



GENOTYPE REPORT

Patient Name:

Date of Birth:

Sample Number:

Referring Practitioner:

Date Reported:



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 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 personalisation by considering the genetic contribution of relevant diet and lifestyle factors.

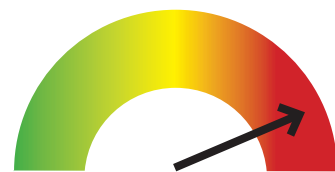
We consider four primary diet and lifestyle factors: exercise, obesity risk, sensitivity to carbohydrates and sensitivity to saturated fats. The significance of each of these is illustrated graphically, as below:



LOW RISK



MODERATE RISK



HIGH RISK

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



HOW TO READ THIS REPORT

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. The ability to lose weight differs significantly between individuals

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 carbohydrate 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 important to understand the contribution of exercise in your weight management plan.



SUMMARY OF YOUR PERSONALISED WEIGHT MANAGEMENT PLAN

YOUR DIET PLAN

A LOW FAT diet is the best possible plan for you to manage your weight.

YOUR EXERCISE PLAN

A HIGH INTENSITY exercise programme that includes 24 MET HOURS a week.

BACKGROUND TO THE ANALYSIS

DNAlysis 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 analyse 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, qualitatively, to 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 DNAlysis 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. Only gene variants that have a beneficial, moderate or high impact on metabolic processes have been described in detail, as gene variants that have no impact or a mild impact do not require altered diet or lifestyle intervention.



GENETIC RESULTS

AREA OF ACTIVITY	GENE NAME	GENETIC VARIATION	YOUR RESULTS	GENE IMPACT
Absorption and metabolism	FABP2 Ala54Thr	G>A	GA	⊛ ⊛
	PPARG Pro12Ala	C>G	CG	⊛ ⊛
	ADRB2 Arg16Gly	A>G	AG	⊛ ⊛
	ADRB2 Gln27Glu	C>G	CG	⊛ ⊛
	APOA5 T>C	T>C	TT	⊛ ⊛
Fat metabolism, obesity and satiety	APOA2 -265 T>C	T>C	TT	No Impact
Regulation of metabolism and feeding behaviour	MC4R T>C	T>C	CC	⊛ ⊛ ⊛
Insulin sensitivity and regulation of energy intake	FTO T>A	T>A	TA	⊛ ⊛
	TCF7L2 C>T	C>T	CC	No Impact
Exercise responsiveness	ADBR3 Trp64Arg	T>C	TT	No Impact
Circadian rhythms	CLOCK T>C	T>C	TC	⊛
Fat storage	PLIN G>A	G>A	GG	No Impact
Inflammation	TNFA -308 G>A	G>A	GG	No Impact

⊛
Low Impact

⊛ ⊛
Medium Impact

⊛ ⊛ ⊛
High Impact



WEIGHT MANAGEMENT PRIORITIES

Four diet and lifestyle variables have been analysed 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 programme 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



You scored in the medium risk range for saturated fat. According to your gene results, your saturated fat intake may impact your ability to lose weight and should be limited.

CARBOHYDRATE



You scored in the low range for carbohydrate. It is therefore 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 medium range for exercise. According to your gene results, you require a HIGH MET HOURS exercise plan to help mobilize fat stores in response to exercise.

DIET PLAN PRINCIPLES

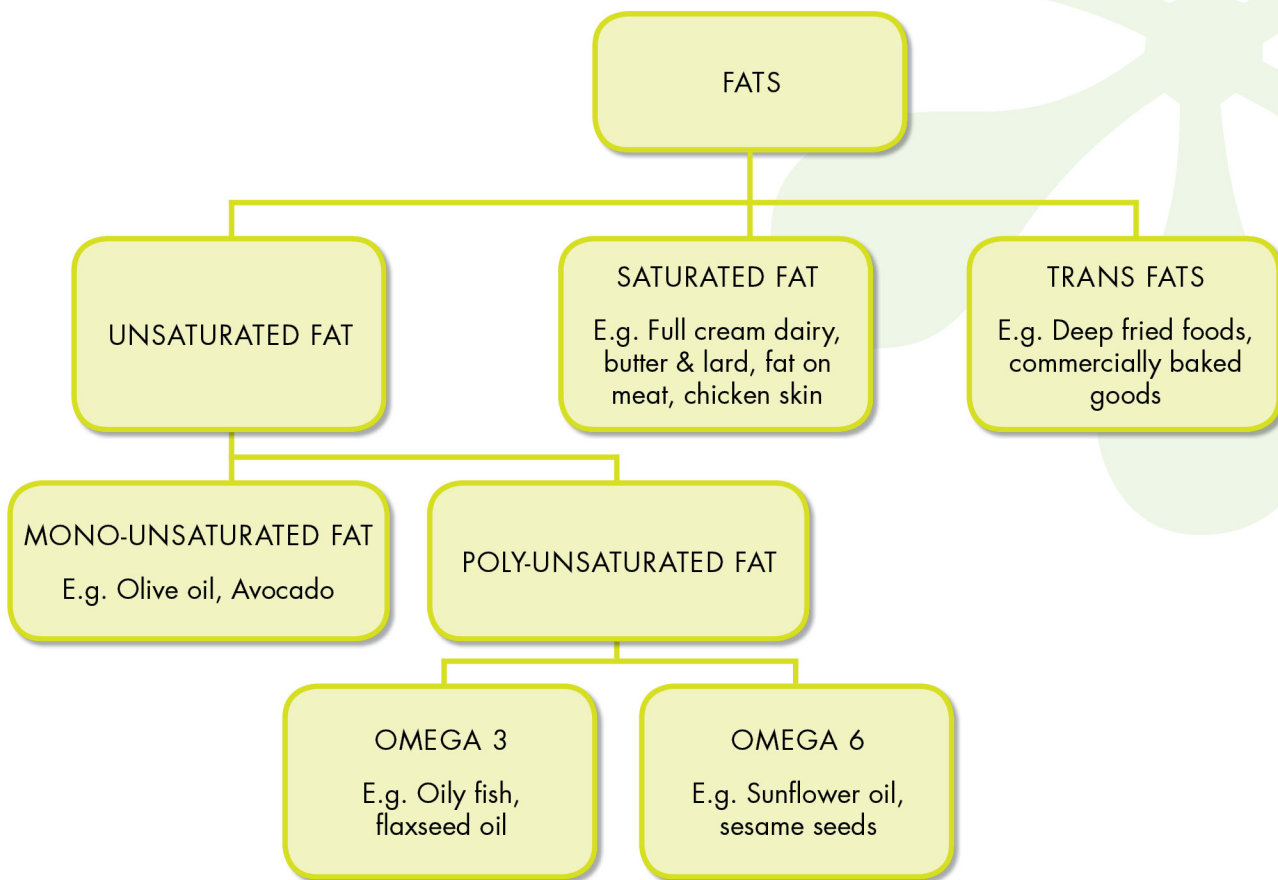
LOW FAT DIET

- A low fat diet is what is usually recommended by the AHA, USDA Healthy Eating guidelines and South African Food Based Dietary Guidelines.
- In general a low fat diet comprises a fat intake of less than 30% total energy, however for the purposes of weight loss we recommend that fat be reduced to 20% of total energy.
- Consume whole-grains, vegetables, fruits, and legumes.
- Choose lean sources of meat, chicken, fish and dairy (low fat or fat free).
- Attention should be paid to the procurement, preparation and cooking of meals to keep fat content at a minimum.
- Refined carbohydrates and sugar should be avoided.
- A minimum of 3 meals should be eaten, ideally with 2 snacks, and no meals should be skipped!



DIET PLAN PRINCIPLES

WHAT IS A FAT?



YOUR EXERCISE PLAN



By now you will know the amount of exercise we recommend you do a week to maximise your chance 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 programme, 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 activities you need to do in a week.

3 EASY STEPS TO CALCULATING YOUR WEEKLY MET HOURS SCORE

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

2. Use this equation to calculate the MET HOURS for each activity.

$$\frac{\text{MET value}}{\text{MET value}} \times \frac{\text{duration (in hours)}}{\text{duration (in hours)}} = \frac{\text{MET HOURS score}}{\text{MET HOURS score}}$$

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, ran for 30 minutes at a pace of 8 km/hour ($8 \times .5 = 4$) and played 2 hours of golf ($4.5 \times 2 = 9$), then your weekly MET HOURS score will 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.

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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 surface	3.8
Water aerobics	4
Golf	4.5
Badminton	4.5

MODERATE	5 - 9 METS
Cycling, stationary, 100 watts, light effort	5.5
Weight lifting, vigorous effort	6
Jogging/walking combination, less than 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	10-16 METS
Cycling, 22-26km/hr, vigorous	10
Running, 9.6km/hr	10
Running, 12.8km/hr	13.5
Kickboxing, judo, etc	10
Rollerblading	12
Cycling, ≥ 32 km/hr	16
Stairmaster	9
Stationary rowing, 200 watts, very vigorous	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 explanation of all the genes analysed in this test. Pay particular attention to those genes where you received moderate or high impact scores in the gene table on page 5.

ADRB2 Arg16Gly

This ADRB2 receptor protein is involved in the mobilisation 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 and lose weight more slowly. These carriers are less able to mobilize fat stores in response to exercise. In these individuals it is important to emphasize diet for weight management as exercise may be less effective.

ADRB2 Gln27Glu

The G allele has been associated with increased BMI and fat mass. Subjects with these genotypes are less able to mobilise fat stores for energy and have been shown to have a greater risk of obesity and elevated insulin levels when CHO intake is greater than 49% . Decreasing intake of CHO has been shown to reduce insulin levels and is beneficial in weight management.

ADRB3 Trp64Arg

The C allele is associated with increased BMI and weight loss resistance. These individuals do not break down abdominal fat 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.

APOA2 T>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 genotype is associated with obesity and increased food consumption, especially total fat and saturated fat intake. When saturated fat intake is high the CC genotype is strongly associated with increased BMI and obesity. This diet-gene interaction may also play a role in insulin resistance (IR)

APOA5

APOA5 interactions has been previously demonstrated for triglyceride metabolism as well as interactions with BMI. The T allele has been associated with greater weight, less weight loss, especially when on a high fat, high saturated fat diet.

ADRB3

The beta-3 adrenergic receptor (ADRB3) protein is expressed primarily in visceral adipose tissue where it is involved in the regulation of lipolysis.

The C allele is associated with increased BMI and weight loss resistance. The higher risk of obesity among carriers of the C allele may be diminished by above average levels of vigorous physical activity.

CLOCK

Circadian Locomotor Output Cycles Kaput (CLOCK), an essential element of the human biological clock, is involved in metabolic regulation. Carriers of the C allele are less successful losing weight than the TT genotype. In addition, those with the C 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 behaviour and weight loss.

FABP2

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 allele is associated with obesity, elevated BMI, increased abdominal fat, higher leptin levels, insulin resistance, higher insulin levels, and hypertriglyceridemia. A 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.

FTO

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 BMI, body fat percentage and waist circumference, especially in individuals with a sedentary lifestyle and a high fat intake. Modify the diet to include a moderate amount of carbohydrate, increase MUFA and decrease SAT FAT, and manage the total fat intake. Regular physical activity is recommended.

MC4R

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 greater snacking in children and adults, greater hunger and a higher prevalence of eating large amounts of food.

PLIN

The allele is associated with greater obesity risk. A allele carriers are more weight loss resistant and show greater decrease in lipid oxidation rate than GG. When there is a higher intake of complex CHO, the allele is protective against obesity. Avoid all refined CHO.

PPARG

Protein is abundantly expressed in fat cells. It is a transcription factor activated by fatty acids and plays an important role in the expression of adipocyte-specific genes.

The CC genotype is highly sensitive to the type and amount of fat in the diet, with regards susceptibility to obesity and weight gain. An increase in total dietary fat and saturated fat has been associated with increased waist circumference in CC genotype individuals.

TCF7L2

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 IR and diabetes. T allele carriers lose more weight on a low fat hypo-energetic diet than a high fat diet. A low GL diet and all interventions to manage insulin is also recommended.

TNFA -308 G>A

Tumour necrosis factor- α (TNF α), a proinflammatory cytokine secreted by immune cell and fat cells and has been implicated in the development of obesity and insulin resistance. The A allele increases TNF α production and is associated with increased obesity risk especially when dietary fat intake is high. Weight management is imperative in managing inflammation.

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