCISE PLAN

By now, you know the recommended amount of weekly exercise to maximize your chances of weight loss. This recommendation would have been given as MET HOURS. Below you will find a detailed explanation of exactly what MET HOURS are, and a guide to plan your exercise week to meet your recommended MET HOURS. Remember to consult your physician before embarking on a new exercise program, and to stop exercising if you feel nauseous or short of breath.

WHAT IS A MET?

MET stands for Metabolic Equivalent Task. METs are a way to measure how much energy you burn up during any chosen physical activity. Every activity, from watching TV to going for a run, has a MET value. The more vigorous the activity, the higher the MET value.

WHAT ARE MET HOURS?

Whereas METs are a way to measure the intensity of a particular activity, MET HOURS allow you to calculate how many hours of your chosen avtivities you need to do in a week.

3 EASY STEPS TO CALCULATING YOUR WEEKLY MET HOUR SCORE

1. Below is a list of activities divided into light, moderate, and virgorous intensity. Find the activity closest to yours.

2. Use this equation to caluclate the MET HOURS for each acitivity.

MET Value X Duration = MET HOURS

For example: if you play singles tennis for 1 hour and 40 minutes (1.60 hours) – 8 METS X 1.60 = 13 MET HOURS.

3. To calculate your weekly MET HOURS score, add the MET HOURS score of each workout for that week.

For example, if you played singles tennis for 1 hour and 40 minutes (8 x 1.6 = 13), ran for 30 minutes at a pace of 8 km/hour (8 x .5 = 4) and played 2 hours of golf (4.5 x 2 = 9), then your weekly MET HOURS score would be 26 (13 + 4 + 9). See how this compares to the MET HOURS recommendations in your report.

Below is a list of MET VALUES, divided into light, moderate and vigorous intensity activities. Talking during exercise is a reliable way to measure your exercise intensity. If you can talk without puffing at all, you're not pushing too hard and it's very likely a light intensity activity. If you can talk but not sing, you're exercising at a moderate intensity. If you can't talk without gasping, then you are exercising at a high intensity.

LIGHT INTENSITY	LESS THAN 5 METS
Stretching, Hatha Yoga	2.5
Horse Riding	2.5
Walking, less than 3.2km/hr, flat ground	2
Walking, 3.2km/hr, firm, flat ground	2.5
Walking, 4km/hr, downhill	2.8
Cycling, less than 16km/hr for leisure	3.4
Rowing, stationary, 50 watts, light effort	4
Tai chi	4
Walking, 5.6km/hr, brisk pace, firm pace	3.8
Water aerobics	4
Golf	4.5
Badminton	4.5

MODERATE INTENSITY	5 - 9 METS
Cycling, stationary, 100 watts, light effort	5.5
Weigh lifting, virgrous effort	6
Jogging/walking combination, 10 minutes	6
Boxing, punching bag	6
Hiking, cross country	6
Walking, 5.6km/hr uphill	6
Mountain biking	8.5
Cycling, general	8
Cycling, stationary, 150 watts	7
Circuit training	8
Stationary rowing, 150 watts	8.5
Aerobics, high impact	7
Running, 8km/hr	8
Cross country running	8
Hockey	8
Tennis, singles	8
Mountain climbing	8
Swimming, freestyle, moderate	7
Walking, 8km/hr	8

HIGH INTENSITY	9 AND ABOVE METS
Cycling, 22-26km/hr, vigrous	10
Running, 9.6km/hr	10
Running, 12.8km/hr	13.5
Kickboxing, judo, etc	10
Rollerblading	12
Cycling, >32km/hr	16
Stairmaster	9
Stationary rowing, 200 watts, very virgorous	12
Boxing, sparring	9
Soccer, competitive	9
Orienteering	9
Rope jumping, fast	12
Squash	12
Swimming, butterfly	11
Swimming, treading water, fast	10

GENE EXPLANATIONS

Below follows an explaination of all the genes analyzed in this test. Pay particular attention to those genes where you received moderate or high impact scores within the Genetic Results section.

ANKK1 | Taq1A A1/A2

Midbrain dopamine circuits, particularly dopaminergic signaling via dopamine receptor 2 (DRD2) may play an important role in both addiction and normal eating behavior as they are involved in reward processing. Low DRD2 density is associated with the T (A) allele, putatively making individuals less sensitive to the activation of dopamine-based reward circuitry and rendering them more likely to overeat, especially on energy dense foods. T (A) allele carriers should avoid all high-sugar foods and reduce total carbohydrate intake.

YOUR RESULT: **G/G**

No variant was detected.

ADRB2 | 79C>G (Gln27Glu)

This ADRB2 receptor protein is involved in energy expenditure regulation through stimulating thermogenesis and lipid metabolism in adipose tissue. The G allele has been associated with increased BMI and fat mass. Subjects with the CG and GG genotypes are less able to mobilize fat stores for energy and have been shown to have a greater risk of obesity and elevated insulin levels when carbohydrate (CHO) intake is greater than 49%. Decreasing intake of CHO has been shown to reduce insulin levels and is beneficial in weight management.

YOUR RESULT: **G/G**

Variant was detected.

SLC2A2 | Thr110Ile

GLUT2, coded by the SLC2A2 gene, facilitates the first step in glucose induced insulin secretion, with the entry of glucose into the pancreatic ßcell. Due to its low affinity for glucose, it has been suggested as a glucose sensor, is considered to be important in the postprandial state, and is involved in food intake and regulation. Individuals with the TT genotype have a higher daily intake of sugars, more so from sweets, such as baked goods, chocolate and sweetened beverages. In T allele carriers, it is important to avoid all high-sugar foods in the diet, especially foods that contain refined sugars.

YOUR RESULT: **C/C**

No variant was detected.

TAS1R2 | Ile191Val

TAS1R2 encodes the taste receptor type 1 member 2, a key protein involved in the sweet taste recognition. The diverse tissue distribution of TAS1R2 gene affects food intake beyond the detection of sweet taste on the tongue and palate. These tissues include the gastrointestinal tract, pancreas, and hypothalamus -- tissues known for regulating metabolic and energy homeostasis. It is important to decrease intake of high-carbohydrate containing foods, especially high sugar foods.

YOUR RESULT: **A/G**

Variant was detected.

TNF | -308G>A

Tumour necrosis factor-a (TNFA), a proinflammatory cytokine secreted by immune cells and fat cells, has been implicated in the development of obesity and insulin resistance. The A allele increases TNFA production and is associated with increased obesity risk, especially when dietary saturated fat and omega-6 fatty acids intake is high. Manage inflammation and emphasize dietary intake of omega 3 fatty acids.

YOUR RESULT: **G/G**

No variant was detected.

ADRB2 | 46A>G (Arg16Gly)

This ADRB2 receptor protein is involved in the mobilization of fat from fat cells for energy in response to catecholamines and modulates lipolysis during exercise. The G allele has been associated with obesity, and G allele carriers are more likely to gain and regain weight as well as lose weight more slowly. These carriers are less able to mobilize fat stores in response to exercise. For these individuals, it is important to emphasize the use of diet for weight management and to adjust weight management goals.

YOUR RESULT: **G/G**

Variant was detected.

APOA5 | -1131T>C

Apolipoprotein A5 encodes a protein that plays an important role in regulating plasma triglyceride levels. The T (A) allele has been associated with greater weight and less weight loss, especially when on a high fat, high saturated fat diet. For these individuals, it is important to monitor saturated fat intake.

YOUR RESULT: **A/G**

Variant was detected.

FABP2 | Ala54Thr

Fatty acid binding protein 2 (FABP2) protein is found in the small intestine epithelial cells where it strongly influences fat absorption and metabolism. The A (T) allele is associated with obesity, elevated BMI, increased abdominal fat, insulin resistance, higher insulin levels, and hypertriglyceridemia. A (T) allele carriers have greater fat absorption and tend to have a slower metabolism, leading to a tendency for weight gain, slower weight loss and difficulty in losing abdominal fat.

YOUR RESULT: **C/C**

No variant was detected.

PPARG | Pro12Ala

The Ala12 (G) allele is associated with impaired transcriptional activity in adipose tissue and with increased obesity risk in the presence of an obesogenic environment. Focusing on a calorie-restricted diet and increasing physical activity levels in G allele carriers has been associated with improved weight management outcomes.

YOUR RESULT: **C/G**

Variant was detected.

ADRB3 | Trp64Arg

The beta-3 adrenergic receptor (ADRB3) protein is expressed primarily in visceral adipose tissue. The C allele is associated with increased BMI and weight loss resistance. These individuals break down abdominal fat less easily in response to exercise. As a result, they may have a slower energy metabolism and are less responsive to the beneficial effects of exercise for weight management. The higher risk of obesity among carriers of the C allele may be diminished by higher levels of vigorous physical activity.

YOUR RESULT: **T/C**

Variant was detected.

APOA2 | -265T>C

Apolipoprotein A2 (APOA2), the second most abundant apolipoprotein in HDL, plays a complex and relatively undefined role in lipoprotein metabolism, insulin resistance, obesity and atherosclerosis susceptibility. The CC (GG) genotype is associated with obesity and increased food consumption, especially total fat and saturated fat intake. When saturated fat intake is high, the CC (GG) genotype is strongly associated with increased BMI and obesity. This diet-gene interaction may also play a role in insulin resistance (IR).

YOUR RESULT: **A/A**

No variant was detected.

CLOCK | 3111T>C

Circadian Locomotor Output Cycles Kaput (CLOCK), an essential element of the human biological clock, is involved in metabolic regulation. Carriers of the C (G) allele are less successful at losing weight compared to the TT (AA) genotype. In addition, those with the C (G) allele have reduced sleep, report morning fatigue and show an evening preference for activities. They also have higher ghrelin levels which regulates appetite, potentially altering eating behavior and weight loss.

YOUR RESULT: **A/G**

Variant was detected.

FTO | rs9939609 T>A

Fat-mass-and-obesity-associated (FTO) gene is present at high levels in several metabolically active tissues, including, heart, kidney, and adipose tissue, and is most highly expressed in the brain, particularly in the hypothalamus which is concerned with the regulation of arousal, appetite, temperature, autonomic function, and endocrine systems. It has been suggested that the FTO gene plays a role in appetite regulation and that it is associated with energy expenditure, energy intake, and diminished satiety. The A allele has been associated with higher body mass index (BMI), body fat percentage and waist circumference, especially in individuals with a sedentary lifestyle. Overweight individuals with the A allele are at increased risk for insulin resistance and diabetes, especially when there is a high fat intake. Modify the diet to include a moderate amount of carbohydrate, increase monounsaturated fatty acids (MUFA) intake and decrease satured fats (SAT FAT); manage the overall fat intake. Regular physical activity is recommended.

YOUR RESULT: **A/A**

Variant was detected.

TCF7L2 | C>T

Transcription factor 7-like 2 (TCF7L2) gene encodes a transcription factor that regulates blood glucose homeostasis and may operate via impaired glucagon-like peptide 1 secretion, which is stimulated more by fat than by carbohydrate ingestion. Individuals with the T allele, and more so the TT genotype, experience less weight loss than CC genotype. Diet and exercise intervention is very important for T allele carriers to prevent weight regain and development of Insulin resistance and diabetes. T allele carriers lose more weight on a low fat hypo-energetic diet than on a high fat diet. A low glycemic load diet and all interventions to manage insulin is also recommended.

YOUR RESULT: **C/C**

No variant was detected.

MC4R | V103I

Melanocortin 4 Receptor (MC4R) is a strong obesity candidate gene, significantly associated with energy intake and expenditure. The C allele is associated with higher intakes of total energy and dietary fat, as well as increased snacking in children and adults, increased hunger and a higher prevalence of eating large amounts of food. Provide a personalized, calorie-restricted eating plan that includes mindful eating strategies and methods to promote satiety.

YOUR RESULT: **T/T**

No variant was detected.

PLIN1 | 11482G>A

PLIN1 gene encodes a protein called perilipin-1. This protein coats lipid storage droplets in adipocytes, thereby protecting them until they can be broken down by hormone-sensitive lipase. The A allele is associated with greater obesity risk. A allele carriers are more weight loss resistant and show greater decrease in lipid oxidation rate compared to the GG genotype. When there is a higher intake of complex carbohydrates, and lower saturated fat intake, the allele is protective against obesity. Avoid all refined carbohydrates.

YOUR RESULT: **A/A**

Variant was detected.

Approved By:

Name of Laboratory Director	Laboratory Director
Nutrigenomics Test Lab	CLIA: 123456789

NOTES FOR PRACTITIONERS

***Disclaimer**: These tests were developed and characterized by this laboratory. They have not been cleared or approved by the U.S. Food and Drug Administration (FDA). The FDA has determined that such clearance or approval is not necessary.*

Only a qualified healthcare professional should advise a person on the use of information in this report.

All clinical decisions relative to test results should be directed by your qualified healthcare provider. The laboratory makes no representations or recommendations in regards to results.

***Methodology**: All SNP genotyping tests performed using Agena Bioscience MassARRAY technology. All PCR based methods are subject to rare interference such as inhibitors or quality or quantity of DNA. If present, the interference typically yields a no result requiring a repeat rather than an inaccurate one.*

Array based assays detect listed alleles, including all common and most rare variants with known clinical significance at analytical sensitivity and specificity >99%.

***Limitations**: This test will not detect all the known mutations that result in altered or inactive tested genes. Absence of a detectable gene mutation or polymorphism does not rule out the possibility that a person has intermediate or high sensitivity phenotypes due to the presence of an undetected polymorphism.*

***HIPAA**: TEST REPORT CONFIDENTIALITY NOTICE: This clinical test report is confidential and intended solely for the use of the individual or entity to whom they are addressed. This report contains confidential information and is intended only for the individual named and his/hers attending qualified healthcare professional. If you are not the intended recipient, you are hereby notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited (Federal Regulation 42 CFR, Part 2, and 45 CFR, Part 160).*

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GENE MATRIX