ADVANCED Nutrigenomics
Nutrition for You

Genetis precision medicine

Advanced NGx

Your Nutrigenetic Report

Optimize your nutrition according to your genetic background

Clinical Laboratory Improvement Amendments

This test was performed in a CLIA and CAP accredited laboratory

CAP ACCREDITED
COLLEGE of AMERICAN PATHOLOGISTS

Introduction

Advanced Nutrigenomics and **Smart EpiGenetX** generated your personalized nutrigenetic report based on your genetic background. This report includes those packages you have selected. This report was compiled based on the currently available scientific knowledge in the field of nutrigenetics.

Advanced NGx brings to you a new approach in nutrigenetics, and it is the result of expertize in academic nutrigenetic research accumulated over two decades.

This report allows you to:

- Evaluate your personal nutrient requirements based on your genetic background;
- Talk to your nutritionist and customize your meal plans according to your requirements;
- Informs you about the structure of several other genes, with educational purposes.

The genetic analyses used in this report have been performed in a US laboratory that is CLIA and CAP accredited.

Advanced Nutrigenomics and **Smart EpiGenetX** are ready to answer any questions you may have.

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Thank you for using our product.

Mihai Niculescu, MD, PhD
Founder & CEO Advanced Nutrigenomics

Advanced Nutrigenomics LLC is a registered company in the State of North Carolina, U.S.A.
Smart EpiGenetX SRL is a registered company in Romania.

ADVANCED Nutrigenomics	Protected Information			
	Personal Details			Method
	NAME:	Jane Doe	Test ID: JD	Next Generation Sequencing – NGS
	Barcode:	0		
Advanced NGx test Test version: 1.1 Report version: 1-4	**Date of birth:**	Hidden		**Sample collected on:** Hidden
	Gender:	F		
	Ethnicity:	Caucasian		**Sample received on:** Hidden
Report approved by: Mihai Niculescu, MD, PhD				**Report generated on:** Hidden

Packages ordered:

Package 1. Nutrition in pregnancy and lactation	Yes
Package 2. Adult nutrition	Yes
Package 3. Metabolic imbalances	Yes
Package 4. Physical activity	Yes

Free bonus:
Package 5. Other genetic variations

This document reflects the legal provisions regarding the use of your personal data (including genetic data and data provided online to Advanced Nutrigenomics LLC) as set out in (EU) REGULATION 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL from April 27th 2016.

You can access this document here:

- Regulation 2016/679: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0679

Advanced Nutrigenomics LLC and its partners agree that:

- You are the only owner of your genetic data that was generated by us using your biological sample provided to us;
- You have the right, at any time, to request that your personal information, as well as your genetic information, be deleted from any database owned by us or our partners;
- Advanced Nutrigenomics LLC and its partners have the obligation to respond to such a request as soon as technically possible, and letting you know about this procedure either by email or in written form;
- Advanced Nutrigenomics LLC and Smart EpiGenetX will never share any information included in this report with any third parties. This information includes your personal identifiable information as well as your genetic information;
- As long as your genetic information is still present in our databases, you have the right to recover such information (such as obtaining a new copy of this report), without additional costs, except for costs involved in the printing or mailing the report to you. However, this right will be forfeited from the moment you requested the deletion of your data from our databases.

Table of Contents

Objectives, context and limitations

This report contains a maximum of five packages. Depending on the combination of packages chosen by you, this report contains at least three packages. Regardless your selection, package 5 is offered to you as a free bonus.

The results provided in this report must be carefully interpreted by your medical health care provider or by a certified nutritionist/dietician. Only a doctor can interpret the results provided in Package 5.

Risks
The Advanced NGx test is performed in a CLIA and CAP certified laboratory, and using FDA approved sequencing technology and reagents. In rare instances, laboratory error can occur, which might lead to incorrect results. Examples include, but are not limited to, sample or DNA mislabeling or contamination, failure to obtain an interpretable report, and other operational laboratory errors. In such situation, you may be required to provide a new biological sample, and a new test will be performed at no additional cost to you.

Limitations
This report provides information about how specific genetic variations found in your DNA affect your nutritional needs, metabolism, weight, exercise, and energy use. However, you should not change your diet, physical activity, or any medical treatments you are currently using based on these results without consulting your personal health care provider or nutritionist.

As the science of nutrigenetics is continuously developing, and as many other personal health factors affect diet and health, you should use this report in conjunction with such other factors, and do not make decisions regarding your health based solely on this report.

Another limitation of this nutrigenetic report is that it used studies performed mostly on Caucasian population. Therefore, some results may or may not be relevant to individuals of different ethnicities.

The association between genetic variations and your nutritional needs is an active area of scientific research, and future scientific studies might change the way we understand the relationship between the reported genetic variations and your nutritional needs.

Based on these results and other medical knowledge that you might have, your nutritionist or health care provider might consider additional testing.

How to interpret this report

This personalized report is meant to provide you with the latest information on how the existence of genetic variations (changes in your DNA sequence) can influence the amount of nutrients you need in order to optimize your health, or to mitigate the consequences that certain metabolic dysfunctions have on your metabolism.

The entire report includes up to 5 packages, structured on the basis of nutritional particularities needed in certain physiological or metabolic conditions, or for a physically active lifestyle. The report also includes a series of genetic variations than are not related to nutrition (package 5). The results of this report are for you and you alone.

Depending on your choice, this report may include 3, 4 or 5 packages. To the extent that you have opted for 3 or 4 packages, remember that you can order the rest of the packages at any time without having to provide biological samples again.

The 5 packages are:

1) **Nutrition in pregnancy and lactation** includes the analysis of genetic variations present in women and that influence the amounts of nutrients necessary for a healthy development of the fetus during pregnancy, and of the newborn during breastfeeding. This package is especially aimed at women who want to become pregnant. The package is also useful for pregnant women (in the early pregnancy) or for those who are breastfeeding.

2) **Adult nutrition** includes the analysis of genetic variations that influence the optimal nutrient requirements for healthy adults (non-pregnant women and men). This package is intended to provide you with the information you need to optimize your nutrition and, therefore, reduce the risk of metabolic diseases that might occur due to unbalanced nutrition.

3) **Metabolic imbalances** provides the analysis of genetic variations which, in the presence of certain metabolic problems, may lead to complications, in the absence of adequate nutrition. This can help optimizing the nutritional management required in such conditions.

4) **Physical activity** includes an estimate, on a genetic basis, of the potential you have to practice certain types of exercise, and the impact that physical effort can have on your metabolism. Therefore, this package can help you or your coach (fitness specialist, trainer, etc.) to decide whether certain nutritional changes are necessary to improve your physical performance.

5) **Other genetic variations** are provided in a bonus package that includes certain genetic variations in genes that might be of interest to you. It also includes several pharmacogenetic assessments. The results of this package should be interpreted by a doctor.

SCIENTIFIC AND TECHNICAL TERMS

To understand the results in this report, it Is useful to define some terms and abbreviations that you will encounter. The terms below are listed in the order in which they appear in this report.

UNITS — Generic term used in the summary tables (packages 1 and 2) to denote the recommended daily nutrient quantities.

Standard recommendations — Daily nutrient intakes recommended for all individuals (of a certain age and gender), regardless of the existence of genetic variations.

Personal recommendations — Daily nutrient intakes recommended for you based on this test. These recommendations (values or comments marked in blue in the summary table) take precedence over standard recommendations where these values differ.

LOCUS — Term used to designate a standardized unique number (preceded by the letters "rs") identifying a certain genetic variation in the human genome.

GENOTYPE — Association of genetic variations defined by the presence of nucleic acids (nucleotides) in both copies of a gene. The two letters (examples C/T) denote the two nucleotides in the two copies of the gene, for a given genomic position. Each gene within the human genome is present in two copies, each copy being inherited from one parent. Exceptions make the genes located in chromosomes X and Y in men, for which there is only one copy.

Gene-gene interactions — Interactions arising from the concomitant presence (in the same individual) of multiple genetic variations in several genes, and defining a specific nutrition recommendation.

HAPLOTYPE — A combination of genetic variations in the same genomic region (usually in the same gene or adjacent genes) that are found in a large segment of a population. Haplotypes are inherited from one generation to another.

Genetic score — A numeric value or a positive/negative assessment, established using a specific algorithm, and associated with a specific recommendation.

Risk — A term used in the context in which the existence of one or more genetic variations or haplotype(s) is associated in the scientific literature with an increase in the chances of occurrence of a particular disease or metabolic disorder. An increased risk denotes greater chances for a disorder to occur, compared to the average chances in a population surveyed. An increased risk does not mean that the person will definitely have a certain illness, but only that he or she has a higher chance of having this condition than the average chance in the studied population. For example, the risk for women to get breast cancer is 10% in the general population (10 out of 100 women). A woman who has a specific mutation in the BRCA1 gene has a 65% chance of breast cancer (65 out of 100 women who have this mutation). The risk is increased 6,5 times.

In/Del — Indicates the presence (In, insertion) or the absence (Del, deletion) of a nucleotide sequence. Terms used to define a genotype.

Tolerable upper limits (UL)

The table at the end of this report indicates the tolerable upper limits for each nutrient, according to age and sex. These limits are the maximum daily amounts in which nutrients can be consumed without unpleasant or adverse health effects. In certain situations, and always following a medical advice, these tolerable limits can be exceeded for a short period (days or weeks), but only for the purpose of treating a specific disorder. In rare cases, these limits can be exceeded continuously, but only at the doctor's advice, as treatment against a chronic condition.

ND (not determined)

In rare situations (1-2% of genetic variations), sequencing cannot identify a DNA sequence, probably due to neighborhood mutations that interfere with the sequencing process used by this test. In such instance a genotype is declared ND (not determined). In other instances, although sequencing is successful, certain genotypic combinations (haplotypes) cannot be determined either due to the ambiguity of the sequences or because a possible haplotipic combination has not yet been described in the scientific literature.

OTHER CONSIDERATIONS

Because packages 1-4 refer to different physiological contexts, some of the recommendations from packages 1, 3, and 4 could differ from those in package 2. In this case, priority should be given to packages 1, 3 or 4, because these take into consideration specific physiological or metabolic states. That is the reason why this report needs to be interpreted by a specialist who applies the existing recommendations in the context of your specific health and lifestyle.

It is important to know that all of the genetic sequences in this test are declared on the basis of the "forward" DNA strand. Therefore, certain DNA sequences, well known in the literature as genotypes declared on the reverse strand, will be annotated differently in this report. One example is the well-known C677T mutation in the *MTHFR* gene (rs1801133), thus declared on the reverse strand, but which in this report appears as G677A on the forward strand. The annotation of all the sequences in this report, according to the "forward" strand, is provided in order to streamline further search in genomic databases.

Package 1. Nutrition in pregnancy and lactation

This genetic testing package identifies your nutritional needs during pregnancy or breast-feeding. Because the structure of your genes contributes to defining these needs, your results define the personalized nutritional needs just for you, and cannot be considered appropriate for any another person. These personalized recommendations are for you only.

What are the benefits?

Many of the health issues that arise at birth, and which influence the health of the newborn baby, are due to poor nutrition during pregnancy. An example is maternal folate deficiency, associated with neural tube closure defects. Similarly, the baby's health can be influenced by mother's nutrition during breastfeeding.

This package provides your specific recommendations, consistent with the scientific information obtained from many published studies. In this way, by optimizing your nutrition, you can considerably reduce the risk of birth deffects for your baby.

What should I do with these results?

It is important to understand that nutrition is a complex science and that is why it requires the advice of a specialist. These results are very useful not only to you, but also to your nutritionist (either a physician or a nutritionist) who, on the basis of this report, can recommend an optimal diet for your specific needs.

That is why we recommend that you should show these results to your doctor and your nutritionist, who are taking care of you during these very important periods for your baby's health.

SUMMARY

Your recommendations for pregnancy and breastfeeding are the following:

Congenital lactase deficiency	In the absence of other causes, the newborn can consume breast milk / formula containing lactose.
Thiamine metabolism (vitamin B_1)	Daily Thiamine intake of at least 1,4 mg during pregnancy and lactation.
Adenosine metabolism	There are no special recommendations in this case.
Choline metabolism	Daily intake of Choline of at least 1 g during pregnancy and lactation. Do not exceed 3 g choline/day.
Vitamin A metabolism	There are no special recommendations in this case.
Betaine metabolism	Daily Betaine intake of at least 200 mg during pregnancy and lactation.
Folates metabolism	Use 5-methyltetrahydrofolate (5-MTHF) supplementation and/or folates from foods. Talk to a specialist.

YOUR RECOMMENDED NUTRIENT INTAKES

As a result of the genetic analysis of your DNA, the table on next page suggests your recommended nutrient intakes. These intakes are recommended only during pregnancy and breastfeeding. These values are for you and only you. In some instances, it is possible that other metabolic conditions might require further modifications of these nutrient intakes, as indicated in packages 2 and 3, but such a decision should be made under medical supervision or by a certified nutritionist/dietician.

We do not recommend these intakes to exceed the upper tolerable limits indicated at the end of this report.

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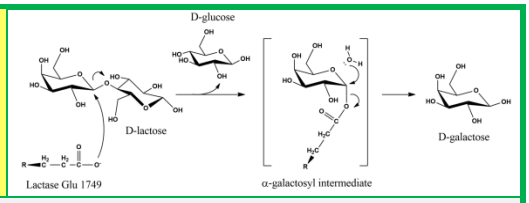
The custom recommendations are for nutrients **marked in blue**, which are the subject of this genetic testing. For the rest of the nutrients (**marked in black**) there are still insufficient scientific data to justify changes from standard recommendations, or the existing scientific data have not yet been sufficiently confirmed*.

* The algorithms used in this package take into account the latest scientific findings published in specialized, peer reviewed, scientific journals. These algorithms are the intellectual property of Advanced Nutrigenomics. The genetic variations included in this package, as well as the nutrients for which personalized values are offered, are the result of continuous evaluation of existing published studies.

NUTRIENT	UNITS	STANDARD RECOMMENDATIONS		YOUR RECOMMENDATIONS	
		Pregnancy	Lactation	**Pregnancy**	**Lactation**
Water	L/d	3	3,8	**3**	**3,8**
Carbohydrates	g/d	175	175	**175**	**175**
Fiber	g/d	28	29	**28**	**29**
Linoleic acid	g/d	13	13	**13**	**13**
α-linolenic acid	g/d	1,4	1,3	**1,4**	**1,3**
Proteins	g/d	71	71	**71**	**71**
Vitamin A	µg/d	770	1300	**770**	**1300**
Vitamin C	mg/d	85	120	**85**	**120**
Vitamin D	µg/d	15	15	**15**	**15**
Vitamin E	mg/d	15	19	**15**	**19**
Vitamin K	µg/d	90	90	**90**	**90**
Thiamine	mg/d	1,4	1,4	**1,4**	**1,4**
Riboflavin	mg/d	1,4	1,6	**1,4**	**1,6**
Niacin	mg/d	18	17	**18**	**17**
Vitamin B_6	mg/d	1,9	2	**1,9**	**2**
Folates	µg DFE/d	600	500	***S**	***S**
Vitamin B_{12}	µg/d	2,6	2,8	**2,6**	**2,8**
Pantothenic acid	mg/d	6	7	**6**	**7**
Betaine[1]	mg/d	-	-	**200**	**200**
Biotin	µg/d	30	35	**30**	**35**
Choline	mg/d	450	550	**1000**	**1000**
Calcium	mg/d	1000	1000	**1000**	**1000**
Chromium	µg/d	30	45	**30**	**45**
Copper	µg/d	1000	1300	**1000**	**1300**
Iron	mg/d	27	9	**27**	**9**
Fluoride	mg/d	3	3	**3**	**3**
Phosphorus	mg/d	700	700	**700**	**700**
Iodine	µg/d	220	290	**220**	**290**
Magnesium	mg/d	350	310	**350**	**310**
Manganese	mg/d	2	2,6	**2**	**2,6**
Molybdenum	µg/d	50	50	**50**	**50**
Selenium	µg/d	60	70	**60**	**70**
Zinc	mg/d	11	12	**11**	**12**
Potassium	g/d	4,7	5,1	**4,7**	**5,1**
Sodium	g/d	1,5	1,5	**1,5**	**1,5**
Chloride	g/d	2,3	2,3	**2,3**	**2,3**

L (liter), g (grams), mg (milligrams), µg (micrograms, mcg), DFE (dietary folate equivalents)
***S** = talk to a specialist (OB/GYN or your personal doctor).
[1]There are no standard recommendations for Betaine.

CONGENITAL LACTASE DEFICIENCY



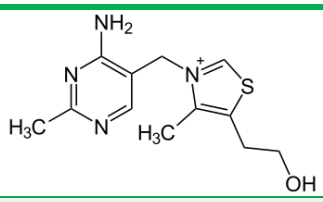
Test 1		
Locus	**Gene**	**Genotype**
rs121908936	LCT	A/A

Comment
This genotype is normal.

The *LCT* gene regulates the process of hydrolysis ("digestion") of lactose. A parent with a T genetic variation can transmit it to the child. If the newborn has two T genetic variations (genotype T/T), he or she may develop congenital lactase deficiency.

Recommendation:
In the absence of other causes, the newborn can consume breast milk / formula containing lactose.

THIAMINE (VITAMIN B_1)



Test 2		
Locus	**Gene**	**Genotype**
rs228584	TPK1	T/T

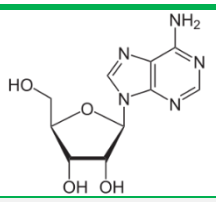
Comment
This maternal genotype does not change the standard recommendations for Thiamine (Vitamin B1) intake during pregnancy and breastfeeding.

The *TPK1* gene controls the conversion of thiamine to thiamine pyrophosphate. Mothers carrying the C genetic variation have an increased risk of giving birth to children weighing less than the average birth weight.

Recommendation:
Daily Thiamine intake of at least 1,4 mg during pregnancy and lactation.

Foods rich in Thiamine (Vitamin B_1) include: **beef, liver, powdered milk, nuts, oranges, pork, eggs, peas, dried beans, and yeast**.

ADENOSINE



Test 3		
Locus	**Gene**	**Genotype**
rs6031682	ADA	G/G

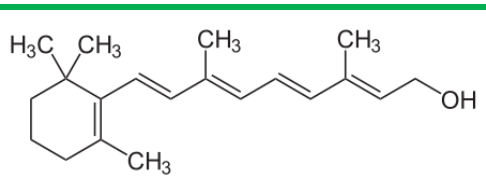
Comment
This maternal genotype requires no action regarding Adenosine intake during pregnancy and breastfeeding.

The *ADA* gene controls the metabolism of adenosine. Mothers carrying two copies of the gene with the genetic variation C (genotype C/C) have an increased risk of giving birth to children with neural tube closure defects, possibly due to accumulation of deoxyadenosine.

Recommendation:
Daily Thiamine intake of at least 1,4 mg during pregnancy and lactation.

Foods rich in purines (adenosine and adenine) include: **animal organs, meat (including game, pork, lamb, beef), fish, wheat germ.**

VITAMIN A



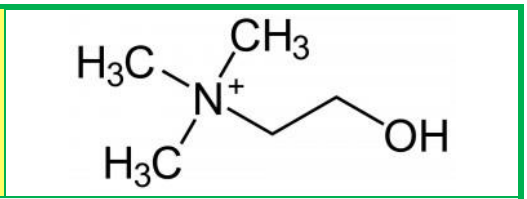
Test 4		
Locus	**Gene**	**Genotype**
rs7169289	ALDH1A2	G/A

Comment
This maternal genotype does not change the standard recommendations for Vitamin A intake during pregnancy and breastfeeding.

The *ALDH1A2* gene controls the synthesis of retinoic acid from retinaldehyde. Mothers carrying two copies of the gene containing the genetic variation A (genotype A/A) are at an increased risk of giving birth to children with neural tube closure defects.

Recommendation:
There are no special recommendations in this case.

CHOLINE



Test 5		
Locus	**Gene**	**Genotype**
rs7946	PEMT	C/T

Rezoluție
This maternal genotype does not change the standard recommendations for Choline intake during pregnancy and breastfeeding.

The *PEMT* gene controls for the endogenous synthesis of choline. Mothers carrying two copies of the gene containing the genetic variation C (genotype C/C) are at increased risk of giving birth to children with neural tube closure defects.

Test 6		
Locus	**Gene**	**Genotype**
rs7639752	PCYT1A	A/A

Comment
This maternal genotype requires an increased Choline intake during pregnancy and breastfeeding.

The *PCYT1A* gene is involved in the control of endogenous synthesis of phosphatidyl-choline. Mothers carrying the genotypes G/A or A/A are at increased risk of giving birth to children with neural tube closure defects for mouth and face.

Test 7 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs6445606	CHDH	T/T
rs3764897	PLD2	G/G
CHDH x PLD2:		Favorable

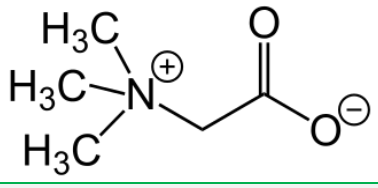
Comment
This maternal genotype does not change the standard recommendations for Choline intake during pregnancy and breastfeeding.

The *CHDH* and *PLD2* genes are involved in choline metabolism. Carriers of the T/T genotype (for *CHDH*) and G/G genotype (for *PLD2*) are at increased risk of giving birth to children with tooth agenesis in their early childhood.

Recommendation:
Daily intake of Choline of at least 1 g during pregnancy and lactation. Do not exceed 3 g choline/day.

Foods rich in choline include: **meat (chicken, beef, pork), fish, dairy, rice, eggs.**

BETAINE



Test 8		
Locus	**Gene**	**Genotype**
rs6445606	CHDH	T/T

Comment

This maternal genotype requires the monitoring of Betaine intake during pregnancy and lactation.

The *CHDH* gene controls the synthesis of betaine from choline. Mothers carrying two copies of the genetic variation T (T/T genotype) are at increased risk of giving birth to children with tooth agenesis.

Test 9		
Locus	**Gene**	**Genotype**
rs526264	BHMT2	A/T

Comment

This maternal genotype does not require the monitoring of Betaine intake during pregnancy and lactation.

Test 10		
Locus	**Gene**	**Genotype**
rs625879	BHMT2	A/C

Comment

This maternal genotype does not require the monitoring of Betaine intake during pregnancy and lactation.

The *BHMT2* gene is one of the two genes (together with the *BHMT* gene) that control the transfer of a methyl group from betaine to homocysteine, resulting methionine. The T/T genotype (rs526264) or C/C genotypes (rs625879) are at increased risk of giving birth to children with tooth agenesis.

Test 11		
Locus	**Gene**	**Genotype**
rs7356530	BHMT	G/A

Comment

This maternal genotype does not require the monitoring of Betaine intake during pregnancy and lactation.

Test 12		
Locus	**Gene**	**Genotype**
rs600473	BHMT	G/T

Comment

This maternal genotype does not require the monitoring of Betaine intake during pregnancy and lactation.

Test 13		
Locus	**Gene**	**Genotype**
rs3733890	BHMT	G/A

Comment

This maternal genotype does not require the monitoring of Betaine intake during pregnancy and lactation.

Continue to next page...

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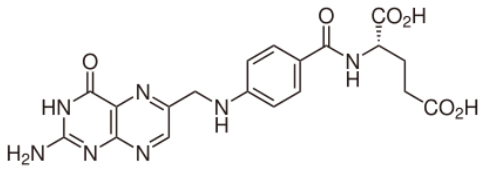
The *BHMT* gene is one of two genes (together with the *BHMT2* gene) that control the transfer of a methyl group from betaine to homocysteine, resulting methionine. Mother with the genotypes A/A (rs7356530), T/T (rs600473), or G/G (rs3733890) are at increased risk of giving birth to children with tooth agenesis.

Recommendation:
Daily Betaine intake of at least 200 mg during pregnancy and lactation.

Foods rich in Betaine include: **wheat bran, quinoa, red beet, spinach.**

FOLATES



Test 14		
Locus	**Gene**	**Genotype**
rs1801133	MTHFR	G/G

Comment
This maternal genotype does not change the standard recommendations for Folates during pregnancy and breastfeeding.

The *MTHFR* gene controls the endogenous synthesis of 5-methyltetrahydrofolate (5-MTHF, the active form of folate). Mothers carrying the genetic variation A (also known as the C677T variation) can transmit it to the fetus, which has an increased risk of developing neural tube closure defects.

Test 15		
Locus	**Gene**	**Genotype**
rs2295083	MTHFD1L	G/A

Comment
This maternal genotype requires an increased 5-methyltetrahydrofolate (5-MTHF) intake during pregnancy and lactation.

The *MTHFD1L* gene controls the synthesis of tetrahydrofolate. Mothers carrying the genetic variation A have an increased risk of giving birth to children with neural tube closure defects.

Test 16		
Locus	**Gene**	**Genotype**
rs70991108	DHFR	In/In

Comment
This maternal genotype does not change the standard recommendations for Folates during pregnancy and breastfeeding.

The *DHFR* gene controls the synthesis of tetrahydrofolic acid from dihydrofolic acid. Mothers carrying the Del genetic variation (a 19-bp deletion) are at increased risk of giving birth to children with neural tube closure defects.

Continue to next page...

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Test 17		
Locus	**Gene**	**Genotype**
rs17803441	SLC25A32	C/C

Comment
This maternal genotype does not change the standard recommendations for Folates during pregnancy and breastfeeding.

The *SLC25A32* gene (also known as *MFT* or *MFTC*) controls the transport of folate to the mitochondria. Mothers carrying the genetic variation T have an increased risk of giving birth to children with neural tube closure defects.

Test 18 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs2236225	MTHFD1	G/G
rs1805087	MTR	A/G
rs1051266	RFC1	C/C
MTHFD x MTR x RFC1:		Favorable

Comment
The result of this interaction does not change the standard recommendations for Folates during pregnancy and breastfeeding.

The *MTHFD1* gene is involved in the metabolism of folate in several metabolic pathways. The *MTR* gene controls the synthesis of methionine from homocysteine and 5-MTHF. The *RFC1* gene controls the intracellular transport of folate. Mothers who have an unfavorable outcome for the interaction between these three genotypes have an increased risk of pre-term birth.

Recommendation:
Use 5-methyltetrahydrofolate (5-MTHF) supplementation and/or folates from foods. Talk to a specialist.

Foods rich in folate include: **lentils, beans and dried peas, leafy green vegetables.**

Package 2. Adult nutrition

This package identifies the nutrient targets you need as adult. Because your DNA structure contributes to defining these targets, these results define the personalized nutritional needs just for you, and cannot be considered appropriate for another person. These personalized recommendations are for you only.

What are the benefits?

Some of the health issues occuring during your lifetime could be due to inadequate nutrition. Personalized nutrition, when correlated with your genetic structure, is the main way to prevent such disorders and metabolic diseases, including type-2 diabetes, obesity, hepatosteatosis, osteoporosis, and premature decrease in cognitive and memory abilities.

This package provides your specific recommendations, consistent with the scientific information presently available. In this way, by optimizing your nutrition, you can considerably reduce the risk of health problems that may occur in your life.

What should I do with these results?

It is important to realize that nutrition is a complex science and that is why you need the advice of a specialist. These results are very useful not only to you, but also to a nutritionist who, based this report, can design a meal plan that is appropriate to your specific needs.

That is why we recommend that you talk about these results to your doctor or your nutritionist.

SUMMARY

Your recommendations are the following:

Alcohol

Limit alcohol consumption to a maximum of 5 g/day (total alcohol 100%).

Coffee

This result does not recommend an exact daily limit for coffee consumption (caffeine). Coffee (caffeine) should be consumed with moderation in any situation.

Omega-6 and omega-3 fatty acids

Polyunsaturated OMEGA-6 (N6)		Polyunsaturated OMEGA-3 (N3)		RATIO N6/N3
Linoleic acid (LA)	<8 g/d	Alpha-linolenic acid (ALA)	>1,1 g/d	<10
		Eicosapentaenoic acid (EPA)	>0,4 g/d	
		Docosahexaenoic acid (DHA)	>0,88 g/d	

Vitamin A

Intake of Vitamin A and its precursors of at least 700 micrograms/day (retinol equivalent).

Vitamin B_2 (riboflavin)

Intake of Vitamin B2 of at least 2,2 milligrams/day.

Vitamin B_3 (niacin)

Intake of Vitamin B3 of at least 21 milligrams/day.

Vitamin B_{12} (cobalamin)

Intake of Vitamin B12 of at least 4,8 micrograms/day.

Vitamin C

Intake of Vitamin C of at least 75 milligrams/day.

Vitamin D

Intake of Vitamin D of at least 25 micrograms/day (equivalent cholecalciferol). 1 microgram cholecalciferol = 40 IU Vitamin D.

Vitamin E

Intake of Vitamin E of at least 30 milligrams/day (equivalent alpha-Tocopherol).

Vitamin K

Intake of Vitamin K of approximately 90 micrograms/day.

Continue on next page...

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Betaine	Intake of Betaine of at least 200 milligrams/day.
Choline	Intake of Choline of at least 425 milligrams/day.
Folates	Intake of Folates of at least 400 DFE/day.
Calcium	Intake of Calcium of at least 1500 milligrams/day.
Iron	Intake of Iron of at least 10 milligrams/day.
Magnesiu	Intake of Magnesium of at least 390 milligrams/day.
Selenium	Intake of Selenium of at least 85 micrograms/day.
Zinc	Intake of Zinc of at least 8 milligrams/day.

YOUR RECOMMENDED NUTRIENT INTAKES

As a result of the genetic analysis of your DNA, the table on next page suggests your recommended nutrient intakes. These intakes are recommended only for healthy adults. These values are for you and only you. In some instances, it is possible that other metabolic conditions might require further modifications of these nutrient intakes, as indicated in packages 1, 3, 4, and 5, but such a decision should be made under medical supervision or by a certified nutritionist/dietician.

We do not recommend these intakes to exceed the upper tolerable limits indicated at the end of this report.

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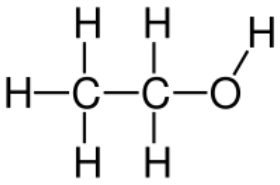
The custom recommendations are for nutrients **marked in blue**, which are the subject of this genetic testing. For the rest of the nutrients (**marked in black**) there are still insufficient scientific data to justify changes from standard recommendations, or the existing scientific data have not yet been sufficiently confirmed*.

* The algorithms used in this package take into account the latest scientific findings published in specialized, peer reviewed, scientific journals. These algorithms are the intellectual property of Advanced Nutrigenomics. The genetic variations included in this package, as well as the nutrients for which personalized values are offered, are the result of continuous evaluation of existing published studies.

NUTRIENT	UNITS	STANDARD RECOMMENDATIONS	YOUR RECOMMENDATIONS
Water	L/d	2,7	**2,7**
Carbohydrates	g/d	130	**130**
Fiber	g/d	21	**21**
Linoleic acid	g/d	11	**<8**
α-linolenic acid	g/d	1,1	**>1,1**
Proteins	g/d	46	**46**
Vitamin A	µg/d	700	**700**
Vitamin C	mg/d	75	**75**
Vitamin D	µg/d	15	**25**
Vitamin E	mg/d	15	**30**
Vitamin K	µg/d	90	**90**
Thiamine	mg/d	1,1	**1,1**
Riboflavin	mg/d	1,1	**2,2**
Niacin	mg/d	14	**21**
Vitamin B_6	mg/d	1,5	**1,5**
Folates	µg DFE/d	400	**400**
Vitamin B_{12}	µg/d	2,4	**4,8**
Pantothenic acid	mg/d	5	**5**
Betaine[1]	mg/d	-	**200**
Biotin	µg/d	30	**30**
Choline	mg/d	425	**425**
Calcium	mg/d	1200	**1500**
Chromium	µg/d	20	**20**
Copper	µg/d	900	**900**
Iron	mg/d	8	**10**
Fluoride	mg/d	3	**3**
Phosphorus	mg/d	700	**700**
Iodine	µg/d	150	**150**
Magnesium	mg/d	320	**390**
Manganese	mg/d	1,8	**1,8**
Molybdenum	µg/d	45	**45**
Selenium	µg/d	55	**85**
Zinc	mg/d	8	**8**
Potassium	g/d	4,7	**4,7**
Sodium	g/d	1,3	**1,3**
Chloride	g/d	2	**2**

L (liter), g (grams), mg (milligrams), µg (micrograms, mcg), DFE (dietary folate equivalents)
* = as 5-methyltetrahydrofolate (5-MTHF).
** = as 5-methyltetrahydrofolate (5-MTHF). Avoid using supplementation with folic acid.
[1]There are no standard recommendations for Betaine.

ALCOHOL



Test 19 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs1230025	ADH1	A/T
rs16941667	ALDH2	C/C
ADH1 x ALDH2:		Favorable

Comment

The result of this interaction does not recommend an exact limit of daily consumption of acohol. Alcohol should be consumed with moderation in any situation.

The *ADH1* gene controls the metabolism of alcohol to acetic aldehyde. The *ALDH2* gene controls the metabolism of acetic aldehyde to acetic acid. The concomitant presence of the A genetic variant (*ADH1*) and T genetic variant (*ALDH2*) increases the risk of gastric cancer at an alcohol intake of more than 5 g/day.

Test 20 (haplotype ADH1)		
Locus	**Gene**	**Genotype**
rs1230025	ADH1	A/T
rs13123099	ADH1	G/G
rs17033	ADH1	T/T
rs13133908	ADH1	T/T
Haplotype AGTT:		Present

Comment

This haplotype recommends limiting alcohol consumption to a maximum of 5 g alcohol/day.

The AGTT haplotype is associated with an increased risk of gastric cancer at an alcohol intake of more than 5 g/day.

Test 21 (haplotype ALDH2)		
Locus	**Gene**	**Genotype**
rs16941667	ALDH2	C/C
rs886205	ALDH2	G/G
rs968529	ALDH2	C/C
Haplotype CGT:		Absent

Comment

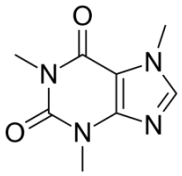
This haplotype does not recommend defining an exact limit of daily consumption of acool. Alcohol should be consumed with moderation in any situation.

The CGT haplotype is associated with an increased risk of gastric cancer at an alcohol intake of more than 5 g/day.

Recommendation:

Limit alcohol consumption to a maximum of 5 g/day (total alcohol 100%).

COFFEE



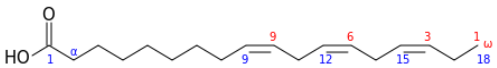
Test 22		
Locus	**Gene**	**Genotype**
rs762551	CYP1A2	A/A

Comment
This genotype does not require strict monitoring of coffee consumption (caffeine). Drink coffee in moderate amounts.

The *CYP1A2* gene controls the metabolism of caffeine. Carriers of the genetic variation C have an increased risk of myocardial infarction if they consume more than one cup of coffee per day (or caffeine equivalent).

Recommendation:
This result does not recommend an exact daily limit for coffee consumption (caffeine). Coffee (caffeine) should be consumed with moderation in any situation.

OMEGA-6 AND OMEGA-3 FATTY ACIDS



Test 23 (haplotype FADS1/FADS2)

Locus	Gene	Genotype	Locus	Gene	Genotype	
rs174544	FADS1	C/C	rs174562	FADS1/2	A/A	
rs174545	FADS1	C/C	rs174564	FADS2	A/A	
rs174546	FADS1	C/C	rs28456	FADS2	A/A	
rs174547	FADS1	T/T	rs174566	FADS2	A/A	
rs174548	FADS1	C/C	rs174567	FADS2	A/A	
rs174549	FADS1	G/G	rs174568	FADS2	C/C	
rs174550	FADS1	T/T	rs99780	FADS2	C/C	
rs174551	FADS1	T/T	rs1535	FADS2	A/A	
rs174553	FADS1	A/A	rs174574	FADS2	C/C	
rs174554	FADS1	A/A	rs174576	FADS2	C/C	
rs174555	FADS1	T/T	rs174577	FADS2	C/C	
rs174556	FADS1	C/C	rs174578	FADS2	T/T	
rs174560	FADS1/2	T/T	rs174580	FADS2	A/A	Haplotype D:
rs174561	FADS1/2	T/T	rs174581	FADS2	G/G	Present

COMMENT

The presence of haplotype D modifies the nutritional needs of omega-3 and omega-6 unsaturated fatty acids.

The *FADS1* and *FADS2* genes control the fatty acid desaturation rate and the synthesis of omega-3 and omega-6 fatty acids. Haplotype D carriers have an increased risk of developing coronary artery disease without an increased intake of omega-3 fatty acids.

Test 24 (haplotype SIRT1)

Locus	Gene	Genotype
rs7069102	SIRT1	C/G
rs2273773	SIRT1	T/T
rs3818292	SIRT1	A/A
Haplotype CCG/GTA:		GTA

Comment

The result of this test does not indicate a change of the recommended ratio of omega-6 / omega-3 fatty acids.

The *SIRT1* gene controls the activation of cellular receptors to which unsaturated fatty acids bind. The presence of CCG or GTA haplotypes in men, or CCG haplotype in women, associates with an increased risk of high levels of LDL cholesterol, depending on the nutritional intake of omega-6 and omega-3 fatty acids.

Continue on next page...

...continue from previous page (fatty acids).

Test 25 (haplotype SREBF1)		
Locus	**Gene**	**Genotype**
rs2297508	SREBF1	C/C
rs11656665	SREBF1	G/G
Haplotype GG:		Absent

Comment
This result does not require strict monitoring of omega-6 fatty acid intake.

The *SREBF1* gene (*SREBP1*) controls the transcription of the LDL receptor. The presence of GG haplotype in menopausal women over 55 years of age contraindicates the consumption of linoleic acid (a precursor of omega-6 fatty acids), which is associated with an increased risk of coronary artery disease.

Recommendation:

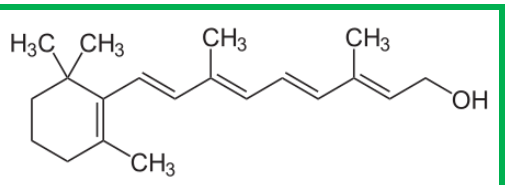
The table below shows the recommended nutrient intake (including dietary supplements) of omega-6 and omega-3 unsaturated fatty acids, as well as the maximum ratio between omega-6 and omega-3. These values are specific to you only.

OMEGA-6 (N6)		OMEGA-3 (N3)		RATIO N6/N3
Linoleic acid (LA)	<8 g/d	Alpha-linolenic acid (ALA)	>1,1 g/d	**<10**
		Eicosapentaenoic acid (EPA)	>0,4 g/d	
		Docosahexaenoic acid (DHA)	>0,88 g/d	

Foods rich in **omega-3** unsaturated fatty acids include **fish (especially mackerel, salmon, cod, herring, sardines, anchovies), shells, flax seeds/flaxseed oil, nuts, peanuts and almonds**.

Foods rich in **omega-6** unsaturated fatty acids include **corn oil, sunflower oil, avocado oil, soybean oil**.

VITAMIN A



Test 26 (haplotype SCARB1)		
Locus	**Gene**	**Genotype**
rs5888	SCARB1	A/G
rs4238001	SCARB1	C/C
rs61932577	SCARB1	G/G
Haplotype GCA:		Absent

Comment

This result does not change the standard recommendations for daily intake of Vitamin A.

The *SCARB1* gene controls the intestinal uptake of some vitamin A precursors. The presence of the GCA haplotype requires an increased nutritional intake of these precursors.

Test 27 (haplotype CD36)		
Locus	**Gene**	**Genotype**
rs1984112	CD36	A/A
rs1761667	CD36	G/A
rs1527479	CD36	T/C
rs1527483	CD36	G/G
rs13230419	CD36	T/T
Haplotype GGTGC:		Absent

Comment

This result does not change the standard recommendations for daily intake of Vitamin A.

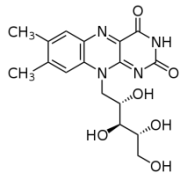
The *CD36* gene controls the intracellular transport of some vitamin A precursors. The presence of the GGTGC haplotype requires an increased nutritional intake of these precursors.

Recommendation:

Intake of Vitamin A and its precursors of at least 700 micrograms/day (retinol equivalent).

Foods rich in Vitamin A or Vitamin A precursors include **sweet potatoes, carrots, lettuce, dried apricots, cantaloupe, fish, liver**.

VITAMIN B_2 (RIBOFLAVIN)



Test 28		
Locus	**Gene**	**Genotype**
rs1801133	MTHFR	G/G
rs1801394	MTRR	A/G
rs1532268	MTRR	T/T

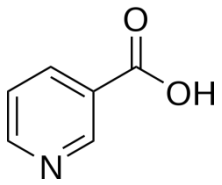
Comment
This result requires an increased daily intake of Vitamin B2.

The *MTHFR* gene controls the endogenous synthesis of 5-methyltetrahydrofolate (5-MTHF, the active form of folate). The presence of genetic variation A requires increased intake of Vitamin B2 in order to control homocysteine levels. The *MTRR* gene is also involved in maintaining normal levels of homocysteine in conjunction with Vitamin B2. The presence of genetic variations G (rs1801394) or T (rs1532268) correlates with an increased risk of increased homocysteine in the absence of adequate intake of Vitamin B2.

Recommendation:
Intake of Vitamin B2 of at least 2,2 milligrams/day.

Foods rich in Vitamin B2 include **eggs, lean meats, milk, broccoli, bananas, plum juice, asparagus**.

VITAMIN B_3 (NIACIN)



Test 29 (haplotype SIRT1)		
Locus	**Gene**	**Genotype**
rs7895833	SIRT1	A/A
rs1467568	SIRT1	A/G
rs497849	SIRT1	C/C
Haplotype AGC:		Present

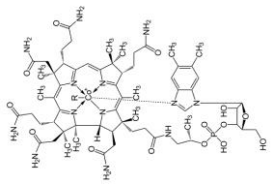
Comment
The presence of this haplotype requires an increased daily intake of Vitamin B3.

The *SIRT1* gene is involved in the control of insulin resistance. Niacin acts as a cofactor in the catalytic activity of the SIRT1 protein. AGC haplotype carriers with type 2 diabetes are at increased risk of death with insufficient vitamin B3 intake.

Recommendation:
Intake of Vitamin B3 of at least 21 milligrams/day.

Foods rich in Vitamin B3 include **turkey meat, chicken breast, peanuts, mushrooms, liver, tuna, green peas, beef (grazed)**.

VITAMIN B_{12} (COBALAMIN)



Test 30 (haplotype FUT2)		
Locus	**Gene**	**Genotype**
rs492602	FUT2	A/G
rs602662	FUT2	G/A
Haplotype AG:		Present

Comment

The presence of this haplotype requires an increased daily intake of Vitamin B12.

The FUT2 gene is associated with the absorption capacity of Vitamin B_{12} in the intestine. The presence of AG haplotype is associated with lower blood levels of vitamin B_{12}.

Test 31 (haplotype MTHFR)		
Locus	**Gene**	**Genotype**
rs1537514	MTHFR	G/C
rs2274976	MTHFR	C/T
Haplotype GC:		Present

Comment

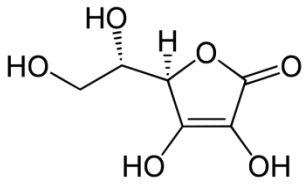
The presence of this haplotype requires an increased daily intake of Vitamin B12.

The *MTHFR* gene controls the endogenous synthesis of 5-methyltetrahydrofolate (5-MTHF, the active form of folate). Vitamin B_{12} is used as a co-factor in the use of 5-MTHF for methionine synthesis. The GC haplotype is associated with elevated homocysteine levels in the absence of an increased intake of Vitamin B_{12}.

Recommendation:
Intake of Vitamin B12 of at least 4,8 micrograms/day.

Foods rich in Vitamin B_{12} include **clams, beef and cow liver, turkey meat, chicken, crustaceans, salmon, eggs, trout**.

VITAMIN C (ASCORBIC ACID)



Test 32		
Locus	**Gene**	**Genotype**
rs11950646	SLC23A1	G/A
rs33972313	SLC23A1	C/C

Comment

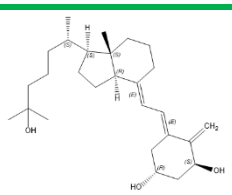
This result does not change the standard recommendations for daily intake of Vitamin C.

The *SLC23A1* gene (also known as *SLC23A2*) controls the intestinal absorption and intracellular transport of Vitamin C (ascorbic acid). Persons carrying the genotypes G/G (rs11950646), or C/ or T/T (rs33972313) have an increased risk of vitamin C.

Recommendation:
Intake of Vitamin C of at least 75 milligrams/day.

Foods rich in Vitamin C include **strawberries, citrus fruits (lemons, oranges, grapefruit, lime), papaya, kiwi, guava, kale, brussel sprouts, melon, cantalupe, broccoli, cauliflower, tomatoes.**

VITAMIN D



Test 33 (haplotype CYP2R1)		
Locus	**Gene**	**Genotype**
rs10741657	CYP2R1	A/A
rs10766197	CYP2R1	G/G
Diplotype:		22

Comment
This combination of haplotypes does not change the standard recommendations for daily intake of Vitamin D.

The *CYP2R1* gene controls the synthesis of the active form of Vitamin D from its precursor. The individuals carrying the "11" or "33" diplotypes are at increased risk of having low levels of active vitamin D in the absence of adequate nutritional intake.

Test 34 (haplotype GC)		
Locus	**Gene**	**Genotype**
rs12512631	GC	T/T
rs842999	GC	G/G
rs4588	GC	T/T
Diplotype:		22

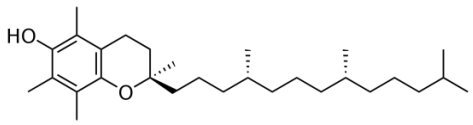
Comment
This combination of haplotypes requires an increased daily intake of Vitamin D.

The *GC* gene controls the transport of Vitamin D to other organs and tissues. Carriers of "22", "45" or "25" diplotypes are at increased risk of having low levels of active vitamin D in the absence of adequate nutritional intake.

Recommendation:
Intake of Vitamin D of at least 25 micrograms/day (equivalent cholecalciferol). 1 microgram cholecalciferol = 40 IU Vitamin D.

Foods rich in Vitamin D and Vitamin D precursors include **fatty fish species (tuna, mackerel, salmon, etc.), vitamin D fortified products, cheeses, beef, liver, eggs**.

VITAMIN E



Test 35 (haplotype CD36)		
Locus	**Gene**	**Genotype**
rs1984112	CD36	A/A
rs1527479	CD36	T/C
rs7755	CD36	A/A
rs1527483	CD36	G/G
Diplotype:		36

Comment

This combination of haplotypes requires an increased daily intake of Vitamin E.

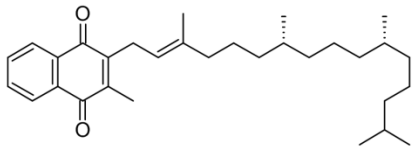
The *CD36* gene controls the intracellular transport of Vitamin E (alpha-tocopherol). Persons carrying haplotype combinations which DO NOT CONTAIN haplotypes "5" or "7" (eg. "24", "46", "89", etc.) exhibit, on average, lower plasma tocopherol and need an increased nutritional intake of Vitamin E.

Recommendation:

Intake of Vitamin E of at least 30 milligrams/day (equivalent alpha-Tocopherol).

Foods rich in Vitamin E include **sunflower oil and seeds, nuts, peanuts, avocado, shrimp, fish (trout, herring, salmon), olive oil, broccoli, pumpkin, kiwi, mango, peaches, nectarines, apricots, guava**.

VITAMIN K



Test 36		
Locus	**Gene**	**Genotype**
rs2359612	VKORC1	A/G

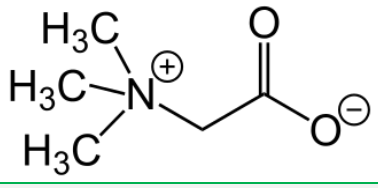
Comment
This result does not change the standard recommendations for daily intake of Vitamin K.

The VKORC1 gene controls blood clotting due to Vitamin K activation. G/G genotype carriers require increased intake of Vitamin K. IMPORTANT: If this test results in the G/G genotype identification, it is necessary to inform your doctor as this genotype may require a reduction of the usual doses of some anticoagulant drugs.

Recommendation:
Intake of Vitamin K of approximately 90 micrograms/day.

Foods rich in Vitamin K include **brussel sprouts, cabbage, broccoli, fermented dairy products, plums, cucumbers**.

BETAINE



Test 37		
Locus	**Gene**	**Genotype**
rs6445606	CHDH	T/T

Comment

This genotype requires increased daily intake of Betaine.

The *CHDH* gene controls the synthesis of betaine from choline. People carrying two copies of genetic variation T (genotype T/T) have increased nutritional requirement of betaine.

Test 38		
Locus	**Gene**	**Genotype**
rs526264	BHMT2	A/T

Comment

This genotype does not require the monitoring of Betaine daily intake.

Test 39		
Locus	**Gene**	**Genotype**
rs625879	BHMT2	A/C

Comment

This genotype does not require the monitoring of Betaine daily intake.

The *BHMT2* gene is one of the two genes (together with the *BHMT* gene) that control the transfer of a methyl group from betaine to homocysteine, resulting in methionine. T/T genotype (rs526264) or C/C genotype (rs625879) require higher daily intakes of betaine.

Test 40		
Locus	**Gene**	**Genotype**
rs7356530	BHMT	G/A

Comment

This genotype does not require the monitoring of Betaine daily intake.

Test 41		
Locus	**Gene**	**Genotype**
rs600473	BHMT	G/T

Comment

This genotype does not require the monitoring of Betaine daily intake.

Test 42		
Locus	**Gene**	**Genotype**
rs3733890	BHMT	G/A

Comment

This genotype does not require the monitoring of Betaine daily intake.

Continue on next page...

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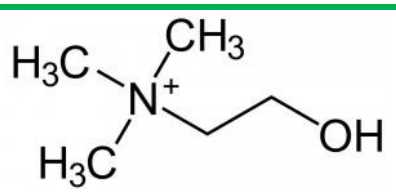
The *BHMT2* gene is one of the two genes (together with the *BHMT* gene) that control the transfer of a methyl group from betaine to homocysteine, resulting in methionine. T/T genotype (rs526264) or C/C genotype (rs625879) require higher daily intakes of betaine.

Recommendation:
Intake of Betaine of at least 200 milligrams/day.

Foods rich in betaine include **wheat bran, quinoa, beets, spinach.**

CHOLINE



Test 43		
Locus	**Gene**	**Genotype**
rs4646343	PEMT	G/T

Comment
This genotype requires a standard daily intake of Choline.

Test 44		
Locus	**Gene**	**Genotype**
rs3760188	PEMT	C/T

Comment
This genotype requires a standard daily intake of Choline.

Test 45		
Locus	**Gene**	**Genotype**
rs1531100	PEMT	A/A

Comment
This genotype requires a standard daily intake of Choline.

Test 46		
Locus	**Gene**	**Genotype**
rs4646365	PEMT	T/T

Comment
This genotype requires a standard daily intake of Choline.

The PEMT gene controls the endogenous synthesis of choline. People carrying at least one of several genetic variations in both copies of the gene have a different nutritional requirement for choline. IMPORTANT: these recommendations should not be followed by pregnant or lactating women because choline requirements during pregnancy and lactation are increased. See Package 1 for such recommendations.

Test 47		
Locus	**Gene**	**Genotype**
rs6591331	CHKA	A/A

Comment
This genotype requires a minimum daily intake of Choline.

The *CHKA* gene controls the first reaction required for phosphatidylcholine synthesis. Those who carry the genetic variation T have an increased nutritional requirement for choline.

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Test 48			Comment
Locus	**Gene**	**Genotype**	
rs1557502	CHKB	T/T	This genotype requires a standard daily intake of Choline.

The *CHKB* gene controls the synthesis of phospho-choline. Those who carry the genetic variation T have an increased nutritional requirement for choline.

Test 49			Comment
Locus	**Gene**	**Genotype**	
rs7873937	SLC44A1	G/G	This genotype requires a minimum daily intake of Choline.

Test 50			Comment
Locus	**Gene**	**Genotype**	
rs2771040	SLC44A1	A/A	This genotype requires a minimum daily intake of Choline.

Test 51			Comment
Locus	**Gene**	**Genotype**	
rs6479313	SLC44A1	C/C	This genotype requires a minimum daily intake of Choline.

Test 52			Comment
Locus	**Gene**	**Genotype**	
rs16924529	SLC44A1	G/G	This genotype requires a minimum daily intake of Choline.

Test 53			
Locus	**Gene**	**Genotype**	
rs3199966	SLC44A1	T/T	This genotype requires a minimum daily intake of Choline.

Test 54			Comment
Locus	**Gene**	**Genotype**	
rs440290	LOC 101928609	T/T	This genotype requires a minimum daily intake of Choline.

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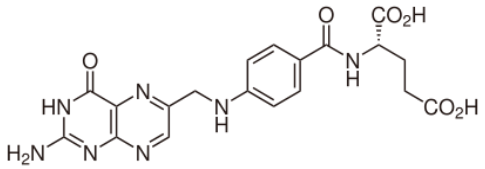
The *SLC44A1* gene controls intracellular choline transport. LOC101928609 is included in the promoter of this gene. People carrying at least one of some genetic variations have a different nutritive requirement of choline when compared to most of the population. IMPORTANT: these recommendations should not be followed by pregnant or lactating women as the choline needs during pregnancy and lactation are increased. See Package 1 for such recommendations.

Recommendation:
Intake of Choline of at least 425 milligrams/day.

Foods rich in choline include **meat (chicken, beef, pork), beef liver, fish, dairy, rice, eggs**.

FOLATES



Test 55		
Locus	**Gene**	**Genotype**
rs1801133	MTHFR	G/G

Comment
This genotype does not change the standard recommended daily intake of Folates.

The *MTHFR* gene controls the endogenous synthesis of 5-methyltetrahydrofolate (5-MTHF, the active form of folate). Individuals carrying the genetic variation A (also known as the C677T variation) have an increased nutritional requirement of folate in its active form (5-methyltetrahydrofolate, 5-MTHF).

Test 56		
Locus	**Gene**	**Genotype**
rs70991108	DHFR	In/In

Comment
This genotype does not change the standard recommended daily intake of Folates.

The *DHFR* gene controls the synthesis of tetrahydrofolic acid from dihydrofolic acid. Individuals carrying the Del genetic variation (deletion of 19 nucleotides) have an increased risk of cancer if they consume supplements containing folic acid.

Recommendation:
Intake of Folates of at least 400 DFE/day.

Foods rich in folates include **lentil, beans and peas, leafy green vegetables**.

CALCIUM	Ca

Test 57		
Locus	**Gene**	**Genotype**
rs1544410	VDR	C/C

Comment
This genotype does not change the standard recommended daily intake of Calcium.

Test 58		
Locus	**Gene**	**Genotype**
rs731236	VDR	A/A

Comment
This genotype does not change the standard recommended daily intake of Calcium.

The *VDR* gene indirectly controls calcium metabolism in the body due to its role in vitamin D-induced gene activation. Menopausal or over 50-year-old women having the genetic variation T (rs1544410) or G (rs731236) have an increased nutritional requirement of calcium.

Test 59		
Locus	**Gene**	**Genotype**
rs17251221	CASR	A/A

Comment
This genotype requires increased daily Calcium intake.

The *CASR* gene controls calcium concentration in the blood. Individuals carrying the genetic variation A have an increased risk for lower blood calcium concentrations in the absence of adequate calcium intake.

Recommendation:
Intake of Calcium of at least 1500 milligrams/day.

Foods rich in calcium include **milk, sardines, yogurt, kefir, broccoli, cheese**.

IRON	Fe

Test 60		
Locus	**Gene**	**Genotype**
rs855791	TMPRSS6	A/G

Comment
This genotype does not change the standard recommended daily intake of Iron.

Test 61		
Locus	**Gene**	**Genotype**
rs4820268	TMPRSS6	G/A

Comment
This genotype requires increased daily Iron intake.

The *TMPRSS6* gene indirectly controls intestinal absorption and iron stores in the body as well as the distribution of iron to organs and tissues. Individuals (males) carrying the genetic variation A (rs855791) or genetic variation G (both sexes, rs4820268) are at increased risk for low levels of iron in the body without a higher daily intake of iron.

Recommendation:
Intake of Iron of at least 10 milligrams/day.

Foods rich in iron include **red meat, pork, poultry, marine food, beans, green leafy vegetables, dried fruits (raisins, apricots), fortified foods with iron (iron fortified cereals, fortified bread with iron, etc.)**.

MAGNESIUM	Mg

Test 62		
Locus	**Gene**	**Genotype**
rs4072037	MUC1	T/T

Comment
This genotype requires increased daily Magnesium intake.

The *MUC1* gene controls the synthesis of mucin, a glycoprotein involved in the protection of the intestines, lungs, stomach, eyes and other organs against pathogens. Carriers of genetic variation T have lower magnesium levels than non-carriers, in the absence of increased magnesium intake.

Test 63		
Locus	**Gene**	**Genotype**
rs13146355	SHROOM3	G/A

Comment
This genotype requires increased daily Magnesium intake.

The *SHROOM3* gene controls the permeability of intercellular junctions. Carriers of genetic variation A have lower magnesium levels than non-carriers, in the absence of increased magnesium intake.

Test 64		
Locus	**Gene**	**Genotype**
rs11144134	TRPM6	T/T

Comment
This genotype does not change the standard recommended daily intake of Magnesium.

The *TRPM6* gene controls the intestinal absorption of magnesium as well as its reabsorption in the kidneys. Carriers of genetic variation C have lower magnesium levels than non-carriers, in the absence of increased magnesium intake.

Test 65		
Locus	**Gene**	**Genotype**
rs3925584	DCDC5	T/T

Comment
This genotype requires increased daily Magnesium intake.

The *DCDC5* gene controls the microtubule polymerization inside the cell, which helps stabilize the three-dimensional shape of a cell. The rs3925584 locus is located in the vicinity of this gene. Carriers of genetic variation T have lower magnesium levels than non-carriers, in the absence of increased magnesium intake.

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Test 66		
Locus	**Gene**	**Genotype**
rs7965584	ATP2B1	A/A

Comment
This genotype requires increased daily Magnesium intake.

The *ATP2B1* gene controls extracellular calcium transport, and the product of this gene (a calcium pump) requires the presence of magnesium. The rs7965584 locus is located in the vicinity of this gene. Carriers of genetic variation A have lower magnesium levels non-carriers, in the absence of increased magnesium intake.

Test 67		
Locus	**Gene**	**Genotype**
rs7197653	PRMT7	G/G

Comment
This genotype requires increased daily Magnesium intake.

The *PRMT7* gene controls the methylation of specific amino acids within the histone H4 structure, contributing to the epigenetic control of gene expression. Carriers of genetic variation G have lower magnesium levels than non-carriers, in the absence of increased magnesium intake.

Recommendation:
Intake of Magnesium of at least 390 milligrams/day.

Magnesium rich foods include **green leafy vegetables (spinach, kale), walnuts and peanuts, pumpkin seeds, fish (mackerel, tuna), beans, soybeans, whole wheat, chinoa, brown rice, avocados, yoghurt, bananas, dried fruits (plums, apricots, raisins), black chocolate**.

SELENIUM	Se

Test 68		
Locus	**Gene**	**Genotype**
rs3877899	SEPP1	C/T

Comment
This genotype requires increased daily Selenium intake.

Test 69		
Locus	**Gene**	**Genotype**
rs7579	SEPP1	C/T

Comment
This genotype requires increased daily Selenium intake.

The *SEPP1* gene encodes an antioxidant selenoprotein for the extracellular space. Carriers of genetic variation T (rs3877899) or T (rs7579) have selenium levels lower than non-carriers, in the absence of increased selenium intake.

Test 70		
Locus	**Gene**	**Genotype**
rs561104	SEP15	C/T

Comment
This genotype requires increased daily Selenium intake.

The *SEP15* gene encodes a selenoprotein with potential antioxidant role. Carriers of genetic variation T have selenium levels lower than non-carriers, in the absence of increased selenium intake.

Recommendation:
Intake of Selenium of at least 85 micrograms/day.

Foods rich in Selenium include **nuts and hazelnuts (different varieties), shellfish, shrimp, lobster, fish (tuna, tilapia, mackerel, etc.), whole flour bread, sunflower seeds, chia seeds, sesame, lean pork, lamb, beef, chicken, turkey, mushrooms**.

ZINC	Zn

Test 71		
Locus	**Gene**	**Genotype**
rs11126936	SLC30A3	G/T

Comment
This genotype does not change the standard recommended daily intake of Zinc.

The *SLC30A3* gene controls the transport and absorption of zinc. People carrying the genetic variation G in both copies of the gene (G/G genotype) have zinc levels lower than non-carriers, in the absence of increased zinc intake.

Recommendation:
Intake of Zinc of at least 8 milligrams/day.

Zinc-rich foods include **shellfish, lamb, beef, wheat germ, spinach, whole grains, pumpkin seeds, peanuts, cocoa, pork, chicken, beans, and mushrooms**.

Package 3. Risks of metabolic imbalances

This package aims to identify metabolic risks associated with your genetic structure, for which nutritional management is available. Because your genetic structure may contribute to such risks, these tests identify personalized solutions just for you, that cannot be considered appropriate for another person. These personalized recommendations are for you only.

What are the benefits?

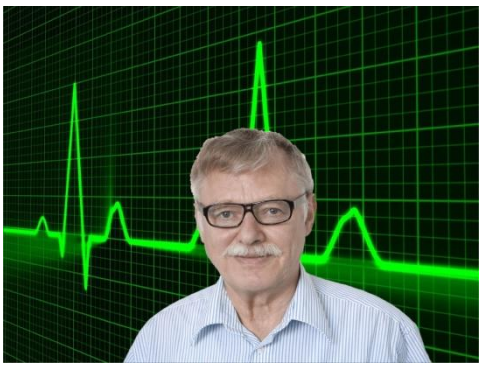
Some risks for metabolic disturbances are increased by inadequate nutrition. These risks may vary from person to person due to genetic differences. Often there are nutritional solutions to reduce these risks or to diminish unwanted metabolic outcomes, according to the structure of your genes. Such solutions can be applied for a wide range of disorders such as type 2 diabetes, hypercholesterolemia or hepatosteatosis.

This package provides you with specific recommendations, consistent with the scientific information obtained from many published studies. As such, you may reduce the risk of metabolic diseases, or even reduce their amplitude.

What should I do with these results?

The identification of metabolic risks should be performed by your doctor. A doctor is the only one that can correctly integrate the information provided by this package with an effective dietary meal plan or medication. If certain metabolic disorders are already present and this package indicates possible solutions, the doctor is the only one who can apply these solutions correctly.

That is why we recommend that you present these results to your doctor.



SUMMARY

The recommendations below should only be followed if you suffer from the aforementioned metabolic conditions or to reduce the risk of their occurrence.

Non-alcoholic hepatosteatosis (NASH)	Supplementation with Choline, Betaine, 5-methyltetrahydrofolate (5-MTHF), Vitamin B12, Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA) in doses recommended by your specialist. It is recommended to start at high doses (3-4 times higher than the recommended standard nutritional values). Subsequently, if the degree of hepatosteatosis is reduced, the successive decreases in these doses will determine the effective minimal dose with which it will continue in the long term, depending on the specialist's advice. It is mandatory to also use adequate nutritional recommendations to reduce body weight.
Obesity	You have a relatively high risk of weight gain. Consult a specialist for proper nutrition recommendations.
Hyperhomocysteinemia	If your doctor has rejected the diagnosis of hyperhomocysteinemia, it is not necessary to make changes for the purpose of decreasing your homocysteine. If hyperhomocysteinemia is present, follow the treatment recommended by your doctor.
Cholesterol	Continuous monitoring of cholesterol levels is recommended. It is advisable to consult with a specialist (nutritionist or your doctor) to implement an appropriate lifestyle that minimizes the risk of high LDL cholesterol. If LDL cholesterol is higher than normal, your doctor may use this information to personalize and enhance the efficacy of antihypercholesterolemic treatments and for proper nutritional management.

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Type 2 Diabetes / Insulin resistance	If you have not been diagnosed with type 2 diabetes, an aggressive approach to preventing type 2 diabetes is required, according to your doctor's advice. This approach includes both a healthy diet and an active lifestyle. Continuous monitoring of biochemical parameters that may indicate insulin resistance or type 2 diabetes may be required. If you have already been diagnosed with diabetes, your doctor may use this information to personalize and make more effective your antidiabetic treatment, and for adequate nutritional management.
Cardiovascular disease in the aging adult	Intake of Zinc of at least 8 milligrams/day.
Postprandial hyperlipidemia	Reduce significantly the intake of foods rich in animal fats, according to your nutritionist's advice.
Alcohol intake	Limit alcohol consumption to a maximum of 5 g/day (total alcohol 100%).

The algorithms used in this package take into account the latest scientific findings published in specialized, peer reviewed, scientific journals. These algorithms are the intellectual property of Advanced Nutrigenomics. The genetic variations included in this package, as well as the nutrients for which personalized values are offered, are the result of continuous evaluation of existing published studies.

NON-ALCOHOLIC HEPATOSTEATOSIS (NASH)

Test 72 (genetic score)

Locus	Gene	Genotype	Locus	Gene	Genotype
rs1109859	PEMT	A/A	rs7238	CHKB	A/G
rs12103822	PEMT	C/C	rs2526678	FADS2	G/A
rs16961845	PEMT	C/C	rs526126	FADS2	C/C
rs13342397	PEMT	T/T	rs10135928	MTHFD1	T/T
rs4479310	PEMT	C/T	rs1801133	MTHFR	G/G
rs936108	PEMT	T/T	rs2066471	MTHFR	C/C
rs8068641	PEMT	A/A	rs4846048	MTHFR	G/A
rs7946	PEMT	C/T	rs4846052	MTHFR	T/T
rs7214988	PEMT	C/C	rs7525338	MTHFR	C/C
rs4244593	PEMT	G/G	rs868014	MTHFR	G/G
rs6502603	PEMT	T/T	rs1580820	PCYT1A	A/A
rs1149222	ABCB4	T/T	rs4898190	PCYT1B	C/C
rs1202283	ABCB4	A/A	rs2281135	PNPLA3	G/G
rs2071645	ABCB4	G/G	rs738409	PNPLA3	C/C
rs31672	ABCB4	T/T	rs11557927	SCD	T/G
rs4148811	ABCB4	T/T	rs11599710	SCD	G/A
rs9655950	ABCB4	T/T	rs12247426	SCD	C/C
rs2854117	APOC3	C/C	rs2167444	SCD	T/A
rs12676	CHDH	C/C	rs7849	SCD	T/C
rs2289209	CHDH	C/C	rs10120572	SLC44A1	T/T
rs4563403	CHDH	C/C	rs10820799	SLC44A1	A/A
rs4687591	CHDH	A/G	rs193008	SLC44A1	T/T
rs6807783	CHDH	G/C	rs328006	SLC44A1	G/G
rs7634578	CHDH	C/C	rs440290	SLC44A1	T/T
rs881883	CHDH	A/G	rs443094	SLC44A1	G/G
rs1557502	CHKB	T/T	rs7018875	SLC44A1	C/C
rs1557503	CHKB	G/A	rs9891119	STAT3	A/C
rs470117	CHKB	C/C	Genetic score:		Positive

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This test uses 55 genetic variations to generate a genetic score. Its development is based on existing clinical studies. **The test is for overweight or obese people** rather than those with normal body weight. This test only refers to metabolic (non-alcoholic) hepatosteatosis in the context of an increased body weight.

A positive genetic score indicates:

1. The fact that an **overweight or obese person** has developed or will likely develop hepatosteatosis as long as they do not alter their obesogenic lifestyle that has contributed to this pathological condition;

2. The fact that such a person could benefit from specific nutritional management for the reduction of hepatosteatosis.

A negative genetic score indicates:

1. The fact that an **overweight or obese person** will probably not develop hepatosteatosis associated with increased body weight (approximately 10% of obese cases);

2. The fact that, if an obese or overweight person develops hepatosteatosis, there is no scientific information that would allow specific nutritional management, except for what is generally recommended for losing body weight.

Recommendation applicable only if you are overweight or obese:
Supplementation with Choline, Betaine, 5-methyltetrahydrofolate (5-MTHF), Vitamin B12, Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA) in doses recommended by your specialist. It is recommended to start at high doses (3-4 times higher than the recommended standard nutritional values). Subsequently, if the degree of hepatosteatosis is reduced, the successive decreases in these doses will determine the effective minimal dose with which it will continue in the long term, depending on the specialist's advice. It is mandatory to also use adequate nutritional recommendations to reduce body weight.

OBESITY

Test 73 (Haplotype UCP2/UCP3)		
Locus	**Gene**	**Genotype**
rs659366	UCP2	C/T
rs653529	UCP2	T/C
rs15763	UCP3	G/G
rs1726745	UCP3	T/C
Identified haplotype:		CTGT

Comment

This haplotype associates with the same risk of obesity as in the general population.

The *UCP2* and *UCP3* genes are involved in mitochondrial energy generation. Carriers of TCAC haplotype have a low risk of weight gain, when compared to carriers of other haplotypes UCP2/UCP3 (Block 2).

Test 74 (haplotype FABP2)		
Locus	**Gene**	**Genotype**
rs6857641	FABP2	C/C
Indicates haplotype:		AA

Comment

This haplotype is not associated with changes in body weight.

The *FABP2* gene is involved in the metabolism of fatty acids. Individuals carrying the haplotype BB and who are normoponderal (with body weight within normal range) tend to have a weight below the average of the general population and relative protection against obesity.

Test 75 (haplotype PLIN1)		
Locus	**Gene**	**Genotype**
rs2304795	PLIN1	A/G
rs1052700	PLIN1	A/T
Haplotype AT or GT:		Present

Comment

This haplotype is associated with an increased risk of obesity.

The *PLIN1* gene controls the storage and release of fat in the adipocytes. Female individuals carrying the AT or GT haplotype have an increased risk of obesity.

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Test 76		
Locus	**Gene**	**Genotype**
rs17817449	FTO	T/T

Comment
This genotype does not change the standard food recommendations.

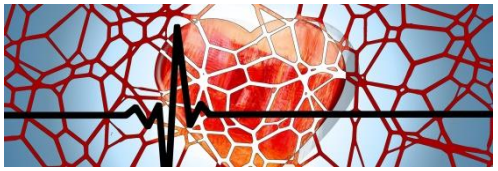
Test 77		
Locus	**Gene**	**Genotype**
rs1421085	FTO	T/T

Comment
This genotype is generally not associated with increased hunger.

The *FTO* gene helps control hunger sensation within the hypothalamus, as well as food preferences.

Recommendation:
You have a relatively high risk of weight gain. Consult a specialist for proper nutrition recommendations.

HYPERHOMOCYSTEINEMIA



Test 78 (haplotype BHMT2)		
Locus	**Gene**	**Genotype**
rs506500	BHMT2	C/C
rs3733890	BHMT2	G/A
rs585800	BHMT2	A/A
Haplotype ACT:		Absent

Comment

This result is not associated with an increased risk of hyperhomocysteinemia.

The *BHMT2* gene (together with *BHMT*) controls the conversion of homocysteine to methionine, using betaine as methyl donor. Carriers of the ACT haplotype have an increased risk of hyperhomocysteinemia when compared to general population.

Test 79 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs1801133	MTHFR	G/G
rs2274976	MTHFR	C/T
Interaction rs x rs:		Favorable

Comment

The result of this interaction is not associated with an increased risk of hyperhomocysteinemia, taking into account your gender.

Test 80 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs1801133	MTHFR	G/G
rs1801131	MTHFR	T/G
Interaction rs x rs:		Favorable

Comment

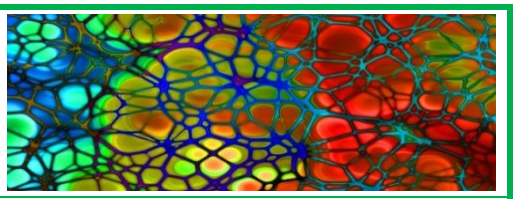
The result of this interaction is not associated with an increased risk of hyperhomocysteinemia.

The *MTHFR* gene controls the endogenous synthesis of 5-methyltetrahydrofolate (5-MTHF, the active form of folate). Carriers of specific combinations of genetic variations have an increased risk of hyperhomocysteinemia, depending on gender, age, lifestyle and diet.

Recommendation:

If your doctor has rejected the diagnosis of hyperhomocysteinemia, it is not necessary to make changes for the purpose of decreasing your homocysteine. If hyperhomocysteinemia is present, follow the treatment recommended by your doctor.

CHOLESTEROL



Test 81 (haplotype UCP3)		
Locus	**Gene**	**Genotype**
rs3781907	UCP3	A/G
rs11235972	UCP3	G/A
rs1800849	UCP2	G/A
Haplotype GAA:		Present

Comment

This haplotype is associated with higher risk for increased total cholesterol and LDL cholesterol when compared to the mean values in the general population.

The *UCP2* and *UCP3* genes are involved in mitochondrial energy generation. Carriers of the GAA haplotype have, on average, elevated total cholesterol and LDL cholesterol versus mean values in the general population. Higher than average values may be within or above normal limits.

Test 82 (haplotype PON1)		
Locus	**Gene**	**Genotype**
rs662	PON1	G/A
rs854560	PON1	A/A
Haplotype GA:		Present

Comment

This haplotype is associated with higher risk for increased total cholesterol and LDL cholesterol when compared to the mean values in the general population.

The *PON1* gene contributes to the anti-atherosclerotic function of HDL cholesterol, and indirectly to the control of LDL cholesterol levels. GA haplotype carriers have, on average, elevated levels of LDL cholesterol, when compared to the average values in general population. Higher than average values may be within or above normal limits.

Recommendation:

Continuous monitoring of cholesterol levels is recommended. It is advisable to consult with a specialist (nutritionist or your doctor) to implement an appropriate lifestyle that minimizes the risk of high LDL cholesterol. If LDL cholesterol is higher than normal, your doctor may use this information to personalize and enhance the efficacy of antihypercholesterolemic treatments and for proper nutritional management.

TYPE 2 DIABETS / INSULIN RESISTANCE

Test 83 (haplotype IRS1)		
Locus	**Gene**	**Genotype**
rs7578326	IRS1	A/A
rs2943641	IRS1	C/C
Haplotype AC:		Present

Comment

The presence of this haplotype increases the risk of insulin resistance, then of type 2 diabetes, compared to the general population.

The *IRS1* gene is involved in molecular processes that allow insulin to enter cells. Carriers of the AC haplotype have an increased risk of developing insulin resistance, followed by type 2 diabetes. These metabolic disorders may occur more frequently in overweight or obese individuals but may also be present in normal-weight individuals.

Test 84 (haplotype TRPM6)		
Locus	**Gene**	**Genotype**
rs3750425	TRPM6	C/T
rs2274924	TRPM6	T/C
Haplotype TC:		Present

Comment

This haplotype is associated with increased type 2 diabetes when Magnesium intake is not adequate.

The *TRPM6* gene controls the intestinal absorption of magnesium as well as its reabsorption in the kidneys. Women carrying the TC haplotype have an increased risk of type 2 diabetes if the daily intake of magnesium is less than 250 milligrams.

To analyze the interaction between other genetic variations and physical activity, with roles in modifying the risk of type 2 diabetes, see **Package 4 - Genotypes associated with physical exercise or sports performance**.

Recommendation:

If you have not been diagnosed with type 2 diabetes, an aggressive approach to preventing type 2 diabetes is required, according to your doctor's advice. This approach includes both a healthy diet and an active lifestyle. Continuous monitoring of biochemical parameters that may indicate insulin resistance or type 2 diabetes may be required. If you have already been diagnosed with diabetes, your doctor may use this information to personalize and make more effective your antidiabetic treatment, and for adequate nutritional management.

CARDIOVASCULAR RISK

Test 85 (haplotype MT1A)		
Locus	**Gene**	**Genotype**
rs8052394	MT1A	A/A
rs11640851	MT1A	A/A
Haplotype GC:		Absent

Comment

This result is not associated with increased risk of cardiovascular disease.

The *MT1A* gene is involved in the synthesis of zinc-containing metalloproteins. These proteins have antioxidant and protective roles against cardiovascular pathological changes. Carriers of the GC haplotype, over 60 years of age, who have insufficient zinc intake, are at increased risk for cardiovascular disease compared to those of the same age and carriers of other MT1A haplotypes.

Recommendation:
Intake of Zinc of at least 8 milligrams/day.

POSTPRANDIAL HYPERLIPIDEMIA

Test 86 (haplotype APOA5)		
Locus	**Gene**	**Genotype**
rs662799	APOA5	G/A
rs3135506	APOA5	G/G
Haplotype APOA5*1:		Absent

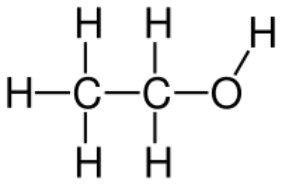
Comment

The absence of this haplotype is associated with an increased risk of postprandial hyperlipidemia, which may favor the development of cardiovascular disease.

The *APOA5* gene controls plasma levels of triglycerides, having an important role in preventing cardiovascular disease due to excessive fat intake. Carriers of the APOA5*1 haplotype have a degree of protection against high plasma triglyceride increases immediately after a high fat meal and are therefore relatively protected against this risk factor.

Recommendation:
Reduce significantly the intake of foods rich in animal fats, according to your nutritionist's advice.

ALCOHOL CONSUMPTION AND GASTRIC CANCER RISK



Test 87 (gene-gene interaction)		
Locus	**Gene**	**Genotype**
rs1230025	ADH1	A/T
rs16941667	ALDH2	C/C
ADH1 x ALDH2:		Favorable

Comment

The result of this interaction does not recommend an exact limit of daily consumption of alcohol. Alcohol should be consumed with moderation in any situation.

The *ADH1* gene controls the metabolism of alcohol to acetic aldehyde. The *ALDH2* gene controls the metabolism of acetic aldehyde to acetic acid. The concomitant presence of the A genetic variant (*ADH1*) and T genetic variant (*ALDH2*) increases the risk of gastric cancer at an alcohol intake of more than 5 g/day.

Test 88 (haplotype ADH1)		
Locus	**Gene**	**Genotip**
rs1230025	ADH1	A/T
rs13123099	ADH1	G/G
rs17033	ADH1	T/T
rs13133908	ADH1	T/T
Haplotype AGTT:		Present

Comment

This haplotype recommends limiting alcohol consumption to a maximum of 5 g alcohol/day.

The AGTT haplotype is associated with an increased risk of gastric cancer at an alcohol intake of more than 5 g/day.

Test 89 (haplotype ALDH2)		
Locus	**Gene**	**Genotype**
rs16941667	ALDH2	C/C
rs886205	ALDH2	G/G
rs968529	ALDH2	C/C
Haplotype CGT:		Absent

Comment

This haplotype does not recommend defining an exact limit of daily consumption of alcohol. Alcohol should be consumed with moderation in any situation.

The CGT haplotype is associated with an increased risk of gastric cancer at an alcohol intake of more than 5 g/day.

Recommendation:

Limit alcohol consumption to a maximum of 5 g/day (total alcohol 100%).

Package 4. Physical activity and sports performance

This package aims to identify the link between your genetic structure and the impact that physical activity can have on your health. These genetic tests identify personalized solutions for you that cannot be considered appropriate for another person. These personalized recommendations are for you only.

What are the benefits?

Many of the risks for metabolic alterations are due not only to inadequate nutrition but also to the way the genetic structure may limit the ability to perform physical activity. These risks may vary from person to person due to genetic differences between different people. Nutrition and adequate physical activity can reduce these risks or solve these metabolic problems, depending on the structure of your genes.

This package provides you with specific recommendations, consistent with the scientific information obtained from many published studies. In this way, by optimizing your physical activity, you can reduce the risk of developing metabolic disorders.

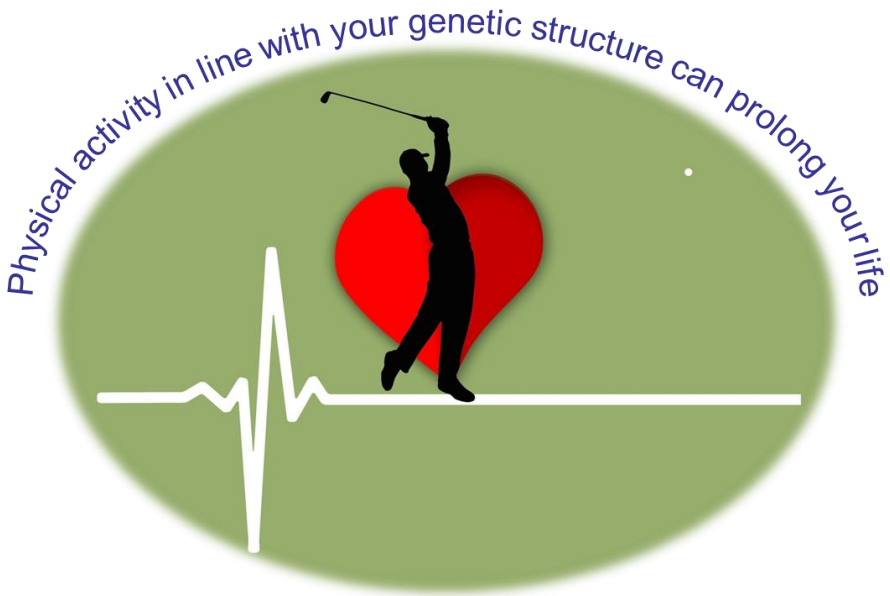
What should I do with these results?

Identifying risks related to physical activity should be followed by advice received from your fitness coach (or sports coach), your nutritionist or your doctor. Your coach is the most appropriate person who can correctly integrate the information provided by this package into an effective physical activity schedule. If certain metabolic disorders are already installed, these results can be used to alleviate such metabolic problems, in which case your doctor may also integrate this information.

SUMMARY

Your recommendations are the following:

Cardiac, vascular and respiratory functions	Genetic predisposition less favorable to sustained physical effort (endurance). Average benefits (comparable to the average of the general population) on cardio-metabolic functions associated with moderate and repeated physical effort.
Muscle function	Normal sprint potential. Normal muscle strength capacity. Increased potential to improve physical performance in physically active individuals over 60 years of age.
Body weight	Average potential for weight gain (same as the average population potential). This information may be useful to those who practice sports or routine physical activities in order to manage body weight, as needed.
Metabolism	It is recommended to avoid physical efforts of maximum intensity. Medium intensity physical efforts should be limited to a maximum of one hour a day. Small physical efforts are beneficial to your metabolism.



The algorithms used in this package take into account the latest scientific findings published in specialized, peer reviewed, scientific journals. These algorithms are the intellectual property of Advanced Nutrigenomics. The genetic variations included in this package, as well as the nutrients for which personalized values are offered, are the result of continuous evaluation of existing published studies.

CARDIAC, VASCULAR AND RESPIRATORY FUNCTIONS

Test 90		
Locus	**Gene**	**Genotype**
rs1049434	SLC16A1	A/T

Comment
This genotype associates with average endurance during physical activity.

The *SLC16A1* gene (*MCT1*) contributes to the control of lactic acid and pyruvic acid transport through cell membranes. T/T genotype carriers have an increased resistance to sustained physical effort (endurance).

Test 91 (haplotype PPARA)		
Locus	**Gene**	**Genotype**
rs135542	PPARA	T/T
rs135539	PPARA	C/C
rs4253728	PPARA	G/G
rs1800206	PPARA	C/C
rs4253778	PPARA	G/G
Haplotype H-23:		Absent

Comment
The absence of this haplotype results in average benefits (comparable to the average in the general population), in reducing cardiovascular risk, in the presence of moderate intensity physical activity.

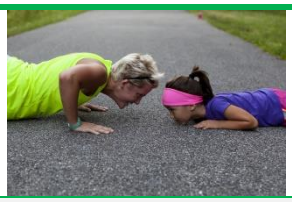
The *PPARA* gene controls the activity of peroxisomes involved in many metabolic processes, including cardiovascular and anti-inflammatory protection. The presence of the H-23 haplotype (CAGCG) is associated with a favorable, maximized cardiovascular risk reduction response in individuals who practice moderate and daily physical activity.

Conclusion

Genetic predisposition less favorable to sustained physical effort (endurance).

Average benefits (comparable to the average of the general population) on cardio-metabolic functions associated with moderate and repeated physical effort.

MUSCLE FUNCTION



Test 92		
Locus	**Gene**	**Genotype**
rs1815739	ACTN3	C/C

Comment
This genotype does not negatively affect the ability for sprinting.

The *ACTN3* gene encodes and controls the synthesis of the protein known as alpha-actinin 3. This protein contributes to the ability of type II muscle fibers to contract rapidly during sprinting. Those who carry the genetic variation T in both copies of the gene (T/T genotype) have a reduced capacity for sprinting.

Test 93		
Locus	**Gene**	**Genotype**
rs12676	CHDH	C/C

Comment
This genotype does not affect muscle contraction (muscle strength).

The *CHDH* gene controls the conversion of choline into betaine, generating a large amount of ATP in the mitochondria. Individuals carrying the genetic variation A in both copies of the gene (A/A genotype) have mitochondria with altered structure, associated with a reduced capacity to generate the amount of ATP required for muscle contraction. This outcome might be improved by supplementation with choline and betaine.

Test 94		
Locus	**Gene**	**Genotype**
rs1799752	ACE	Del/Del

Comment
This genotype is associated with improved physical performance at older ages.

The *ACE* gene contributes to blood pressure control. Individuals over 60 years of age who carry the Del variation in both copies of the gene (Del/Del genotype) can benefit from a gradual improvement in physical performance, if they remain physically active. People of the same age, who carry the Del/In or In/In genotypes, can benefit from physical activity, but with less chance of improving these performances.

Conclusion

Normal sprint potential.
Normal muscle strength capacity.
Increased potential to improve physical performance in physically active individuals over 60 years of age.

BODY WEIGHT

Test 95		
Locus	**Gene**	**Genotype**
rs17817449	FTO	T/T

Comment
This genotype is not associated with predisposition to weight gain.

Test 96		
Locus	**Gene**	**Genotype**
rs1421085	FTO	T/T

Comment
This genotype is not associated with predisposition to weight gain.

The *FTO* gene helps control the hunger sensation from the hypothalamus as well as food preferences. G/G genotype (rs17817449) or C/C genotype (rs1421085) carriers have increased tendency to gain weight easier, coupled with increased calorie intake.

Conclusion

Average potential for weight gain (same as the average population potential).

This information may be useful to those who practice sports or routine physical activities in order to manage body weight, as needed.

METABOLISM

Test 97		
Locus	**Gene**	**Genotype**
rs1496653	UBE2E2	A/G
rs6795735	ADAMTS9-AS2	C/T
rs10842994	KLHDC5	C/C
rs2943640	IRS1	C/C
Genetic score:		6

Comment

This score recommends avoiding physical effort of maximum intensity. Medium intensity physical efforts should be limited. Small physical efforts are beneficial to your metabolism.

This genetic score is a result of the interaction between certain genetic variations within genes involved in metabolic activity (especially carbohydrate metabolism), and the of physical activity. The score, ranging from 0 to 8, indicates the predisposition that certain physical activity type might be associated with a higher risk of metabolic disorders, such as increased insulin resistance and type-2 diabetes.

Conclusion

It is recommended to avoid physical efforts of maximum intensity. Medium intensity physical efforts should be limited to a maximum of one hour a day. Small physical efforts are beneficial to your metabolism.

Package 5. Other tests

This package is meant to inform you about certain genetic variations that may be known to be associated with the occurrence of certain diseases. The results of this package cannot be considered as diagnostic tests. The existence of any of these variations does not mean that such a condition is already present, or that the occurrence of such a disease is inevitable. This package also identifies certain genetic variations that may interfere with certain drug treatments. Therefore, the tests of this package are not medical diagnostic tests. Only physicians are able to perform a medical diagnosis, taking into account, in addition to the existence of genetic variations, other factors such as family history, manifestations and symptoms, other medical analyzes, etc.

What are the benefits?

The onset of some diseases depends, in part, on the existence of genetic changes. Most of the time, however, these genetic changes are not enough for the onset of these conditions.

Knowing about the presence of genetic changes allows the physician not only to establish appropriate prevention against the disease onset, but provides also with essential information for the treatment of some diseases with genetic substrates. These tests may also provide important information regarding the efficacy of certain drug treatments. These results are for information purposes nly and cannot be considered as diagnostic tools.

What should I do with these results?

The results of this package should be interpreted by your doctor, who is the only able to interpret them correctly. Therefore, please inform your doctor about the results of this package. If there is any suspicion in regard to a particular genetic variation, it is necessary to confirm this result using a dedicated genetic diagnostic test.

Genotypes associated with drug response

ESTROGENS/ESTROGEN-CONTAINING CONTRACEPTIVES IN WOMEN

Test 98		
Locus	**Gene**	**Genotype**
rs1799963	F2	G/G

The *F2* gene (factor II, thrombin / prothrombin) helps control blood clotting. **Individuals carrying the genetic variation A (also known as genetic variation G20210A) have an increased risk of thrombosis (thrombophilia).** Women who carry this genetic variation, and who undergo estrogen treatments (including estrogen-containing contraceptives), have an increased risk of thrombosis as a side effect of these treatments.

Test 99		
Locus	**Gene**	**Genotype**
rs6025	F5	C/C

The F5 gene (factor V Leiden) helps to control blood coagulation. **Carriers of the T allele (also known as genetic variation R506Q) have an increased risk of thrombosis (thrombophilia)**. Women carrying this genetic variation, and following estrogen treatments (including estrogen-containing contraceptives), have an increased risk of thrombosis as a side effect of these treatments.

TREATMENT WITH THIOPURINES

Test 100		
Locus	**Gene**	**Genotype**
rs2647047	class HLA II	C/C

Comment
Genetic risk variant is ABSENT.

Test 101		
Locus	**Gene**	**Genotype**
rs7745656	class HLA II	G/G

Comment
Genetic risk variant is ABSENT.

Test 102		
Locus	**Gene**	**Genotype**
rs2647087	class HLA II	A/A

Comment
Genetic risk variant is ABSENT.

Test 103		
Locus	**Gene**	**Genotype**
rs6935723	class HLA II	T/T

Comment
Genetic risk variant is ABSENT.

Test 104		
Locus	**Gene**	**Genotype**
rs2647089	class HLA II	T/T

Comment
Genetic risk variant is ABSENT.

The HLA II genes encode proteins involved in the major histocompatibility complex II (MHC II), with roles in extracellular presentation of some antigens to T lymphocytes. This mechanism is involved in immune control. Alterations of this mechanism are also responsible for the onset of autoimmune diseases or reactions. In the case of people receiving thiopurine therapy, the presence of at least one of the above genetic variations significantly increases the risk of development secondary pancreatitis due to thiopurine therapy. Thus, carriers of these genetic variations have a risk of up to 17% for developing pancreatitis during treatment with tiopurine (between 21 and 27 days of treatment), when compared to the risk of those who do not have these genetic variations (4-7 %).

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Test 105 (haplotype TPMT)		
Locus	**Gene**	**Genotype**
rs1800462	TPMT	C/C
rs1800460	TPMT	C/C
rs1142345	TPMT	T/T
Identified haplotype:		*1/*1

Comment
This haplotype does not require modification of the generally recommended thiopurines dosage.

The *TPMT* gene controls the metabolism of thiopurines (inactivation by methylation). Individuals carrying certain genetic variations classified by certain haplotypes have a reduced metabolic capacity for these drugs and, consequently, an increased risk of complications (toxic side effects) such as myelosuppression, anemia, bleeding, leukopenia, and infections. In these situations, it is necessary to reduce thiopurine doses according to the recommendations for each treatment protocol applied.

Conclusion

These results do not justify modifying the standard therapy with thiopurines for the medical condition for which it is prescribed, and according to the protocol used.

This test cannot detect haplotype *4 TPMT.

RESPONSE TO VITAMIN D IN ATOPIC DERMATITIS

Test 106 (haplotype CYP24A1)		
Locus	**Gene**	**Genotype**
rs2248359	CYP24A1	C/C
rs2296241	CYP24A1	G/G
Haplotype of risk:		Absent

Comment
The absence of a risk haplotype is not associated with severe atopic dermatitis or refractory to treatment.

The *CYP24A1* gene is involved in the metabolism of active vitamin D form. Individuals carrying CA or TA haplotypes, who are diagnosed with atopic dermatitis, can benefit from the addition of Vitamin D in the treatment regimen if the disease is severe or refractory to the previously applied treatment protocol.

Test 107 (haplotype CYP27B1)		
Locus	**Gene**	**Genotype**
rs703842	CYP27B1	G/G
rs10877012	CYP27B1	T/T
rs3782130	CYP27B1	C/C
rs4646536	CYP27B1	G/G
Haplotype AGGG:		Absent

Comment
The absence of a risk haplotype is not associated with severe atopic dermatitis or refractory to treatment.

The *CYP27B1* gene controls the activation of Vitamin D (calcitriol synthesis). Individuals carrying the AGGG haplotype, who are diagnosed with atopic dermatitis, may benefit from the addition of calcitriol to the treatment regimen if the form of the disease is severe or refractory to the previously applied treatment protocol.

Conclusion

There are no special indications outside of the treatment options indicated for atopic dermatitis.

TREATMENT WITH METHOTREXATE

Test 108		
Locus	**Gene**	**Genotype**
rs1677693	DHFR	G/G

Comment
This genotype probably does not interfere with standard doses of methotrexate.

Test 109		
Locus	**Gene**	**Genotype**
rs1643659	DHFR	T/T

Comment
This genotype probably does not interfere with standard doses of methotrexate.

Test 110		
Locus	**Gene**	**Genotype**
rs1650694	DHFR	G/G

Comment
This genotype may be associated with resistance to methotrexate (acute lymphoblastic leukemia, ALL).

Test 111		
Locus	**Gene**	**Genotype**
rs408626	DHFR	T/T

Comment
This genotype may be associated with resistance to methotrexate (acute lymphoblastic leukemia, ALL).

Test 112		
Locus	**Gene**	**Genotype**
rs1105525	DHFR	C/T

Comment
This genotype may be associated with resistance to methotrexate (acute lymphoblastic leukemia, ALL).

Test 113		
Locus	**Gene**	**Genotype**
rs1650697	DHFR	A/A

Comment
This genotype may be associated with resistance to methotrexate (acute lymphoblastic leukemia, ALL).

Test 114		
Locus	**Gene**	**Genotype**
rs3045983	DHFR	In/In

Comment
This genotype is not associated with resistance to methotrexate (acute lymphoblastic leukemia, ALL).

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Test 115		
Locus	**Gene**	**Genotype**
rs1232027	DHFR	G/G

Comment
This genotype is associated with a lower response to methotrexate treatment in psoriatic arthritis.

Test 116		
Locus	**Gene**	**Genotype**
rs7387	DHFR	ND

Comment
This genotype could not be determined.

The *DHFR* gene controls the synthesis of tetrahydrofolic acid from dihydrofolic acid. Carriers of specific genetic variations may have a different response to methotrexate treatment. Depending on your condition and the information your doctor considers relevant, these tests may help to make a therapeutic decision, modify the dose of methotrexate or administer alternative drugs.

Conclusion

Your doctor should be informed if you are taking a treatment containing methotrexate or before you have been prescribed such treatment. Only the doctor can decide how to use the information provided by these tests.

PYRIDOXINE TREATMENT IN HOMOCYSTEINURIA

Test 117		
Locus	**Gene**	**Genotype**
rs375846341	CBS	T/T

Comment
This genotype associates with adequate response to pyridoxine treatment in homocysteinuria.

The *CBS* gene controls the use of Vitamin B6 in the conversion of homocysteine to cystathionine. Carriers of the G/G genotype, who are suffering from homocysteinuria, do not respond adequately to pyridoxine treatment, whereas T/G genotype carriers may have a poor response to this treatment.

Conclusion

No changes are suggested to the pyridoxine treatment regimen for homocysteinuria.

WARFARIN SENSITIVITY

Test 118		
Locus	**Gene**	**Genotype**
rs9923231	VKORC1	C/T

Test 119		
Locus	**Gene**	**Genotype**
rs1799853	CYP2C9	C/T

Test 120		
Locus	**Gene**	**Genotype**
rs1057910	CYP2C9	A/A

The result of this test is a combination of genotypes that defines the therapeutic dose of varfarin (see below), in the absence of other contraindications.

The genotype for the rs9923231 locus is provided for the forward DNA strand. Therefore, the following results for this genotype are equivalent: C/C is equivalent to G/G on the reverse strand; C/T is equivalent to G/A on the reverse strand; T/T is equivalent to A/A on the reverse strand.

Results	
Gene	**Genotype / Haplotype**
VKORC1	C/T (G/A)
CYP2C9	CYP2C9 *1/*2

The *VKORC1* gene controls blood clotting due to Vitamin K activation. The *CYP2C9* gene controls the metabolism (inactivation) of warfarin. To find the recommended warfarin dose based on the result of this test, see the table below.

This table follows the PharmGKB recommendations for the personalization of coumarin agents (warfarin equivalent) based on genotypes VKORC1 and CYP2C9 (https://www.pharmgkb.org/molecule/PA451906). Doses are mg/day warfarin.

VKORC1	CYP2C9 *1/*1	CYP2C9 *1/*2	CYP2C9 *1/*3	CYP2C9 *2/*2	CYP2C9 *2/*3	CYP2C9 *3/*3
C/C (G/G)	5-7	5-7	3-4	3-4	3-4	0,5-2
C/T (G/A)	5-7	3-4	3-4	3-4	0,5-2	0,5-2
T/T (A/A)	3-4	3-4	0,5-2	0,5-2	0,5-2	0,5-2

Conclusion

The recommended dose of WARFARIN (Coumadin) is 3-4 mg/day.

Genotypes associated with some medical conditions

ACHONDROPLASIA

Test 121

Locus	Gene	Genotype	Reference	Mutation	Your result
rs28931614	FGFR3	G/G	G/G	A, C	Negative

The *FGFR3* gene controls bone growth by stimulating cartilage proliferation during the growth period. Individuals carrying a genetic variation A or C (rs28931614) will develop acondroplasia, starting with fetal life or early childhood. This mutation is responsible for approximately 98% of cases of acondroplasia. This mutation can be transmitted by either parent or may occur spontaneously. The existence of two mutations (in both copies of the gene) is incompatible with survival.

ASTHENOSPERMIA

Test 122

Locus	Gene	Genotype	Reference	Mutation	Your result
rs12676	CHDH	C/C	C/C	A	Negative

The *CHDH* gene controls the synthesis of betaine from the choline. This reaction is accompanied by the release of ATP (energy) required for normal sperm motility. Male individuals diagnosed with asthenospermia carrying the A/A genotype may benefit from improved sperm motility by addition of betaine, 5-methyltetrahydrofolate (5-MTHF) and Vitamin B12 to the treatment regimen.

Recommendation
This test is not relevant to you.

GAUCHER DISEASE

Test 123

Locus	Gene	Genotype	Reference	Mutation	Your result
rs76763715	GBA	T/T	T/T	C, G	Negative
rs421016	GBA	A/A	A/A	C, G	Negative

The *GBA* gene encodes for the beta-glucocerebrosidase enzyme, active in lysosomes, and which has the role of recycling some metabolites. Depending on the heterozygous or homozygous status for the above genetic variations, a person may be transmitter of these variations (parents) or may have Gaucher disease (typically homozygous or carriers of several genetic variations involved). These two variations, in various combinations or along with the presence of other mutations in the GBA gene, represent about 89% of the genetic causes of Gaucher disease. Analysis of these genetic variations should be performed by a geneticist.

BRCA1/BRCA2

Test 124

Locus	Gene	Genotype	Reference	Mutation	Your result
rs80357969	BRCA1	In/In	CT/CT (In/In)	- (Del 2 bp)	Negative
rs80356898	BRCA1	G/G	G/G	A	Negative
rs80357927	BRCA1	In/In	T/T (In/In)	- (Del)	Negative
rs80357468	BRCA1	C/C	C/C	T	Negative
rs80359874	BRCA1	In/In	In/In	- (Del 40 bp)	Negative
rs28897672	BRCA1	A/A	A/A	C	Negative
rs730881459	BRCA1	In/In	A/A (In/In)	- (Del)	Negative
rs80357526	BRCA1	In/In	In/In	- (Del 4 bp)	Negative
rs80357082	BRCA1	T/T	T/T	A	Negative
rs80358061	BRCA1	A/A	A/A	C	Negative
rs80358163	BRCA1	T/T	T/T	C	Negative
rs62625306	BRCA1	C/C	C/C	A, T	Negative
rs80357664	BRCA1	In/In	CT/CT (In/In)	- (Del 2 bp)	Negative
rs80357669	BRCA1	In/In	G/G (In/In)	- (Del)	Negative
rs80356925	BRCA1	G/G	G/G	C	Negative
rs80357971	BRCA1	In/In	TT/TT (In/In)	- (Del 2 bp)	Negative
rs80356978	BRCA1	C/C	C/C	A	Negative
rs80357661	BRCA1	In/In	In/In	- (Del 4 bp)	Negative
rs80357819	BRCA1	In/In	In/In	- (Del 5 bp)	Negative
rs80357115	BRCA1	A/A	A/A	C	Negative
rs273899692	BRCA1	AG/AG	AG/AG	TA	Negative
rs80356936	BRCA1	A/A	A/A	G	Negative
rs80357424	BRCA1	C/C	C/C	A	Negative
rs80357877	BRCA1	In/In	In/In	- (Del 11 bp)	Negative
rs80357509	BRCA1	In/In	T/T (In/In)	- (Del)	Negative
rs80357621	BRCA1	In/In	A/A (In/In)	- (Del)	Negative
rs62625307	BRCA1	G/G	G/G	A/A	Negative
rs80357797	BRCA1	Del/Del	Del/Del	+ (In 4 bp)	Negative
rs28897686	BRCA1	C/C	C/C	T	Negative
rs80357868	BRCA1	In/In	In/In	- (Del 4 bp)	Negative
rs80357848	BRCA1	Del/Del	Del/Del	+ T (In)	Negative
rs80357634	BRCA1	Del/Del	Del/Del	+ A (In)	Negative
rs80357711	BRCA1	In/In	T/T (In/In)	- (Del)	Negative
rs80358178	BRCA1	C/C	C/C	T	Negative
rs80357260	BRCA1	G/G	G/G	A	Negative
rs80356991	BRCA1	C/C	C/C	T	Negative

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Test 124					
Locus	**Gene**	**Genotype**	**Reference**	**Mutation**	**Your result**
rs41293455	BRCA1	G/G	G/G	A	Negative
rs80358027	BRCA1	C/C	C/C	T	Negative
rs80357433	BRCA1	G/G	G/G	C	Negative
rs80356862	BRCA1	G/G	G/G	C	Negative
rs80359876	BRCA1	In/In	In/In	- (Del 19 bp)	Negative
rs55770810	BRCA1	G/G	G/G	T	Negative
rs41293459	BRCA1	C/C	C/C	T	Negative
rs28897696	BRCA1	G/G	G/G	T, A	Negative
rs80357872	BRCA1	In/In	G/G (In/In)	- (Del)	Negative
rs80357867	BRCA1	In/In	In/In	- (Del 4 bp)	Negative
rs80358004	BRCA1	C/C	C/C	A, G, T	Negative
rs80357462	BRCA1	G/G	G/G	C	Negative
rs80357123	BRCA1	G/G	G/G	A	Negative
rs397507246	BRCA1	Del/Del	Del/Del	+G (In)	Negative
rs80358150	BRCA1	C/C	C/C	G, T	Negative
rs80358099	BRCA1	C/C	C/C	A	Negative
rs41293463	BRCA1	A/A	A/A	C, T	Negative
rs786203663	BRCA1	CCACA/CCACA	CCACA/CCACA	TCACT	Negative
rs80358073	BRCA1	C/C	C/C	A, G, T	Negative
rs80356962	BRCA1	C/C	C/C	T	Negative
rs41293465	BRCA1	G/G	G/G	A	Negative
rs80357919	BRCA1	In/In	In/In	- (Del 4 bp)	Negative
rs80357670	BRCA1	In/In	AC/AC (In/In)	- (Del 2 bp)	Negative
rs397515635	BRCA2	Del/Del	Del/Del	+ (In 4 bp)	Negative
rs397507265	BRCA2	In/In	G/G (In/In)	- (Del)	Negative
rs80359277	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359283	BRCA2	In/In	AG/AG (In/In)	- (Del 2 bp)	Negative
rs80358428	BRCA2	G/G	G/G	T	Negative
rs80358435	BRCA2	G/G	G/G	T	Negative
rs80358452	BRCA2	T/T	T/T	G	Negative
rs80359301	BRCA2	In/In	A/A (In/In)	- (Del)	Negative
rs80359302	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80358474	BRCA2	C/C	C/C	T	Negative
rs80359322	BRCA2	In/In	C/C (In/In)	- (Del)	Negative
rs80358494	BRCA2	C/C	C/C	T	Negative
rs397507285	BRCA2	T/T	T/T	G	Negative
rs80358515	BRCA2	C/C	C/C	T	Negative
rs398122752	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359351	BRCA2	In/In	In/In	- (Del 4 bp)	Negative

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Test 124					
Locus	**Gene**	**Genotype**	**Reference**	**Mutation**	**Your result**
rs80358533	BRCA2	A/A	A/A	T	Negative
rs80359372	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs730881521	BRCA2	A/A	A/A	T	Negative
rs80359380	BRCA2	Del/Del	Del/Del	+ (In 2 bp)	Negative
rs80359391	BRCA2	In/In	TG/TG (In/In)	- (Del 2 bp)	Negative
rs746229647	BRCA2	In/In	TG/TG (In/In)	- (Del 2 bp)	Negative
rs80358638	BRCA2	G/G	G/G	T	Negative
rs276174843	BRCA2	CT/CT	CT/CT	DelCTInA	Negative
rs730881607	BRCA2	In/In	TT/TT (In/In)	- (Del 2 bp)	Negative
rs276174844	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359444	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359448	BRCA2	In/In	A/A (In/In)	- (Del)	Negative
rs80359449	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359454	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80358692	BRCA2	A/A	A/A	T	Negative
rs80359461	BRCA2	In/In	A/A (In/In)	- (Del)	Negative
rs80359470	BRCA2	In/In	AA/AA (In/In)	- (Del)	Negative
rs80359473	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80358721	BRCA2	C/C	C/C	G	Negative
rs80359480	BRCA2	Del/Del	Del/Del	+A (In)	Negative
rs80359494	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359499	BRCA2	Del/Del	Del/Del	+T (In)	Negative
rs770318608	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80358783	BRCA2	A/A	A/A	T	Negative
rs80359525	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359526	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs41293497	BRCA2	C/C	C/C	A, G, T	Negative
rs80359533	BRCA2	In/In	AT/AT (In/In)	- (Del 2 bp)	Negative
rs80359538	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359541	BRCA2	In/In	C/C (In/In)	- (Del)	Negative
rs80359543	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359550	BRCA2	In/In	T/T (In/In)	- (Del)	Negative
rs80359555	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359558	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs276174868	BRCA2	GCA/GCA	GCA/GCA	DelGCAInC	Negative
rs11571658	BRCA2	In/In	TT/TT (In/In)	- (Del 2 bp)	Negative
rs81002899	BRCA2	T/T	T/T	C, G	Negative
rs80359577	BRCA2	Del/Del	Del/Del	+A (In)	Negative
rs80359584	BRCA2	In/In	In/In	- (Del 5 bp)	Negative

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Test 124

Locus	Gene	Genotype	Reference	Mutation	Your result
rs80359590	BRCA2	Del/Del	Del/Del	+T (In)	Negative
rs80359598	BRCA2	In/In	In/In	- (Del 4 bp)	Negative
rs80359604	BRCA2	In/In	GT/GT (In/In)	- (Del 2 bp)	Negative
rs730881601	BRCA2	Del/Del	Del/Del	+ (In 4 bp)	Negative
rs80358920	BRCA2	C/C	C/C	T	Negative
rs28897743	BRCA2	G/G	G/G	A	Negative
rs80359636	BRCA2	In/In	CT/CT (In/In)	- (Del 2 bp)	Negative
rs80359647	BRCA2	Del/Del	Del/Del	+G (In)	Negative
rs80359671	BRCA2	In/In	In/In	- (Del 5 bp)	Negative
rs80359677	BRCA2	In/In	AG/AG (In/In)	- (Del 2 bp)	Negative
rs80359027	BRCA2	G/G	G/G	A	Negative
rs80359035	BRCA2	C/C	C/C	A, T	Negative
rs41293511	BRCA2	G/G	G/G	C	Negative
rs41293513	BRCA2	A/A	A/A	C	Negative
rs730881581	BRCA2	G/G	G/G	A	Negative
rs80359705	BRCA2	In/In	C/C (In/In)	- (Del)	Negative
rs81002837	BRCA2	G/G	G/G	A, T	Negative
rs276174907	BRCA2	TAG/TAG	TAG/TAG	DelTAGInAA	Negative
rs81002798	BRCA2	G/G	G/G	A, T	Negative
rs276174914	BRCA2	A..T/A..T	A..T/A..T	Del9In10	Negative
rs81002862	BRCA2	A/A	A/A	G	Negative
rs80359752	BRCA2	Del/Del	Del/Del	+A (In)	Negative
rs81002889	BRCA2	G/G	G/G	A, C	Negative
rs80359200	BRCA2	C/C	C/C	G	Negative

The *BRCA1* and *BRCA2* genes control the process of repairing DNA replication errors. Numerous genetic variations have been found in the structure of these genes, many of which are associated with various forms of cancer, or causing various forms of cancer.

If you have a POSITIVE result for any of the above mutations, you should ask your doctor to establish a strategy to prevent and reduce the risk of cancer. Additional, more extensive, genetic testing may be required.

ALPHA-1 ANTITRYPSIN DEFICIENCY

Test 125

Locus	Gene	Genotype	Reference	Mutation	Your result
rs28929474	SERPINA1	C/C	C/C	T	Negative
rs17580	SERPINA1	T/T	T/T	A	Negative

The *SERPINA1* gene encodes and controls the synthesis of a protein, alpha-1 antitrypsin, which limits the action of an enzyme, neutrophil-elastase. Normally, neutrophil-elastase is released by leukocytes to fight infections in tissues, including the lungs and the liver. Deficiency of alpha-1 antitrypsin causes the activation and action of neutrophil-elastase to be exaggerated, leading to diseases affecting various organs.

rs28929474 — For this locus, a POSITIVE result might be associated with severe deficiency of alpha-1 antitrypsin, causing pulmonary emphysema and hepatic impairment. People with this mutation will always transmit this mutation to their children. This mutation is also associated with liver complications in people diagnosed with cystic fibrosis (see below). A CARRIER result might indicate that these people have a 50% chance of transmitting the mutation to their children. A CARRIER of this mutation is also associated with an increased risk of granulomatosis with polyangiitis.

rs17580 — For this locus, a POSITIVE result might be associated with mild deficiency of alpha-1 antitrypsin, associated with an increased risk of chronic obstructive pulmonary disease (COPD). People with a POSITIVE result will always transmit this mutation to their children. A CARRIER result means that these people have a 50% chance of transmitting the mutation to their children.

If there is a positive/carrier result for any of the above mutations, you should ask your doctor for a strategy to prevent and reduce the risk of lung or liver damage. Additional genetic testing may be required.

BIOTINIDASE DEFICIENCY

Test 126

Locus	Gene	Genotype	Reference	Mutation	Your result
rs80338685	BTD	A/A	A/A	C	Negative
rs80338686	BTD	C/C	C/C	T	Negative
rs13078881	BTD	G/G	G/G	C	Negative
rs13073139	BTD	G/G	G/G	A	Negative

The *BTD* gene controls the recycling of biotin (vitamin B7, vitamin H), ie the release of biotin from food proteins. The free form of biotin is then used in various metabolic processes that contribute to the metabolism of proteins, fatty acids and carbohydrates. Individuals carrying one or more mutations (POSITIVE result) may suffer, with varying degrees of severity, from biotinidase deficiency, a disease that begins to manifest in the newborn or small child. Detected on time, this disease can be successfully treated using biotin.

If there is a POSITIVE result for any of the above mutations, you should ask your doctor for a strategy to prevent or reduce the biotinidase deficiency. Additional genetic testing or other biochemical testing may be required.

FACTOR II DEFICIENCY (PROTHROMBIN)

Test 127

Locus	Gene	Genotype	Reference	Mutation	Your result
rs1799963	F2	G/G	G/G	A	Negative

The *F2* gene (factor II, thrombin/prothrombin) helps control blood clotting. Individuals carrying the genetic variation A (also known as genetic variation G20210A) have an increased risk of thrombosis (thrombophilia). A POSITIVE result may indicate increased risk of thrombophilia.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with thrombophilia. Additional genetic testing and other tests may be required.

FACTOR V DEFICIENCY (LEIDEN)

Test 128

Locus	Gene	Genotype	Reference	Mutation	Your result
rs6025	F5	C/C	C/C	T	Negative

The *F5* gene (factor V Leiden) helps control blood coagulation. T allele carriers (also known as genetic variation R506Q) have an increased risk of thrombosis (thrombophilia). A POSITIVE result indicates increased risk of thrombophilia.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with thrombophilia. Additional genetic testing and other tests may be required.

FAMILIAL MEDITERANEAN FEVER

Test 129

Locus	Gene	Genotype	Reference	Mutation	Your result
rs28940578	MEFV	C/C	C/C	T	Negative

The *MEFV* gene controls the synthesis of a protein (pyrin/marenostrin) that is involved in the control of inflammatory processes. Usually, carriers of the T/T genotype are those who suffer from this condition. In rare cases, due to the co-dominance process, some carriers of the C/T genotype may also manifest this condition.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with familial mediteranean fever. Additional genetic testing and other tests may be required.

CYSTIC FIBROSIS

Test 130

Locus	Gene	Genotype	Reference	Mutation	Your result
rs113993960	CFTR	In/In	CTT/CTT (In/In)	- (Del 3 bp)	Negative

The *CFTR* gene controls exocrine gland excretion (mucus production, sweating, digestive enzymes, etc.). Individuals with a POSITIVE result (homozygous for deletion) are, usually, diagnosed with cystic fibrosis, this mutation being responsible for 70% of cases of cystic fibrosis. People with a genetic diagnosis of CARRIER (heterozygotes) are generally unaffected, but can transmit this mutation to their children. In rare cases, people who are heterozygous for this mutation may suffer from cystic fibrosis if this mutation is accompanied by other mutations.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with cystic fibrosis. Additional genetic testing and other tests may be required.

HEREDITARY HEMOCHROMATOSIS

Test 131

Locus	Gene	Genotype	Reference	Mutation	Your result
rs1799945	HFE	C/C	C/C	G	Negative
rs1800730	HFE	A/A	A/A	T	Negative
rs1800562	HFE	G/G	G/G	A	Negative

The *HFE* gene helps control the circulation and distribution of iron in the body. Persons carrying any of the several genetic variations in this gene are at increased risk or may develop hereditary hemochromatosis, depending on the location of these genetic variations and the presence of one or more variations. The onset of this condition depends, in part, on the amount of iron intake from foods as well as the degree of exposure to excess iron. Therefore, a positive disease diagnosis in general can not be determined solely on the basis of genetic analysis. A POSITIVE result indicates, in this context, the possibility of an increased risk of hereditary hemochromatosis, and may contribute to completing the information required to determine a medical diagnosis.

If there is a POSITIVE result for any of the above mutations, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with hemochromatosis. Additional genetic testing and other tests may be required.

HOMOCYSTINURIA

Test 132

Locus	Gene	Genotype	Reference	Mutation	Your result
rs375846341	CBS	T/T	T/T	G	Negative

The *CBS* gene controls the use of Vitamin B6 in the metabolism of homocysteine to cystathionine. Carriers of the genetic variation G have an increased risk of developing homocystinuria. A POSITIVE result may indicate an increased risk of developing this condition.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with homocystinuria. Additional genetic testing and other tests may be required.

CONGENITAL LACTASE DEFICIENCY

Test 133

Locus	Gene	Genotype	Reference	Mutation	Your result
rs121908936	LCT	A/A	A/A	T	Negative

The *LCT* gene controls the process of hydrolysis ("digestion") of lactose. A parent, carrier for the genetic variation T (genotype A/T), can transmit it to his or her child. If the newborn has two genetic variations T (genotype T/T), he or she may develop congenital alactasia. A POSITIVE result indicates the presence of two copies of the gene containing the genetic variation T, which may be accompanied by the manifestation of congenital alactasia in the newborn. A CARRIER result indicates the presence of a copy of the gene containing the genetic variation T. The carrier does not manifest the disease but can transmit this genetic variation to his or her children.

If there is a POSITIVE result for the above mutation, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with congenital alactasia. Additional genetic testing and other tests may be required.

LACTOSE INTOLERANCE

Test 134

Locus	Gene	Genotype	Reference	Mutation	Your result
rs4988235	MCM6	G/G	A/A	G	POSITIVE
rs182549	MCM6	C/C	T/T	C	POSITIVE

The *MCM6* gene controls the expression of the *LCT* gene. *LCT* controls lactase synthesis, an enzyme required to digest milk containing lactose. Carriers of one or more genetic variations in the *MCM6* gene may develop (especially if they are homozygous for at least one of these genetic variants: G/G or C/C) lactose intolerance, which generally begins to manifest at the end of the childhood or in adulthood. A POSITIVE result indicates a high probability that the person will develop lactose intolerance during his or her lifetime. A CARRIER result is generally not accompanied by manifestations of lactose intolerance, but the person could transmit this genetic variation to his/her children. Lactose intolerance can be easily prevented by limiting drastically or completely the consumption of unfermented milk containing lactose. Fermented milk products (fermented cheese, yoghurt, beaten milk, kefir, etc.) or milk without lactose can be consumed.

If there is a POSITIVE result for one of the genetic variations above, you should ask your nutritionist to establish a list of foods that should be avoided, and to provide alternative foods.

THYROID VOLUME

Test 135

Locus	Gene	Genotype	Reference	Mutation	Your result
rs1354920	FAM227B	T/T	C/C	T	POSITIVE
rs17767491	LOC105371356	A/G	A/A	G	POSITIVE
rs12091047	CAPZB	T/T	C/C	T	POSITIVE

The presence of genetic variations in any of the above genes is associated with an increased risk of changes in thyroid volume and function, accompanied by changes in hormones and antibodies that are either secreted by the thyroid or contribute to thyroid function. A POSITIVE result indicates an increased risk of changes in thyroid volume and function. For information purposes, the table below shows the endocrine changes associated with these genetic variations (mean values relative to mean values in the general population of European origin). This information may be useful to the endocrinologist if you are diagnosed with thyroid disorders. The table indicates the direction (positive or negative, +/-) and the mean amplitude of these changes in the case of a POSITIVE result for that genetic variation.

Locus	TSH	anti-TPO	fT3	fT4
rs1354920	+ 4,7%	+ 5,8%	+ 5,9%	+ 5,9%
rs17767491	+ 5,3%	+ 6,4%	+ 6,3%	+ 6,5%
rs12091047	- 5,1%	- 5,8%	- 5,7%	- 5,8%

If there is a POSITIVE result for any of the above variations, you should ask your doctor for a strategy to prevent or reduce the manifestations associated with thyroid-related problems. Additional genetic testing and other tests may be required.

Upper tolerable limits

The table below indicates the maximum daily intake of nutrients for adults, based on age, gender and physiological status. Except for doctor's recommendations, these limits should not be exceeded.

NUTRIENT	UNITS	MEN	WOMEN	PREGNANCY	LACTATION
Vitamin A	µg/d	3000	3000	3000	3000
Vitamin C	mg/d	2000	2000	2000	2000
Vitamin D	µg/d	100	100	100	100
Vitamin E	mg/d	1000	1000	1000	1000
Vitamin K	µg/d	ND	ND	ND	ND
Thiamin	mg/d	ND	ND	ND	ND
Riboflavin	mg/d	ND	ND	ND	ND
Niacin	mg/d	35	35	35	35
Vitamin B6	mg/d	100	100	100	100
Folates	µg/d	1000	1000	1000	1000
Vitamin B12	µg/d	ND	ND	ND	ND
Pantothenic acid	mg/d	ND	ND	ND	ND
Betaine	mg/d	ND	ND	ND	ND
Biotin	µg/d	ND	ND	ND	ND
Choline	mg/d	3500	3500	3500	3500
Calcium	mg/d	2500 (<50 yo) 2000 (>50 yo)	2500 (<50 yo) 2000 (>50 yo)	2500	2500
Chromium	µg/d	ND	ND	ND	ND
Copper	µg/d	10000	10000	10000	10000
Iron	mg/d	45	45	45	45
Fluoride	mg/d	10	10	10	10
Phosphorus	mg/d	4000 (<70 yo) 3000 (>70 yo)	4000 (<70 yo) 3000 (>70 yo)	3500	4000
Iodine	µg/d	1100	1100	1100	1100
*Magnesium	mg/d	350	350	350	350
Manganese	mg/d	11	11	11	11
Molibdenum	µg/d	2000	2000	2000	2000
Selenium	µg/d	400	400	400	400
Zinc	mg/d	40	40	40	40
Sodium	g/d	2,3	2,3	2,3	2,3
Chloride	g/d	3,6	3,6	3,6	3,6

* The upper limit for Magnesium is the contribution of supplements and medicines, and does not reflect the contribution of food and water.

ND = not determined

Conversion formulas

Nutrient	IU → μg or mg	Equivalents → μg or mg
Vitamin A	1 IU = 0.3 μg retinol 1 IU = 0.6 μg beta-caroten	1 μg RE = 1 μg retinol 1 μg RE = 2 μg beta-caroten (supplements) 1 μg RE = 12 μg beta-caroten (foods) 1 μg RE = 24 μg alpha-caroten 1 μg RE = 24 μg beta-chryptoxanthin
Vitamin E	1 IU = 0.67 mg *d*-alpha-tocoferol (natural) 1 IU = 0.9 mg *dl*-alpha-tocopherol (synthetic)	1 mg Vitamin E (alpha-tocoferol) = 1 mg natural alfa-tocoferol 1 mg Vitamin E (alpha-tocopherol) = 0.5 mg synthetic alpha-tocopherol
Vitamin D	1 IU = 0.025 μg	1 IU = 0.025 μg
Folates		1 μg DFE = 1 μg natural folates 1 μg DFE = 0.6 μg folic acid (in supplements or fortified foods with folic acid)
Niacin		1 mg NE = 1 mg niacinamide 1 mg NE = 1 mg inositole hexanicotinate 1 mg NE = 1 mg niacin 1 mg NE = 60 mg tryptophan

Selected references

The following databases can be useful to specialistsin order to learn more about the frequency, structure and association of genetic variations with certain conditions, and about existing treatment alternatives:

dbSNP – database containing the localization, frequency and structure of localized genetic variations (https://www.ncbi.nlm.nih.gov/projects/SNP/).

ClinVar – a database associating pathogenic genetic variations with details of pathogenicity and current scientific evidence (https://www.ncbi.nlm.nih.gov/clinvar/).

PharmGKB – database indicating the interactions between genetic variations and drugs (https://www.pharmgkb.org/).

GeneCards – provides information on the role of genes amd encoded proteins (http://www.genecards.org/).

Specific Genetic Disorders – provides diagnostic and treatment information for rare diseases with genetic aetiology (https://www.genome.gov/10001204/).

Susan G Komen Foundation – provides information on the role of BRCA1/BRCA2 mutations in the pathogenesis of cancers in women and men (http://ww5.komen.org/BreastCancer/InheritedGeneticMutations.html).

The list of references below is a selection of the studies and information used to compile this report. This list does not represent the entire set of information that was used to generate this report, but only to the extent that it may be useful to the professionals.

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