SelfDecode™

Weight Control Pathway

Joseph Cohen

Report date: 28 April 2026

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Personal information

NAME

Joseph Cohen

SEX AT BIRTH

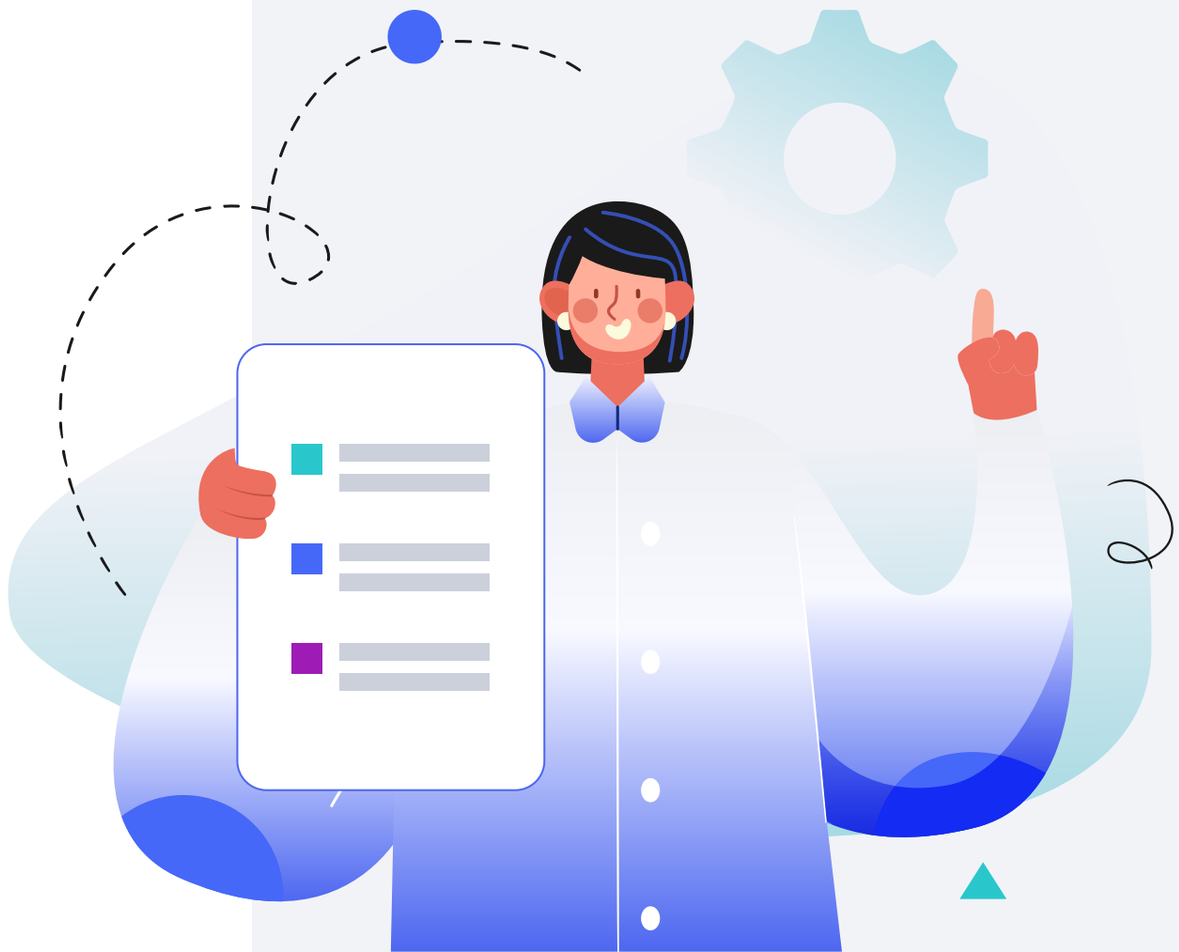
Male

HEIGHT

5ft 8" 172.7cm

WEIGHT

180lb 81.6kg



DISCLAIMER

This report does not diagnose this or any other health conditions. Please talk to a healthcare professional if this condition runs in your family, you think you might have this condition, or you have any concerns about your results.

How this works

Why do some people seem to eat the same foods and live the same lifestyle as everyone around them, yet still struggle with their weight? The answer is often written in your DNA.

This report examines the genes that shape how your body manages weight and metabolism — not just how much you eat, but *why* you eat, *when* you burn fat, and *how efficiently* your cells process the food you give them.

Food intake & appetite is where many people's challenges begin. Genes like *FTO*, *MC4R*, and *LEPR* influence how your brain receives hunger and fullness signals. Variants in these genes can mean you feel hungry sooner, feel full later, or experience stronger cravings — none of which are a matter of willpower.

Your **circadian rhythm** — the body's internal clock — does far more than regulate sleep. Genes like *CLOCK*, *PER2*, and *CRY1* govern the timing of your metabolism, determining when your body is primed to process carbohydrates, burn fat, or store energy. Disruptions here can quietly drive weight gain even when diet and exercise seem on point.

How your body handles carbohydrates, fats, and proteins is determined by your **macronutrient metabolism** genes. Variants in *TCF7L2*, *FGF21*, and *AMY1A* shape your personal tolerance for carbohydrates and your tendency to store rather than burn what you eat.

Insulin sensitivity, governed by genes like *IRS1*, *GIPR*, and *INSR*, determines how efficiently your cells respond to the hormone that controls blood sugar — a cornerstone of both weight management and long-term metabolic health.

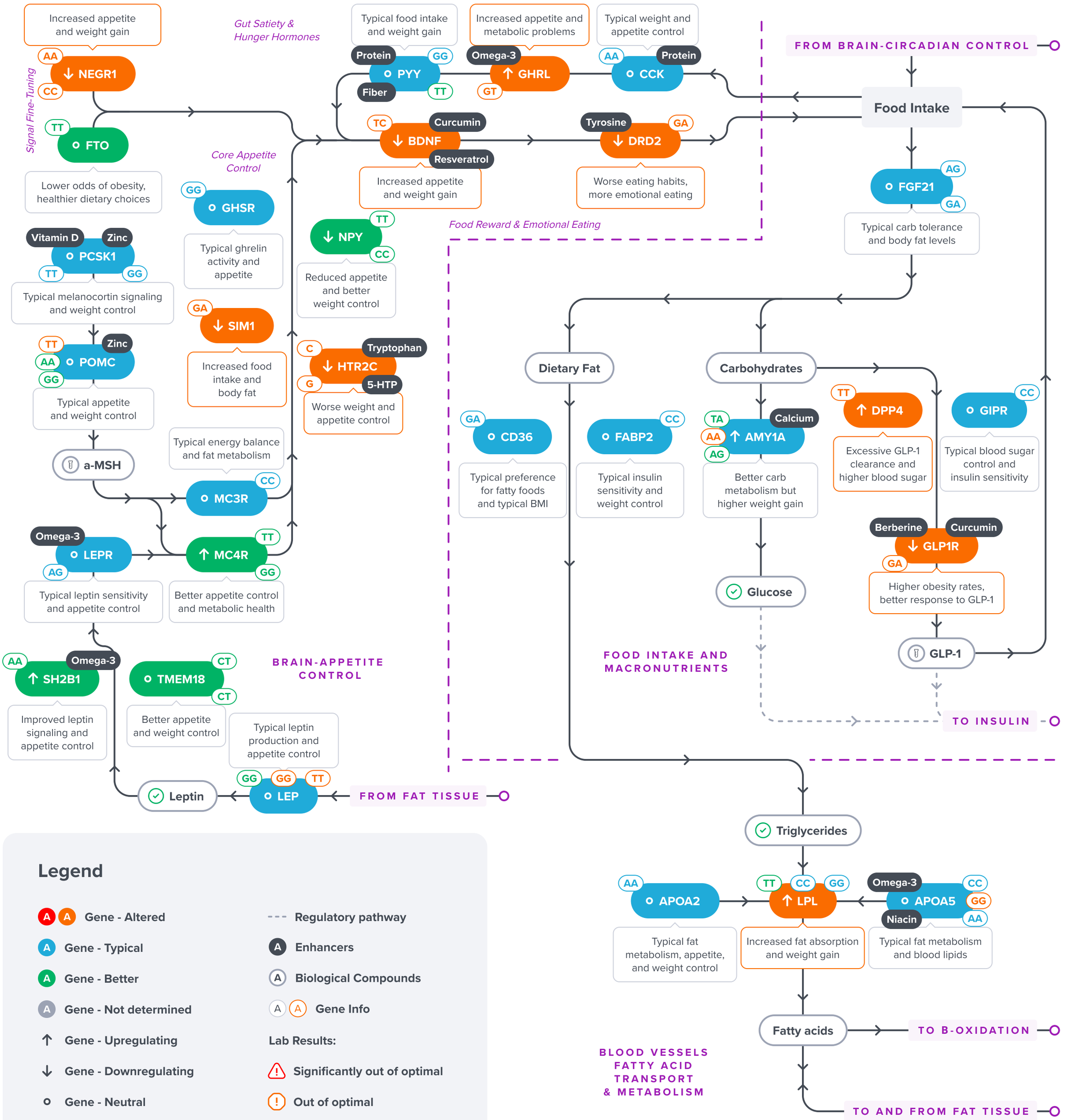
Your **fat metabolism** genes — including *LPL*, *APOA5*, and *PPARA* — influence how fats move through your bloodstream and how readily your body taps into fat stores for fuel.

Finally, **mitochondrial fat metabolism** genes like *UCP1*, *UCP3*, and *PPARGC1A* determine how effectively your cells' power plants actually burn fat for energy.

Together, these six gene groups paint a uniquely personal picture of your metabolism — and a roadmap for working *with* your biology rather than against it.

Weight Control Pathway

Weight Control Pathway



Legend

- Gene - Altered
- Gene - Typical
- Gene - Better
- Gene - Not determined
- Gene - Upregulating
- Gene - Downregulating
- Gene - Neutral
- Genotype
- Genotype not determined
- Main pathway
- Regulatory pathway
- Enhancers
- Biological Compounds
- Gene Info

Lab Results:

- Significantly out of optimal
- Out of optimal
- Normal
- Optimal
- Missing lab result

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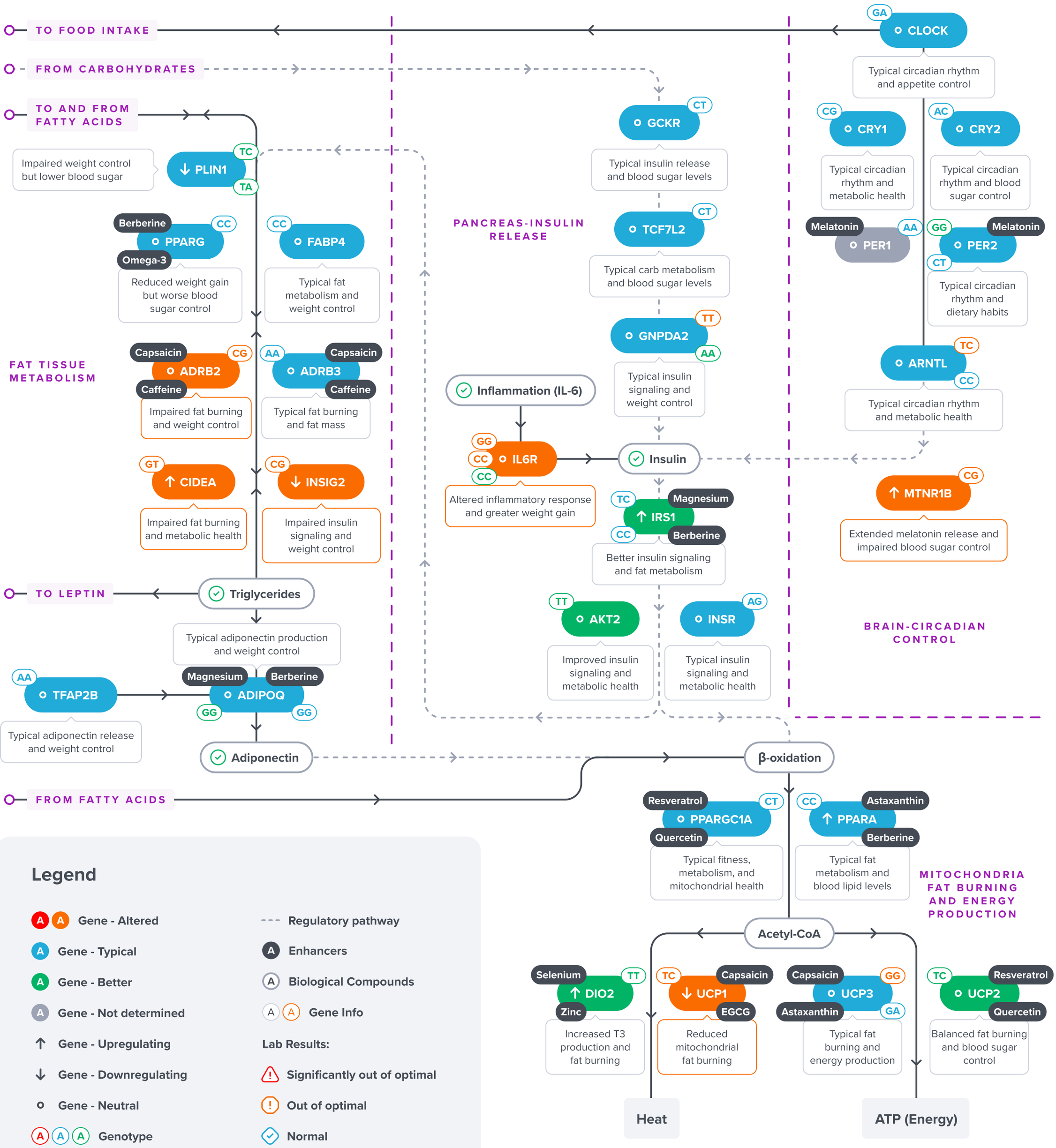
Weight Control Pathway

Weight Control Pathway



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Results Overview

Brain-Appetite Control

Gene - SNP Summary

BDNF	rs6265	↓ TC
HTR2C	rs3813929	↓ C
	rs518147	↓ G
GHSR	rs490683	○ GG
MC3R	rs3746619	○ CC
POMC	rs6713532	↓ TT
	rs1042571	↑ GG
	rs934778	↑ AA
NPY	rs16139	↓ TT
	rs5574	↓ CC

DRD2	rs1800497	↓ GA
NEGR1	rs2815752	↓ AA
	rs3101336	↓ CC
LEP	rs7799039	↓ GG
	rs10244329	↑ TT
	rs3828942	↑ GG
PYY	rs162430	○ GG
	rs2070592	↑ TT
SH2B1	rs7498665	↑ AA
TMEM18	rs6548238	○ CT
	rs2867125	○ CT

GHRL	rs696217	↑ GT
SIM1	rs3734355	↓ GA
CCK	rs10460960	○ AA
LEPR	rs1137101	○ AG
PCSK1	rs6232	○ TT
	rs6234	○ GG
FTO	rs9939609	○ TT
MC4R	rs17782313	↑ TT
	rs12970134	↑ GG

Labs Summary

Serotonin, Serum · Ferritin · ACTH, Plasma · C-Reactive Protein (CRP) · Cortisol · Glucose, Fasting · HOMA-IR · Insulin, Fasting · Iron · Leptin · Triglycerides · Tryptophan, Plasma · Vitamin D, 25-Hydroxy, Total · Ghrelin · Hemoglobin A1c · Vanillylmandelic Acid (VMA), Random Urine

Food Intake and Macronutrients

Gene - SNP Summary

DPP4	rs12617656	↑ TT
CD36	rs1761667	o GA
FGF21	rs838133	o AG
	rs838145	o GA
GLP1R	rs6923761	↓ GA
FABP2	rs1799883	o CC
GIPR	rs2287019	o CC
AMY1A	rs4244372	o TA
	rs11185098	o AG
	rs1566154	↓ AA

Labs Summary

C-Peptide · Glucose, Fasting · Glucagon-like peptide 1 (GLP-1) · Hemoglobin A1c

Blood Vessels Fatty Acid Transport & Metabolism

Gene - SNP Summary

LPL	rs1800590	↓ TT
	rs264	o GG
	rs7841189	o CC
APOA2	rs5082	o AA
APOA5	rs2075291	o CC
	rs662799	o AA
	rs3135506	↓ GG

Fat Tissue Metabolism

Gene - SNP Summary

ADRB2	rs1042714	o CG
ADIPOQ	rs1501299	o GG
	rs17300539	o GG
CIDEA	rs11545881	↑ GT
ADRB3	rs4994	o AA
PPARG	rs1801282	o CC
INSIG2	rs7566605	↓ CG
FABP4	rs1054135	o CC
TFAP2B	rs987237	o AA

Labs Summary

ALT · ApoB · Glucose, Fasting · HOMA-IR · Insulin, Fasting · Triglycerides · Free Fatty Acids · Hemoglobin A1c · Postprandial Glucose · Vanillylmandelic Acid (VMA), Random Urine

Pancreas-Insulin Release

Gene - SNP Summary

IL6R	rs4845623	GG
	rs2229238	CC
	rs2228145	CC
IRS1	rs2943641	TC
	rs1801278	CC
GCKR	rs1260326	CT
INSR	rs2059807	AG
TCF7L2	rs7903146	CT
GNPDA2	rs1996023	TT
	rs10938397	AA
AKT2	rs3730051	TT

Brain-Circadian Control

Gene - SNP Summary

MTNR1B	rs10830963	↑ CG
CRY2	rs11605924	AC
CLOCK	rs1801260	GA
PER2	rs2304672	GG
	rs4663302	CT
CRY1	rs2287161	CG
PER1	rs2735611	AA

Labs Summary

- Glucose, Fasting
- HOMA-IR
- Insulin, Fasting
- Hemoglobin A1c
- Melatonin (Waking) (DUTCH)

Mitochondria Fat Burning and Energy Production

Gene - SNP Summary

UCP1	rs1800592	↓ TC
UCP3	rs1800849	↓ GG
	rs647126	GA
PPARA	rs1800206	CC
DIO2	rs225014	↑ TT
PPARGC1A	rs8192678	CT
UCP2	rs659366	TC

Labs Summary

- TSH
- Carnitine, Total
- T3 Total
- T4 (Thyroxine), Total
- Thyroid Peroxidase Antibodies (TPO)
- VO2 Max
- Free Fatty Acids

Your recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your lab results, along with the amount of scientific evidence supporting the recommendation.

You'll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

		DOSAGE
1	Berberine	1000 mg
2	Capsaicin	
3	Dietary Protein	
4	Morning Bright Light Therapy	20 minutes
5	Omega-3 (Fish Oil)	2000 mg
6	Resveratrol	150 mg
7	5-HTP	100 mg
8	Avoid Processed Carbs	
9	Coenzyme Q10 (CoQ10)	100 mg
10	Curcumin	500 mg
11	Green Tea Extract	250 mg
12	Limit Fructose	25 g
13	Magnesium	350 mg
14	Regular Sleep Schedule	
15	Zinc	15 mg
16	Alpha-Lipoic Acid	600 mg
17	Astaxanthin	12 mg
18	Avoid Meals 3-4 Hours Before Bedtime	
19	Caffeine	100 mg
20	Copper	2 mg
21	Dietary Beta-Carotene	
22	Dietary L-Tyrosine	
23	Dietary Polyphenols	
24	Dietary Tryptophan	
25	Eat Fiber-Rich Foods	
26	L-Carnitine	1 g
27	L-Tyrosine	500 mg
28	Limit Saturated Fat	
29	Lion's Mane	500 mg
30	Maintain a Regular Meal Schedule	

31	Melatonin	500 mcg
32	Mindfulness-Based Stress Reduction (MBSR)	2 hours
33	Nicotinamide Riboside (NR)	250 mg
34	Phosphatidylserine	300 mg
35	Plant Sterols & Stanols	300 mg
36	Quercetin	250 mg
37	Strength Training	1 hour

Berberine

How to implement

Take 500 mg of berberine two times a day before meals. Continue this regimen for up to three months, then evaluate its effects with your healthcare provider.

TYPICAL STARTING DOSE

1000 mg

How it helps

Berberine activates a key metabolic enzyme called AMPK, sometimes called the body's master energy switch, which improves how cells take up glucose and burn fat. It also helps lower blood sugar after meals and can reduce appetite over time.

Personalized to Your Genes

↑ DPP4	Directly inhibits DPP4 enzymatic activity, allowing GLP-1 to act longer
↓ GLP1R	Prolongs endogenous GLP-1 half-life by inhibiting DPP4, increasing signal at the downregulated receptor
↓ INSIG2	Activates AMPK and suppresses SREBP, directly compensating for INSIG2-related loss of lipogenesis control
○ POMC	Activates AMPK and has been shown to upregulate hypothalamic POMC expression in metabolic dysfunction

Capsaicin

How to implement

Apply a capsaicin cream or gel to the affected area up to 4 times daily. Make sure the skin is intact and not broken. Start with a lower concentration (0.025%) and gradually increase to 0.075% if needed for pain relief. Use continuously for at least 4 weeks to evaluate its effectiveness.

How it helps

Capsaicin the active compound in chili peppers activates receptors that stimulate brown fat activity and slightly raise metabolic rate. Regular intake can reduce appetite and increase the amount of calories burned, particularly from fat.

Personalized to Your Genes

ADRB2	Activates thermogenic signaling through β3-adrenergic receptors in adipose tissue
↓ UCP1	Activates TRPV1 receptors, stimulating sympathetic activation of UCP1 in brown fat
UCP3	Stimulates UCP3 expression in muscle tissue

Dietary Protein

How to implement

Include a variety of protein sources such as meat, fish, eggs, dairy, beans, and nuts in your diet every day, aiming for at least 0.8 grams of protein per kilogram of body weight. For more active individuals or those looking to build muscle, increase intake to 1.2 to 2.0 grams per kilogram of body weight daily, spread out over all meals to maximize absorption.

How it helps

Protein is the most satiating macronutrient and requires more energy to digest than carbohydrates or fat. A high-protein diet preserves lean muscle during weight loss, reduces hunger hormones, and supports a higher resting metabolic rate.

Personalized to Your Genes

↓ NEGR1	NEGR1 influences hypothalamic appetite circuits and high protein is the strongest macronutrient lever when central signaling is impaired
↓ SIM1	High protein maximizes melanocortin input to the SIM1-regulated hypothalamic neurons
POMC	Protein strongly stimulates POMC expression in the hypothalamus, directly targeting the downregulated pathway

Morning Bright Light Therapy

How to implement

Expose yourself to a light therapy box, which mimics natural sunlight, for about 20-30 minutes each morning within the first hour of waking up. It's important to do this daily, especially during months with less natural sunlight, to help manage symptoms of Seasonal Affective Disorder (SAD) or other conditions influenced by light exposure.

TYPICAL STARTING DOSE

20 minutes

How it helps

Light exposure in the morning sets the body's master internal clock, which regulates the timing of cortisol, insulin sensitivity, appetite hormones, and metabolism throughout the day. Just 10-20 minutes of morning sunlight can have a meaningful positive effect on metabolic health.

Personalized to Your Genes

↓ BDNF	Increases BDNF via serotonergic pathways
↑ MTNR1B	Accelerates melatonin clearance, shortening the window of MTNR1B-driven insulin suppression
○ ARNTL	Resets the brain clock that drives ARNTL/BMAL1 cycling

Omega-3 (Fish Oil)

How to implement

Take 1-2 g of omega-3 (fish oil) supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

2000 mg

How it helps

EPA and DHA omega-3 fatty acids reduce systemic inflammation, improve insulin sensitivity, lower triglycerides, and beneficially regulate dozens of genes involved in fat metabolism and appetite. They are among the most broadly supported

supplements for metabolic health.

Personalized to Your Genes

↓ BDNF	Upregulates BDNF expression in the hypothalamus
↑ CIDEA	Promotes fat oxidation in adipose tissue, counteracting CIDEA-driven fat storage
↓ INSIG2	Suppresses SREBP-1c transcription and hepatic lipogenesis, compensating for lost INSIG2-mediated feedback

Resveratrol

How to implement

Take 150-500 mg of resveratrol as a supplement daily, preferably with meals to enhance absorption. This dosage range is based on studies for various health benefits, and it's advised to not exceed 500 mg per day without medical supervision.

TYPICAL STARTING DOSE

150 mg

How it helps

Resveratrol activates SIRT1, a protein that regulates energy metabolism, circadian rhythms, and fat breakdown. It supports mitochondrial function, reduces inflammation, and can improve insulin sensitivity, particularly relevant for individuals with circadian or mitochondrial gene variants.

Personalized to Your Genes

↓ BDNF	Boosts BDNF levels, likely through SIRT1 pathway
↑ CIDEA	Activates SIRT1, which reduces CIDEA expression and promotes fat oxidation over storage
ARNTL	Activates SIRT1, a key regulator of ARNTL/BMAL1 transcriptional activity

5-HTP

How to implement

Take 100 mg of 5-HTP as a supplement daily, ideally with a glass of water. It can be taken at any time of the day but taking it at the same time each day may help establish a routine.

TYPICAL STARTING DOSE

100 mg

How it helps

5-HTP is a direct building block of serotonin, a brain chemical that helps regulate appetite and mood. Raising serotonin levels can reduce cravings, decrease emotional eating, and improve feelings of fullness after meals.

Personalized to Your Genes

↓ HTR2C	Directly raises serotonin levels, increasing signaling through the downregulated HTR2C receptor
↓ SIM1	Serotonin input to the paraventricular nucleus amplifies SIM1-mediated satiety signals

Avoid Processed Carbs

How to implement

Eliminate or significantly reduce foods such as white bread, pastries, sodas, and other processed or refined sugars from your daily diet. Instead, focus on consuming whole grains, fruits, and vegetables. Aim to maintain this dietary change consistently over time to achieve and sustain health benefits.

How it helps

Refined carbohydrates and added sugars cause rapid blood sugar spikes that trigger large insulin responses, promote fat storage, and create a cycle of hunger and cravings. Reducing them is one of the most impactful dietary changes for improving metabolic health and reducing body fat.

Personalized to Your Genes

↑ DPP4	Reduces postprandial glucose spikes that upregulated DPP4 fails to buffer
↑ MTNR1B	Aligns carb intake with the window of lowest MTNR1B-driven insulin suppression

Coenzyme Q10 (CoQ10)

How to implement

Take a 100 mg Coenzyme Q10 (CoQ10) supplement once daily with a meal that contains fat for better absorption.

TYPICAL STARTING DOSE

100 mg

How it helps

CoQ10 is a molecule that sits at the heart of the cell's energy-producing machinery. Supplementing with it helps mitochondria burn fat more efficiently and reduces the oxidative stress that can impair metabolism and insulin function.

Personalized to Your Genes

↓ UCP1	CoQ10 maximizes output of residual UCP1 activity dependent on an intact electron transport chain
○ UCP3	Supports mitochondrial function when UCP3 downregulation reduces energy production efficiency

Curcumin

How to implement

Take a 500 mg curcumin supplement daily with food. To enhance absorption, take it with a meal that contains fats or oils since curcumin is fat-soluble.

TYPICAL STARTING DOSE

500 mg

How it helps

Curcumin the active compound in turmeric reduces inflammation and blocks molecular pathways that promote fat storage. It also improves insulin sensitivity and supports healthier blood sugar levels, particularly when taken in a high-bioavailability form.

Personalized to Your Genes

↓ BDNF	Upregulates BDNF signaling, partly via CREB activation
↓ GLP1R	Shown to upregulate GLP-1 secretion and receptor sensitivity

Green Tea Extract

How to implement

Take a green tea extract supplement containing 250-500 mg of EGCG (the active compound in green tea) daily, preferably with a meal to enhance absorption. This dosage is typically split into two separate doses, taken in the morning and later in the day. Continue this regimen for at least three months to observe potential health benefits.

TYPICAL STARTING DOSE

250 mg

How it helps

EGCG from green tea inhibits enzymes that break down adrenaline, prolonging the fat-burning signal in the body. It also mildly raises metabolic rate and supports fat oxidation, particularly when combined with caffeine.

Personalized to Your Genes

○ ADRB2	Slows norepinephrine breakdown, prolonging ADRB2 fat-burning signals
↓ UCP1	Synergistically activate the sympathetic pathway that drives UCP1 expression and brown fat thermogenesis
	Upregulates UCP1 expression, enhancing thermogenesis

Limit Fructose

How to implement

Limit your daily intake of fructose, particularly from added sugars and sweetened beverages, to less than 25 grams per day. Check nutrition labels for fructose content in foods and beverages and make adjustments to stay within this limit.

TYPICAL STARTING DOSE

25 g

How it helps

Fructose is uniquely processed by the liver in a way that promotes fat production, raises triglycerides, and causes inflammation in the hypothalamus that drives leptin resistance and overeating. Limiting fructose especially from processed sources directly reduces these harmful metabolic effects.

Personalized to Your Genes

↓ INSIG2	Fructose strongly activates SREBP and INSIG2 downregulation removes the feedback brake
○ LEP	Fructose drives leptin resistance via hypothalamic inflammation — reducing it is the primary lever with LEP overproduction

Magnesium

How to implement

Take up to 350 mg of magnesium daily as a supplement, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

350 mg

How it helps

Magnesium is involved in over 300 metabolic reactions including insulin signaling, glucose metabolism, and energy production. Deficiency which is extremely common worsens insulin resistance and can impair thyroid function, sleep quality, and stress hormones, all of which affect weight.

Personalized to Your Genes

↑ MTNR1B	Supports insulin sensitivity without directly stimulating melatonin, reducing the metabolic cost of extended MTNR1B activity
○ ARNTL	Cofactor in CLOCK/BMAL1 complex activity

Regular Sleep Schedule

How to implement

Go to bed and wake up at the same time every day, even on weekends and holidays. This helps regulate your body's internal clock, leading to better sleep quality. Aim for 7-9 hours of sleep per night.

How it helps

Going to sleep and waking at the same time every day keeps the body's internal clock regulated, which in turn keeps hunger hormones, blood sugar rhythms, and fat metabolism working properly. Irregular sleep timing is a surprisingly powerful driver of weight gain.

Personalized to Your Genes

↓ HTR2C	Irregular sleep further reduces HTR2C-mediated satiety signaling
ARNTL	External disruptions cause greater metabolic damage when ARNTL is dysfunctional

Zinc

How to implement

Take a 15 mg zinc supplement daily, ideally with a meal to enhance absorption.

TYPICAL STARTING DOSE

15 mg

How it helps

Zinc is involved in the production and regulation of numerous metabolic hormones including insulin, leptin, and ghrelin. Deficiency can worsen appetite dysregulation, impair immune function, and reduce the activity of enzymes critical for hormone processing.

Personalized to Your Genes

↑ GHRL — Zinc deficiency is associated with exaggerated GHRL signaling

POMC — Zinc is needed for proper POMC processing

Alpha-Lipoic Acid

How to implement

Take 600-1800 mg of alpha-lipoic acid daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE
600 mg

How it helps

Alpha-lipoic acid is an antioxidant that helps cells respond better to insulin and reduces inflammation in the brain that can drive overeating. It supports more efficient energy metabolism and can modestly reduce body weight.

Personalized to Your Genes

LEP — Reduces hypothalamic inflammation and improves leptin receptor sensitivity, allowing LEP's excess output to signal effectively

Astaxanthin

How to implement

Take an astaxanthin supplement daily, with a typical dosage ranging from 4 to 12 mg. It is best taken with a fat-containing meal to enhance absorption.

TYPICAL STARTING DOSE
12 mg

How it helps

Astaxanthin is a potent antioxidant that may improve metabolic health by reducing oxidative stress and improving mitochondrial function. There is some early evidence suggesting it may enhance fat utilization and improve insulin sensitivity, but most data comes from animal studies or small human trials.

Personalized to Your Genes

UCP3 — Supports UCP3-mediated mitochondrial efficiency

Avoid Meals 3-4 Hours Before Bedtime

How to implement

Finish your last meal of the day at least 3 to 4 hours before you go to sleep. For example, if you usually go to bed at 10 pm, aim to have dinner no later than 6 pm to 7 pm.

How it helps

The body's metabolic processes slow down in the evening, making calories consumed at night more likely to be stored as fat. Stopping eating 2-3 hours before bed improves blood sugar control, supports melatonin release, and reduces overall caloric intake.

Personalized to Your Genes

↑ MTNR1B — Eating during peak melatonin exposure is particularly damaging with MTNR1B upregulation

Caffeine

How to implement

Consume 100 to 200 mg of caffeine supplement daily, ideally in the morning to avoid interference with sleep. This can be in the form of a pill or powder, taken with water. Avoid exceeding 400 mg per day to prevent side effects.

TYPICAL STARTING DOSE

100 mg

How it helps

Caffeine stimulates the nervous system to release adrenaline, which signals fat cells to release stored fat for energy. It also modestly boosts metabolic rate and can improve exercise performance, making fat burning during workouts more effective.

Personalized to Your Genes

ADRB2 — Amplifies catecholamine-driven fat oxidation via ADRB2

Copper

How to implement

Take a copper supplement of 2 milligrams (mg) per day with water, preferably with a meal to reduce the risk of stomach upset. This dosage is for general maintenance of copper levels in adults and should not exceed the recommended amount without consulting a healthcare provider.

TYPICAL STARTING DOSE

2 mg

How it helps

Copper is an essential cofactor for enzymes that process appetite-regulating hormones and support energy metabolism. Deficiency can impair these pathways, worsening appetite control and metabolic efficiency.

Personalized to Your Genes

POMC — Copper and zinc are cofactors for the enzymes that process POMC into appetite-suppressing alpha-MSH

Dietary Beta-Carotene

How to implement

Incorporate foods rich in beta-carotene into your diet daily. These include carrots, sweet potatoes, spinach, kale, and cantaloupe. Aim for at least one serving of these vegetables or fruits at each meal to ensure an adequate intake of beta-carotene.

How it helps

Vitamin A plays a role in regulating genes involved in appetite and fat cell development. Getting adequate beta-carotene from colorful vegetables supports these signaling pathways and contributes to healthier hormonal balance.

Personalized to Your Genes

POMC — Retinoic acid signaling regulates POMC gene expression

Dietary L-Tyrosine

How to implement

Incorporate foods high in L-Tyrosine such as chicken, turkey, fish, dairy products, almonds, avocados, bananas, and soy products into your daily diet. Aim for a balanced intake spread across your meals rather than consuming high amounts in a single meal.

How it helps

Tyrosine is the dietary precursor to dopamine, the brain chemical that governs reward, motivation, and impulse control around food. Eating tyrosine-rich foods like eggs, chicken, and pumpkin seeds provides the raw material for dopamine synthesis.

Personalized to Your Genes

↓ DRD2 — Provides substrate for dopamine synthesis, compensating for reduced DRD2 signaling

Dietary Polyphenols

How to implement

Incorporate foods rich in dietary polyphenols into your daily diet. This can include consuming a variety of fruits like berries, apples, and grapes; vegetables such as onions and broccoli; nuts and seeds; as well as beverages like green tea and coffee. Aim for at least five servings of fruits and vegetables per day to achieve a beneficial intake of polyphenols.

How it helps

Polyphenols are plant compounds found in berries, green tea, olive oil, and dark chocolate that reduce inflammation, improve insulin sensitivity, and support beneficial gut bacteria. They influence multiple pathways involved in fat metabolism and appetite regulation.

Personalized to Your Genes

↑ DPP4 Competitively inhibit DPP4 activity and prolong GLP-1 half-life

Dietary Tryptophan

How to implement

Increase your intake of tryptophan-rich foods in your daily diet. Examples include turkey, chicken, milk, cheese, yogurt, eggs, bananas, tofu, salmon, and nuts such as almonds and peanuts. Aim to incorporate these foods into at least one meal per day to meet the dietary recommendation for tryptophan.

How it helps

Tryptophan is the amino acid used to make serotonin, which controls appetite and mood. Pairing tryptophan-rich foods with a small amount of carbohydrate increases the amount that reaches the brain, supporting serotonin production and better appetite control.

Personalized to Your Genes

↓ HTR2C Supports serotonin synthesis for HTR2C activation

Eat Fiber-Rich Foods

How to implement

Incorporate foods high in fiber, such as fruits, vegetables, whole grains, and legumes, into your daily meals. Aim for a total dietary fiber intake of 25 to 30 grams per day, spread out over all meals.

How it helps

Dietary fiber slows the absorption of sugar and fat, feeds beneficial gut bacteria, and triggers the release of satiety hormones like GLP-1 and PYY. High fiber intake is consistently associated with lower body weight, better blood sugar, and reduced appetite.

Personalized to Your Genes

↓ GLP1R — Stimulates L-cell GLP-1 secretion via SCFA production, maximizing signal available to the reduced receptor

L-Carnitine

How to implement

Take 500 mg of L-carnitine supplement daily with a glass of water, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

1 g

How it helps

L-carnitine acts as a transport molecule that shuttles fatty acids into the mitochondria where they are burned for energy. Supplementing with it can improve fat oxidation, particularly in individuals with impaired mitochondrial fat metabolism.

Personalized to Your Genes

UCP3 — Shuttles fatty acids into mitochondria, directly compensating for reduced UCP3-mediated fat handling in muscle

L-Tyrosine

How to implement

Take 500-2000 mg of L-Tyrosine supplement daily, preferably 30 minutes before meals or snacks. This can be taken in one dose or divided into two doses throughout the day. Continue this supplementation daily for a duration of at least a few weeks to assess its effects on your body.

TYPICAL STARTING DOSE

500 mg

How it helps

L-tyrosine is the amino acid precursor to dopamine, a brain chemical involved in reward, motivation, and impulse control around food. Supplementing supports dopamine production, which can reduce emotional eating and food cravings driven by low dopamine signaling.

Personalized to Your Genes

↓ DRD2 Direct precursor to dopamine, supporting synthesis when DRD2 receptor sensitivity is reduced

Limit Saturated Fat

How to implement

Reduce your intake of saturated fats by choosing lean cuts of meat, opting for low-fat or fat-free dairy products, and using cooking oils high in unsaturated fats (like olive or canola oil) instead of butter or lard. Aim to keep saturated fat to less than 10% of your total daily calories. For someone consuming 2000 calories a day, this means 20 grams or less of saturated fat per day.

How it helps

High saturated fat intake promotes inflammation, raises LDL and ApoB particles, and in certain genetic backgrounds significantly worsens fat storage and appetite regulation. Replacing saturated fat with unsaturated alternatives improves metabolic outcomes across multiple pathways.

Personalized to Your Genes

↓ INSIG2 INSIG2 downregulation impairs SREBP feedback — excess SFA plus refined carbs accelerate lipogenic drive

Lion's Mane

How to implement

Take a Lion's Mane supplement of 500-1000 mg daily, usually in capsule or powder form. It can be taken with or without food, but if you experience any digestive upset, take it with meals. Continue this regimen for at least 4 weeks to evaluate its benefits.

TYPICAL STARTING DOSE

500 mg

How it helps

Lion's mane contains compounds that stimulate the production of nerve growth factor and BDNF, brain chemicals that support healthy appetite regulation and neurological function. It may help reduce appetite dysregulation that originates from impaired brain signaling.

Personalized to Your Genes

↓ BDNF — Stimulates BDNF synthesis, compensating for reduced expression

Maintain a Regular Meal Schedule

How to implement

Eat your meals at the same times each day, for instance, breakfast at 7 AM, lunch at 12 PM, and dinner at 6 PM. Stick to this schedule every day, including weekends, to help regulate your body's internal clock and improve digestion.

How it helps

Regular meal timing helps align your circadian clock and metabolic hormones, which is crucial for weight and blood sugar control.

Personalized to Your Genes

↑ GHRL — Prevents the hypoglycemic triggers that further upregulate GHRL in predisposed individuals

Melatonin

How to implement

Take 500 mcg of melatonin orally, about 30 minutes before bedtime, to help with sleep. It can be taken daily as needed.

TYPICAL STARTING DOSE

500 mcg

How it helps

Low-dose melatonin helps regulate the body's internal clock, which in turn governs the timing of hunger hormones, insulin sensitivity, and fat metabolism. Properly timed melatonin supports the circadian alignment needed for healthy metabolic function.

Personalized to Your Genes

ARNTL — Directly interfaces with circadian clock machinery, supporting CLOCK/BMAL1 complex activity

Mindfulness-Based Stress Reduction (MBSR)

How to implement

Enroll in an 8-week MBSR course, which includes a weekly 2.5-hour class, one all-day class after the sixth week, and 45 minutes of daily home practice guided by assignments and instructional recordings.

TYPICAL STARTING DOSE

2 hours

How it helps

Mindfulness-based stress reduction and cognitive behavioral therapy address the psychological drivers of emotional eating and food cravings. These approaches help rewire the brain's reward response to food and build lasting behavioral skills for appetite regulation.

Personalized to Your Genes

↓ DRD2 Cognitive reappraisal directly targets emotional eating linked to DRD2 variants

Nicotinamide Riboside (NR)

How to implement

Take 250-300 mg of Nicotinamide Riboside (NR) supplement daily, with or without food. It can be taken any time of the day, but maintaining a consistent routine, such as taking it every morning, is advised for best results. Continue this regimen daily for an ongoing basis to support cellular health and energy levels.

TYPICAL STARTING DOSE
250 mg

How it helps

NAD+ is a molecule essential for energy production and activating sirtuins, proteins that regulate metabolism, circadian rhythms, and cellular repair. Supplementing with NAD+ precursors like NR supports mitochondrial function and the clock genes involved in metabolic regulation.

Personalized to Your Genes

ARNTL Enhances the NAD+/SIRT1 axis that supports ARNTL/BMAL1 cycling

Phosphatidylserine

How to implement

Take 100 mg of phosphatidylserine three times daily with meals. Continue this regimen for up to 6 months to evaluate its effectiveness.

TYPICAL STARTING DOSE
300 mg

How it helps

Phosphatidylserine is a key component of neuronal membranes that supports the health and connectivity of brain circuits involved in appetite regulation. It can also reduce cortisol levels, indirectly lowering stress-driven appetite and fat storage.

Personalized to Your Genes

↓ NEGR1 Supports neuronal membrane integrity in the appetite-regulating circuits where NEGR1 acts

Plant Sterols & Stanols

How to implement

Consume a total of 300 mg of plant sterols and stanols per day. This can be achieved by incorporating foods fortified with these compounds, such as certain margarines, orange juice, and yogurt drinks, into your daily diet or by taking a specific supplement that meets this dosage requirement.

TYPICAL STARTING DOSE
300 mg

How it helps

Plant sterols are natural compounds that block cholesterol absorption in the gut and interfere with the molecular machinery that drives excess fat and cholesterol production in the liver. They help keep blood lipids in a healthier range.

Personalized to Your Genes

↓ INSIG2 Interact with SREBP-mediated cholesterol regulation, compensating for impaired INSIG2-driven feedback

Quercetin

How to implement

Take 250-1000 mg of quercetin supplement daily with a glass of water, preferably with a meal to aid in its absorption.

TYPICAL STARTING DOSE
250 mg

How it helps

Quercetin is a plant flavonoid that inhibits inflammatory pathways, improves insulin sensitivity, and has been shown to reduce the activity of enzymes like DPP4 that break down appetite-regulating hormones. It supports metabolic health through multiple complementary mechanisms.

Personalized to Your Genes

↑ DPP4 Natural DPP4 inhibitor that improves postprandial GLP-1 availability

Strength Training

How to implement

Engage in strength training exercises, such as weight lifting or bodyweight exercises, for 60 minutes per session, 2 to 3 times per week. Ensure you work all major muscle groups and rest each muscle group for at least 48 hours before exercising it again.

TYPICAL STARTING DOSE

1 hour

How it helps

Building muscle through resistance exercise increases the body's resting metabolic rate, improves insulin sensitivity by adding more glucose-storing tissue, and stimulates hormones that promote fat burning. It is one of the most durable long-term interventions for body composition.

Personalized to Your Genes

↓ HTR2C Upregulates serotonin receptor sensitivity over time, compensating for HTR2C downregulation

ADRB2

ADRB2 Report

The *ADRB2* gene encodes the beta-2 adrenergic receptor, a vital part of the sympathetic nervous system. This receptor binds catecholamines, especially adrenaline (epinephrine), which increase cAMP levels [R].

Catecholamines control fat burning and energy expenditure, especially during caloric restriction (fasting) and exercise. Along with the primary beta-3 receptors in fat tissue, beta-2 receptors stimulate fat burning, resulting in energy and temperature release [R, R, R].

Leptin is a crucial metabolic hormone that helps burn fat stores by stimulating sympathetic activity and raising catecholamine levels. This pathway is often blunted in obese people, leading to excess fat accumulation [R].

SNP	Your Genotype
rs1042714 Q27E or Gln27Glu Alleles **G:** Altered ADRB2 activity **C:** Normal ADRB2 activity	CG **Your genotype is linked to altered ADRB2 activity and impaired fat burning and weight control**

Intro and Health Effects

The rs1042714 variant (also known as Q27E or Gln27Glu) has been most widely researched when it comes to weight. Its minor 'G' allele (Glu, E) was associated with approximately 20% higher odds of obesity in a meta-analysis of 18 studies [R].

An older meta-analysis came to a similar conclusion. However, the authors observed a significant link between rs1042714-G and obesity only in populations with lower frequencies of this allele, such as Asians and Native Americans. In two studies with 150 women, those with the 'G' allele had more fat mass and impaired burning [R, R, R].

This variant has also been linked to:

- Reduced exercise performance and VO2 max [R]
- Increased risk of cardiovascular events in coronary artery disease patients [R]
- Increased risk of Graves' disease in Caucasians [R]

On the bright side, people with this variant tend to lose weight more easily when they reduce calorie intake. However, given the link of this variant with obesity under regular conditions, there is a potential risk of weight regain ("yo-yo" effect) after dieting [R, R].

This variant may be linked to lower asthma odds in adults and children [R].

Normally, leptin helps burn excess fat stores by stimulating the sympathetic activity in fat tissue. However, according to one clinical trial, this pathway may be suppressed in people with the above SNP. The ‘G’ allele carriers had higher leptin levels, indicating leptin resistance [R].

Interestingly, this SNP doesn't seem to alter the function of beta-2 receptors. Scientists are still looking for the exact mechanism behind its effects on sympathetic activity and fat burning. It may be just a marker for another variant with functional consequences [R].

BDNF

BDNF Report

BDNF (brain-derived neurotrophic factor) is a component produced mainly in brain cells. It plays many key roles that support your brain's ability to grow and learn [R, R].

More precisely, BDNF helps stimulate [R, R, R, R]:

- Neurogenesis: the production of new nerve cells
- Synaptic plasticity: growing new connections between brain cells

In the brain, BDNF is most active in regions responsible for cognitive function, including learning and memory. In line with this, low BDNF levels are linked to reduced cognitive function and Alzheimer's disease [R, R, R, R, R].

BDNF plays a key role in how your brain regulates appetite, energy balance, and motivation to be physically active. When BDNF activity is lower, it's often linked to increased food intake, reduced satiety, and a higher risk of weight gain, partly because the brain becomes less efficient at controlling hunger signals.

Enhancers:

Omega-3 Curcumin Resveratrol

SNP

rs6265 Val66Met

Alleles

C: Typical BDNF activity

T: Reduced BDNF activity

Your Genotype

↓TC

Your genotype is linked to reduced BDNF activity and increased appetite and weight gain.

Intro and Health Effects

The BDNF gene helps produce BDNF and strongly impacts its levels and activity [R].

A crucial BDNF gene variant is rs6265, also known as "Val66Met". It may affect BDNF production, storage, and release in brain cells [R, R, R, R].

As a result, the "T" ("Met") allele is linked to **reduced cognitive function** [R, R, R, R].

This variant is linked to higher BMI, waist circumference, and obesity risk, particularly in men and certain ethnic groups like Puerto Ricans. It may disrupt BDNF's role in suppressing appetite and promoting energy expenditure. This allele can interact

with diet (e.g., fat intake) to worsen weight gain traits [R, R, R].

CIDEA

CIDEA Report

The *CIDEA* gene encodes a protein called '*cell death-inducing DFFA-like effector A*', homologous to a mouse protein known to activate cell death and called Cidea [R].

Mice lacking this protein have higher metabolic rates, increased fat breakdown in brown fat tissue, and resistance to diet-induced obesity and diabetes [R].

Human CIDEA is primarily found in fat tissue, where it's believed to play a role in fat metabolism [R].

SNP

rs11545881 V115F

Alleles

G: Reduced CIDEA activity

T: Increased CIDEA activity

Your Genotype

↑GT

Your genotype is linked to increased CIDEA activity and impaired fat burning and metabolic health

Intro and Health Effects

By far, the best-characterized *CIDEA* polymorphism is **rs11545881**, commonly known as V115F. Its minor 'T' allele has been associated with higher odds of central obesity, metabolic syndrome, and dyslipidemia in several populations [R, R, R, R].

DPP4

DPP4 Report

The *DPP4* gene encodes '*dipeptidyl peptidase 4*', an enzyme found on the cell surface that breaks down several metabolic hormones, most notably GLP-1 and GIP. By doing so, it may help control insulin release, blood sugar, and appetite [R].

This is the same pathway targeted by DPP4 inhibitor drugs used for type 2 diabetes. Because GLP-1 influences satiety and energy balance, DPP4 is biologically relevant for body weight and metabolic health [R].

Other substrates cleaved by DPP4 include [R, R]:

- Hormones (GLP-2)
- Neuropeptides (PYY, NPY)
- Messengers of the immune system (CXCL12, IL-1RA)
- Enzymes involved in energy metabolism

SNP	Your Genotype
rs12617656	↑ TT
Alleles **C:** Reduced DPP4 activity **T:** Increased DPP4 activity	**Your genotype is linked to increased DPP4 activity, excessive GLP-1 clearance, and higher blood sugar**

Intro and Health Effects

One of the main *DPP4* variants is **rs12617656**. Its major 'T' allele has been associated with higher DPP4 levels. Possibly due to the increased breakdown of GLP-1, which may reduce insulin response and satiety, this variant has been associated with an increased risk of type 2 diabetes [R, R].

DRD2

DRD2 Report

The *DRD2* gene helps make dopamine D2 receptors. Those are proteins on the surface of brain cells that bind dopamine [R].

The functions of D2 receptors are complex. They depend on the brain region and the position of receptors on brain cells. For the most part, these receptors are *inhibitory,* which means they prevent excessive dopamine release [R].

By controlling dopamine functions in the brain, D2 receptors play a role in:

- Social interactions [R, R, R]
- Motivation and reward [R, R]
- Novelty seeking [R]
- Substance dependence [R, R]
- Cognitive function [R, R]

DRD2 influences how your brain experiences reward, especially from food. When DRD2 activity is reduced, people may feel less satisfaction from eating and become more prone to overeating, cravings, and seeking high-calorie foods to compensate for a weaker reward response.

SNP	Your Genotype
rs1800497 Alleles **A:** Reduced DRD2 activity **G:** Typical DRD2 activity	↓GA **Your genotype is linked to reduced DRD2 activity and worse eating habits, more emotional eating.**

Intro and Health Effects

When it comes to the *DRD2* gene, the most studied variant is rs1800497, also known as Taq1A. Interestingly, this variant is found in another gene, *ANKK1*, which controls the activity of *DRD2* [R, R, R].

The **“A” (“A1”) allele** of this variant is linked to different pleasure-seeking behaviors, such as:

- Alcohol and substance misuse [R, R, R]
- Food cravings and emotional eating [R, R, R, R]
- Other addictive behaviors [R]

This allele is linked to a **30%** lower number of D2 receptors in brain regions responsible for **motivation and reward**. People with this allele may **seek more pleasure** from alcohol, high-calorie foods, drugs, and other addictive substances and behaviors

[R, R, R].

GHRL

GHRL Report

The *GHRL gene* encodes a preprotein that is cleaved to yield **ghrelin**, a hormone best known for stimulating appetite and signaling hunger to the brain. The stomach mainly produces this hormone, but smaller amounts are also produced by other organs [R, R, R, R, R].

Ghrelin is considered the “hunger hormone” because it stimulates appetite, promotes eating, and increases fat storage [R, R].

The preprotein encoded by *GHRL* is also cleaved to obestatin, a peptide believed to regulate adipocyte function and glucose metabolism [R].

SNP	Your Genotype
rs696217 Leu72Met Alleles **G:** Normal GHRL activity **T:** Increased GHRL activity	↑GT **Your genotype is linked to increased GHRL activity and increased appetite and metabolic problems**

Intro and Health Effects

By far, the best-researched GHRL variant is rs696217, also known as Leu72Met. Its minor ‘T’ allele may increase gene expression [R, R].

This variant has been associated with:

- Higher BMI and waist circumference [R, R, R, R]
- Higher risk of metabolic syndrome [R]
- Higher risk of bulimia [R]
- Lower HDL cholesterol [R]
- Higher risk of type 2 diabetes [R]
- Higher blood pressure in type 2 diabetes patients [R]

GLP1R

GLP1R Report

The *GLP1R* gene encodes the receptor for GLP-1, a hormone that plays a pivotal role in regulating blood sugar levels, making it one of the references to develop therapies for diabetes, particularly type 2 diabetes. GLP-1 is both a *neuropeptide* (a peptide with effects on the nervous system) and an *incretin* (a metabolic hormone that reduces glucose levels after meals) [R, R, R].

Upon binding to GLP-1, the receptor is transferred from the cell surface to the cell interior, where it activates signaling pathways that lead to insulin secretion [R].

GLP1R variants influence **glucose control, insulin secretion, and incretin signaling** in humans. Because GLP-1 signaling affects satiety and energy balance, GLP1R fits best as a **metabolic and appetite pathway modifier** rather than a primary obesity gene [R].

Enhancers:

Curcumin

SNP

rs6923761 Gly168Ser

Alleles

A: Reduced GLP1R activity

G: Increased GLP1R activity

Your Genotype

↓GA

Your genotype is linked to reduced GLP1R activity and higher obesity rates, better response to GLP-1

Intro and Health Effects

By far, the best-characterized *GLP1R* variant is **rs6923761** (Gly168Ser). Its minor 'A' allele (Ser168) has been associated with higher basal GLP-1 levels but reduced GLP-1-stimulated insulin secretion, suggesting decreased activity [R, R].

A Polish study associated the 'A' allele with an increased risk of excessive body mass [R].

However, obese carriers of this variant may have:

- Lower BMI [R, R]
- Lower weight [R, R, R]
- Lower fat mass [R, R, R]
- Lower waist circumference [R, R, R]
- Lower waist-to-hip ratio [R, R]
- Lower leptin levels [R]

- Lower fasting glucose levels [R]
- Lower fasting insulin levels [R, R]
- Lower triglyceride levels [R, R, R]
- Lower insulin resistance [R, R, R]
- Higher HDL cholesterol levels [R]

These benefits may be more evident in those eating a low-calorie diet. Similarly, carriers may lose more weight in response to GLP-1 receptor agonists [R, R, R, R, R, R, R].

In contrast, this allele has been associated with decreased weight loss from bariatric surgery [R, R].

HTR2C

HTR2C Report

The *HTR2C* gene encodes a serotonin receptor, 5-HT2C, present mostly in the brain. Changes in this receptor's activity play a role in [R, R, R, R]:

- Mental health
- Weight and metabolism
- Pain management

Serotonin is a crucial signaling molecule found throughout the brain and body. It is commonly known as the "happiness neurotransmitter" or the "happiness hormone" due to its prominent role in regulating mood and behavior [R, R].

Importantly, increased activity of serotonin receptors typically decreases appetite and weight gain. In line with this, antipsychotics that block serotonin receptors like 5HT2C are strongly associated with weight gain in some patients [R, R, R, R].

SNP

rs3813929

Alleles

C: Reduced HTR2C activity

T: Increased HTR2C activity

Your Genotype

↓C

Your genotype is linked to reduced HTR2C activity and worse weight and appetite control.

Intro and Health Effects

The best-characterized HTR2C polymorphism is rs3813929. Its minor 'T' allele may increase gene expression, leading to a higher density of 5-HT2C receptors. This allele has been associated with [R]:

- **Lower weight gain** in response to antipsychotics [R, R]
- Decreased risk of ADHD [R]

SNP	Your Genotype
rs518147 Alleles **G:** Reduced HTR2C activity **C:** Increased HTR2C activty	↓G **Your genotype is linked to reduced HTR2C activity and worse weight and appetite control**

Intro and Health Effects

Another allele increasing HTR2C expression, ‘C’ at rs518147, has been associated with:

- Lower weight gain in response to antipsychotics [R]
- Decreased risk of ADHD [R]
- Lower likelihood of smoking [R]

IL6R

IL6R Report

IL6R (Interleukin 6 Receptor) influences how your body responds to inflammation, which is closely tied to metabolism and fat storage. When IL6R signaling is altered, it can promote chronic low-grade inflammation, impair insulin sensitivity, and make the body more likely to store fat, increasing the risk of weight gain.

SNP

rs4845623

Alleles

A: Normal IL6L activity

G: Altered IL6L activity

Your Genotype

GG

Your genotype is linked to altered IL6L activity and altered inflammatory response and greater weight gain.

Intro and Health Effects

The rs4845623-G and rs2228145-C variants have been associated with increased BMI in indigenous Pima people only. No studies have investigated the relationship of these SNPs to weight in other populations so far [R].

SNP

rs2229238

Alleles

C: Normal IL6L activity

T: Altered IL6L activity

Your Genotype

CC

Your genotype is linked to normal IL6L activity, better inflammatory response, and lower weight gain

Intro and Health Effects

Three *IL6R* variants (rs2229238-T, rs4845623-G, and rs2228145-C) have been associated with weight gain in specific populations [R, R].

The rs2229238-T variant has been associated with increased abdominal fat in young Taiwanese girls and with increased BMI in indigenous Pima people (native to Arizona) [R, R].

SNP

rs2228145

Alleles

A: Normal IL6R activity

C: Altered IL6R activity

Your Genotype

CC

Your genotype is linked to altered IL6R activity and altered inflammatory response and greater weight gain

Intro and Health Effects

The rs4845623-G and rs2228145-C variants have been associated with increased BMI in indigenous Pima people only. No studies have investigated the relationship of these SNPs to weight in other populations so far [R].

In addition, the ‘C’ allele of rs2228145 has been associated with:

- Higher IL6R levels [R, R, R, R, R]
- Higher IL-6 levels [R]

INSIG2

INSIG2 Report

The *INSIG2* gene encodes a protein also called INSIG2, which is short for '*Insulin-induced gene 2*'. INSIG2 regulates the production of cholesterol and fatty acids by blocking it when the levels of these molecules are high. As its name suggests, *INSIG2* expression increases when insulin secretion is abundant. This is the case in conditions such as diabetes and obesity [R, R].

INSIG2 reduces the production of fatty molecules (via inhibiting SREBPs) [R, R, R].

Engineered mice lacking the *INSIG2* gene accumulated high levels of cholesterol and triglycerides in the liver due to their inability to inhibit SREBPs. Conversely, those producing high levels of this protein in the liver showed reduced fat production [R, R].

SNP

rs7566605

Alleles

G: Increased INSIG2 activity

C: Reduced INSIG2 activity

Your Genotype

↓CG

Your genotype is linked to reduced INSIG2 activity and impaired insulin signaling and weight control

Intro and Health Effects

The minor 'C' variant of the **rs7566605** SNP has been associated with obesity and high BMI in multiple populations [R, R, R, R, R, R, R, R, R, R, R].

Moreover, it was linked to increased fat and weight gain during pregnancy in American women and the waist-to-hip ratio in Norwegian men [R, R, R].

Similarly, the 'C' variant was associated with childhood obesity in multiple studies [R, R, R, R, R, R, R].

A meta-analysis investigating these discrepancies found the variant is overall unrelated to obesity, possibly due to different ethnicities between studies. However, it did find an association between the 'C' variant and extreme obesity (BMI> 37.5 kg/m2) [R].

The rs7566605 polymorphism is located near the *INSIG2* gene, in a region believed to affect its expression. Although its contribution to *INSIG2* expression and activity hasn't been investigated, the variant might reduce INSIG2 based on its effects on body weight [R].

In a trial on American and Irish Caucasian men, carriers of the 'C' variant lost less body fat from resistance training [R].

Similarly, obese children and adolescents with the ‘C’ variant lost less weight from an intervention combining exercise and dietary education in two German studies [R, R].

A Danish study failed to associate this variant with obesity but found that carriers gained more weight during periods of physical inactivity [R].

However, this variant increased the positive effects of a lifestyle intervention in a multi-ethnic American study, and carriers of the ‘G’ allele regained more intramuscular fat in the arm one year after stopping physical training [R, R].

LPL

LPL Report

Lipases are enzymes that break down dietary fats and oils so that they can be absorbed from the intestine into the bloodstream. When they break down triglycerides, these fat molecules are either used for energy or stored in fatty tissue for later use [R].

Pancreatic lipase is the most important type of lipase and the main form of lipase in the gut, produced and released by the pancreas, the same gland that makes insulin. After a meal, your pancreas releases lipase into your digestive tract, where it breaks down fatty triglycerides into smaller molecules that are easier to absorb (monoglycerides and fatty acids) [R].

In addition to the pancreas, lipases are also produced in the liver (hepatic lipase), blood vessel lining (endothelial lipase), and other tissues such as the muscles, heart, brain, and even fat tissues themselves (lipoprotein lipase, encoded by the *LPL* gene) [R, R, R].

Mutations in the *LPL* gene can cause familial lipoprotein lipase deficiency. Symptoms of this genetic disease include [R]:

- Excess fat
- Abdominal pain
- Pancreatitis
- Diabetes
- Fatty stools
- Enlarged liver

SNP

rs1800590

Alleles

G: Increased LPL activity

T: Reduced LPL activity

Your Genotype

↓TT

Your genotype is linked to reduced LPL activity and reduced fat absorption and weight gain

Intro and Health Effects

The ‘G’ allele of **rs1800590** has been associated with increased BMI and more abdominal fat. [R].

Generally speaking, variants that increase lipase allow for increased fat absorption, which potentially increases blood fats and fat tissue [R, R].

SNP	Your Genotype
rs264 Alleles **A:** Increased LPL activity **G:** Reduced LPL activity	GG **Your genotype is linked to typical LPL activity, fat absorption, and weight gain.**

Intro and Health Effects

The ‘A’ allele of **rs264** has been associated with increased weight regain after a weight loss program [R, R].

Generally speaking, variants that increase lipase allow for increased fat absorption, which potentially increases blood fats and fat tissue [R, R].

SNP	Your Genotype
rs7841189 Alleles **C:** Typical LPL activity **T:** Reduced LPL activity	CC **Your genotype is linked to typical LPL activity, fat absorption, and weight gain.**

Intro and Health Effects

At **rs7841189**, the uncommon ‘T’ allele appears to be linked to reduced lipase activity (possibly protective against metabolic syndrome) [R, R].

MTNR1B

MTNR1B Report

The *MTNR1B* gene provides instructions for making a receptor that responds to melatonin, a hormone that helps regulate our internal body clock, also known as the circadian rhythm. This rhythm controls our sleep-wake cycle and many other processes, including how our bodies manage blood sugar.

In addition to its role in the brain, the MTNR1B receptor is found in the pancreas, influencing how much insulin is released. Insulin is the hormone that helps control blood sugar levels. If melatonin signaling is disrupted—due to irregular sleep, stress, or changes in light exposure—it can throw off the body's ability to manage blood sugar.

Scientists have found that changes in the MTNR1B gene can affect how well this system works, potentially leading to higher blood sugar levels and an increased risk of type 2 diabetes. Learning about these genetic differences can help us better understand how sleep, lifestyle, and metabolism are connected.

SNP	Your Genotype
rs10830963	↑CG
Alleles **G:** Increased MTNR1B activity **C:** Reduced MTNR1B activity	**Your genotype is linked to increased MTNR1B activity, extended melatonin release, and impaired blood sugar control**

Intro and Health Effects

One genetic variant in the MTNR1B gene - rs10830963 - has emerged as a key player in the connection between sleep timing and blood sugar control.

The minor “G” allele has one of the strongest links with high blood sugar and type 2 diabetes. It increases the expression of melatonin receptors in pancreatic beta cells, which release insulin [R, R].

Here's where timing becomes crucial: Melatonin naturally suppresses insulin release - a useful feature during our normal sleeping hours when we're not eating. However, people carrying the G allele have heightened sensitivity to this effect. For these individuals, eating late at night can lead to a reduced insulin response and higher blood sugar levels [R].

New research has uncovered something unexpected: carriers of this variant produce melatonin for about 41 minutes longer than non-carriers, and their melatonin offset (when melatonin levels drop in the morning) is delayed by about 80 minutes [R].

This finding has important implications, particularly for early risers. If you carry this variant and wake up early, you might still have elevated melatonin levels when you eat breakfast. Since melatonin suppresses insulin release, this could lead to higher

blood sugar levels during your morning meal, contributing to diabetes [R].

Taken together, these studies suggest that people with rs10830963-G may particularly benefit from intermittent fasting. By avoiding late dinners and early breakfasts, you lessen the negative impact of melatonin on blood sugar control [R].

NEGR1

NEGR1 Report

The *NEGR1* gene encodes a protein called '*neuronal growth regulator 1*', also known as kilon and neurotractin. NEGR1 is found in many brain areas, such as the hippocampus, olfactory bulb, and cortex, and most abundantly in the hypothalamus [R, R, R, R].

Studies in animals have associated the lack of *NEGR1* expression with altered fat transport. It increased cholesterol and triglyceride levels in isolated cells, and fat buildup in the liver and fatty tissues of mice. In human fat tissue, *NEGR1* expression was increased during the formation of fat cells and was required for their proper development [R, R, R].

NEGR1 may also influence weight through its effects on brain structure, possibly affecting regions involved in feeding behavior. Studies in humans associated a variant commonly found in obese people with reduced white matter integrity and **a tendency to eat more carbohydrates but fewer saturated and unsaturated fats** [R, R, R].

SNP	Your Genotype
rs2815752 Alleles **A:** Reduced NEGR1 activity **G:** Increased NEGR1 activity	↓AA **Your genotype is linked to reduced NEGR1 activity and increased appetite and weight gain**

Intro and Health Effects

The most widely investigated *NEGR1* polymorphism is **rs2815752**. Its major allele 'A' has been associated with increased obesity rates, BMI, and total body fat in multiple studies on different European, American, and Pakistani populations. However, a German and a Japanese study failed to associate this variant with obesity traits [R, R, R, R, R, R, R, R].

The variant was also associated with obesity in Greek, Mexican, Dutch, Australian, and Brazilian children and adolescents, but not in Chinese children at puberty [R, R, R, R, R, R].
Interestingly, this variant also predicted increased weight regain after different weight-loss interventions in a multi-ethnic American study [R].

SNP

rs3101336

Alleles

C: Reduced NEGR1 activity

T: Increased NEGR1 activity

Your Genotype

↓CC

Your genotype is linked to reduced NEGR1 activity and increased appetite and weight gain

Intro and Health Effects

The major ‘C’ variant of **rs3101336** has been associated with obesity, BMI, and total body fat in Chinese, Spanish, British, and African American adults, as well as in children from the US and UK [R, R, R, R, R, R].

SIM1

SIM1 Report

The *SIM1* gene encodes a hypothalamic transcription factor called '*SIM bHLH transcription factor 1*'. SIM1 helps regulate energy balance, largely through circuits that integrate melanocortin signaling and downstream satiety pathways [R, R, R].

In animal studies, the lack of *SIM1* causes severe hyperphagic obesity. Similarly, a whole deletion of this gene or the chromosome region in which the gene is found has been associated with severe forms of obesity in humans [R, R, R, R].

SNP	Your Genotype
rs3734355 Ala371Val Alleles **A:** Reduced SIM1 activity **G:** Typical SIM1 activity	↓GA **Your genotype is linked to reduced SIM1 activity and increased food intake and body fat**

Intro and Health Effects

The *SIM1* variants most widely researched with respect to weight are **rs3734355** (Ala371Val) and **rs3734354** (Pro352Thr). These variants are usually inherited together, so you will either carry both or neither of them [R].

Their minor alleles, which may reduce *SIM1* expression, have been associated with higher BMI in Caucasians, but not in Pima Indians [R, R, R, R, R].

UCP1

UCP1 Report

There are three main types of fat tissue:

- **White fat:** this is what many people think of as “body fat.” This is the body’s primary form of energy storage; people with too much white fat are considered obese [R].
- **Brown fat:** also called "good fat". Brown fat burns calories to generate heat and maintain body temperature [R].
- **Beige fat:** When white fat starts working like brown fat and burns calories, it is called beige fat. White fat is converted into beige fat in a process called “browning” [R, R].

The *UCP1* gene encodes a protein called *uncoupling protein 1, which is* mainly found in the mitochondria of brown and beige fat cells. It's also called *thermogenin* because it helps generate heat by a process called *non-shivering thermogenesis*, which helps our bodies stay warm in cold environments [R, R, R, R, R].

Because it prevents excess energy from being stored as body fat (and instead turns it into heat), many researchers believe that UCP1 could protect against weight gain and obesity [R, R, R].

Enhancers:

EGCG (green tea)

SNP	Your Genotype
rs1800592	↓TC
Alleles **C:** Reduced UCP1 activity **T:** Increased UCP1 activity	**Your genotype is linked to reduced UCP1 activity and reduced mitochondrial fat burning**

Intro and Health Effects

One of the best-studied SNPs in the *UCP1* gene is rs1800592 (also known as the “-3826 A>G” polymorphism). It helps determine how your body uses and stores the energy that you get from food [R].

The 'T' allele is linked to increased activity of the *UCP1* gene. It's associated with a higher resting metabolic rate, higher body heat production, and less weight gain. According to some researchers, this variant helps turn more of the energy from food into heat instead of body fat (white fat) [R, R].

Conversely, the 'C' allele is linked to *decreased* activity of the *UCP1* gene. It's associated with a lower resting metabolic rate, lower body heat production, higher weight gain, and a higher BMI. If less of the energy acquired from food is turned into heat,

then more of it would get stored as body fat [R, R].

According to several studies, the 'C' allele (and especially the 'CC' genotype) is associated with increased weight gain as well as a higher chance of being obese [R, R, R, R, R, R, R, R].

For example, people with the 'CC' genotype were found to have lower basal metabolic rates than people with the ‘T’ allele. In other words, they burned less energy when resting. In fact, one study reported that 'C' carriers may burn as many as 200 fewer calories per day than people with the 'TT' genotype [R, R]!

Apart from burning less energy when resting, people with the 'CC' genotype also produced less heat when exposed to cold [R, R].

We all lose brown fat as we age. However, in one study, people with the 'CC' genotype had less brown fat at a younger age than people with the ‘T’ allele [R].

Several studies link the 'C' allele and the 'CC' genotype to metabolic disturbances commonly associated with being overweight. In various studies, the ‘C’ allele has been associated with elevated blood pressure, greater insulin resistance, and higher LDL cholesterol and triglycerides [R, R, R, R, R, R].

Fun fact: worldwide, about 30% of people have the 'TT' genotype, which is associated with higher resting metabolism and increased heat production. But this genotype is much more frequent in Europe, where 58% of people have it! Many researchers believe that the *UCP1* gene and the rs1800592 SNP are in part responsible for human adaptation to colder climates [R].

However, although today we consider the 'T' allele beneficial in terms of its potential effect on body weight, this allele is essentially linked to lower metabolic efficiency. In other words, people with this allele may “waste” more of the energy that they get from food on generating body heat. It is plausible that the more efficient 'C' allele may be advantageous when food is scarce and the climate is warm [R].

ADIPOQ

ADIPOQ Report

The ADIPOQ gene encodes the protein hormone adiponectin. This hormone is the most abundant gene product of fat cells and acts as a messenger molecule in other tissues, especially in the muscles and liver [R, R].

By activating multiple pathways in these tissues, adiponectin controls processes such as insulin sensitivity, fat burning, inflammation, and cell death [R, R, R].

Whether low adiponectin levels actually cause these conditions or are just a biomarker for their onset and progression remains unknown, but the production of this hormone is reduced in people with [R, R, R, R]:

- Obesity
- Heart disease
- Diabetes
- Asthma
- Preterm birth

Conversely, high adiponectin levels have been associated with autoimmune diseases such as rheumatoid arthritis, osteoarthritis, and lupus [R, R].

Enhancers:

Magnesium

SNP

rs1501299

Alleles

A: Altered ADIPOQ activity

G: Normal ADIPOQ activity

Your Genotype

GG

Your genotype is linked to normal ADIPOQ activity, improved adiponectin production, and weight control

Intro and Health Effects

The minor ‘T’ variant of rs1501299 was associated with increased BMI and risk of obesity in several studies on different populations, especially those of Caucasian ethnicity. Similarly, obese carriers of this variant had higher fat percentage in a Swedish study [R, R, R, R, R, R, R, R, R, R, R].

However, some studies didn’t find this link [R, R, R, R, R, R].

The ‘T’ variant has been associated with increased insulin resistance, type 2 diabetes, and metabolic syndrome in Italian, Indian, and Spanish studies [R, R, R, R].

SNP

rs17300539

Alleles

A: Altered ADIPOQ activity

G: Typical ADIPOQ activity

Your Genotype

GG

Your genotype is linked to typical ADIPOQ activity, typical adiponectin production, and weight control

Intro and Health Effects

Similarly, the ‘A’ allele of rs17300539 showed a link with impaired weight and blood sugar control but with some mixed evidence [R, R, R, R, R, R, R, R].

ADRB3

ADRB3 Report

The *ADRB3* gene encodes the beta-3 adrenergic receptor. This receptor binds catecholamines and activates the sympathetic nervous system by increasing cAMP levels [R].

Beta-receptors impact vital processes such as breathing and blood flow but also have diverse metabolic roles. They control fat metabolism, insulin release, glucose production, and more [R, R].

Unlike beta-1 and beta-2, expressed throughout the body, the beta-3 receptor is mainly located in fat tissue. Once activated by catecholamines, It stimulates fat burning and heat production [R].

Leptin is a crucial metabolic hormone that helps burn fat stores by stimulating sympathetic activity and raising catecholamine levels. These pathways are often blunted in obesity due to underactive beta receptors, leptin resistance, or other factors [R, R, R, R].

SNP

rs4994 Trp64Arg

Alleles

A: Typical ADRB3 activity

G: Reduced ADRB3 activity

Your Genotype

AA

Your genotype is linked to typical ADRB3 activity and typical fat burning and fat mass

Intro and Health Effects

Over 100 studies have examined the relationship between one *ADRB3* variant—rs4994 or Trp64Arg— and body-weight measures. The A>G switch at rs4994 changes one amino acid in the beta-3 receptor structure. The “mutant” receptor had a reduced ability to produce cAMP and burn fat in test tubes [R, R, R].

One meta-analysis included 97 studies, involving 44,800 participants. Among East Asians, those with the "G" allele had, on average, 0.31 units higher body mass index, which would equal 0.8-1 kg. In European descendants, the difference was four times smaller and wasn't statistically significant [R].

The same group of authors conducted the largest study of 4,854 European (UK) subjects and confirmed the lack of association between this SNP and BMI [R].

In a meta-analysis of 16 studies and 12,500 children and adolescents, rs4994-G correlated with 23% higher obesity rates. Once again, the effect stemmed from East Asian subjects, who had 47% higher odds of obesity per copy of the "G" allele [R].

A study of 329 adults from Saudi Arabia found a significant link between this SNP and obesity. People with the "G" allele also had a higher waist-hip ratio, blood lipids, leptin, and insulin levels [R].

Research has associated the same variant with other conditions, such as:

- Diabetes [R, R]
- High blood pressure [R]
- Heart disease [R]

Those genetic effects were also more pronounced in East Asians.

AMY1A

AMY1A Report

Humans have two primary amylase genes: *AMY1A* and *AMY2A*. *AMY1A* encodes salivary amylase, while *AMY2A* encodes pancreatic amylase. In this report, we will be focusing on salivary amylase (AMY1A) [R, R].

Amylase is an enzyme that breaks down starch (carbs) into simple sugars. Digestion of carbs is extremely important, since carbs are ultimately broken down into glucose, the main energy source that fuels our bodies.

Salivary amylase is produced by salivary glands, and it starts digesting food as you chew it [R, R, R].

Individuals carry multiple copies of the *AMY1A* gene. How many copies each individual possesses is known as their *AMY1A* gene copy number. *AMY1A* gene copy number varies considerably, from 2-17 (or even 2-20) copies [R].

Carrying more copies of the *AMY1A* gene is associated with increased amylase enzyme levels, whilst carrying fewer gene copies is associated with lower levels [R, R].

Individuals from cultures that eat more starch carry more *AMY1A* gene copies. In contrast, people from cultures that typically eat less starch, such as those of Northern Siberia, carry relatively fewer copies of the *AMY1A* gene. This suggests that *AMY1A* copy number may be an **evolutionary adaptation to diet** [R, R]

Enhancers:

Calcium

SNP

rs4244372

Alleles

A: Reduced AMY1A activity

T: Increased AMY1A activity

Your Genotype

TA

Your genotype is linked to balanced AMY1A activity and balanced carb metabolism and weight control.

Intro and Health Effects

There are several *AMY1A* gene variant alleles that have been associated with significantly lower gene copy numbers. Each variant carried is thought to cause a difference of up to 2 gene copies [R, R].

The link between AMY1A activity and obesity may depend on diet type. Some studies found that **lower-amylase variants may offer protection against obesity on a high-carb diet**, likely because a portion of those carbs goes undigested. A study

observed this effect **only in women** [R].

Simply put, if you have higher AMY1A activity, you may metabolize starches more efficiently. This is good for your metabolic health, but if you eat a lot of starches, it may contribute to weight gain.

SNP	Your Genotype
rs11185098 Alleles **A:** Increased AMY1A activity **G:** Reduced AMY1A activity	○ AG **Your genotype is linked to balanced AMY1A activity and balanced carb metabolism and weight control.**

Intro and Health Effects

Individuals carrying more AMY1A gene copies tend to have increased amylase enzyme activity, and an improved ability to break down starch and complex carbs into simple sugars [R].

There are several AMY1A gene variant alleles that have been associated with significantly lower gene copy numbers. Each variant carried is thought to cause a difference of up to 2 gene copies [R, R].

One such variant is rs11185098. When put on a diet, people with the higher-amylase 'A' variant tended to lose more weight. The study included over 800 obese participants monitored for 2 years. However, other studies have had mixed results [R, R].

The link between AMY1A activity and obesity may depend on diet type. Some studies found that lower-amylase variants may offer protection against obesity on a high-carb diet, likely because a portion of those carbs goes undigested. A study observed this effect only in women [R].

Simply put, if you have higher AMY1A activity, you may metabolize starches more efficiently. This is good for your metabolic health, but if you eat a lot of starches, it may contribute to weight gain.

Note that some of these variants also affect the activity of the AMY2A gene, which helps make pancreatic amylase.

SNP	Your Genotype
rs1566154 Alleles **A:** Reduced AMY1A activity **G:** Increased AMY1A activity	↓AA **Your genotype is linked to reduced AMY1A activity and worse carb metabolism but lower weight gain..**

Intro and Health Effects

There are several AMY1A gene variant alleles that have been associated with significantly lower gene copy numbers. Each variant carried is thought to cause a difference of up to 2 gene copies [R, R].

The link between AMY1A activity and obesity may depend on diet type. Some studies found that lower-amylase variants may offer protection against obesity on a high-carb diet, likely because a portion of those carbs goes undigested. A study observed this effect only in women [R].

Simply put, if you have higher AMY1A activity, you may metabolize starches more efficiently. This is good for your metabolic health, but if you eat a lot of starches, it may contribute to weight gain.

APOA2

APOA2 Report

The APOA2 gene codes for apolipoprotein A-II, which builds HDL cholesterol and regulates fat metabolism. Unlike apoE and apoB, the exact metabolic roles of apoA-II are still largely unknown [R].

Emerging research suggests the inhibitory effects of apoA-II on VLDL and triglyceride metabolism, as well as insulin sensitivity [R, R].

SNP	Your Genotype
rs5082	AA
Alleles **A:** Typical APOA2 activity **G:** Reduced APOA2 activity	**Your genotype is linked to typical APOA2 activity and typical fat metabolism, appetite, and weight control**

Intro and Health Effects

Scientists have observed the association between one APOA2 variation, rs5082, and obesity across different ethnic groups. People with the “GG” genotype have significantly higher BMIs and obesity rates [R, R].

According to two major trials, the “GG” genotype at rs5082 lowers apo A-II levels and correlates with increased calorie intake. Detailed analyses have confirmed the role of apo A-II in appetite control [R, R, R].

Two studies gathered data from four populations (over 8K total participants) and found a robust association between rs5082, obesity, and saturated fat (SF) intake. The "GG" carriers had much higher obesity rates compared with other genotypes when their SF intake was high [R, R].

Among 180 diabetic patients, unsaturated fatty acids positively affected those with the "GG" genotype. Increased intake of omega-3 and MUFA was associated with lower inflammatory markers (IL-18 and CRP) and stronger antioxidant defense (SOD) [R, R].

On the bright side, this variant has been associated with a better blood lipid profile [R, R, R, R, R, R].

APOA5

APOA5 Report

APOA5 encodes a fat transport protein called apolipoprotein A5 (also abbreviated as ApoA5). It is similar in structure to other apolipoproteins, including the well-known APOE; like other proteins of this type, it binds to fat molecules and transports them through the bloodstream [R].

APOA5 specifically forms a part of HDL (high-density lipoprotein), sometimes known as “good cholesterol” [R].

HDL particles help remove excess cholesterol from the blood by [R, R, R]:

- transporting it to the liver, where it becomes a part of bile and is excreted through feces
- taking it to the adrenal glands, ovaries, and testes, where cholesterol is converted into steroid hormones (e.g. cortisol, estrogens, testosterone)

Cholesterol transported by HDL is known as “good” cholesterol because it is being removed from artery walls, which helps prevent, reduce, and even reverse hardening of the arteries (atherosclerosis) and heart disease [R].

Generally speaking, lower apoA5 activity is associated with metabolic disruption [R, R].

Enhancers:

Omega-3 Vitamin B3 (Niacin)

SNP

rs2075291

Alleles

A: Reduced APOA5 activity

C: Typical APOA5 activity

Your Genotype

CC

Your genotype is linked to typical APOA5 activity and typical fat metabolism and blood lipids

Intro and Health Effects

Different APOA5 variants, such as rs2075291-A, are linked to impaired metabolic and cardiovascular health, more precisely [R, R, R, R, R, R, R, R]:

- Higher triglycerides, LDL, and apoB levels
- Lower HDL and vitamin D levels
- Heart problems

They may reduce APOA5 activity, impairing the removal of excess fat and cholesterol from the blood [R].

SNP

rs662799

Alleles

A: Typical APOA5 activity

G: Reduced APOA5 activity

Your Genotype

AA

Your genotype is linked to typical APOA5 activity, typical fat metabolism, and blood lipids

Intro and Health Effects

Different APOA5 variants, such as rs662799-G, are linked to impaired metabolic and cardiovascular health, more precisely [R, R, R, R, R, R, R, R]:

- Higher triglycerides, LDL, and apoB levels
- Lower HDL and vitamin D levels
- Heart problems

They may reduce APOA5 activity, impairing the removal of excess fat and cholesterol from the blood [R].

SNP

rs3135506

Alleles

A: Typical APOA5 activity

G: Reduced APOA5 activity

Your Genotype

↓GG

Your genotype is linked to reduced APOA5 activity and impaired fat metabolism and altered blood lipids

Intro and Health Effects

Different APOA5 variants, such as rs3135506-G, are linked to impaired metabolic and cardiovascular health, more precisely [R, R, R, R, R, R, R, R]:

- Higher triglycerides, LDL, and apoB levels
- Lower HDL and vitamin D levels
- Heart problems

They may reduce APOA5 activity, impairing the removal of excess fat and cholesterol from the blood [R].

ARNTL

ARNTL Report

The *ARNTL* gene, also known as *BMAL1*, encodes a protein called '*aryl hydrocarbon receptor nuclear translocator-like*' that binds to CLOCK to form a complex that activates the expression of multiple genes. This complex is a key regulator of the circadian rhythm by activating the expression of genes such as *PER1*, *PER2*, *PER3*, *CRY1*, and *CRY2* [R].

ARNTL helps align your metabolism with your daily rhythm, influencing when your body burns calories versus stores fat. When its activity is disrupted, the body is more likely to store energy as fat, especially with late eating or irregular sleep, increasing the risk of weight gain.

Enhancers:

Magnesium

SNP	Your Genotype
rs2278749	TC
Alleles **C:** Typical ARNTL activity **T:** Altered ARNTL activity	**Your genotype is linked to altered ARNTL activity, impaired circadian rhythm, and worse metabolic health**

Intro and Health Effects

The best-researched ARNTL polymorphism is rs2278749. Its minor 'T' allele has been associated with:

- Increased risk of disturbing dreams [R]
- Increased risk of miscarriages [R]
- Increased risk of Alzheimer's disease (in APOE ε4 non-carriers) [R]

This SNP may subtly affect metabolic traits like appetite through daily/seasonal rhythms, though direct obesity links remain limited.

SNP

rs11022775

Alleles

C: Typical ARNTL activity

T: Altered ARNTL activity

Your Genotype

CC

Your genotype is linked to typical ARNTL activity, typical circadian rhythm, and blood sugar control

Intro and Health Effects

Another variant, ‘T’ at rs11022775, has been associated with an increased risk of type 2 diabetes but a decreased risk of dyslipidemia and high blood pressure [R, R, R, R, R].

CCK

CCK Report

The *CCK* gene encodes cholecystokinin, formerly called pancreozymin. This is a gut peptide that promotes the digestion of fat and protein by stimulating pancreatic enzyme secretion and gallbladder contraction [R, R].

Cholecystokinin is synthesized and secreted by the endocrine cells in the first segment of the small intestine (the *duodenum*) and can act either as a neuropeptide in the brain or as a peptide hormone in the gut [R, R].

When it acts as a neuropeptide, it controls various behavioral phenomena such as satiety, appetite, and anxiety. By doing so, it may indirectly regulate weight [R].

SNP	Your Genotype
rs10460960 Alleles **A:** Typical CCK activity **G:** Increased CCK activity	AA **Your genotype is linked to typical CCK activity, typical weight, and appetite control**

Intro and Health Effects

The main CCK polymorphism associated with weight is **rs10460960**. Several studies have associated its minor 'G' allele with decreased weight. Carriers may have a 0.02-unit lower BMI per copy of the minor allele [R, R, R, R, R, R].

CD36

CD36 Report

The *CD36* (cluster of differentiation 36) gene encodes a receptor (CD36) that transports fatty acids into cells. As a result of this function, fats are transported into new fat cells, taken up into muscle cells for use in energy production, and absorbed from food in the gut [R].

The CD36 receptor is activated by a wide variety of compounds—including collagen, LDL cholesterol, and bacterial proteins—that can trigger an increase in CD36 receptor activity (and, thus, uptake of fats) [R].

In the taste buds, CD36 appears to specifically affect our sensitivity to the taste of fatty foods; the greater the production of CD36, the greater the sensitivity [R, R].

Based on the results of rat studies, researchers suspect that low amounts of CD36 can lead to increased intake of fatty foods to compensate for a reduced ability to taste fat. People with high amounts of CD36 may have increased levels of endocannabinoids, which in turn increase appetite. Thus, while low amounts of CD36 may lead to an increased preference for fatty foods, high amounts of CD36 may lead to increased overall food intake [R, R, R].

SNP

rs1761667

Alleles

A: Altered CD36 activity

G: Normal CD36 activity

Your Genotype

GA

Your genotype is linked to typical CD36 activity, typical preference for fatty foods, and typical BMI

Intro and Health Effects

The CD36 receptor has a complicated relationship with diet and may affect everything from taste preferences to fat metabolism [R].

The ‘A’ allele at rs1761667 is associated with reduced production of the CD36 receptor, increased preference for fatty foods, and increased BMI [R, R].

CLOCK

CLOCK Report

The *CLOCK* ('Circadian Locomotor Output Cycles Kaput') gene is a core component of the biological clock. It is one of the main genes responsible for human daily rhythms, also known as circadian rhythms [R].

Many processes in the body follow a daily rhythm, which is why *CLOCK* has many and varied effects. To name a few, mutations in this gene have been linked to:

- Being an evening person [R, R, R]
- Sleep patterns and insomnia [R, R]
- Obesity and weight loss [R, R, R, R]
- ADHD [R, R]
- Schizophrenia [R]
- Insulin levels, metabolic syndrome, and diabetes [R, R, R]
- Alzheimer's [R]

CLOCK is a gene that also regulates metabolism and the timing of hunger signals. When CLOCK function is disrupted, it can lead to irregular eating patterns, impaired glucose metabolism, and a higher risk of weight gain, especially with late-night eating or poor sleep.

SNP

rs1801260

Alleles

A: Reduced CLOCK activity

G: Increased CLOCK activity

Your Genotype

GA

Your genotype is linked to typical CLOCK activity and typical circadian rhythm and appetite control

Intro and Health Effects

The **rs1801260** polymorphism is the most studied SNP in the *CLOCK* gene. Its minor 'G' allele increases CLOCK activity and has been associated with many sleep-related traits, such as [R]:

- Abnormal and less stable circadian rhythms [R, R]
- Shorter sleep duration (≤6 h per day) [R, R, R]
- Being an evening person [R, R, R]
- Less activity overall, being active later in the day, and being sleepier during the morning [R, R]

This variant has also been linked to:

- Higher prevalence of obesity (mixed findings) [R, R]
- Higher ghrelin (hunger hormone) levels and lower satiety [R, R]

- Higher insulin and insulin resistance [R]
- Low compliance with dietary programs, such as the Mediterranean diet [R]
- More difficulty losing weight from diets or bariatric surgery [R, R, R]

There is a link between how the *CLOCK* gene affects circadian rhythms and sleep on one hand, and metabolic balance and eating behavior on the other [R, R].

Studies have found that sleep deprivation disrupts metabolism by increasing the levels of the stress hormone cortisol and decreasing insulin sensitivity. Furthermore, a lack of sleep increases the levels of the hunger hormone ghrelin, which increases hunger and appetite -- thereby increasing the risk of obesity [R, R, R, R, R, R].

CRY1

CRY1 Report

The *CRY1* gene encodes a **core circadian rhythm regulator** called '*cryptochrome circadian regulator 1*'. It helps control the body's internal clock, including sleep timing, hormone release, metabolism, and how the body handles food across the day [R, R].

Because the circadian rhythm strongly influences glucose metabolism, appetite hormones, and meal timing, *CRY1* has become a well-studied gene in metabolic health and weight-related research [R, R].

When CRY1 is disrupted, it is linked to impaired glucose regulation, increased hunger, and a greater tendency to store fat, especially with irregular eating or sleep patterns.

SNP	Your Genotype
rs2287161 Alleles **G:** Normal CRY1 activity **C:** Altered CRY1 activity	CG **Your genotype is linked to typical CRY1 activity, typical circadian rhythm, and metabolic health**

Intro and Health Effects

By far, the best-studied *CRY1* variant when it comes to metabolic traits is **rs2287161**. Its minor 'C' allele has been associated with:

- Higher BMI [R, R, R]
- Higher weight [R]
- Higher fat mass [R]
- Higher hip circumference [R]
- Higher fasting glucose [R]
- Slower resting metabolic rate [R]

Moreover, carriers may have an even slower resting metabolic rate if they eat a diet high in saturated fats and higher insulin resistance if they consume a diet high in carbohydrates. In contrast, adherence to a healthy diet may reduce the odds of an elevated BMI, fat mass, LDL, blood pressure, and fasting glucose in carriers of this allele [R, R, R, R, R].

CRY2

CRY2 Report

Cryptochrome 2 (CRY2) plays a crucial role in our circadian rhythms - the daily cycles that govern everything from sleep to metabolism. This gene helps regulate our master biological clock and influences how our bodies process nutrients throughout the day.

CRY2 functions by suppressing other clock genes, particularly at night, helping to maintain the proper timing of our internal processes. What makes CRY2 particularly interesting from a nutritional perspective is its involvement in glucose metabolism and insulin sensitivity.

Research has shown that CRY2 also responds to changes in our diet and eating patterns. This two-way relationship means that our dietary choices can influence our circadian rhythms, while our internal clock affects how we process the nutrients we consume.

SNP	Your Genotype
rs11605924 Alleles **A:** Altered CRY2 activity **C:** Normal CRY2 activity	AC **Your genotype is linked to typical CRY2 activity and typical circadian rhythm and blood sugar control**

Intro and Health Effects

The main CRY2 variant is rs11605924. Its “A” allele is associated with higher blood sugar and diabetes [R, R, R].

On the bright side, this variant may be linked to enhanced fat burning on a high-fat diet [R].

Circadian rhythm is well-established in diet, metabolism, and blood sugar control [R].

FABP2

FABP2 Report

The *FABP2* gene encodes a protein called fatty acid binding protein 2 that is found throughout the whole intestine and may help with the body's energy balance. FABP2 absorbs and transports long-chain fatty acids and helps produce triglyceride-rich lipoproteins. It also senses and adjusts how many fat molecules are available for energy production [R, R].

FABP2 levels may rise in response to intestinal injury. Elevated levels may signal conditions such as celiac disease and necrotizing enterocolitis [R, R, R].

SNP

rs1799883 Ala54Thr

Alleles

C: Typical FABP2 activity

T: Increased FABP2 activity

Your Genotype

CC

Your genotype is linked to typical FABP2 activity, typical insulin sensitivity, and weight control.

Intro and Health Effects

The most widely researched polymorphism is rs1799883, also called Ala54Thr. Its minor 'T' allele encodes a protein with an amino acid substitution that increases its affinity for long-chain fatty acids. As a result, the mutated version of this protein increases intestinal fatty acid absorption while reducing insulin sensitivity [R].

In line with its link to reduced insulin sensitivity, this variant has been associated with an increased risk of type 2 diabetes, especially in Asians [R, R, R, R].

This variant has also been associated with:

- High blood pressure [R]
- High triglycerides [R]
- High BMI, body weight, and hip circumference [R, R]
- Metabolic syndrome [R]
- Coronary artery disease [R]
- Ischemic stroke [R, R]

FABP4

FABP4 Report

The *FABP4* gene encodes a protein called '*fatty acid binding protein 4*', also called aP2 (*adipocyte protein 2*). FABP4 is mainly expressed in fat cells and macrophages, and is involved in the uptake, transport, and metabolism of fatty acids [R, R].

Because of this role, *FABP4* variation has been studied in relation to body fat, insulin resistance, and obesity-related metabolic traits in multiple human cohorts.

SNP

rs1054135

Alleles

C: Typical FABP4 activity

T: Increased FABP4 activity

Your Genotype

CC

Your genotype is linked to typical FABP4 activity, typical fat metabolism, and weight control

Intro and Health Effects

The most widely-researched *FABP4* polymorphism when it comes to weight is **rs1054135**. Its minor 'T' allele has been associated with higher FABP4 levels [R, R].

In children, this variant has been associated with obesity and OSA. Moreover, it has been associated with higher LDL cholesterol levels in adults with obesity and type 2 diabetes [R, R, R].

FGF21

FGF21 Report

The *FGF21* (Fibroblast growth factor 21) gene codes for a hormone with complex roles in metabolism, thermoregulation, and food preferences. The liver is the primary source of FGF21, where it regulates fat and glucose metabolism, response to fasting, and more [R, R, R].

More precisely, it increases insulin sensitivity and promotes fatty acid oxidation. Brown fat tissue is another significant source of FGF21, which stimulates energy production and helps the body adapt to cold temperatures [R, R].

Reduced activity of this hormone may play a role in obesity and other metabolic disorders. In preliminary research, FGF21 analogs have shown the potential to improve weight control, blood lipid profile, liver fat content, and glucose metabolism [R, R, R, R].

SNP	Your Genotype
rs838133 Alleles **A:** Better carb tolerance **G:** Worse carb tolerance	AG **Your genotype is linked to typical carb tolerance and body fat levels**

Intro and Health Effects

A 2018 study analyzed the data from over 450,000 people and found a significant association between one FGF21 SNP and macronutrient preference. Carriers of the minor “A” allele at rs838133 consumed less fat and more carbohydrates. Additionally, these subjects had lower body fat [R].

Another trial of 38,000 participants confirmed the link between rs838133 and lower fat/higher carb preference [R].

SNP	Your Genotype
rs838145 Alleles **A:** Worse carb tolerance **G:** Better carb tolerance	GA **Your genotype is linked to typical carb tolerance**

Intro and Health Effects

One more SNP in this gene showed a similar trend in a study of 33,500 subjects. People with the minor “G” allele at rs838145 consumed less fat and more carbs [R].

GCKR

GCKR Report

Glucokinase is an enzyme that can convert blood sugar (glucose) to another compound (glucose-6-phosphate). This conversion is an early step in the release of the hormone insulin from the pancreas, and the production of the stored form of blood sugar (glycogen) in the liver [R].

Insulin can act on the liver to boost production of the stored form of blood sugar in response to elevated blood sugar levels; for example, after consumption of a meal [R].

The *GCKR* gene codes for the glucokinase regulator. This protein binds to and physically inhibits glucokinase from converting blood sugar to glucose-6-phosphate [R].

In this manner, the glucokinase regulator can lower the production of insulin and prevent the storage of blood sugar when blood sugar levels are low [R].

Variants of *GCKR* have been associated with elevated blood sugar [R, R].

SNP	Your Genotype
rs1260326 Alleles **C:** Increased GCKR activity **T:** Reduced GCKR activity	CT **Your genotype is linked to typical GCKR activity and typical insulin release and blood sugar levels**

Intro and Health Effects

The main *GCKR* variants are:

- rs1260326
- rs780093

They are almost always inherited together, meaning you will most likely have either all or none of them. Their “C” alleles may be linked to higher blood sugar levels and diabetes [R, R, R].

On the positive side, these variants are linked to lower levels of cholesterol and other blood lipids [R].

These variants may increase the production or activity of the glucokinase regulator, and thus inhibit the actions of glucokinase. This can result in elevated blood sugar levels — and lower blood lipids — by decreasing insulin release in response to meals [R, R].

GHSR

GHSR Report

The *GHSR* gene encodes a protein called '*growth hormone secretagogue receptor*', which acts as the **main receptor for the "hunger hormone" ghrelin**. This hormone is mainly produced by the stomach, but smaller amounts are also produced by other organs [R, R, R, R, R].

Ghrelin is considered the "hunger hormone" because it stimulates appetite, promotes eating, and increases fat storage [R, R].

GHSR is mainly found in the hypothalamus, where it promotes hunger upon binding to ghrelin [R, R].

Outside the hypothalamus, the binding of ghrelin to this receptor signals the pituitary gland to start secreting growth hormone [R].

SNP	Your Genotype
rs490683 Alleles **G:** Typical GHSR activity **C:** Reduced GHSR activity	GG **Your genotype is linked to typical GHSR activity and typical ghrelin activity and appetite**

Intro and Health Effects

The main *GHSR* polymorphism when it comes to weight is **rs490683**. Its minor 'C' allele prevents the binding of a transcription factor to the DNA sequence, which results in a reduced gene expression [R, R].

This variant has been associated with greater weight loss from both dietary changes and bariatric surgery [R, R, R, R].

GIPR

GIPR Report

The *GIPR* gene is responsible for encoding a protein with the same name, GIPR (gastric inhibitory polypeptide receptor) [R].

The *GIPR* gene and the protein it helps create play an important role in insulin production in the body [R].

Research has found that certain variants in the *GIPR* gene can alter the body's ability to secrete insulin. As a result, these variants may be associated with insulin resistance, diabetes, and obesity [R, R, R].

The 'R' in GIPR stands for receptor, as it acts as a receptor for the GIP protein. The GIP protein belongs to a class of hormones called incretins, which are responsible for regulating blood sugar (glucose) levels [R].

When glucose levels become high, such as after a meal, GIP is secreted from special intestinal cells called K cells. This newly secreted GIP binds to GIPR located in the pancreas, which causes insulin secretion. Insulin allows the body to use or store glucose, which helps lower blood glucose levels [R].

Research suggests that certain variants in the GIPR gene may influence aspects of metabolic health, such as insulin resistance, type 2 diabetes, and body fat [R, R].

SNP

rs2287019

Alleles

C: Typical GIPR activity

T: Reduced GIPR activity

Your Genotype

CC

Your genotype is linked to typical GIPR activity and typical blood sugar control and insulin sensitivity.

Intro and Health Effects

The main variants in the GIPR gene are rs2287019 and rs10423928. They are almost always inherited together, meaning you will most likely have either both or none of them.

The minor alleles, rs2287019–T and rs10423928–A, are strongly linked to [R, R, R, R]:

- Type 2 diabetes
- Insulin resistance
- Gestational diabetes

On the other hand, they have shown associations with reduced body weight [R, R].

These variants may reduce insulin secretion after a meal. This may impair blood sugar control and contribute to diabetes but also promote fat burning [R, R].

GNPDA2

GNPDA2 Report

The *GNPDA2* gene encodes an enzyme that converts glucosamine-6-phosphate to fructose-6-phosphate and ammonium as part of what's called "aminosugar metabolism" [R].

This reaction is believed to be a part of sugar and fat metabolism. One study that investigated the effects of high and low GNPDA2 found that it increased fat deposition and altered the expression of genes that affect the insulin response [R].

The GNPDA2 enzyme is primarily active in the brain, and some research suggests it could play a role in appetite regulation [R, R].

Researchers believe that GNPDA2 increases the rates of obesity through its action in the hypothalamus. GNPDA2 enzyme levels in the hypothalamus increase with leptin [R, R, R].

Leptin is the primary hormone that suppresses appetite and makes us feel full. It is released after we have eaten a meal and in response to some other triggers. Researchers have found that GNPDA2 is released around the same time as leptin, but they are not sure whether it is a cause or consequence of leptin release, or whether GNPDA2 is released because of the same root signals as leptin [R, R].

One study suggests that GNPDA2 may also have something to do with fat deposition and the creation of new fat tissue. In this study, overexpression of GNPDA2 in stem cells led to increased accumulation of fat; a lack of GNPDA2 led to decreased accumulation of fat [R].

High GNPDA2 may therefore be a double-edged sword: it could decrease appetite (in the hypothalamus), but increase the rate of fat deposition (elsewhere in the body).

SNP	Your Genotype
rs1996023	o TT
Alleles **G:** Normal GNPDA2 activity **T:** Altered GNPDA2 activity	**Your genotype is linked to altered GNPDA2 activity and impaired insulin signaling and weight control.**

Intro and Health Effects

Another variant, **rs1996023**-T has been associated with obesity in Chinese children [R, R].

SNP

rs10938397

Alleles

A: Normal GNPDA2 activity

G: Altered GNPDA2 activity

Your Genotype

AA

Your genotype is linked to normal GNPDA2 activity and improved insulin signaling and weight control

Intro and Health Effects

Three *GNPDA2* variants have been associated with weight gain. The best-studied one is **rs10938397**, at which the minor 'G' allele has been linked to childhood obesity, increased body mass index (BMI), and increased waist circumference (WC) [R, R, R, R].

INSR

INSR Report

The *INSR* gene encodes the insulin receptor, which allows cells to respond to insulin and regulate glucose uptake, fat storage, and energy balance [R, R].

Insulin is a hormone that increases the uptake and storage of sugar in the muscles, liver, and fat cells for energy production. By doing this, insulin lowers blood sugar levels. Insulin also helps build proteins and fat [R, R, R, R, R].

Mutations in this gene lead to inherited severe insulin resistance syndromes, such as type A insulin resistance syndrome, Donohue syndrome, and Rabson-Mendenhall syndrome [R, R].

SNP	Your Genotype
rs2059807 Alleles **A:** Improved INSR activity **G:** Typical INSR activity	AG **Your genotype is linked to typical INSR activity, typical insulin signaling, and metabolic health**

Intro and Health Effects

When it comes to weight and insulin sensitivity, the main *INSR* polymorphism is **rs2059807**. Its minor 'A' allele has been associated with a decreased risk of:

- PCOS [R, R, R, R]
- Metabolic syndrome [R]

Moreover, this variant has been associated with lower hip circumference [R].

LEP

LEP Report

The *LEP* gene encodes **leptin**, **a satiety hormone that promotes weight loss**. Leptin is one of the big 4 hormones that determine weight. It is made in fat tissue, while receptors for it are dense in two important brain regions: the hypothalamus and hippocampus [R, R].

Along with ghrelin, leptin regulates appetite. Where ghrelin triggers feelings of hunger, leptin increases feelings of fullness and typically encourages us to stop eating [R].

The more fat is present, the more leptin is produced. This feedback loop, when functioning normally, keeps body weight in homeostasis: eating more food increases body fat, which increases leptin secretion. This decreases appetite and increases energy expenditure [R].

However, chronically high leptin (produced by large quantities of fat tissue, for example) might reduce the sensitivity of leptin receptors. This could lead to a state called leptin resistance, similar to insulin resistance in diabetes. People who are resistant to leptin would be less likely to feel full after eating; this could, in turn, lead to overeating and additional weight gain [R, R].

SNP	Your Genotype
rs7799039 Alleles **A:** Increased LEP activity **G:** Reduced LEP activity	↓GG **Your genotype is linked to reduced LEP activity, balanced leptin production, and appetite control**

Intro and Health Effects

Generally speaking, variants that lead to increased baseline leptin production are also linked with higher baseline weight, increased appetite, and more weight regain following a weight loss program [R].

The main *LEP* variants associated with higher leptin levels and increased weight include [R, R, R]:
'A' of **rs7799039**

SNP	Your Genotype
rs10244329 Alleles **A:** Reduced LEP activity **T:** Increased LEP activity	↑TT **Your genotype is linked to increased LEP activity, excessive leptin production, and worse appetite control**

Intro and Health Effects

Generally speaking, variants that lead to increased baseline leptin production are also linked with higher baseline weight, increased appetite, and more weight regain following a weight loss program [R].

The main *LEP* variants associated with higher leptin levels and increased weight include [R, R, R]:
'T' of **rs10244329**

SNP	Your Genotype
rs3828942 Alleles **A:** Reduced LEP activity **G:** Increased LEP activity	↑GG **Your genotype is linked to increased LEP activity, excessive leptin production, and worse appetite control**

Intro and Health Effects

Generally speaking, variants that lead to increased baseline leptin production are also linked with higher baseline weight, increased appetite, and more weight regain following a weight loss program [R].

The main *LEP* variants associated with higher leptin levels and increased weight include [R, R, R]:
'G' of **rs3828942**

LEPR

LEPR Report

Leptin is one of the two major hormones that control appetite and food intake, along with ghrelin. Where ghrelin triggers feelings of hunger, however, leptin increases feelings of fullness and typically encourages us to stop eating [R].

Initially, leptin was only known to be secreted by fat tissue and to circulate at levels directly proportional to the total amount of fat in the body [R].

Leptin is now known to be produced by various tissues and organs including the placenta, kidney, salivary glands, and stomach [R, R, R, R].

Some researchers believe that chronically high leptin (produced by large quantities of fat tissue, for example) might reduce the sensitivity of leptin receptors. This could lead to a state called leptin resistance, similar to insulin resistance in diabetes. People who are resistant to leptin would be less likely to feel full after eating; this could, in turn, lead to overeating and additional weight gain [R, R].

The *LEPR* gene encodes the leptin receptor and is a prime candidate gene for susceptibility to leptin resistance. Most researchers argue that people with fewer or less sensitive leptin receptors would be more likely to develop resistance and be overweight [R, R].

Enhancers:

Omega-3

SNP

rs1137101

Alleles

A: Increased LEPR activity

G: Reduced LEPR activity

Your Genotype

AG

Your genotype is linked to typical LEPR activity and typical leptin sensitivity and appetite control.

Intro and Health Effects

Many LEPR variants are currently under investigation for their possible link to leptin resistance and obesity. The most important one is rs1137101.

At rs1137101, the ‘GG’ genotype is associated with higher weight, higher BMI, and increased daily intake of calories. People with the ‘GG’ genotype at rs1137101 are also likely to have higher cholesterol, higher blood sugar, and insulin resistance [R].

A recent meta-analysis has confirmed a link between this variant and obesity. The risk was 19% higher per each “G” allele [R].

This variant likely reduces the number or activity of leptin receptors, potentially contributing to leptin resistance [R, R].

MC3R

MC3R Report

The MC3R gene encodes the melanocortin 3 receptor, activated by alpha-MSH and other melanocortins. MC3R is primarily expressed in the brain and fat tissue; it controls feeding behavior, fat burning, energy balance, and more [R, R].

Unlike MC4R, which suppresses appetite, the activation of MC3R in the brain stimulates short-term feeding after energy restriction [R, R].

Mice lacking MC3R are moderately obese and have much higher fat mass. Interestingly, they eat less but also move less and have impaired fat metabolism. The lack of MC3R stimulates fat buildup independent of food intake [R, R, R].

These effects become even more pronounced in the presence of a high-fat diet [R].

Likewise, mutations and variants in the MC3R gene may correlate with obesity, fat mass, and different metabolic conditions in humans [R, R].

SNP

rs3746619 Thr6Lys

Alleles

A: Reduced MC3R activity

C: Typical MC3R activity

Your Genotype

CC

Your genotype is linked to typical MC3R activity and typical energy balance and fat metabolism

Intro and Health Effects

Scientists have identified two major SNPs in the MC3R gene with a potential impact on body-weight measures: rs3746619 (Thr6Lys) and rs3827103 (Val81Ile). They are almost always inherited together, and the studies often refer to them in pairs.

The minor “A” alleles at rs3746619 and rs3827103 correlate with higher weight and fat mass in children, mostly of African and Asian descent [R, R, R, R].

Among 237 African American adults, those with the pair of “AA” genotypes had higher average BMI (37.6 vs. 35.2) and fat mass (45 vs. 39.7 kg) [R].

However, other studies have mostly failed to establish a connection between these SNPs and obesity in adults [R, R, R, R].

The obesity-associated “AA” genotypes are **scarce among European descendants**, so most trials had insufficient sample sizes to investigate these variants.

The “AA” genotypes at rs3746619 and rs3827103 change two amino acids in the MC3R structure. In test tubes, scientists found that this combination **reduces** receptor expression and activity [R, R].

Clinical studies have confirmed the link between the “A” alleles, excess leptin, and suppressed fat oxidation [R, R, R, R].

Did you know? The reduction in MC3R activity has likely brought an evolutionary advantage to people during starvation. They were able to build fat stores more efficiently, which increased their chances of survival. This phenomenon is called the thrifty gene hypothesis and may be responsible for a much higher frequency of the “A” allele in African populations [R].

PCSK1

PCSK1 Report

The PCSK1 gene helps produce proprotein convertase 1/3 (PC1/3), an enzyme abundant in the brain and endocrine system. PC1/3 activates a range of hormones and peptides involved in [R, R]:

- Temperature control
- Nutrient absorption
- Appetite and feeding behavior
- Glucose and fat metabolism
- Energy expenditure

PCSK1 was among the first discovered genes with a role in severe hereditary obesity [R, R].

Animal and clinical research have identified overeating as the primary cause of PCSK1-associated obesity. The PC1/3 enzyme is crucial in the hypothalamus, where it activates an array of peptides involved in food intake and metabolism [R, R, R].

In addition, PC1/3 activates many other hormones involved in energy balance and metabolism. It enables glucose metabolism by turning proinsulin into active insulin. Not surprisingly, common variants in the PCSK1 gene have been associated with diabetes and impaired insulin levels [R, R, R].

Enhancers:

Zinc Vitamin D

SNP

rs6232

Alleles

C: Reduced PCSK1 activity

T: Increased PCSK1 activity

Your Genotype

TT

Your genotype is linked to typical PCSK1 activity, typical melanocortin signaling and weight control

Intro and Health Effects

PCSK1 is one of the most studied genes when it comes to obesity. A huge meta-analysis gathered data from over 330K people and confirmed a significant link between three PCSK1 variants and obesity [R]:

- **rs6232**: people with the less common “C” allele had 15% higher obesity rates
- **rs6234**/**rs6235**: people with the less common “C/G” alleles had 7% higher obesity rates

The second and third SNPs are always inherited together, so the authors presented them as a pair. The SNPs had a higher impact among European children, with 53% and 15% higher obesity rates for rs6232 and rs6234/rs6235, respectively [R].

Another large meta-analysis of 19 trials and over 200K participants came to a similar conclusion. It observed 19% higher odds of obesity for rs6232 and 9% for rs6234/rs6235 [R].

The "C" allele at rs6232 changes one amino acid in the PC1/3 structure, hindering the production of this enzyme and reducing its activity by 30% [R, R].

SNP

rs6234

Alleles

G: Increased PCSK1 activity

C: Reduced PCSK1 activity

Your Genotype

GG

Your genotype is linked to typical PCSK1 activity, typical melanocortin signaling, and weight control

Intro and Health Effects

PCSK1 is one of the most studied genes when it comes to obesity. A huge meta-analysis gathered data from over 330K people and confirmed a significant link between three PCSK1 variants and obesity [R]:

- **rs6232**: people with the less common “C” allele had 15% higher obesity rates
- **rs6234**/**rs6235**: people with the less common alleles had 7% higher obesity rates

The second and third SNPs are always inherited together, so the authors presented them as a pair. The SNPs had a higher impact among European children, with 53% and 15% higher obesity rates for rs6232 and rs6234/rs6235, respectively [R].

Another large meta-analysis of 19 trials and over 200K participants came to a similar conclusion. It observed 19% higher odds of obesity for rs6232 and 9% for rs6234/rs6235 [R].

Rs6234 and rs6235 cause changes in the enzyme region responsible for proper folding and recognition of target hormones. Scientists haven't yet identified the functional consequences of these SNPs, but they likely impair enzyme activity [R, R].

PER2

PER2 Report

PER2, short for PERIOD2, is a core component of the biological clock. It is one of the main genes responsible for human daily rhythms, also known as circadian rhythms [R, R, R].

A lot of what happens in the body follows a daily rhythm, so it's not surprising that PER2 has many and varied roles. To name a few, mutations in this gene have been linked to:

- Being either a morning lark or a night owl [R, R, R, R, R]
- Advanced sleep phase syndrome, an inherited abnormal sleep pattern where people are sleepy early in the evening and wake up very early in the morning [R, R, R]
- Melatonin levels [R]
- Depression, bipolar disorder, seasonal variations in mood, and winter depression [R, R, R, R]
- Insomnia [R]
- Reward circuitry and dopamine levels in the brain [R, R]
- Body weight [R, R]
- Fasting blood glucose, cholesterol levels, and metabolic syndrome [R, R, R, R]

In this report, we will focus on PER2's role in dieting. When PER2 is disrupted, it can lead to misaligned metabolism, increased appetite at the wrong times, and a higher tendency to gain weight, especially with irregular sleep or eating schedules.

SNP

rs2304672

Alleles

A: Altered PER activity

G: Normal PER2 activity

Your Genotype

GG

Your genotype is linked to normal PER2 activity, better circadian rhythm, and dietary habits

Intro and Health Effects

Scientists put 454 overweight and obese Spanish people on a Mediterranean diet. They found that people who were carrying the minor “C” allele for the rs2304672 variant in the PER2 gene were more likely to [R]:

- Drop out of the diet/study
- Experience stress when dieting
- Be extreme snackers
- Eat when bored
- Skip breakfast

SNP

rs4663302

Alleles

C: Normal PER2 activity

T: Altered PER2 activity

Your Genotype

CT

Your genotype is linked to typical PER2 activity, typical circadian rhythm, and dietary habits

Intro and Health Effects

People with another PER2 variant, rs4663302-T, were more likely to drop out from the study. They also had more belly fat [R].

Researchers found that mice that lack the PER2 gene develop the so-called "night eating syndrome", which combines features of a circadian rhythm disorder and an eating disorder. On a high-fat diet, these mice eat as much during their rest period as they do during their active period and that's how they become obese [R].

PLIN1

PLIN1 Report

PLIN (Perilipin) controls how fat is stored and released from fat cells by regulating access to stored lipids. When its function is altered, the body may hold onto fat more easily or break it down less efficiently, which can contribute to increased fat accumulation and difficulty losing weight.

SNP

rs894160

Alleles

C: Reduced PLIN1 activity

T: Increased PLIN1 activity

Your Genotype

TC

Your genotype is linked to typical PLIN1 activity and balanced blood sugar and weight control

Intro and Health Effects

The best-characterized PLIN1 polymorphism is rs894160. Its minor 'T' allele increases lower perilipin levels and has been associated with an increased risk of type 2 diabetes, metabolic syndrome, and PCOS [R, R, R, R, R, R].

Interestingly, the effects of this variant on blood glucose control strongly depend on the composition of the diet. Increasing complex carbohydrates may counteract the negative effects of the 'T' allele on insulin sensitivity, while dietary fats may worsen them [R, R].

On the bright side, the 'T' variant has been associated with enhanced fat breakdown and decreased obesity risk in white women. Two studies associated this allele with smaller waist and hip circumferences when complex carbohydrate intake is higher than 144 g/day, but with larger waist circumference when it's lower [R, R, R, R, R, R].

SNP

rs1052700

Alleles

A: Reduced PLIN1 activity

T: Increased PLIN1 activity

Your Genotype

TA

Your genotype is linked to typical PLIN1 activity and balanced blood sugar and weight control

Intro and Health Effects

Another well-researched variant is rs1052700 (14995A>T). Its minor ‘T’ allele has been associated with an increased risk of type 2 diabetes and glucose intolerance. Carriers of the minor allele may benefit from increasing their dietary ratio of complex carbohydrates to fat when it comes to reducing insulin resistance [R, R, R, R].

POMC

POMC Report

Proopiomelanocortin, or POMC, is a protein that is cut into multiple other, smaller proteins with specialized functions. More specifically, POMC is divided into adrenocorticotropic hormone (ACTH) and three melanocyte-stimulating hormones (α-, β-, and γ-MSH) [R].

POMC is expressed by nerve cells called POMC neurons. These neurons mainly exist in the hypothalamus, a small brain structure that controls hormone expression and maintains homeostasis—that is, whenever the hypothalamus receives signals that something is out of the ordinary, it sends appropriate signals to restore systems to normal [R, R].

POMC helps maintain homeostasis by, among other things, suppressing appetite when we have eaten enough food [R].

Mutations that shorten the POMC gene may cause POMC deficiency, characterized by uncontrolled appetite, obesity, and adrenal insufficiency [R, R].

Enhancers:

Zinc

SNP

rs6713532

Alleles

C: Increased POMC activity

T: Reduced POMC activity

Your Genotype

↓TT

Your genotype is linked to reduced POMC activity and increased appetite and weight gain.

Intro and Health Effects

Three SNPs so far have been associated with higher weight and body fat to varying degrees. They include [R, R, R, R]:

- **rs6713532**-T

Lower POMC is generally associated with higher appetite and potential for weight gain [R].

SNP

rs1042571

Alleles

A: Reduced POMC activity

G: Increased POMC activity

Your Genotype

↑GG

Your genotype is linked to increased POMC activity, reduced appetite, and better weight control

Intro and Health Effects

Three SNPs so far have been associated with higher weight and body fat to varying degrees. They include [R, R, R, R]:

- rs1042571-A

Lower POMC is generally associated with higher appetite and potential for weight gain [R].

SNP

rs934778

Alleles

A: Increased POMC activity

G: Reduced POMC activity

Your Genotype

↑AA

Your genotype is linked to increased POMC activity, reduced appetite, and better weight control.

Intro and Health Effects

Three SNPs so far have been associated with higher weight and body fat to varying degrees. They include [R, R, R, R]:

- rs934778-G

Lower POMC is generally associated with higher appetite and potential for weight gain [R].

PPARA

PPARA Report

The *PPARA* gene encodes a protein called PPAR-α (short for peroxisome proliferator-activated receptor alpha). PPAR-α is part of the larger PPAR family, which also includes PPAR-γ (*PPARG*) and PPARβ/δ (*PPARD*). In general, PPARs bind to polyunsaturated fatty acids. However, different fatty acids activate different PPARs, triggering diverse downstream effects [R].

PPAR-α is a key regulator of fat burning. More broadly, it controls energy balance and the metabolism of fats, carbohydrates, and amino acids [R, R].

PPAR-α signals the liver to break down more fat. When you're fasting and there aren't enough carbs in your body to burn for energy, PPAR-α helps trigger ketogenesis, the process of burning fat for energy [R, R].

The *PPARA* gene is important for determining your response to diet because PPAR-α is under strong influence of nutrients, especially fats. Its main natural activators are polyunsaturated fatty acids (PUFAs) [R].

When it comes to synthetic compounds, PPAR-α is activated by drugs used to treat dyslipidemia. Other PPAR-α activators are being developed, which further emphasizes this protein's role in maintaining fatty acid balance in the body [R].

SNP

rs1800206 L162V

Alleles

G: Reduced PPARA activity

C: Typical PPARA activity

Your Genotype

CC

Your genotype is linked to typical PPARA activity, typical fat metabolism, and blood lipid levels

Intro and Health Effects

So far, the most well-studied PPARA SNP in nutrigenomics is rs1800206. Its minor 'G' allele (also known as the *L162V polymorphism*) reduces PPAR-α activity, according to the available data [R].

Carrying this allele has been associated with [R]:

- Increased heart disease risk in whites, with higher levels of triglycerides, total cholesterol, LDL, apoA1, and apoB, and decreased levels of HDL
- Possible, but uncertain impact on diabetes development

The negative effects of this genotype seem to be more pronounced in men than in women, and in whites than in Asians. Data on other ethnicities are sparse [R].

Moreover, people carrying at least one ‘G’ allele who consumed high amounts of saturated fat had smaller LDL particles than those with lower intakes in a study. Based on this, they don’t seem to be well-suited for a ketogenic diet high in saturated fat [R].

The opposite may be true for ‘CC’ carriers. Among people with this genotype, those with higher saturated fat intakes had larger LDL particles than those with lower saturated fat intakes [R].

A study of 2373 participants found an association between the ‘G’ allele and higher total and LDL cholesterol in men and apolipoprotein B in both genders. The LDL cholesterol link was even stronger in carriers of the “good” E2 *APOE* allele [R].

A follow-up study of 2106 people from the same cohort concluded that ‘G’-allele carriers had greater triglyceride and apoC-III levels when they consumed a low-PUFA diet. But when their PUFA intake was high, they had *lower* triglyceride and apoC-III levels. The authors pointed out that the more PUFAs ‘G’-allele carriers ate, the more their triglycerides and apoC-III levels dropped--and vice versa [R, R].

Theoretically, a higher PUFA intake might make up for lower PPARA activity in ‘G’-allele carriers. A diet high in omega-3 PUFAs is still the healthiest choice even for people carrying the more common ‘CC’ genotype, but these subjects might be less prone to triglyceride spikes if their diet happens to be a bit lower in PUFAs, as most diets that rely on animal fat are [R].

PPARG

PPARG Report

The *PPARG* gene encodes a protein called PPAR-γ (peroxisome proliferator-activated receptor-gamma) [R].

PPAR-γ affects metabolic health and response to diet, acting as a master regulator between [R, R]:

- Nutrient intake
- Weight control
- Inflammation
- Fat burning
- Insulin sensitivity

Different dietary compounds activate different PPARs, making them a central topic in nutrigenomics and personalized nutrition. The primary PPAR-γ activators are omega-3 fatty acids (DHA and EPA), and omega-6 fatty acids (linoleic acid, alpha-linolenic acid) [R, R].

PPAR-γ has been mostly researched with respect to its role in weight control. On the one hand, it seems to maintain the function of existing fat cells but *decreases* their size, preventing weight gain, obesity-related inflammation, and mitochondrial dysfunction [R, R, R].

On the other hand, studies suggest that PPAR-γ can also jump-start the creation of new fat cells. This effect may protect against metabolic issues due to overeating but also contribute to persistent obesity [R, R].

PPAR-γ also reduces inflammation and allows fats cells to take up glucose and free fatty acids, enhancing insulin sensitivity [R, R, R, R].

Enhancers:

Omega-3

SNP

rs1801282

Alleles

G: Reduced PPARG activity

C: Typical PPARG activity

Your Genotype

CC

Your genotype is linked to typical PPARG activity and reduced weight gain but worse blood sugar control

Intro and Health Effects

Out of the different SNPs in the *PPARG* gene, researchers have mostly focused on rs1801282 (*Pro12Ala,* referred to as rs1805192 in some studies). Its 'G' allele changes one amino acid in the PPAR-γ structure, reducing its ability to activate target genes [R, R].

In a large meta-analysis of 75 studies and 49,000 subjects, the 'G' allele correlated with a slightly higher BMI. The link was more robust in European populations. A 2015 meta-analysis of 56 trials came to a similar conclusion. Another meta-analysis associated the 'G' allele with 55% higher obesity rates [R, R, R].

However, some studies failed to confirm a relationship between this variant and body weight, and some even observed a protective effect of the 'G' allele [R, R, R, R, R].

Among 978 elderly subjects, rs1801282-G correlated with 66% higher obesity rates. The lack of physical activity and increased intake of carbs amplified this genetic effect [R].

Interestingly, three studies found that people with rs1801282-G respond better to physical activity when it comes to metabolic improvements [R, R, R].

This variant may also affect weight loss from the Mediterranean diet. Several studies found that 'G' carriers lost more weight when eating a Mediterranean diet rich in MUFAs, PUFAs, and extra virgin olive oil, but lost less or even gained it when eating a diet low in these and high in saturated fats [R, R, R, R, R].

PPAR-γ can be a double-edged sword when it comes to regulating blood sugar levels. While its activity in the liver and pancreas enhances glucose metabolism and insulin sensitivity, excess PPAR-γ activity in fat cells can accumulate fatty acids and other factors that contribute to insulin resistance and elevated blood sugar [R, R, R, R].

This may explain why the 'C' variant has been associated with higher blood sugar and increased rates of type 2 diabetes. In one of the studies, obesity further increased the risk of type 2 diabetes associated with this variant [R, R, R, R].
Finally, the 'G' variant of rs1801282 has also been associated with reduced rates and severity of acne [R, R].

PPARGC1A

PPARGC1A Report

The *PPARGC1A* gene encodes a protein called PPARG coactivator 1 alpha, or PGC-1α. PGC-1α regulates the expression of genes that help produce energy in the cell. It is involved in the production of new mitochondria, as well as in the function of existing mitochondria. Along with *UCP3*, *PPARGC1A* helps your body stay warm by converting energy into heat [R, R].

PGC-1α increases PPARG and thyroid hormone levels. It also affects how energy metabolism changes over a 24-hour cycle (following a circadian rhythm) [R].

The expression of this gene is affected by physiological stimuli such as exercise, fasting, and cold exposure [R, R].

When its activity is reduced, the body burns fewer calories and fat at rest, which can promote fat accumulation and make weight loss more difficult.

Enhancers:

Resveratrol Quercetin

SNP	Your Genotype
rs8192678	CT

Alleles

C: Increased PPARGC1A activity

T: Reduced PPARGC1A activity

Your genotype is linked to typical PPARGC1A activity and typical fitness, metabolism, and mitochondrial health

Intro and Health Effects

The most well-researched PPARGC1A polymorphism is rs8192678. Its minor ‘T’ allele decreases PPARGC1A expression and PGC-1α levels in the muscles [R, R, R].

This variant has been associated with a decreased overall athletic ability and sports performance, especially in endurance sports such as long-distance running and cycling. Moreover, carriers may benefit less from aerobic exercise for improving their aerobic capacity, gaining muscle mass, and lowering LDL cholesterol [R, R, R].

This variant has been associated with an increased risk of type 2 diabetes in European, Indian, and Chinese populations, as well as with higher blood pressure in individuals younger than 50 years old [R, R, R, R].

It may also be linked to worse cold adaptation due to reduced PGC-1α levels and impaired mitochondrial function.

In contrast, a study of 161 Caucasian athletes from Russia and Lithuania found an increased prevalence of the ‘TT’ genotype among powerlifters [R].

PYY

PYY Report

Neuropeptides are small proteins used to transmit signals in the brain, and neuropeptide Y (NPY) is one of the most abundant of these, along with peptide YY (PYY) and pancreatic polypeptide (PP) [R].

PYY is what's called an anorexigenic or anorectic compound, meaning that it reduces appetite and food intake [R, R].

This peptide has such a strong effect on body weight that it has been considered as a potential treatment for obesity. In multiple rat and mouse studies, injecting PYY into the brain led to dramatic weight reductions in appetite and subsequent weight loss; however, researchers have struggled to reproduce this result in humans or to find substances that dramatically increase PYY in humans [R].

SNP	Your Genotype
rs162430 Alleles **A:** Reduced PYY activity **G:** Increased PYY activity	GG **Your genotype is linked to typical PYY activity, typical food intake, and weight gain**

Intro and Health Effects

At rs162430, the 'A' allele was more common in obese children than in children of healthy weight. This allele was also associated with severe obesity in indigenous Pima men [R].

SNP	Your Genotype
rs2070592 Alleles **C:** Reduced PYY activity **T:** Increased PYY activity	↑TT **Your genotype is linked to increased PYY activity and reduced food intake and weight gain**

Intro and Health Effects

At rs2070592, the 'C' allele is associated with reduced PYY gene expression and increased total cholesterol. This association was especially strong when combined with the common 'G' allele at rs162431 [R].

TCF7L2

TCF7L2 Report

The *TCF7L2* gene, previously known as TCF4, codes for a vital transcription factor. It controls the expression of other genes in digestive organs such as the gut and pancreas, with a particular role in glucose metabolism and insulin secretion [R, R].

TCF7L2 research has mostly focused on its strong association with type 2 diabetes. However, variants in this gene also correlate with impaired lipid metabolism and heart disease [R, R, R, R].

From what we currently know, *TCF7L2* variants can impair insulin secretion but not insulin sensitivity. This gene controls the activity of GLP-1, an intestinal peptide that stimulates insulin secretion in response to food [R, R, R].

Besides its crucial role in glucose control, TCF7L2 impacts fat metabolism. It regulates the production of signalling proteins—such as leptin and adiponectin—for weight gain, appetite, and more. The exact mechanisms behind this control are still unknown [R, R].

SNP

rs7903146

Alleles

C: Increased TCF7L2 activity

T: Reduced TCF7L2 activity

Your Genotype

CT

Your genotype is linked to typical TCF7L2 activity and intermediate response to carbs.

Intro and Health Effects

The *TCF7L2* gene affects insulin release after eating foods like grains. It is one of the genes most strongly associated with **diabetes.** Depending on which variant of this gene you carry, your body may respond differently to carbs [R].

The “farmer” variant (rs7903146-CC) is linked to a better response to carbs. **In people with this variant, carbs don't tend to spike blood sugar** [R, R, R].

The "hunter-gatherer" variant (rs7903146-TT) is linked to a worse response to carbs. **In people with this variant, even complex carbs like whole grains tend to spike blood sugar** [R, R, R].

People carrying both variants (rs7903146-CT) have an intermediate response to cabs. **This means that cabs may spike their blood sugar levels but to a lesser extent**.

TFAP2B

TFAP2B Report

The *TFAP2B* gene codes for a protein called *transcription factor AP-2B*, which can control the activity of other genes. TFAP2B influences cell division and programmed death (apoptosis) [R].

Research shows that TFAP2B is active in cells in the early prenatal period, affecting how the brain and other tissues and organs develop [R].

The *TFAP2B* gene is mostly expressed in fat tissue. Scientists think that TFAP2B overactivity might contribute to inflammation and fat buildup. It does so by reducing adiponectin and increasing IL-6 [R, R, R].

Low adiponectin levels have been linked with obesity, insulin resistance, and heart disease. IL-6 is an inflammatory cytokine. Hence, TFAP2B seems a plausible link between obesity and low-grade inflammation [R, R].

This gene also appears to increase the size of fat cells. Switching *TFAP2B* on in test tubes transformed regular cells into massive, dangerous fat cells that are characteristic of obesity [R].

SNP	Your Genotype
rs987237	**AA**
Alleles **A:** Typical TFAP2B activity **G:** Increased TFAP2B activity	**Your genotype is linked to typical TFAP2B activity and typical adiponectin release and weight control**

Intro and Health Effects

Variations in the TFAP2B gene have been associated with increased weight and belly fat, and type 2 diabetes. The majority of obesity and diet-related research focused on a SNP labeled rs987237. Its minor “G” allele may increase TFAP2B expression in fat cells [R, R, R].

In a huge meta-analysis of over 195,000 people, the “G” allele was associated with a higher body mass index (BMI) [R].

The “G” allele was associated with 24% obesity rates in a meta-analysis that included 34,600 European participants. Another large review of 16 trials found a link between this variant and waist circumference, which is a measure of abdominal obesity [R, R].

In a study of 642 obese adults, those with the “GG” genotype lost 2.6 kg more on a high-fat diet, compared with a low-fat diet [R].

UCP3

UCP3 Report

The *UCP3* gene encodes a protein called '*uncoupling protein 3*'. In the mitochondria (the main powerhouse of cells), the breakdown of nutrient fuels is *coupled* to the production of the energy molecule ATP. Members of the uncoupling protein family prevent the production of this molecule and instead cause the energy to be dissipated as heat [R, R].

UCP3 is mainly found in muscles, but also present in smaller amounts in heart and brown fat tissues. Fasting and acute exercise increase the expression of the *UCP3* gene, while endurance training reduces or increases it depending on the study [R, R, R, R, R, R, R].

The biological function of UCP3 remains poorly understood. Although it can block ATP generation to produce heat, just as its sister protein UCP1, research suggests its main role is to break down fatty acids and remove them from the inner side of the mitochondria. This may reduce oxidative damage and preserve mitochondrial function [R, R, R, R].

When UCP3 activity is reduced, fat oxidation becomes less efficient and more energy is stored rather than burned, which can contribute to fat gain and reduced metabolic flexibility.

SNP	Your Genotype
rs1800849 -55C/T Alleles **A:** Increased UCP3 activity **G:** Reduced UCP3 activity	↓GG **Your genotype is linked to reduced UCP3 activity and reduced fat burning and energy production**

Intro and Health Effects

The most widely-investigated *UCP3* polymorphism by far is rs1800849, also known as -55C/T. A study in Pima Indians found that the minor allele 'A' increases *UCP3* expression, and possibly the levels of the protein, in the muscles [R].

Some studies suggest that the minor variant at this polymorphism may protect from obesity, especially in Caucasians. The mixed results observed may be due to differences in the diet, physical activity, and genetic background of the different populations. Importantly, different *UPC2* and *UPC3* variants are inherited together and their combinations may influence their effects on weight [R, R, R, R].

This variant has been associated with a higher waist circumference, waist-to-hip ratio, and abdominal fat in multiple populations. However, a Spanish study found no relationship between this polymorphism and fat mass or distribution in obese individuals. Another study on American women associated it with increased lean mass and calorie intake [R, R, R, R, R, R].

Two meta-analyses confirmed the association of the ‘A’ variant with increased susceptibility to type 2 diabetes in Asians but not in Europeans [R, R].

SNP	Your Genotype
rs647126	GA
Alleles **A:** Reduced UCP3 activity **G:** Increased UCP3 activity	**Your genotype is linked to typical UCP3 activity, typical fat burning, and energy production.**

Intro and Health Effects

The minor variants at the rs647126 and rs2075577 polymorphisms, which are usually inherited together, were associated with increased BMI in Dutch men. Based on their effect, the authors of the study speculated that these variants may reduce UCP2/UCP3 activity [R].

Different *UPC2* and *UPC3* variants are inherited together, and their combinations may influence their effects on weight.

AKT2

AKT2 Report

The *AKT2* gene encodes one of the three closely related serine/threonine-protein kinases, AKT2, which plays a key role in the insulin signaling pathway [R, R].

AKT2 helps transmit insulin's signal inside cells, promoting glucose uptake and regulating fat storage. Reduced AKT2 signaling efficiency is linked to insulin resistance, a central feature of obesity-related metabolic dysfunction [R, R, R].

Because of this role, common *AKT2* variants have been studied in relation to insulin resistance, BMI, and central adiposity in human populations [R, R, R].

SNP	Your Genotype
rs3730051 Alleles **C:** Altered AKT2 activity **T:** Normal AKT2 activity	TT **Your genotype is linked to normal AKT2 activity and improved insulin signaling and metabolic health**

Intro and Health Effects

A study of almost 500 women associated the minor 'C' alleles of **rs3730051** and **rs8100018** with an increased risk of PCOS, a condition associated with higher rates of obesity and insulin resistance [R].

These variants are usually inherited together, so you will either carry both or neither of them.

DIO2

DIO2 Report

DIO2 (Type 2 Deiodinase) controls the local activation of thyroid hormones, which directly influences metabolic rate and calorie burning. When DIO2 activity is reduced, less active thyroid hormone is available in tissues, leading to a slower metabolism, lower energy expenditure, and a greater tendency to gain weight.

Enhancers:

Selenium Zinc

SNP

rs225014 Thr92Ala

Alleles

C: Reduced DIO2 activity

T: Increased DIO2 activity

Your Genotype

↑TT

Your genotype is linked to increased DIO2 activity and increased T3 production and fat burning

Intro and Health Effects

At first glance, one might think DIO2 doesn't have much of an impact on thyroid health. Multiple studies failed to make a connection between variations in this gene and thyroid hormone levels [R, R].

However, many people have symptoms of low thyroid hormones despite their lab results being in the normal range ('hidden hypothyroidism'). That *might be* because their thyroid hormones don't function well on a cellular and tissue level, which cannot be measured by blood tests.

One *DIO2* variant may be involved in this phenomenon. The less common "C" allele on rs225014 (Thr92Ala) is associated with:

- Poor response to thyroid meds [R, R]
- Obesity and insulin resistance [R]
- Inadequate blood sugar control [R]
- Impaired cognitive development (lower IQ) [R]

All of the above may indicate low thyroid hormones in DIO2 target tissues such as the brain, fat tissue, and muscles.

The same DIO2 variant (rs225014) is associated with an inadequate response to thyroid meds in some people. Out of 45 patients, those who carried at least one "C" allele didn't respond as well to standard T4 treatment and were significantly more depressed. They preferred a combination of T4 and T3 (liothyronine) instead [R].

A larger trial came to a similar conclusion, though the effects were significant only for patients who had both copies of the “C” allele [R].

A Dutch study with over 12,600 participants found no connection between DIO2 and thyroid treatment response. However, they didn’t investigate the effects of the T4+T3 combination [R].

FTO

FTO Report

FTO is one of the best-studied genes when it comes to body weight and obesity, hence the name: fat mass and obesity-associated gene. It's the first discovered genetic link to obesity and continues to be the gene with the largest known effect on body weight to this day [R, R, R].

A lot is still unclear about FTO functions, but studies suggest this gene works as a "master switch" that controls a variety of other weight-associated genes and pathways in our bodies [R, R].

One of the primary ways that FTO may affect body weight is through its influence on appetite, emotional aspects of eating, and food preferences. Another potential mechanism includes its adverse effects on fat metabolism and energy expenditure [R, R, R].

SNP	Your Genotype
rs9939609 Alleles **A:** Altered FTO activity **T:** Normal FTO activity	TT **Your genotype is linked to normal FTO activity, lower odds of obesity, and healthier dietary choices.**

Intro and Health Effects

An SNP in this gene, rs9939609, has shown a robust association with obesity across different ages and ethnic groups. Carriers of the minor 'A' allele tend to gain more weight and have higher rates of obesity [R, R, R, R].

Many human studies suggest that the 'A' allele at rs9939609 is associated with:

- Higher levels of ghrelin or the "hunger hormone" [R]
- Higher food intake [R, R, R]
- Increased preference for higher-calorie foods [R, R, R]
- Increased enjoyment of food [R]
- Not feeling full after meals [R, R, R]
- Eating in the absence of hunger [R, R]
- Food cravings [R]
- Emotional and binge eating [R]

In contrast, the 'T' allele is linked to normal body weight, more satiety after meals, and possibly healthier dietary choices [R, R, R].

In addition to its potential influence on appetite and hunger control, this FTO SNP may also have metabolic effects that affect how the body actually processes the food we eat. For example, several studies suggest that the 'A' allele of rs9939609 may be linked with higher insulin resistance and blood sugar [R, R, R, R].

Multiple studies have associated an increased intake of dietary fat, specifically saturated and trans fat, with obesity in carriers of the ‘A’ allele [R, R, R, R, R, R, R].

Carriers of this variant may benefit from replacing saturated fat with healthy fats such as PUFA and MUFA, and increasing their protein intake [R, R, R, R, R].

IRS1

IRS1 Report

Insulin receptor substrate 1 (IRS1) is a key player in how our bodies process and use energy. It's part of the system that helps cells respond to insulin, a hormone that regulates blood sugar levels.

When insulin binds to its receptor on a cell, IRS1 gets activated and starts a chain reaction inside the cell. This process helps cells take in sugar from the blood, store fat, and manage cholesterol. In short, IRS1 is vital for keeping our metabolism running smoothly.

When IRS1 doesn't work properly, it can lead to problems like insulin resistance, which is a major factor in type 2 diabetes. It can also throw off fat and cholesterol balance, raising the risk of heart disease. Because of this, IRS1 plays a crucial role in many aspects of our overall metabolic health.

Enhancers:

Magnesium

SNP	Your Genotype
rs2943641	TC
Alleles **C:** Reduced IRS1 activity **T:** Increased IRS1 activity	**Your genotype is linked to typical IRS1 activity, typical insulin signaling, and fat metabolism**

Intro and Health Effects

One of the most studied IRS1 variants is rs2943641. People with the "T" allele may have [R]:

- Lower odds of heart disease and diabetes
- Lower levels of fasting glucose, insulin, and triglycerides
- Higher levels of HDL or "good" cholesterol

Interestingly, a study linked this variant to improved insulin resistance and weight loss on a high-carb, low-fat diet. However, another study reached the opposite conclusion [R, R].

Variants linked to better metabolic outcomes may boost IRS1 activity, improving insulin receptor activation. This stimulates the downstream signaling pathways essential for glucose uptake and lipid metabolism, directly impacting blood sugar and fat storage [R].

SNP

rs1801278 G972R

Alleles

C: Typical IRS1 activity

T: Reduced IRS1 activity

Your Genotype

CC

Your genotype is linked to typical IRS1 activity, typical insulin signaling, and fat metabolism

Intro and Health Effects

One rare variant, rs1801278 (G972R), changes the structure of the IRS1 protein. Its “T” allele is linked to:

- Type 2 diabetes [R]
- Gestational diabetes (diabetes in pregnancy) [R]
- Higher cholesterol [R]

According to limited evidence, this variant also seems to favor high-carb diets [R].

Variants linked to better metabolic outcomes may boost IRS1 activity, improving insulin receptor activation. This stimulates the downstream signaling pathways essential for glucose uptake and lipid metabolism, directly impacting blood sugar and fat storage [R].

MC4R

MC4R Report

The *MC4R* gene encodes the melanocortin 4 (MC4) receptor, which binds alpha-melanocyte-stimulating hormone or a-MSH. The primary location of this receptor is the brain, more precisely the hypothalamus, where it controls food intake, metabolism, reproductive behavior, and more [R].

The MC4 receptor is a part of the leptin-melanocortin pathway in the hypothalamus. Leptin is a crucial hormone for appetite and weight control, released by fat tissue. When fat stores are adequate, leptin suppresses appetite by stimulating the production of a-MSH. On the other hand, low leptin reduces MC4R activity and thus promotes energy intake [R].

Even though leptin suppresses appetite and stimulates energy expenditure, excess levels are typical in obese people. Over-secretion leads to leptin resistance, a condition in which leptin loses the ability to reduce food intake via melanocortins [R].

MC4R is one of the most studied genes when it comes to obesity. Reduced activity of the MC4 receptor is the most common genetic cause of obesity, mediated by increased food intake [R, R].

Did you know? MC4R deficiency might have played a crucial role in our evolution. People with mutations that impaired MC4R function were prone to overeating, which likely brought them an evolutionary advantage during food shortages. However, now that food is abundant for the majority, these mutations are showing their other face and contributing to obesity [R].

Besides food intake, MC4R can also impact weight control via glucose and fat metabolism and growth stimulation [R].

SNP

rs17782313

Alleles

C: Reduced MC4R activity

T: Increased MC4R activity

Your Genotype

↑TT

Your genotype is linked to increased MC4R activity and better appetite control and metabolic health.

Intro and Health Effects

The most studied SNP near the MC4R gene is rs17782313. The "C" allele is linked to:

- Higher BMI (8%) and obesity rates (12-30%) [R, R]
- Increased hunger, snacking, and overeating [R]
- Eating high-calorie foods high in fat [R, R]

SNP

rs12970134

Alleles

A: Reduced MC4R activity

G: Increased MC4R activity

Your Genotype

↑GG

Your genotype is linked to Increased MC4R activity and better appetite control and metabolic health.

Intro and Health Effects

Another important MC4R variant is rs12970134. The “A” allele is linked to:

- Obesity, higher BMI, and waist circumference [R, R, R]
- Food cravings and increased beverage consumption [R]
- High blood sugar and insulin resistance [R, R, R, R]

NPY

NPY Report

Neuropeptides are small proteins used to transmit signals in the nervous system, and neuropeptide Y (NPY) is one of the most abundant of these, along with peptide YY (PYY) and pancreatic polypeptide (PP) [R].

NPY plays a role in appetite regulation, energy balance, sleep rhythms, cognition, and stress reduction. Because of its wide-ranging functions, NPY is found throughout many different parts of the brain [R, R].

There are two major mechanisms by which elevated NPY may promote weight gain: by promoting stress eating and by directly stimulating the production of fat tissue. NPY represents a link between stress and food intake, where a stress-induced increase in NPY may cause so-called “stress eating” [R].

Ghrelin, the “hunger hormone,” favors the accumulation of stomach fat, which in turn favors the formation of liver fat and increases the risk of developing insulin resistance. Chronically high levels of ghrelin have been shown to increase food intake and promote fat storage in white and brown fat cells. Researchers believe that ghrelin achieves some of these effects by increasing NPY [R, R, R, R].

SNP	Your Genotype
rs16139 Alleles **C:** Increased NPY activity **T:** Reduced NPY activity	↓TT **Your genotype is linked to reduced NPY activity, reduced appetite, and better weight control**

Intro and Health Effects

Several variants in the *NPY* gene have been associated with weight gain, BMI, or obesity. For instance, the minor ‘C’ allele of **rs16139** has been associated with higher BMI [R].

SNP	Your Genotype
rs5574 Alleles **C:** Reduced NPY activity **T:** Increased NPY activity	↓CC **Your genotype is linked to reduced NPY activity, reduced appetite, and better weight control**

Intro and Health Effects

Another minor variant, the ‘T’ allele of **rs5574**, has been associated with obesity [R].

SH2B1

SH2B1 Report

The *SH2B1* gene encodes '*SH2B adaptor protein 1*', which controls the function of different hormones and growth factors, such as [R, R]:

- Insulin
- IGF-1
- BDNF
- Leptin

Given its critical metabolic roles, slight changes in *SH2B1* expression and activity can impact glucose and fat metabolism. Variants in this gene correlate with body-weight changes, insulin resistance, diabetes, and more [R, R, R, R].

SH2B1 activity in the brain is crucial for leptin signaling and thus impacts weight & energy balance. While mice lacking this protein are obese, tend to overeat, and have increased leptin, insulin, and blood lipids, overexpression of this gene protects against obesity and boosts glucose & fat metabolism [R, R, R].

Enhancers:

Omega-3

SNP

rs7498665 Ala484Thr

Alleles

A: Increased SH2B1 activity

G: Reduced SH2B1 activity

Your Genotype

↑AA

Your genotype is linked to increased SH2B1 activity and improved leptin signaling and appetite control

Intro and Health Effects

In a meta-analysis of over 116K people, the "G" allele at rs7498665 (Ala484Thr) was associated with a 0.15 increase in BMI. Similarly, this allele was associated with 13-26% higher obesity rates in three European studies of over 8k participants [R, R, R, R].

An even larger meta-analysis of more than 200K subjects revealed the same correlation between rs7359397-T and BMI [R].

Because SH2B1 helps boost metabolism and control weight & appetite by enhancing leptin sensitivity, obesity-associated variants likely reduce *SH2B1* expression and impair leptin signaling. Indeed, rs7498665 correlated with leptin levels in a study of 2,455 European (Caucasian) women [R, R, R, R].

The above SNPs are always inherited together in most populations, so they represent a single genetic factor.

TMEM18

TMEM18 Report

TMEM18, short for *transmembrane protein 18*, is a gene whose exact role is still unknown. Over the past decade, however, there's been almost a multitude of studies that found a link between this gene and body weight and obesity [R, R, R, R].

TMEM18 seems to have a relatively large impact on body weight among all these genes. In some studies, it's second only to *FTO* (*fat mass and obesity-associated gene*) [R, R, R, R, R, R, R].

Scientists think that *TMEM18* may affect either of the following:

- Other genes linked to appetite and energy balance in the brain [R]
- Fat accumulation in fat tissue [R, R]
- Insulin and glucagon metabolism [R]

SNP	Your Genotype
rs6548238 Alleles **C:** Altered TMEM18 activity **T:** Normal TMEM18 activity	CT **Your genotype is linked to normal TMEM18 activity and better appetite and weight control.**

Intro and Health Effects

The 'C' allele in the rs6548238 SNP near the *TMEM18* gene was first linked to BMI and obesity in 2009, in a meta-analysis of 15 genome-wide association studies with over 91k people [R].

Since then, the link has been confirmed in many different studies, large and small. These studies involved children, adolescents, and/or adults from all over the world -- from Japan, China, and New Zealand, over Europe and Africa, to North and South America [R, R, R, R, R, R, R, R, R, R, R, R, R, R].

SNP	Your Genotype
rs2867125 Alleles **C:** Altered TMEM18 activity **T:** Normal TMEM18 activity	CT **Your genotype is linked to normal TMEM18 activity and better appetite and weight control.**

Intro and Health Effects

The of 'C' allele of rs2867125 has been linked to higher BMI in Europe, Korea, Japan, Singapore (including Chinese, Malay, and Indian ethnicities) and US (including Whites, African-Americans, and Pima Indians) [R, R, R, R, R, R, R, R, R, R, R].

Interestingly, a study with over 5.4k Pima Indians found that the rs2867125 'C' allele corresponded to around a 3.0% increase in BMI per copy, which was a 2-fold larger effect compared to Europeans [R].

UCP2

UCP2 Report

The *UCP2* gene encodes a protein called '*uncoupling protein 2*'. In the mitochondria (the main powerhouse of cells), the breakdown of nutrient fuels is *coupled* to the production of the energy molecule ATP. Members of the uncoupling protein family prevent the production of this molecule and instead cause the energy to be dissipated as heat [R, R].

UCP2 is found in a wide variety of tissues, such as brown an white fat, muscles, pancreatic insulin-producing cells, immune system, heart, and liver. Its expression is increased when blood fatty acid levels are high, such as during fat burning or when eating a high-fat diet. Conversely, obese and diabetic people have lower UCP2 levels [R, R, R, R, R, R].

The biological function of UCP2 remains poorly understood. Although it can block ATP generation to produce heat, just as its sister protein UCP1, research suggests its main role is the regulation of fat and carbohydrate metabolism. UCP2 may also protect the brain and other tissues from oxidative stress [R, R, R, R, R].

Enhancers:

Quercetin Resveratrol

SNP

rs659366

Alleles

C: Reduced UCP2 activity

T: Increased UCP2 activity

Your Genotype

TC

Your genotype is linked to typical UCP2 activity and balanced fat burning and blood sugar control

Intro and Health Effects

The minor 'T' variant of the rs659366 increases *UCP2* expression in the fatty tissue, pancreas, and liver [R, R, R].

This allele showed a protective effect from obesity in studies on Austrian and Iranian adults and Turkish children. Similarly, the major 'C' allele was associated with obesity in Danish and Egyptian adults, and Korean, Hungarian, and Spanish children [R, R, R, R, R, R, R, R].

However, no association between this polymorphism and obesity was found in some studies on Danish and Italian adults and German children. The 'T' variant was even associated with *increased* obesity rates and body fat in Danish, Egyptian, Russian, Spanish, Mexican, Balinese, Indonesian, and Indian adults, and Spanish children [R, R, R, R, R, R, R, R, R, R, R, R, R].

Despite these discrepancies, all meta-analyses agree that the ‘T’ variant is associated with lower obesity rates and BMI in European but not in Asian populations [R, R, R, R].

However, this variant may have negative effects on blood lipids, glucose control, and diabetic outcomes [R, R, R, R, R, R, R, R, R].

PER1

PER1 Report

The *PER1* gene encodes a central component of the body's **circadian clock** called '*Period circadian protein homolog 1*'. It helps regulate daily rhythms in sleep–wake cycles, hormone release, glucose handling, and energy expenditure [R].

PER1 is mostly expressed in a brain region called the *suprachiasmatic nucleus* (SCN), the primary circadian pacemaker in the mammalian brain. PER1 controls the circadian rhythm in the absence of light. When exposed to light at night, the amount of the protein encoded for by Per1 increases [R, R]

PER1 variants may subtly influence how the body responds to sleep patterns, meal timing, and light exposure, which can indirectly affect body weight over time.

SNP	Your Genotype
rs2735611 Alleles **A:** Typical PER1 activity **G:** Increased PER1 activity	AA **Your genotype is linked to typical PER1 activity, typical circadian rhythm, and appetite control**

Intro and Health Effects

The main *PER1* variant associated with weight is **rs2735611**. Its minor 'G' variant may increase PER1 expression, which reduces appetite and food intake [R].

In line with this, a study associated this variant with lower body weight [R, R].

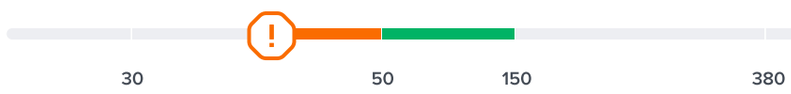
Lab markers to check

Serotonin, Serum — 35.2 ng/mL — 27 May 2024

Personalized to Your Genes

↓ HTR2C — Low levels indicate HTR2C pathway is further compromised by insufficient serotonin availability

Ferritin — 41 ng/mL — 11 Mar 2026



Personalized to Your Genes

↓ DRD2 — Iron deficiency impairs dopamine synthesis, magnifying DRD2 receptor insufficiency

Hemoglobin A1c (%) — 5.4 % — 11 Mar 2026

TSH — 2.85 mIU/L — 11 Mar 2026

Personalized to Your Genes

↓ UCP1 — T3 is the primary hormonal activator of UCP1 transcription — full thyroid panel is essential

Zinc — 71 mcg/dL — 27 Jan 2026

ACTH, Plasma — 40.3 pg/mL — 6 – 50 — 17 Sep 2024

Personalized to Your Genes

↓ SIM1 — Abnormal HPA axis activity reveals broader hypothalamic dysfunction from SIM1 downregulation via CRH-ACTH axis

POMC — Low ACTH alongside appetite dysregulation confirms functional POMC insufficiency

Adiponectin — 13.8 ug/mL — 2 – 4 – 26 — 11 Oct 2024

ALT — 15 U/L — 9 – 15 – 30 – 46 — 11 Mar 2026

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↑ CIDEA — CIDEA-driven lipid droplet accumulation manifests as elevated TG and liver enzymes

↓ INSIG2 — INSIG2 downregulation promotes SREBP-driven hepatic lipogenesis making fatty liver a primary risk

ApoB — 62 mg/dL — 40 – 80 – 120 — 11 Mar 2026

Personalized to Your Genes

↓ INSIG2 — INSIG2 downregulation leads to elevated hepatic fat and lipid synthesis reflected in the lipid panel

AST — 19 U/L — 5 – 17 – 30 – 40 — 11 Mar 2026

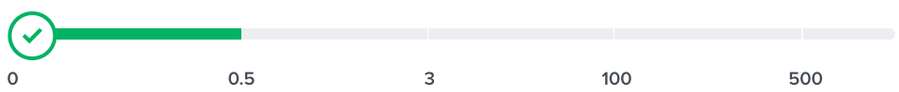
C-Peptide 1.25 ng/mL

5 Aug 2024

Personalized to Your Genes

↓ GLP1R — Reveals functional consequence of GLP1R downregulation on beta-cell insulin output

C-Reactive Protein (CRP) 0.04 mg/L



11 Jul 2024

Personalized to Your Genes

○ LEP — CRP reflects the systemic inflammatory burden that determines how much LEP overproduction is functionally wasted

Carnitine, Total 45.1 umol/L

27 May 2024

Personalized to Your Genes

○ UCP3 — Carnitine deficiency compounds UCP3 downregulation and is directly correctable

Cortisol 10.7 mcg/dL

11 Mar 2026

Personalized to Your Genes

↓ DRD2 — Identifies HPA axis contributors to DRD2-linked emotional eating via cortisol-dopamine depletion

↑ GHRL — Stress and cortisol amplify GHRL signaling — identifying HPA axis dysregulation guides interventions

○ ARNTL — Abnormal cortisol patterns confirm systemic ARNTL/BMAL1 clock disruption and guide intervention timing

POMC — Abnormal cortisol patterns reveal the broader extent of POMC pathway disruption via ACTH-cortisol axis

GGT — 9.5 U/L — 11 Mar 2026

Glucose, Fasting — 89 mg/dL — 11 Mar 2026

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BDNF — Low BDNF accelerates metabolic dysfunction and appetite dysregulation

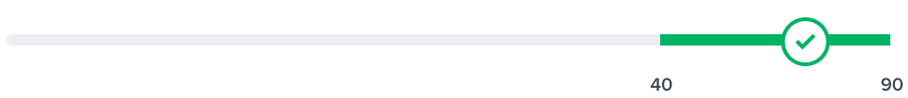
DPP4 — Tracks cumulative glycemic impact of DPP4-driven impairment of GLP-1-mediated insulin secretion

GLP1R — Tracks cumulative metabolic impact of impaired GLP1R incretin-driven glycemic control

MTNR1B — Primary monitoring targets for MTNR1B-associated elevated fasting glucose and T2D risk

PPARG — Primary markers to track for this PPARG variant's direct impairment of blood sugar control

HDL Cholesterol — 71 mg/dL — 11 Mar 2026



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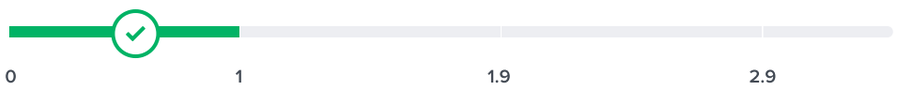
ARNTL — ARNTL dysfunction creates a characteristic dyslipidemia pattern detectable in basic lipid panels

HOMA-IR — 0.54 :1 — 26 Jul 2023



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GHRL — Elevated GHRL promotes insulin resistance and fat accumulation

↓ HTR2C	HTR2C downregulation accelerates insulin resistance
↓ INSIG2	INSIG2 downregulation impairs insulin signaling pathways, driving insulin resistance
↑ MTNR1B	Fasting insulin reveals whether beta-cell compensation is occurring for MTNR1B-driven insulin suppression
↓ NEGR1	Insulin resistance is the primary downstream metabolic consequence of NEGR1-driven overconsumption
↓ SIM1	Insulin resistance is the primary metabolic consequence of SIM1-driven hyperphagia and caloric surplus
ARNTL	ARNTL/BMAL1 impairment is a significant independent driver of metabolic syndrome
PPARG	Reveals whether impaired PPARG activity is producing compensatory hyperinsulinemia

IL-6	1.4 pg/mL	0 5	10 Apr 2024
Insulin, Fasting	3.5 uIU/mL	1 6 19.6 25	11 Mar 2026

Personalized to Your Genes

↑ GHRL	Elevated GHRL promotes insulin resistance and fat accumulation
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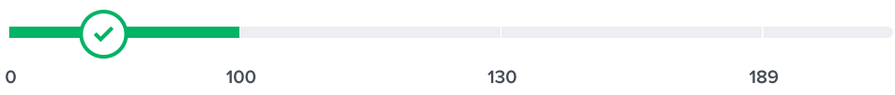
PPARG — Reveals whether impaired PPARG activity is producing compensatory hyperinsulinemia

Iron 86 mcg/dL — 11 Mar 2026

Personalized to Your Genes

DRD2 — Iron deficiency impairs dopamine synthesis, magnifying DRD2 receptor insufficiency

LDL Cholesterol 40 mg/dL — 11 Mar 2026



Personalized to Your Genes

ARNTL — ARNTL dysfunction creates a characteristic dyslipidemia pattern detectable in basic lipid panels

Leptin 2.5 ng/mL — 27 Jan 2026

Personalized to Your Genes

NEGR1 — Elevated leptin with ongoing weight gain confirms NEGR1-driven central appetite dysregulation

SIM1 — Elevated leptin with ongoing hyperphagia confirms failed hypothalamic leptin-SIM1 signal transduction

LEP — Very high leptin with ongoing appetite dysregulation confirms functional leptin resistance from LEP upregulation

POMC — Elevated leptin reveals whether upstream signaling to POMC is also compromised

Magnesium 2.1 mg/dL — 24 Feb 2026

Magnesium, RBC	5.7 mg/dL	4 – 6.4	27 Jan 2026
Non-HDL Cholesterol	57 mg/dL	0 – 130	11 Mar 2026
OxLDL	34 U/L	0 – 60	10 Apr 2024
Selenium	143 mcg/L	63 – 120 – 180 – 250 – 400	24 Feb 2026
T3 Total	1.44 nmol/L	0.92 – 1.23 – 3.08	27 Oct 2024

Personalized to Your Genes

↓ UCP1

T3 is the primary hormonal activator of UCP1 transcription — full thyroid panel is essential

T4 (Thyroxine), Total	8.7 mcg/dL	4.9 – 10.5	11 Mar 2026

Personalized to Your Genes

↓ UCP1

T3 is the primary hormonal activator of UCP1 transcription — full thyroid panel is essential

Thyroid Peroxidase Antibodies (TPO)	1 IU/mL	0 – 9	11 Mar 2026

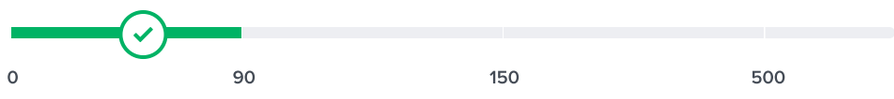
Personalized to Your Genes

↓ UCP1

T3 is the primary hormonal activator of UCP1 transcription — full thyroid panel is essential

Triglycerides

51 mg/dL



11 Mar 2026

Personalized to Your Genes

↓ INSIG2

INSIG2 downregulation leads to elevated hepatic fat and lipid synthesis reflected in the lipid panel

ARNTL

ARNTL dysfunction creates a characteristic dyslipidemia pattern detectable in basic lipid panels

LEP

High TG is the key modifiable mechanism by which excess LEP-driven leptin fails to reach hypothalamic receptors

Tryptophan, Plasma

51 umol/L

27 Jan 2026

Personalized to Your Genes

↓ HTR2C

Reveals whether absorption issues compound the genetic HTR2C deficit

Vitamin D, 25-Hydroxy, Total

66 ng/mL

29 Dec 2025

Personalized to Your Genes

↓ BDNF

Vitamin D deficiency compounds genetic low BDNF and is easily corrected

VO2 Max

48.8 mL/kg/min

27 Jul 2023

Personalized to Your Genes

UCP3

Low lactate threshold indicates impaired mitochondrial fat oxidation — primary functional consequence of UCP3 downregulation

8-Hydroxy-2-deoxyguanosine, Urine

Alpha Melanocyte Stimulating Hormone

Free Fatty Acids

Personalized to Your Genes

ADRB2

Low fasting FFAs alongside excess body fat indicate impaired ADRB2-driven fat mobilization

↑ CIDEA

Low FFAs alongside excess fat mass confirm impaired CIDEA-driven fat mobilization

↓ UCP1

Impaired UCP1 function reduces fatty acid oxidation in BAT, potentially manifesting as elevated fasting FFAs

Ghrelin

Personalized to Your Genes

↑ GHRL

Directly measures the upregulated GHRL pathway — useful for baseline and tracking

Glucagon-like peptide 1 (GLP-1)

Personalized to Your Genes

↑ DPP4	Low postprandial GLP-1 confirms clinically meaningful GLP-1 deficiency from excessive DPP4-driven clearance
↓ GLP1R	Essential to determine whether impaired GLP1R is about receptor number, ligand availability, or both

Hemoglobin A1c

Personalized to Your Genes

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↑ DPP4	Tracks cumulative glycemic impact of DPP4-driven impairment of GLP-1-mediated insulin secretion
↓ GLP1R	Tracks cumulative metabolic impact of impaired GLP1R incretin-driven glycemic control
↑ MTNR1B	Primary monitoring targets for MTNR1B-associated elevated fasting glucose and T2D risk
○ PPARG	Primary markers to track for this PPARG variant's direct impairment of blood sugar control

L-Lactate (Genova)

Malondialdehyde

Melatonin (Waking) (DUTCH)

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↑ MTNR1B	Directly quantifies how long melatonin remains elevated, informing precise breakfast timing recommendations

Postprandial Glucose

Personalized to Your Genes

PPARG	Post-meal testing is more revealing than fasting glucose for this PPARG variant

Vanillylmandelic Acid (VMA), Random Urine

Personalized to Your Genes

ADRB2	Reveals whether the problem is receptor-level or driven by low sympathetic input
↓ DRD2	Reveals whether DRD2 deficit is compounded by low dopamine production

Glossary

a-MSH (Alpha-Melanocyte-Stimulating Hormone)
A hormone that reduces appetite and increases energy use by signaling fullness in the brain.

Acetyl-CoA
A key molecule in metabolism that links the breakdown of fats, carbohydrates, and proteins to energy production.

Adiponectin
A hormone released by fat cells that improves insulin sensitivity and supports fat burning.

ATP (Energy)
The main energy currency of the body, used by cells to power all biological processes.

β-oxidation
The process by which fatty acids are broken down in cells to produce energy.

Circadian
Relating to the body's internal 24-hour clock that regulates sleep, metabolism, and hormone release.

Fatty Acid
A building block of fats that can be stored for energy or broken down for fuel.

GLP-1 (Glucagon-Like Peptide-1)
A hormone that helps regulate blood sugar, slows digestion, and promotes feelings of fullness.

Glucose
A type of sugar in the blood that serves as a primary energy source for the body.

Insulin
A hormone that helps cells absorb glucose from the blood for energy or storage.

Leptin
A hormone produced by fat cells that signals fullness and helps regulate energy balance.

Mitochondria
Structures inside cells that produce energy (ATP) by converting nutrients like glucose and fatty acids into usable fuel.

Pancreas
An organ that produces hormones like insulin and glucagon to regulate blood sugar levels.

Triglycerides
A form of fat stored in the body and used as a long-term energy source.