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Nutrition Plus (Health 3.0)

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Protein

Protein is an essential macronutrient that plays a crucial role in various bodily functions, including muscle repair, immune function, and hormone production. Protein also provides structure to cells and tissues, and insufficient protein can result in a variety of issues such as muscle wasting, weakened immune function, and delayed growth in children. This section explores genetic predispositions for protein intake and provides insights into the degree of benefits of protein consumption.

Genetic variations can influence how the body responds to dietary protein. Some individuals may have a genetic propensity which responds similarly to high protein and moderate protein diets, while others are more strongly affected by variations in protein consumption, requiring them to adjust their protein intake to achieve optimal results. Protein quality varies depending on the types and quantity of amino acids that make it up, so complete sources of protein such as eggs and fish are recommended.

Understanding genetic tendencies related to protein intake can help guide dietary choices and optimize protein consumption for various goals, such as muscle building, weight management, or overall well-being.



Protein Benefit



Neutral

Understanding what this may mean

Likely to have the standard benefits from Protein. Protein intake recommendations vary, but are generally between 0.8-1g/lb (1.8-2.2g/kg) of ideal bodyweight.

Genetic Summary ⁴

SNP	Marker	Genotype
FTO T46-23525A	rs9939609	TT
LPIN1 G-10+5393A	rs4315495	AG

SNP	Marker	Genotype
TFAP2B A602-724G	rs987237	AG
FTO T46-40478A	rs1558902	TT

GAD1 Activity



Increased Activity

Understanding what this may mean

Individuals with this result are likely to have improved conversion of glutamate to GABA in the brain compared to the general population. This can provide support with sleep and reduce risks for anxiety. Some anecdotal reports have linked low GAD1 activity to various food sensitivities including MSG, grains, and glutamic acid, yet there are currently no scientific studies to support this assertion.

Gluten Risk



Very Low

Understanding what this may mean

Individuals with this genetic result have a lower risk of gluten sensitivity or intolerance. Genetic variations associated with this result suggest a reduced likelihood of experiencing adverse reactions to gluten-containing foods. However, it's important to note that gluten sensitivity can vary among individuals and may be influenced by other factors. If individuals with this result experience symptoms or concerns related to gluten, they should consult with healthcare professionals or registered dietitians for further evaluation and guidance.

Lactose Intolerance Risk



Low

Understanding what this may mean

Likely to have a reduced risk of developing any intolerance to dairy.

Weight Gain from Dairy Fat



Neutral

Understanding what this may mean

Individuals with this genetic result can generally expect a typical response to weight gain from consuming dairy fat. This means that their bodies respond to dairy fat intake in a manner similar to the average population. While dairy fat can contribute to overall calorie intake, it is important to maintain a balanced diet and monitor portion sizes to support weight management.

Genetic Summary ¹⁹

SNP	Marker	Genotype
HLA g.G2032A	rs4639334	GG
HLA (A>G)	rs4713586	AG
HLA C82+567T	rs2187668	CC

SNP	Marker	Genotype
GAD1 C-64+894A	rs12185692	CC
GAD1 G-64+2259T	rs3791878	GG
GAD1 C146-3245T	rs3828275	CC

HLA-DRA (G>T)	rs2395182	TT
HLA-DQB1 (T>C)	rs7775228	TC
MCM6 G1917+326A	rs4988235	AA
APOA2 A-265G	rs5082	AG
IL-21 (G>T)	rs6822844	TG
IL-12A-AS1 (A>G)	rs17810546	AA
GAD1 G-151A	rs3749034	AA

CCR3 g.T1184C	rs6441961	TT
RGS1 (C>A)	rs2816316	AC
ATXN2 C732-14033T	rs653178	TT
IL-21 (A>G)	rs13119723	AG
IL-18RAP (T>C)	rs917997	TC
TAGAP T-492C	rs1738074	TC

Obesity Risk

This section focuses on understanding the complex interplay between genetic predispositions and environmental factors that contribute to the risk of developing obesity. This condition, characterized by excessive fat accumulation, poses significant health risks, including heart disease, diabetes, and hypertension.

Genetic Influences: Genetics play a crucial role in determining an individual's susceptibility to obesity. Variations in genes related to appetite regulation, energy metabolism, fat storage, and insulin signaling can significantly influence body weight and fat distribution. This segment delves into specific genetic markers that have been linked to increased obesity risk, providing insight into the hereditary aspects of weight management.

Environmental and Lifestyle Factors: While genetics set the groundwork for obesity risk, environmental and lifestyle factors such as diet, physical activity, sleep patterns, and stress levels heavily modify the expression of genetic predispositions. This section examines how external factors interact with genetic makeup to influence obesity outcomes, emphasizing the importance of a balanced lifestyle for weight management.

Personalized Prevention and Management: Acknowledging the genetic and environmental roots of obesity allows for more personalized approaches to prevention and management. Tailored dietary recommendations, customized exercise programs, and behavioral modifications can be more effectively designed with an understanding of an individual's unique genetic background and lifestyle.



Obesity Risk



Neutral

Understanding what this may mean

Those at a typical risk level possess an average likelihood of developing obesity, mirroring the general population's predisposition. This indicates a standard response to environmental factors such as diet and physical activity. Adhering to healthy lifestyle habits, including a nutritious diet and regular physical activity, is key to managing this baseline risk and promoting overall health.

Weight Regain Propensity



Neutral

Understanding what this may mean

Individuals with a neutral propensity for weight regain have genetic markers that align with the average population's likelihood of regaining weight after losing it. This indicates that their genetic makeup does not significantly sway their risk either way, making lifestyle choices and behavior modifications crucial in maintaining long-term weight loss. Maintaining weight loss typically requires continuous adherence to a balanced diet, regular physical activity, and ongoing behavior changes. Individuals are encouraged to monitor their eating habits, engage in consistent exercise, and perhaps seek support from nutrition and fitness professionals to help sustain weight loss.

SNP	Marker	Genotype
LEP g.G2453A	rs7799039	GG
ADIPOQ G276T	rs1501299	GG
FTO T46-23525A	rs9939609	TT
APOA5 G*158A	rs662799	AA
TCF7L2 C450+33966T	rs7903146	TC
ADIPOQ G3998A	rs17300539	GG

SNP	Marker	Genotype
ADIPOQ G-9+3481A	rs822396	AA
MTNR1B C223+5596G	rs10830963	GG
PPARG C34G	rs1801282	CC
FTO G46-25592T	rs3751812	GG
IL6/IL6-AS1 (G>C)	rs1800795	GC
MC4R (T>C)	rs17782313	TT

Diabetes

Diabetes, a chronic condition characterized by elevated blood glucose levels, includes several types, most notably Type 2 Diabetes (T2D). Both forms of diabetes are influenced by genetic factors that affect their development and progression. Understanding the genetic predispositions to diabetes can provide valuable insights into risk assessment, prevention strategies, and personalized treatment approaches. This section examines the genetic underpinnings of diabetes, highlighting how genetic variability contributes to disease risk and management.

T2D is primarily associated with insulin resistance and is influenced by both genetic and lifestyle factors. Genetic studies have identified numerous loci associated with T2D risk, with genes affecting insulin secretion, insulin action, and glucose metabolism. Notable genes include *TCF7L2*, which influences insulin secretion and glucose production, and *PPARG* and *FTO*, which are involved in fat metabolism and appetite regulation. Understanding these genetic interactions helps in identifying individuals at high risk and tailoring preventive measures such as dietary modifications, physical activity, and early pharmacological intervention.

Beyond T1D and T2D, there are forms of diabetes that result from mutations in a single gene, known as monogenic diabetes, which includes neonatal diabetes and maturity-onset diabetes of the young (MODY). Identifying specific genetic mutations responsible for monogenic diabetes can lead to highly specific treatments, such as using sulfonylureas in patients with mutations in the *KCNJ11* gene, which encodes the Kir6.2 subunit of the potassium channel in pancreatic beta cells.

Genetic testing can enhance the management of diabetes by identifying individuals with a predisposition to the disease and by tailoring treatment approaches to the individual's genetic profile. For T2D, this may involve selecting medications that target specific pathways affected by the patient's genetic makeup. For T1D, understanding genetic risk can inform strategies for early detection and possible intervention to delay or prevent the onset of disease.



Insulin Resistance Propensity (New)



Caution

Understanding what this may mean

Those with a cautionary risk of insulin resistance should be proactive in managing their health. Engaging in regular exercise, eating balanced meals rich in fiber, and avoiding excessive sugars and refined carbs are key. Periodic health check-ups to monitor insulin sensitivity can help in making timely adjustments to lifestyle and diet

Adiponectin Levels



Low

Understanding what this may mean

Individuals with a genetic predisposition for low adiponectin levels may have a reduced capacity to regulate glucose levels and fatty acid breakdown, potentially impacting metabolic health. Adiponectin, a hormone produced by adipose tissue, plays a key role in the body's energy metabolism and insulin sensitivity. Those with low levels might benefit from lifestyle interventions aimed at increasing adiponectin, such as weight management, regular physical activity, and a diet high in monounsaturated and omega-3 fats

Leptin Propensity



Neutral

Understanding what this may mean

Individuals with a neutral leptin propensity have genetic markers that indicate a typical response to leptin, a hormone primarily involved in regulating hunger and energy balance. This average response suggests that their risk of developing leptin resistance, which can lead to difficulties in managing appetite and body weight, is similar to that of the general population. Maintaining a healthy lifestyle, including a balanced diet and regular physical activity, is recommended to support effective leptin function and overall metabolic health. Monitoring for signs of weight gain or abnormal hunger levels can help in early identification and management of potential leptin sensitivity issues

T2D Propensity



Caution

Understanding what this may mean

Those identified with a caution risk for Type 2 diabetes have genetic markers that slightly increase their susceptibility to developing diabetes. This elevated risk indicates the importance of being vigilant about diet and lifestyle choices to manage their predisposition. Measures such as reducing sugar and refined carbohydrates in the diet, increasing physical activity, and regularly monitoring blood sugar levels can be effective in preventing or delaying the onset of diabetes.

Genetic Summary ³¹

SNP	Marker	Genotype
PCSK9 G137T	rs11591147	TG
TCF7L2 T450+29705C	rs7901695	TC
PPARG C1341T	rs3856806	CC
MC4R (T>C)	rs17782313	TT
CDKAL1 (T>C)	rs10811661	TC
CDKAL1 T487C	rs564398	TT
CDKAL1 A371+30101G	rs7756992	AG
CDKAL1 G371+11642C	rs7754840	CG
CDKAL1 A371+11426C	rs10946398	AC
KCNQ1 C1795-29246T	rs2237892	CC
IGF2BP2 A239+11861C	rs1470579	AC
ABCC8 C4105A	rs757110	AC
KCNJ11 T67C	rs5219	TC
HHEX (G>A)	rs7923837	GG

SNP	Marker	Genotype
ADCY5 A1406+851G	rs11708067	AA
GCK (G>A)	rs4607517	AG
GCK C-30T	rs1799884	CC
GCKR T1423-418C	rs780094	CC
MTNR1B C223+5596G	rs10830963	GG
SLC30A8 C973T	rs13266634	CC
TCF7L2 G552+9017T	rs12255372	GG
TCF7L2 C450+33966T	rs7903146	TC
ADIPOQ G-9+3481A	rs822396	AA
ADIPOQ T45G	rs2241766	TT
ADIPOQ G-60+244A	rs182052	AA
ADIPOQ T331C	rs17366743	TT
ADIPOQ G276T	rs1501299	GG
ADIPOQ g.G4012C	rs266729	GC

IRS1 (T>C)	rs2943641	CC
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PPM1K (C>T)	rs1440581	CC
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ADIPOQ G3998A	rs17300539	GG
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Hunger and Fullness Sensing (new)

Understanding the body's hunger and fullness signals is crucial for maintaining a healthy relationship with food and managing appetite effectively.

Hunger and fullness sensing refers to the body's ability to detect and respond to its nutritional needs. Some individuals may have a genetic propensity for heightened hunger sensitivity, experiencing more intense feelings of hunger and a stronger drive to eat. Others may have a genetic predisposition for reduced appetite sensing, meaning they may be more prone to .

Additionally, emotional eating, which is the tendency to turn to food for comfort or as a response to emotional triggers, can also be influenced by genetic factors. Some individuals may have a higher genetic predisposition for emotional eating, making them more susceptible to using food as a coping mechanism for emotional stressors.

By understanding genetic tendencies related to hunger and fullness sensing, as well as emotional eating patterns, strategies can be developed to manage appetite, make informed food choices, and develop healthier relationships with food.

It's important to note that while genetics play a role in hunger and fullness sensing, other factors such as lifestyle, stress levels, and eating habits also contribute to appetite control. By adopting a balanced and nourishing diet, practicing mindful eating, and seeking support from healthcare professionals or coaches, it is possible to develop healthier habits and achieve more balanced relationships with food.



Leptin Propensity



Neutral

Understanding what this may mean

Individuals with a neutral leptin propensity have genetic markers that indicate a typical response to leptin, a hormone primarily involved in regulating hunger and energy balance. This average response suggests that their risk of developing leptin resistance, which can lead to difficulties in managing appetite and body weight, is similar to that of the general population. Maintaining a healthy lifestyle, including a balanced diet and regular physical activity, is recommended to support effective leptin function and overall metabolic health. Monitoring for signs of weight gain or abnormal hunger levels can help in early identification and management of potential leptin sensitivity issues

Snacking/Emotional Eating Risk



Neutral

Understanding what this may mean

Individuals with this genetic result have a lower risk of snacking or engaging in emotional eating behaviors. They are less likely to turn to food as a coping mechanism in response to emotions or stress. This genetic profile suggests a stronger ability to regulate and manage cravings, reducing the likelihood of excessive snacking. Maintaining a balanced diet and implementing healthy coping strategies, such as practicing mindfulness or engaging in physical activity, can further support overall well-being.

Appetite/Fullness Sensing



Less effective

Understanding what this may mean

Individuals with this genetic result are likely to have slightly lower sensing compared to the average population. Monitoring food intake and being mindful of hunger and fullness cues can help manage appetite more effectively. It is important to choose nutrient-dense foods to ensure adequate nutrition despite the reduced sensitivity to hunger signals.

Genetic Summary ⁸

SNP	Marker	Genotype
LEP g.G2453A	rs7799039	GG
CLOCK A*213G	rs1801260	AG
ARNTL T671-305G	rs11022778	TT
APOA2 A-265G	rs5082	AG

SNP	Marker	Genotype
MC4R (T>C)	rs17782313	TT
FTO T46-23525A	rs9939609	TT
ANKK1 G2137A	rs1800497	GG
COMT G472A	rs4680	AA

Carbohydrates (new)

The role of carbohydrates in weight management has been a topic of interest and discussion in the field of nutrition. This section explores genetic variations that may influence individual responses to low-carbohydrate diets, specifically in terms of weight loss.

Low-carbohydrate diets restrict the intake of carbohydrates, typically focusing on higher protein and fat consumption. While these diets have shown promise for weight loss in some individuals, it's important to understand that individual responses can vary based on genetic factors.



Some individuals may have a genetic predisposition that makes them more responsive to low-carbohydrate diets, leading to more significant weight loss. These individuals may experience improved body composition and metabolic markers when following a low-carb approach.

On the other hand, some individuals may have a genetic profile that makes them less responsive to low-carbohydrate diets for weight loss. They may not experience the same level of success or may even find it challenging to adhere to these dietary restrictions.

Understanding genetic tendencies related to carbohydrate metabolism and weight loss can provide valuable insights into the potential effectiveness of a low-carbohydrate diet. However, it's essential to note that individual responses to any diet can be influenced by multiple factors, including overall calorie intake, nutrient balance, lifestyle factors, and personal preferences.

Weight Loss from Low-Carb Diet



Neutral

Understanding what this may mean

Individuals with this genetic result can generally expect a typical response to weight loss from a low-carb diet. Following a low-carb diet may help them achieve weight loss results similar to those observed in the general population. It is still important to approach any weight loss plan, including a low-carb diet, with a focus on overall balance, nutrition, and portion control to support long-term success.

Complex Carb Utilization



Neutral

Understanding what this may mean

Those with a typical ability to utilize complex carbohydrates have an average efficiency in processing and extracting energy from these nutrients, similar to the general population. Complex carbs are essential for providing sustained energy, supporting digestive health, and maintaining stable blood sugar levels. Including a variety of complex carbohydrates in the diet, alongside proteins and healthy fats, can support overall health and well-being. Regular physical activity can also enhance metabolic health, complementing a balanced diet.

Glucose Metabolism



Neutral

Understanding what this may mean

Those with neutral glucose metabolism exhibit genetic markers that reflect the average population's ability to metabolize glucose. This indicates a standard efficiency in processing blood sugar, with lifestyle and dietary habits playing a significant role in maintaining healthy glucose levels. Individuals with this predisposition are advised to follow a healthy lifestyle, including regular exercise, a balanced diet, and regular medical check-ups, to support optimal glucose metabolism and prevent metabolic disorders

Caffeine Effects on Glucose



Poor Response

Understanding what this may mean

Individuals with a poor response to caffeine have genetic markers indicating that caffeine consumption may adversely affect their glucose metabolism, particularly increasing postprandial glucose levels. This response suggests that caffeine can interfere with the normal insulin action or glucose regulation after meals. Those with this genetic predisposition are advised to monitor their caffeine intake, especially in relation to meal times, to manage their blood glucose levels effectively. Considering lower caffeine consumption or timing it well away from meals might help mitigate its impact on glucose levels.

Insulin Resistance Propensity (New)



Caution

Understanding what this may mean

Those with a cautionary risk of insulin resistance should be proactive in managing their health. Engaging in regular exercise, eating balanced meals rich in fiber, and avoiding excessive sugars and refined carbs are key. Periodic health check-ups to monitor insulin sensitivity can help in making timely adjustments to lifestyle and diet

Genetic Summary ¹⁹

SNP	Marker	Genotype
ADORA2A T1083C	rs5751876	CC
CYP1A2 C-163A	rs762551	CC
KCNJ11 T67C	rs5219	TC
PPARG2 C-76-681G	rs10865710	CC
ADIPOQ G-9+3481A	rs822396	AA
GCK (G>A)	rs4607517	AG
MTNR1B C223+5596G	rs10830963	GG
NAT2 A803G	rs1208	AG

SNP	Marker	Genotype
PPARG C34G	rs1801282	CC
PLIN1 C772-799T	rs894160	CC
IRS1 (T>C)	rs2943641	CC
GCKR T1423-418C	rs780094	CC
GCK C-30T	rs1799884	CC
FTO T46-23525A	rs9939609	TT
DIO2 T274C	rs225014	CC
CETP C861T	rs5883	CC

FTO T46-39685G

rs17817449

TT

PPM1K (C>T)

rs1440581

CC

BDNF C196T

rs6265

CC

Low Fat Diets

Low fat diets, which reduce the intake of dietary fats, are often recommended for weight loss and to improve heart health. However, the effectiveness and health benefits of low fat diets can vary significantly among individuals, influenced by specific genetic factors. This section explores how genetic variations can impact the response to low fat diets, emphasizing the importance of personalized dietary recommendations to maximize health benefits.

Certain genetic variants affect how individuals metabolize and respond to dietary fats. For instance, variations in the APOA5 gene, which plays a role in triglyceride metabolism, can influence how effectively a low fat diet reduces lipid levels. Similarly, variants in the FTO gene, associated with fat mass and obesity, can modify the impact of low fat diets on weight loss and body composition.

Understanding these genetic predispositions can help tailor low fat diets to individual needs, improving outcomes in weight management and cardiovascular health. For example, individuals with specific genetic variants that affect cholesterol metabolism may see more significant improvements in lipid profiles on a low fat diet compared to others.

While low fat diets can be beneficial, they are not universally optimal for everyone. Genetic testing can provide insights into whether a low fat diet is suitable for an individual or if adjustments are needed to ensure adequate nutrient intake and health outcomes. It's also important to balance macronutrient ratios and include a variety of foods to meet all nutritional needs.



Low Fat Diet Fit



Good Fit

Understanding what this may mean

Likely to have some benefit from limiting certain forms of fat. Review each fat section for more information

Weight Gain from Dairy Fat



Neutral

Understanding what this may mean

Individuals with this genetic result can generally expect a typical response to weight gain from consuming dairy fat. This means that their bodies respond to dairy fat intake in a manner similar to the average population. While dairy fat can contribute to overall calorie intake, it is important to maintain a balanced diet and monitor portion sizes to support weight management.

Saturated Fat Response



Poor Response

Understanding what this may mean

Individuals with this genetic result may have a poor response to saturated fats. Genetic variations associated with this result suggest that their bodies may have difficulty metabolizing or processing saturated fats efficiently. Consuming high amounts of saturated fats may increase the risk of adverse health outcomes. It is important for individuals with this result to limit their intake of foods high in saturated fats, such as fatty meats, full-fat dairy products, fried foods, and coconut oil.

Dietary Fat Response



Limit intake

Understanding what this may mean

Individuals with this genetic result may have a higher sensitivity to dietary fat and may need to limit their fat intake. Genetic variations associated with this result suggest that the body may not efficiently process or metabolize dietary fats, potentially leading to adverse health effects. It is important to review more specific fat sections to determine ideal ratios of fat sources.

Omega-6 Risk



Low

Understanding what this may mean

Individuals with this genetic result have a lower risk associated with omega-6 fatty acids. Omega-6 fatty acids are essential fats that play a role in various bodily functions. Having a low risk suggests that their bodies can effectively process and metabolize omega-6 fatty acids generally without adverse effects. It is still important to maintain a balanced diet and include a variety of fats from different sources to support overall health and well-being. Blood testing can assist in measuring and managing omega levels.

Diet Summary

The Diet Summary Overview synthesizes the critical insights from various dietary patterns—Mediterranean, Keto, Paleo, Carnivore, Vegetarian, DASH, and others—underlining the paramount importance of personalizing nutrition based on genetic predispositions. This holistic view emphasizes that there is no one-size-fits-all solution to nutrition; rather, successful dietary planning must consider individual genetic makeup to fully harness the potential health benefits of each dietary approach.

Understanding how genetic variations affect the metabolism of fats, proteins, carbohydrates, and key micronutrients can guide the selection of the most suitable diet for an individual, optimizing nutrient absorption and metabolic health. Genetic insights enable the customization of traditional dietary patterns to meet personal health goals, whether it's managing weight, improving cardiovascular health, enhancing athletic performance, or preventing chronic diseases. By aligning dietary choices with genetic risk factors for diseases such as obesity, diabetes, hypertension, and heart disease, individuals can proactively manage health risks and work towards long-term wellness. Successful dietary strategies also consider lifestyle factors, including physical activity, sleep habits, and stress management, creating a comprehensive approach to health that complements genetic predispositions.

The future of nutrition lies in the integration of genetic testing and personalized dietary recommendations, moving beyond generic guidelines to offer tailored advice that maximizes health outcomes. This approach not only enhances the effectiveness of diet-related interventions but also empowers individuals to make informed choices about their nutrition, based on a deep understanding of their own body's needs.



Ideal Diet Plan



Paleo

Understanding what this may mean

Likely to benefit most from a balanced Paleo-style approach.
