nuclein health

genetic test report

A BRIEF INTRODUCTION

Thank you for choosing **Nuclein Health** and our test **GenoScope.** We are a genetic testing company focused on precision medicine – we harness genetic testing's full potential to help you make the healthiest decisions and improve your overall well-being.

We designed this report to be scientifically valid, actionable, easily comprehensible, and effective at communicating key information. Besides, we included personalized recommendations that address your individual needs, provide actionable insights, support disease prevention, and promote healthy habits.

The report consists of five different sections:

1. Carrier status of rare diseases
2. Risk of common diseases
3. Traits and wellness
4. Ancestry
5. Pharmacogenetics

Genetics is complex, which is why we provide you with a comprehensive report that may be longer than you expected due to the thoroughness of the test (estimated reading time ~60 minutes); but don't fret - we took extra care to present your results in a clear and easy-to-understand format.

In case you still have questions, we created genetics 101: understanding your results - a comprehensive guide that covers genetics basics and concepts, diseases, references, and other interesting and useful resources. The guide is meant to help you fully comprehend your test results and their implications.

We're excited to share this report with you and hope it will empower you to make the healthiest decisions and improve your overall well-being.

Please don't hesitate to reach out with any questions or concerns, we want you to get the most out of this experience.

Nuclein Health's team

PERSONAL INFORMATION

Name and last name: **GENE HELIX STRAND**
Gender: **M**
Order number: **NH#001**
Date of order: **01.05.2023**
Date of issue: **03.07.2023**

Sample type: **DNA isolated from buccal swab**
Method: **Microarray genotyping**
Technology: **Illumina® Global Screening Array (GSA) chip**

I. CARRIER STATUS OF RARE DISEASES

Rare diseases, also known as monogenic diseases, stem from genetic variants in a single gene. They often go undiagnosed, causing a significant impact on affected people's health and well-being. Our test analyzes your carrier status of specific genetic variants that cause various rare diseases and uncovers the likelihood of passing them down to your offspring.

In this section, you will discover your carrier status for the rare diseases and variants covered by our test. We provide detailed and extensive information on each disease you carry, including description, symptoms, causes, frequency, inheritance, diagnosis, treatment, prevention strategies and personalized recommendations.

You are a carrier of Familial Mediterranean fever and Wilson Disease (see Table 1).

Table 1. A list of rare (monogenic) diseases analyzed with GenoScope.

Autosomal dominant inheritance	Results
Acute intermittent porphyria	not detected
Birt-Hogg-Dube syndrome	not detected
Brugada syndrome	not detected
Dilated cardiomyopathy 1A	not detected
Familial adenomatous polyposis	not detected
Familial advanced sleep phase disorder (FASPS)	not detected
Familial breast cancer	not detected
Familial hypercholesterolemia	not detected
Familial hypertrophic cardiomyopathy (HCM)	not detected
Familial transthyretin amyloidosis	not detected
Hypokalemic periodic paralysis	not detected
Hypophosphatasia (AR/AD)	not detected
Li-Fraumeni syndrome	not detected
Malignant hyperthermia	not detected
Multiple endocrine neoplasia 2B	not detected

Autosomal recessive inheritance	Results
Agenesis of the corpus callosum with peripheral neuropathy (ACCPN)	not detected
Alpha-1 antitrypsin deficiency	not detected
Alpha-mannosidosis	not detected
ARSACS (autosomal recessive spastic ataxia of Charlevoix-Saguenay)	not detected
Autosomal recessive polycystic kidney disease	not detected
Beta thalassemia	not detected
Biotinidase deficiency	not detected
Bloom syndrome	not detected
Canavan disease	not detected
cblA type methylmalonic aciduria	not detected
cblB type methylmalonic aciduria	not detected
Classical homocystinuria due to CBS deficiency	not detected
Complete achromatopsia (type 2) and Incomplete achromatopsia	not detected
Congenital disorder of glycosylation type 1a (PMM2-CDG)	not detected
Congenital muscular alpha-dystroglycanopathy and Walker-Warburg syndrome	not detected
Congenital myasthenic syndrome	not detected
Congenital stationary night blindness 1C	not detected
Cystic fibrosis	not detected
Cystinosis	not detected
D-bifunctional protein deficiency	not detected
Diastrophic dysplasia	not detected
Dihydrolipoamide dehydrogenase deficiency	not detected
Dubin-Johnson syndrome	not detected
Ehlers-Danlos Syndrome (EDS)	not detected

Familial dysautonomia (Riley-Day syndrome)	not detected
Familial Mediterranean fever	**detected**
Familiar hyperinsulinism (ABCC8-related)	not detected
Fanconi anemia (FANCC-related)	not detected
Gaucher disease	not detected
Glucose-6-phosphate dehydrogenase deficiency (G6PD deficiency)	not detected
Glutaric acidemia type 1	not detected
Glutaric acidemia type 2	not detected
Glycogen storage disease type 1A (Von Gierke Disease)	not detected
Glycogen storage disease type 1B	not detected
Glycogen storage disease type 3	not detected
Glycogen storage disease type 5	not detected
Glycogenosis type 2 or Pompe disease	not detected
GRACILE syndrome	not detected
Hereditary fructose intolerance	not detected
Hereditary hemochromatosis associated with HFE	Not detected
Homocystinuria due to MTHFR deficiency	not detected
Junctional epidermolysis bullosa	not detected
Leigh syndrome, French-Canadian type (LSFC)	not detected
Leukoencephalopathy with vanishing white matter	not detected
Limb-girdle muscular dystrophy	not detected
Maple syrup urine disease type 1B	not detected
Medium-chain acyl-CoA dehydrogenase deficiency (MCADD)	not detected
Metachromatic leukodystrophy	not detected
Methylmalonic aciduria due to methylmalonyl-CoA mutase deficiency	not detected
Mucolipidosis IV	not detected
Mucolipidosis type II	not detected
Neuronal Ceroid-Lipofuscinoses type 1 (associated with PPT1)	not detected
Neuronal Ceroid-Lipofuscinoses type 3 (associated with CLN3)	not detected
Neuronal Ceroid-Lipofuscinoses type 5 (associated with CLN5)	not detected
Neuronal Ceroid-Lipofuscinoses type 6 (associated with CLN6)	not detected
Neuronal Ceroid-Lipofuscinoses type 7 (associated with MFSD8)	not detected
Niemann-Pick disease type A	not detected
Nonsyndromic hearing loss and deafness, DFNB1	not detected
Pendred syndrome	not detected
Peters plus syndrome	not detected
Phenylketonuria	not detected
Pontocerebellar hypoplasia	not detected
Primary hyperoxaluria type 1 (PH1)	not detected
Primary hyperoxaluria type 2 (PH2)	not detected
Pyridoxine-dependent epilepsy	not detected
Refsum disease	not detected
Retinitis pigmentosa	not detected
Rhizomelic chondrodysplasia punctata type 1	not detected
Salla Disease	not detected
Short-chain acyl-CoA dehydrogenase deficiency (SCADD)	not detected
Sjögren-Larsson syndrome	not detected
Tay-Sachs disease	not detected
Type 1 oculocutaneous albinism (tyrosinase negative)	not detected
Type 2 oculocutaneous albinism (tyrosinase positive)	not detected
Tyrosinemia type I	not detected
Usher syndrome	not detected
Very long-chain acyl-CoA dehydrogenase deficiency (VLCADD)	not detected
Wilson's disease	**detected**
Zellweger syndrome	not detected

X-linked recessive	**Results**
Hemophilia A	not detected

Mitochondrial	**Results**
Non-syndromic mitochondrial hearing loss	not detected

1. FAMILIAL MEDITERRANEAN FEVER (FMF)

You are a carrier of Familial Mediterranean fever (FMF). Carriers typically don't present symptoms and don't develop the disease.

We detected a pathogenic heterozygous variant 2230G>T (p.Ala744Ser) in the *MEFV* gene. Pathogenic *homozygous* or *compound heterozygous variants* in *MEFV* cause autosomal recessive Familial Mediterranean fever [OMIM: 249100].

⊱ Description and symptoms

Familial Mediterranean fever (FMF) is a genetic disease that results in periodic outbreaks of fever and inflammation. It affects the lining of the abdomen, chest, joints, and in some cases the heart, the membrane around the brain and spinal cord, or the testicles in men. Infections, stress, vigorous exercise, menstruation or ovulation, exposure to cold weather, consumption of fat-rich food, and certain drugs usually trigger FMF outbreaks.

The first FMF outbreak typically occurs in childhood or teenage years, but it may also occur later in life. Outbreaks usually last 12 to 72 hours, vary in severity, and occur typically once a month. Approximately half of the individuals with FMF experience prodromal symptoms before the outbreak, such as discomfort in the affected area or a general feeling of unease. Affected individuals have no symptoms in between outbreaks and no need for treatment, but without treatment secondary amyloidosis may develop in the organs, particularly the kidneys, leading to failure. Affected individuals may experience severe abdominal pain, chest pain that worsens with each breath, fever and/or alternating chills, muscle aches, painful and swollen knee, ankle, and hip joints, and red and swollen skin rashes ranging from 5 to 20 cm in diameter.

⊱ Causes

FMF is caused by *pathogenic homozygous or compound heterozygous variants in the MEFV gene*; this gene provides instructions for a protein called pyrin found in granulocytes (white blood cells). Pyrin regulates inflammation generated by the immune system by directing white blood cells and molecules to sites of injury or disease to facilitate tissue repair and fight microbes. When the *MEFV* gene is mutated, the activity of pyrin is reduced, leading to inflammation.

⊱ Inheritance

FMF is usually inherited in an autosomal recessive pattern, meaning that *pathogenic variants in both copies of the MEFV gene (homozygous or compound heterozygous)* are required for disease development. If one parent has one normal and one mutated gene copy and the other parent has two normal copies, their children won't be affected but have a 25% chance of being carriers. If both parents have one normal and one mutated gene copy, they are only carriers and typically asymptomatic, but their children have a 50% chance of being carriers and a 25% chance of inheriting the two mutated copies and developing the disease. Rarely, FMF may appear to be passed down in an autosomal dominant pattern (one mutated gene copy causing disease), called pseudo-dominance.

FMF affects people of Mediterranean descent, including those of Armenian, Arab, Turkish, or Jewish origin. It occurs in 1 in 200 to 1000 people and is less common in other populations.

⊱ Diagnosis and treatment

FMF is diagnosed through a combination of symptoms, medical history, and blood tests, including measuring C-reactive protein levels. A genetic test can also help establish a definitive diagnosis. There is no cure for FMF, but symptoms can be relieved or prevented with a treatment plan, including colchicine to reduce inflammation, corticosteroids, and other anti-inflammatory drugs in severe cases such as Anakinra (interleukin-1) if colchicine is not effective, and in rare cases spleen removal.

⊱ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. For individuals who are only carriers of FMF, there are several options that your healthcare provider might recommend you consider:

1. **Family planning**
- Before starting a family, it is recommended to have a genetic counsellor or your health care provider evaluate the risk of passing the variant or the disease to your offspring.
2. **Carrier testing**
- Carrier status genetic testing of your partner is recommended to assess the risk of your offspring developing the disease (25% chance if your partner is also a carrier).
3. **Prenatal testing**
- Prenatal testing can be performed during pregnancy to determine if the fetus is affected. Consult with your healthcare provider about potential risks and benefits.
4. **In vitro fertilization (IVF) with pre-implantation genetic diagnosis (PGD)**
- IVF with PGD is an option for individuals who wish to conceive a child without passing on a variant or a disease they both carry. Consult with your healthcare provider about potential risks and benefits.

Technical details

The *MEFV* c.2230G>T (p.Ala744Ser) missense variant is well described in the literature as a pathogenic variant for FMF. It is reported both in the homozygous and compound heterozygous state (PMID: 17566872, 19449169, 19934083, 20177433, 23031807, 25793047, 26843738). Modelling studies of the pyrin protein indicate that the variant may affect the folding of the binding cavity or impair interaction with other molecules (PMID: 16730661).

Table 2. A list of tested and detected variants that cause Familial Mediterranean Fever (FMF).

Gene	dbSNP	Nucleotide change	AA change	Genotype	Result
MEFV	**rs61732874**	**c.2230G>T**	**p.Ala744Ser**	**GT**	**heterozygous**
MEFV	rs3743930	c.442G>C	p.Glu148Gln	GG	not detected
MEFV	rs104895094	c.2084A>G	p.Lys695Arg	AA	not detected
MEFV	rs104895097	c.2282G>A	p.Arg761His	GG	not detected
MEFV	rs28940579	c.2177T>C	p.Val726Ala	TT	not detected
MEFV	rs11466023	c.1105C>T	p.Pro369Ser	CC	not detected
MEFV	rs28940580	c.2040G>C	p.Met680Ile	GG	not detected
MEFV	rs28940578	c.2082G>A	p.Met694Ile	GG	not detected
MEFV	rs104895083	c.1437C>G	p.Phe479Leu	CC	not detected
MEFV	rs61752717	c.2080A>G	p.Met694Val	AA	not detected

References

- Bhatt, H. & Cascella, M. (2022). Familial Mediterranean Fever. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022.
- Arici, Z.S. et al. (2021). Evaluation of E148Q and Concomitant AA Amyloidosis in Patients with Familial Mediterranean Fever. Journal of Clinical Medicine, 10(16), 3511.
- Kucuk, A. et. al (2014). Familial Mediterranean Fever. Acta Medica (Hradec Kralove), 57(3), 97-104.
- Majeed, H.A. et al. (2005). The spectrum of familial Mediterranean fever gene mutations in Arabs: report of a large series. Seminars in Arthritis and Rheumatism, 34(6), 813-818.
- Shohat, M. (2000). Familial Mediterranean Fever. GeneReviews® [Internet]. Updated on 2016 Dec 15.

2. WILSON'S DISEASE

You are a carrier of Wilson's disease. Carriers don't present symptoms and don't develop the disease.

We detected a *pathogenic heterozygous variant* c.2293G>A (p.Asp765Asn) in the *ATP7B* gene. *Pathogenic homozygous or compound heterozygous variants* in *MEFV* cause autosomal recessive Wilson's Disease [OMIM: 277900].

▻ Description and symptoms

Wilson's disease is a rare autosomal recessive disease that causes copper to accumulate in the liver, brain, and other organs, leading to liver disease, and neurological and psychiatric symptoms. It usually appears between the ages of 5 and 35 years, with an average age of onset between 12 and 23 years.

Liver disease is the initial symptom in younger people, while older people may not have liver symptoms but may have mild liver disease. Symptoms vary in onset due to differences in the penetrance of mutations and environmental factors. Liver disease symptoms include jaundice, fatigue, loss of appetite, and abdominal swelling. Neurological symptoms include clumsiness, tremors, difficulty walking, speech problems, and cognitive impairments. Psychiatric symptoms include depression, anxiety, and mood swings. Ocular symptoms include the presence of a Kayser-Fleischer ring (brown or green ring around the iris) and eye movement abnormalities.

▻ Causes

Pathogenic homozygous or compound heterozygous variants in the ATP7B gene on chromosome 13 cause Wilson's Disease. The *ATP7B* gene codes a protein called copper-transporting ATPase 2; this protein transports metals (including copper) in and out of cells using energy from the ATP molecule. It is mostly found in the liver, with smaller amounts in the kidneys and brain, and helps transport copper and remove excess of it. Copper is important for cell function, and this ATP-ase delivers it to the liver's Golgi apparatus.

▻ Inheritance

Wilson disease is usually inherited in an autosomal recessive pattern, meaning that *pathogenic variants in both copies of the ATP7B gene (homozygous or compound heterozygous)* are required for disease development. If one parent has one normal and one mutated gene copy and the other parent has two normal copies, their children won't be affected but have a 25% chance of being carriers. If both parents have one normal and one mutated gene copy, they are only carriers and typically asymptomatic, but their children have a 50% chance of being carriers and a 25% chance of inheriting the two mutated copies and developing the disease.

▻ Frequency

The estimated prevalence is 1 in 25,000 people in most populations.

▻ Diagnosis and treatment

The diagnosis of Wilson's disease relies on clinical signs and symptoms (liver disease, neurological/psychiatric problems), Kayser-Fleischer rings (eye copper deposits), copper levels in the blood, urine, and liver, and genetic testing.

Treatment includes zinc chelators to remove excess copper and prevent complications, and regular medical care and monitoring. Severe cases may require liver transplantation if therapy fails to stop disease progression.

▻ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. For individuals who are only carriers of Wilson's disease, there are several options that your healthcare provider might recommend you consider:

1. **Family planning**
   - Before starting a family, it is recommended to have a genetic counsellor or your health care provider evaluate the risk of passing the variant or the disease to your offspring.
2. **Carrier testing**
   - Carrier status genetic testing of your partner is recommended to assess the risk of your offspring developing the disease (25% chance if your partner is also a carrier).

3. **Prenatal testing**
- Prenatal testing can be performed during pregnancy to determine if the fetus is affected. Consult with your healthcare provider about potential risks and benefits.

4. **In vitro fertilization (IVF) with pre-implantation genetic diagnosis (PGD)**
- IVF with PGD is an option for individuals who wish to conceive a child without passing on a variant or a disease they both carry. Consult with your healthcare provider about potential risks and benefits.

Technical details

The c.2293G>A (p.Asp765Asn) variant in *ATP7B* is well described in the literature as a pathogenic variant for Wilson's disease [OMIM: 277900]. The sequence change replaces aspartic acid with asparagine at codon 765 of the ATP7B protein (p.Asp765Asn). The aspartic acid residue is highly conserved and there is a small physicochemical difference between aspartic acid and asparagine which is observed in individuals with Wilson's disease (PMID: 15024742, 20517649). Experimental studies show that this missense change affects *ATP7B* function (PMID: 9837819, 10942420). Other variants that disrupt this residue have been determined to be pathogenic (PMID: 23843956, 30384382), which suggests that this residue is clinically significant and that disrupting variants are likely to be disease-causing.

Table 3. A list of tested and detected variants that cause Wilson's disease.

Gene	dbSNP	Nucleotide change	AA change	Genotype	Result
ATP7B	rs28942075	c.2293G>A	p.Asp765Asn	GA	heterozygous
ATP7B	rs76151636	c.3207C>A	p.His1069Gln	CC	not detected

References

- Weiss, K. H. (1999). Wilson Disease.
- Adam, M. P. et al. (1993-2022). GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle.
- Mulligan, C. & Bronstein, J. M. (2020). Wilson Disease: An Overview and Approach to Management. Neurol Clin, 38(2), 417-432.

⚠ VITAL CONSIDERATIONS

Our test is informational and educational. It is not diagnostic, and it is not intended to diagnose or treat any diseases. Do not use the results from the carrier status of rare disease section to explain current health conditions, make medical decisions, or affect treatments. The test doesn't detect all possible genetic variants that affect disease risks; many factors can affect disease risks, such as variants not covered by this test, and extrinsic factors such as lifestyle, medical history, and the environment. The test cannot replace regular medical check-ups, screenings, tests, and appropriate consultations with a healthcare provider. Your healthcare provider should be the only source of medical advice and treatment; we do not provide them. To confirm any findings, your healthcare provider should refer you to an independent genetic test in a clinical setting.

II. RISK OF COMMON DISEASES

Common (polygenic) diseases stem from the complex interplay between thousands of genetic variants and the environment. While each variant may have only a minor effect on its own, their combined influence can significantly increase the risk of developing a disease.

In this section, you can find information on your Polygenic Risk Scores (PRS) for common diseases. You belong to high-risk groups for several common diseases (see Table 4), highlighted with a description of the disease, its symptoms, causes, diagnosis, and treatment options. We also provide personalized recommendations to address your individual needs, provide actionable insights, support disease prevention, and promote healthy habits.

Table 4. Polygenic Risk Scores (PRS) calculation for common (polygenic) diseases.

Disease	Category	Risk group
Graves' disease	Auto-immune diseases	Average-risk group
Hypothyroidism	Auto-immune diseases	Average-risk group
Systemic lupus erythematosus	Auto-immune diseases	Average-risk group
Rheumatoid arthritis	**Bone and joint diseases**	**Moderate high-risk group**
Osteoarthritis of the knee	**Bone and joint diseases**	**Moderate low-risk group**
Osteoporosis	Bone and joint diseases	Average-risk group
Gout	Bone and joint diseases	Average-risk group
Basal cell carcinoma	Cancer	Average-risk group
Colorectal cancer	**Cancer**	**Moderate low-risk group**
Cutaneous malignant melanoma	Cancer	Average-risk group
Prostate cancer	Cancer	Average-risk group
Testicular germ cell cancer	Cancer	Average-risk group
Abdominal aortic aneurysm	Cardio-vascular diseases	Average-risk group
Arterial hypertension	Cardio-vascular diseases	Average-risk group
Atrial fibrillation	Cardio-vascular diseases	Average-risk group
Coronary heart disease	**Cardio-vascular diseases**	**High-risk group**
Deep vein thrombosis	Cardio-vascular diseases	Average-risk group
Myocardial infarction	Cardio-vascular diseases	Average-risk group
Diabetes mellitus type 1	Diabetes	Average-risk group
Diabetes mellitus type 2	**Diabetes**	**High-risk group**
Age-related macular degeneration	Eye diseases	Average-risk group
Cataract	**Eye diseases**	**Moderate high-risk group**
Open-angle glaucoma	Eye diseases	Average-risk group
Crohn's disease	Gastrointestinal diseases	Average-risk group
Gallstones	Gastrointestinal diseases	Average-risk group
Primary biliary cirrhosis	Gastrointestinal diseases	Average-risk group
Ulcerative colitis	Gastrointestinal diseases	Average-risk group
Alzheimer's disease	Neurologic diseases	Average-risk group
Headaches	Neurologic diseases	Average-risk group
Migraines	Neurologic diseases	Average-risk group
Multiple sclerosis	Neurologic diseases	Average-risk group
Narcolepsy	Neurologic diseases	Average-risk group
Parkinson's disease	Neurologic diseases	Average-risk group
Restless legs syndrome	Neurologic diseases	Average-risk group
Bipolar disorder	Psychiatric diseases	Average-risk group
Depression	**Psychiatric diseases**	**Low-risk group**
Schizophrenia	Psychiatric diseases	Average-risk group
Asthma	Respiratory diseases	Average-risk group
Chronic Obstructive Pulmonary Disease (COPD)	**Respiratory diseases**	**High-risk group**
Atopic dermatitis	Skin diseases	Average-risk group
Psoriasis	**Skin diseases**	**Moderate high-risk group**
Vitiligo	Skin diseases	Average-risk group
Chronic kidney disease	Urogenital diseases	Average-risk group

1. RHEUMATOID ARTHRITIS

Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a moderate high-risk group for systemic rheumatoid arthritis - your risk is higher than 94% of our users.

To calculate your Polygenic Risk Score (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

Rheumatoid arthritis is an autoimmune disease characterized by persistent inflammation, leading to pain, swelling, and joint deformity. While it can affect any joint in the body, it is most observed in the wrists and hands. The condition can also extend beyond the joints, damaging various systems, including the skin, eyes, lungs, and blood vessels.

Symptoms of rheumatoid arthritis include pain, stiffness, and reduced joint mobility, predominantly affecting the hands, feet, wrists, shoulders, elbows, hips, and knees. Periods of active inflammation, known as flares, alternate with phases of relative remission. Fatigue, fever, and loss of appetite may occasionally accompany these symptoms. For around 40% of individuals with rheumatoid arthritis, the condition may involve other systems beyond the joints. This chronic and progressive disease is among the most disabling of the rheumatic disorders, significantly impacting the quality of life for affected individuals.

▻ Causes and risk factors

The exact causes of rheumatoid arthritis remain uncertain, but a complex interplay between genetic factors and environmental triggers has been proposed, including viral infections, hormones, and even the role of intestinal flora.

The prevalence of rheumatoid arthritis is approximately 1% in the general population, with a higher frequency in women than in men. Age is also a contributing factor, as the incidence of the disease tends to increase with age.

Among the non-genetic risk factors that may contribute to the development of rheumatoid arthritis, smoking has been identified as a significant factor, with smokers having a higher risk of developing the disease. Additionally, obesity has also been associated with an increased likelihood of developing it. Understanding and addressing these risk factors can aid in the prevention.

▻ Diagnosis and treatment

The diagnosis of rheumatoid arthritis involves a comprehensive evaluation of the patient's medical history, physical examination, and various laboratory tests. Blood tests may be conducted to detect specific antibodies, such as rheumatoid factor and anti-cyclic citrullinated peptide (anti-CCP), which are commonly found in individuals with the disease. Imaging studies like X-rays and ultrasound may also be used to assess joint damage and inflammation.

Treatment for rheumatoid arthritis aims to alleviate symptoms, slow the progression of the disease, and improve overall quality of life. It typically involves a combination of lifestyle modifications, medications, and, in some cases, surgical interventions. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used to manage pain and inflammation. Disease-modifying antirheumatic drugs (DMARDs), such as methotrexate, are prescribed to slow down

the progression of the disease and prevent joint damage. In more severe cases, biologic agents that target specific components of the immune system may be recommended.

Physical therapy and regular exercise are vital components of the treatment plan to maintain joint flexibility and function. Additionally, lifestyle changes, including adopting a balanced diet, maintaining a healthy weight, and quitting smoking, can significantly contribute to managing the condition effectively. A multidisciplinary approach, involving rheumatologists, physiotherapists, occupational therapists, and other healthcare professionals, is crucial in providing comprehensive care to individuals with rheumatoid arthritis.

⤜ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a moderate high-risk group for rheumatoid arthritis - your risk is higher than 94% of our users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent rheumatoid arthritis that will consider your specific needs and risk factors and may include a combination of lifestyle changes, medical management, and special considerations. Your healthcare provider might recommend the following.

1. **Lifestyle changes**
- *Maintain a balanced diet*: Adopt a diet rich in anti-inflammatory foods like fruits, vegetables, whole grains, and omega-3 fatty acids. Limit processed foods, saturated fats, and sugars, as they may contribute to inflammation.
- *Regular exercise:* Engage in low-impact activities like swimming, walking, or yoga to strengthen muscles and joints. Consult with a physical therapist for a personalized exercise plan. Avoid activities that require heavy physical effort such as lifting heavy objects or standing for long hours.
- *Weight management*: Aim for a healthy weight to reduce physical strain on joints and minimize the risk.
- *Stress management*: Practice stress-reducing techniques like meditation, mindfulness, or deep breathing to lower the impact of stress on the immune system.
- *Avoid smoking*: Quit smoking or avoid exposure to secondhand tobacco smoke, as it can increase the risk of developing rheumatoid arthritis.

2. **Medical management**
- *Early intervention:* If any symptoms or joint pain arise, seek medical attention promptly to ensure early diagnosis and intervention.

3. **Special considerations**
- *Protect yourself from infections:* Certain viral infections have been proposed as potential triggers for RA. Practising good hygiene, staying up to date with vaccinations, and avoiding exposure to sick individuals can help reduce the risk of infection. Consult with your healthcare provider about this.
- *Environmental toxins:* Limit exposure to environmental toxins, such as air pollution or chemicals like solvents, heavy metals, or pesticides, which have been suggested to play a role in RA.

⤜ Technical details

Rheumatoid arthritis (RA) is a disease of complex aetiology; twin studies estimate a 60% genetic contribution to the disease. In an association study conducted with approximately 23,000 cases and more than 300,000 controls, more than 70 loci significantly associated with the disease were identified. The RA variants are located in binding sites of various transcription factors related to CD4+ T cells and other immune cells.

Table 5. An overview of the Polygenic Risk Scores (PRS) analysis for rheumatoid arthritis.

Loci	Genes analyzed
73	*ABHD16B, AFF3, AHNAK2, ANKRD55, ARID5B, ATG5, BLK, CCL21, CCR6, CD40, CD83, CEP57, CLNK, COG6, CTLA4, DAP, EOMES, ETS1, FAM133B, FCRL3, GATA3, GPR137, GPR174, GTF2I, ICOSLG, IFNGR2, IL2RA, IL6R, IRF4, IRF5, IRF8, JAZF1, LBH, MACIR, NFKBIE, PADI4, PDE2A, PHTF1, PLCL2, PLD4, PRKCB, PRKCQ, PTGS2, PTPN2, RAD51B, RASGRP1, RBPJ, REL, RIMBP3C, RPLP1, RUNX1, SH2B3, SMC1B, SOX5, SPRED2, STAT4, SWAP70, SYNGR1, TAGAP, TCF7, TET3, TNFAIP3, TNFRSF14, TNFSF4, TRAF1, TXNDC11, TYK2, UBASH3A, VANGL2, WDFY4, YRDC, ZFP36L1, ZNF438, ZNF689, ZPBP2*

References

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- Giannini, D. et al. (2020). One year in review: pathogenesis of RA. Clinical and Experimental Rheumatology, 38(3), 387-397.
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- Oliver, J.E. & Silman, A.J. (2009). Risk factors for the development of rheumatoid arthritis. The Journal of Rheumatology, 36(12), 2687-2689.

2. CORONARY HEART DISEASE

Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a moderate-high risk group for coronary heart disease - your risk is higher than 99% of our users.

To calculate your Polygenic Risk Score (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

Coronary heart disease (CHD) is a condition resulting from the presence of atherosclerosis in the coronary arteries. Atherosclerosis is characterized by the buildup of lipids and inflammatory cells within the blood vessel walls, gradually narrowing the vessels and potentially reducing oxygen supply to tissues. This slow and silent process is the primary cause of ischemic heart disease and can lead to a heart attack (myocardial infarction).

The symptoms of coronary heart disease can vary widely among individuals, ranging from asymptomatic cases to severe and life-threatening symptoms. In the early stages, the narrowing of arteries due to atheromatous plaques may not cause any noticeable symptoms. As the plaques continue to develop, the following symptoms may emerge:

- Angina: Sudden chest pain or discomfort, often described as tightness, which typically occurs in the middle or left side of the chest. Angina can be triggered by physical or emotional stress and usually subsides within minutes.
- Shortness of breath: If the heart cannot pump blood efficiently enough, individuals may experience shortness of breath or fatigue, particularly during physical activities.
- Heart attack: This is the most severe manifestation of CHD, occurring when a coronary artery is completely blocked, cutting off blood flow to the heart. Symptoms of a heart attack may include severe chest tightness, pain radiating to the shoulder or arm, shortness of breath, and sweating.

It is essential to recognize the symptoms of CHD promptly and seek medical attention, if necessary, as timely diagnosis and management are crucial for preventing complications and improving overall heart health.

▻ Causes and risk factors

Coronary heart disease (CHD) is a significant health issue responsible for a considerable proportion of deaths in individuals over 40 years of age in developed countries. In regions such as these, approximately half of men and one-third of women will experience some form of heart disease during their lifetime, highlighting its global impact. Alongside genetic risk factors, non-genetic factors also play a substantial role in increasing the likelihood of CHD. These risk factors include:

- Ageing: As individuals age, the risk of arterial damage and the development of CHD increases.
- Gender: Men are more susceptible to heart disease due to the protective factor of estrogen in women. However, after menopause, the risk becomes similar for both sexes.
- Smoking: Active smoking and passive exposure to tobacco smoke are significant risk factors for CHD.
- Arterial hypertension: Uncontrolled high blood pressure can contribute to the development of heart disease.
- High cholesterol levels: Elevated blood cholesterol levels, specifically hypercholesterolemia, can lead to the formation of atheroma plaques in blood vessels, narrowing the arteries.
- Diabetes: Diabetes is associated with an increased risk of coronary heart disease.
- Obesity: Excess body weight can contribute to the development of CHD.

- Sedentary lifestyle: Lack of physical activity and a sedentary lifestyle are linked to the risk of heart disease.
- Stress: Chronic stress can play a role in the development of CHD.
- Unhealthy diet: A diet high in saturated fats and sugar can increase the risk of coronary heart disease.

Addressing and managing these risk factors through lifestyle modifications and medical interventions are essential steps in preventing and reducing the burden of coronary heart disease. Regular exercise, a balanced diet, quitting smoking, and controlling blood pressure and cholesterol levels are crucial for heart health and reducing the risk.

➢ Diagnosis and treatment

The diagnosis of coronary heart disease (CHD) involves various tests and assessments to evaluate the patient's cardiac health. These may include a physical examination, blood tests to assess cholesterol levels and other cardiac markers, an electrocardiogram (ECG) to record the heart's electrical activity, stress tests to observe the heart's response during exercise, an echocardiogram to create images of the heart's structure and function, and coronary angiography to visualize blockages or narrowed arteries. Early detection and diagnosis are crucial for prompt treatment.

The treatment of CHD aims to alleviate symptoms, improve the patient's quality of life, and reduce the risk of complications. Lifestyle modifications are typically the first line of treatment and include adopting a heart-healthy diet, engaging in regular physical activity, quitting smoking, and managing stress. Medications may be prescribed to control blood pressure, cholesterol levels, and other factors contributing to heart disease. In more severe cases, invasive procedures like angioplasty or coronary artery bypass grafting (CABG) may be necessary to restore blood to the heart.

For some individuals, lifestyle changes and medications may not be sufficient, and the disease may progress to a point where further interventions are necessary. In such cases, a heart transplant may be considered a treatment option. Regular follow-up with a healthcare provider is essential to monitor the disease's progression and adjust the treatment plan as needed to ensure optimal management and prevention of complications.

➢ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Scores (PRS) calculation and analysis show that you belong to a high-risk group for coronary heart disease - your risk is higher than 99% of our users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent CHD that will consider your specific needs and risk factors and may include a combination of lifestyle changes, medical management, monitoring, and special considerations. Your healthcare provider might recommend the following:

- **Lifestyle changes**
- *Heart-healthy diet:* Adopt a heart-healthy diet that includes plenty of fruits, vegetables, whole grains, lean proteins, and healthy fats. Reduce intake of saturated and trans fats, as well as foods high in salt and added sugars. For example, incorporate colourful salads with leafy greens, berries, and nuts into your meals, and replace sugary snacks with natural alternatives like fresh fruits.
- *Regular exercise:* Engage in at least 150 minutes of moderate-intensity aerobic exercise per week, such as brisk walking, swimming, jogging, or cycling. Include strength training exercises two days a week to improve cardiovascular fitness. Schedule regular morning walks or join a fitness class to stay motivated and on track.
- *Weight management:* Aim to achieve and maintain a healthy weight by balancing calorie intake with physical activity. Losing even a small amount of weight can significantly reduce heart disease risk. Consider keeping a food diary or using an app to track eating habits and identify areas for improvement.
- *Limit alcohol intake:* If you consume alcohol, do so in moderation. Excessive alcohol intake can contribute to high blood pressure and increase the risk of heart disease.
- *Smoking cessation:* If you smoke, seek support and resources to quit smoking. Quitting smoking is one of the most significant ways to reduce the risk of CHD.
- **Medical management**
- *Regular health check-ups:* Schedule routine visits with your healthcare provider to monitor blood pressure, cholesterol levels, and overall heart health. Discuss any concerns or symptoms.
- *Medication adherence:* If prescribed medications to manage blood pressure, cholesterol, or other heart disease risk factors, take them as directed by your doctor. Keep a medication log or set reminders to ensure adherence.

- *Blood pressure control:* If diagnosed with hypertension, follow your doctor's recommendations for blood pressure management, which may include medication, dietary changes, and lifestyle modifications.
- *Cholesterol-lowering medications*: If cholesterol levels are high, your doctor may prescribe statins to lower LDL cholesterol. Adhere to the prescribed treatment plan and discuss any side effects with your healthcare provider. Also, discuss with your healthcare provider if you should take statins *proactively*, as there is strong evidence that people with high PRS derive clinical benefits from taking statins preventively.
- *Aspirin therapy:* If advised by your healthcare provider, consider low-dose aspirin therapy for heart disease prevention. Adhere to the prescribed treatment plan and discuss any side effects with your healthcare provider.
- *Diabetes management:* If you have diabetes, carefully manage it with your healthcare provider.
- **Special considerations**
- *Omega-3 fatty acids:* Consider incorporating omega-3 fatty acids into your diet through fish consumption or fish oil supplements. Some evidence suggests potential benefits for cardiovascular health, including a modest reduction in CHD risk. However, consult with your healthcare provider before starting any supplements.
- *Antioxidants* (Vitamin E, Vitamin C, Beta-Carotene): While antioxidants have been studied for their potential cardioprotective effects, their role in reducing CHD risk is inconclusive. It is best to obtain antioxidants from a balanced diet rich in fruits and vegetables rather than relying solely on supplements.
- *Stress reduction:* Practice stress-reducing activities like yoga, meditation, or deep breathing exercises to manage stress levels. Set aside time each day for relaxation and self-care. For instance, dedicate 15 minutes in the morning to practice mindfulness or deep breathing exercises to start the day with a calm and focused mindset.
- *Sleep quality:* Prioritize good sleep habits, aiming for 7-9 hours of quality sleep per night. Practice a bedtime routine to promote restful sleep. Make sure the air quality in the room is good, and the temperature cooler, and invest in a comfortable pillow and mattress.
- *Smart wearables:* Take advantage of technology such as remote monitoring wearable devices to track and manage risk factors, such as smart rings, wristbands, watches and so on.

⤜ Technical details

Coronary heart disease is a disease of complex aetiology, resulting from the interaction of lifestyle and underlying genetics. In investigating the role of genetics, GWAS studies have played a key role. In the largest study to date involving almost 35,000 patients and some 300,000 controls, 179 susceptibility loci were identified. Among the genes found, several involved in lipid metabolism, such as *APOE* or *PCSK9*, and *CDKN2B*, which in previous studies were strongly associated with heart disease, stand out. These findings open new possibilities for improving quantitative measures of genetic risk, allowing a better approach to the prevention of coronary heart disease.

Table 6. An overview of the Polygenic Risk Score (PRS) analysis for coronary artery disease (CHD).

Loci	Genes analyzed
179	*ADAMTS7, APOE, BUD13, CCDC85C, CDKN2B, CDKN2A, COL4A2, COL4A4, EDNRA, FER, ICA1L, INPP5B, JCAD, KCNE2, SLC5A3, KIAA1217, LDLR, LPA, MFGE8, MRAS, NOS3, PCSK9, PHACTR1, PSRC1*

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3. DIABETES TYPE 2

Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a high-risk group for developing type 1 diabetes - your risk is higher than 99% of our users.

To calculate your Polygenic Risk Score (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

Type 2 diabetes is a chronic condition characterized by high levels of glucose (sugar) in the blood, which can cause damage to various organs and systems in the body. It occurs when the body becomes resistant to insulin or does not produce enough insulin to regulate glucose levels. The following symptoms are common in diabetes: increased thirst and hunger, fatigue, blurred vision, slow-healing wounds, numbness or tingling in the hands or feet, recurrent infections, dark skin patches (acanthosis nigricans), frequent urination, unintentional weight loss, and in advanced stages a condition called hyperosmolar hyperglycemic state characterized by severe dehydration and symptoms like mental confusion, drowsiness, and seizures.

▻ Causes and risk factors

Type 2 diabetes affects millions of individuals globally, with estimates suggesting that 422 million adults lived with the condition in 2014, according to the World Health Organization (WHO). This number is predicted to rise to 642 million by 2040. The disease can affect people of all ages and ethnicities, though it is more prevalent among older adults, particularly those over 45. It arises from the development of insulin resistance in muscle, fat, and liver cells, which results in alterations in the interaction between these tissues and insulin, preventing glucose uptake and leading to increased blood glucose levels. Also, the pancreas doesn't produce enough insulin to regulate glucose effectively.

Both genetic and lifestyle factors can play a role; diabetes has a strong hereditary component, and lifestyle factors such as obesity, physical inactivity, and a poor diet increase the risk significantly. Age, ethnicity, hypertension, polycystic ovary syndrome (PCOS), and previous gestational diabetes also increase the risk of developing it. African Americans, Hispanics, and Native Americans have a higher risk, as well as women with PCOS or gestational diabetes

▻ Diagnosis and treatment

Type 2 diabetes is a chronic disease that affects the way the body processes glucose. The diagnosis involves a blood test to measure the level of glucose in the blood. A person is diagnosed with diabetes type 2 if they have a fasting plasma glucose level of 126 mg/dL or higher, or if they have a random plasma glucose level of 200 mg/dL or higher, along with symptoms such as frequent urination, excessive thirst, and fatigue.

Treatment for diabetes type 2 involves lifestyle modifications such as maintaining a healthy diet, engaging in physical activity, and maintaining a healthy weight, along with drugs, such as metformin, sulfonylureas, thiazolidinediones, DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 receptor agonists. In some cases, insulin therapy may also be necessary. Regular monitoring of glucose levels is important to ensure effective treatment and to make necessary adjustments.

▻ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Score (PRS) calculation and analysis show you show that you belong to a high-risk group for diabetes type 2 - your risk is higher than 99% of our

users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent diabetes type 2 that will consider your specific needs and risk factors and may include a combination of lifestyle changes, medical management, and special considerations. Your healthcare provider might recommend the following:

1. **Lifestyle changes**

- *Follow a healthy diet:* Maintaining a healthy diet is crucial for managing type 2 diabetes. Prioritize whole, nutrient-dense foods while limiting sugary and refined carbohydrate-rich options. Eat more fruits, vegetables, lean proteins, and healthy fats. Avoid processed foods, as they often contain added sugars, refined carbs, and unhealthy fats, which can lead to insulin resistance and increase the risk of type 2 diabetes. Adhere to a Mediterranean diet.
- *Exercise regularly:* regular exercise can improve insulin sensitivity and help regulate blood sugar levels. Aim for *at least* 30 minutes of moderate-intensity exercise, most days of the week.
- *Maintain a healthy weight:* obesity is a major risk factor for type 2 diabetes. Aim for a healthy weight by incorporating regular exercise and a healthy diet into your routine.
- *Be mindful of alcohol intake:* alcohol can cause spikes in blood sugar levels and contribute to insulin resistance. It's best not to drink, but If you choose to drink, do so in moderation.
- *Quit smoking:* smoking can increase insulin resistance and contribute to the development of type 2 diabetes. If you smoke, speak with your healthcare provider about strategies to quit.
- *Avoid sedentary behaviour:* Minimize sitting for long periods and try to incorporate more movement throughout the day. For example, taking short walks during breaks, using standing desks, or doing light exercises while watching TV can be beneficial. If your profession requires prolonged periods of sitting during working hours, it's essential to prioritize your health and well-being. Consider setting regular reminders to take brief breaks every 45-60 minutes. During these breaks, stand up from your desk and take a short walk.

2. **Medical management**

- *Regular blood glucose monitoring:* regular blood glucose monitoring is essential in managing type 2 diabetes. Your healthcare provider may recommend regular testing or provide you with a glucose meter for at-home monitoring.
- *Monitor your blood pressure:* high blood pressure is a common complication of type 2 diabetes and can increase the risk of insulin resistance. Monitor your blood pressure regularly and work with your healthcare provider to keep it within a healthy range.
- *Regular check-ups:* regular check-ups with your healthcare provider can help identify any changes.

3. **Special considerations**

- *Vitamin D supplementation:* Ensure adequate vitamin D levels, as some studies suggest that vitamin D deficiency may be associated with an increased risk of type 2 diabetes. Consider vitamin D supplementation if necessary, especially in regions with limited sunlight exposure.
- *Eat more fermented foods:* Introducing more fermented foods into your diet could contribute to decreasing the risk, since *Bifidobacterium, Bacteroides, Faecalibacterium, Akkermansia* and *Roseburia* are negatively associated with type 2 diabetes. Consult with your doctor on possible supplementation.
- *Manage stress:* chronic stress can increase blood sugar levels and contribute to insulin resistance, which can increase the risk of developing diabetes. Consider incorporating stress management techniques into your daily routine, such as mindfulness meditation, deep breathing, or yoga.
- *Get enough sleep:* Sleep deprivation and poor sleep quality have been linked to an increased risk of developing type diabetes. Aim for 7-8 hours of quality sleep each night, make sure the air quality in the room is good, and the temperature cooler, and invest in a comfortable pillow and mattress.
- *Stay hydrated:* drinking enough water can help regulate blood sugar levels and prevent dehydration, which can contribute to insulin resistance.
- *Personalized diet plan:* consult with a registered dietitian or nutritionist to develop a meal plan that fits your individual needs and preferences.
- *Smart wearables:* take advantage of technology such as remote monitoring wearable devices to track and manage risk factors, such as smart rings, wristbands, watches and so on.

⊱ Technical details

A multi-ethnic Genome-Wide Association Study (GWAS) with over 1.4 million participants, including 230,000 cases, was conducted to standardize criteria and identify genetic risk factors for T2D. The study found up to 545 risk loci associated with both T2D development and the progression of common vascular complications.

Table 7. An overview of the Polygenic Risk Scores (PRS) analysis for type 2 diabetes.

Loci	Genes analyzed
545	*ABCB10, ABCC5, ABCC8, ABL2, ABO, ACE, ACSL1, ACTN1, ADAMTS9, ADAMTSL3, ADCY5, ADRB1, AFF3, AKAIN1, ALDH1A2, ALKBH3, AMFR, AMN, ANKDD1B, ANKRD55, ANPEP, AOAH, AOC1A, OPEP, API, PAPOE, APOLD1, ARAP1, ARID2, ARID4A, ARMH4, ARID5B, ARL15, ARL4D, ARNTL, ARPP21, ARVCF, ATP2A1, ATP8B2, AUTS2, AZIN1, BAK1, BBIP1, PDC, CD4, BC, L11, ABCL2, BC, L2L11, BDNF, BEND3, BEND7, BMP8A, BMPR2, BPTF, BRAF, BRD3OS, BTRC, C2, CD4, AC3, ORF70, CALCR, CASR, CASTCBX1, CCAR2, CCDC88B, CCDC92, CCDC9B, CCND1, CCNH, CD101, CDC14, CCDC7, CDH7, CDKAL1, CDKL2, CDKN1C, CDKN2B, CEBPB, CELF4, CENPW, CEP120, CEP68, CK, BCKMT1B, CLEC14, ACMIP, CNTNAP2, COL27A1, CPNE4, CRHR2, CRTC1, CRY2, CRYBA1, CRYBA2, CSPG5, CTBP1, CTRB2, CTTNBP2, CUL1, CWH43, CYTH1, DCAF12, DDC, FIGNL1, DDX20, DEPDC5, DGKB, DGKD, DHFR2NS, UN3, DLEU7, DLK1, DMAC1, DMRT2, DNAH7, STK17B, DNMT3A, EBF1, EBF2, EGFL8, EIF2S2, ELAVL2, EML2, EMSY, EP400, EPO, ERBB4, ERLIN1, ERN1, ETAA1, ETS1, ETV1, EVA1B, EYA1, EYA2, FADS2, FAF1, FAIM2, FAM227B, FAM234A, FANCL, FBRSL1, FBXL22, FBXW7, TMEM154, FCGRTF, FGFR3, FIBCD1, FOCAD, FOXA2, FOXK1, FOXP1, FRAT2, FRRS1L, FSD2, FTO, FXYD2, GALNT3, GBA2, GCDH, GCK, GCKR, GDF6, GINS2, GIP, GLI2, GLIS3, GLP2R, GLRA1, GNAS, GNPDA2, GOLIM4, GP2, GPC5, GPR26, GPSM1, GRB14, GRID1, GRP, GSAP, GTF2I, GUCY1B1, H1-7, H2BC8, HACL1, HCN1, HDAC9, HEY2, NCOA7, HHEX, HIVEP2, HLA-GHMBS, HMGA2, HNF1A, HNF1B, HNF4A, HORMAD2, HOXC5, HPS1, HS6ST3, HSD17B1, HSF1, HSPA12A, ID4, IFT52, IFT80, IGF1R, IGF2BP2, IKBKE, IKZF2, IL20R, AIL34, INSR, IRS1, IRS2, IRX3, ISCA2, ITGA1, JADE2, JARID2, JAZF1, JMY, KBTBD6, KCNH7, KCNJ12, KCNK16, KCNK17, KCNU1, KCTD8, KDM3A, KDM4B, KIAA1522, KIF3C, KLKLF14, KLHL42, KLLN, KMT2E, KPNA3, KSR2, L1TD1, L3MBTL2, L3MBTL3, LAMA1, LAMC1, LARP1, BLCORLLDH, BLEPR, LIN7, ALINGO2, LMF1, LONRF1, LPLLPP, LRFN2, LRMDALRRC1, LRRC66, LRRC74, ALRTM1, LTBP3, LTK, MACIR, MAFF, MAGI2, MAML3, MAP2K7, MBNL1, MC4R, MDFIC2, MDM4, MED23, MED27, MEOX2, METAP2, MFHAS1, MGAT1, MNAT1, MOB1B, MPHOSPH9, MPPED2, MRAS, MRPS30, MSANTD1, MSRAMT, MR2, MTNR1B, MTOR, MYC, MYCN, MYO5C, NACAD, NAP1L5, NDST2, NDUFAF6, TP53INP1, NEDD1, NEGR1, NELL1, NEUROD2, NEUROG3, NFAT5, NFATC2, NFIB, NHSL1, NKX6-3, NLGN1, NMIN, OL4, NOP2, NOS1, NOTCH2, NPAS3, NPC1, NR5A2, NRBF2, NRP1, NRXN3, NTAN1, NUAK1, NUDT5, NUP160, NUP54, NUS1, OLFM4, OMG, OR4A47, OR4C12, OR5B3, OR5D18, PARD3B, PARP8, PCBD1, PCCB, PCDH17, PCDH9, PCGF3, PDE3A, PDGFC, PDLIM3, PDZRN4, PENK, PEPD, PFN1, PGM1, PHF13, PI16, PIGC, PIK3C3, PIK3R1, PIM3, PKHD1, PKLR, PLEKHA1, PLEKHM3, PLXND1, PML, PNOC, PNPLA3, PODXL, POU3F3, PPARG, PPP4R3A, PRC1, PRDM5, PRICKLE1, PRIM1, PRIMA1, PRKD1, PROX1, PSAT1, PSMC2, PSMD6, PTP4A1, PTPN9, PURG, QKI, SER1, RAB24, RAB3C, RANBP17, RASEF, RASGRP1, RBM6, RBMS1, RBMS3, RDH14, REV3L, RFT1, RFX3, RGMARGS17, RNF6, ROBO2, RPL10L, RPL13, RPTOR, RRAGA, RREB1, RSPO3, RTN4, RUNX2, RWDD3, SAE1, SAT2, SBF2, SCD5, SCLT1, SEC16B, SEC23I, SEPTIN14, SETD5, SGCG, SGCZ, SGIP1, SHISA4, SHQ1, SHROOM3, SIDT1, SINHC, AF, SKOR1, SLC12A8, SLC16A11, SLC16A7, SLC1A2, SLC22A3, SLC25A12, SLC25A34, SLC2A2, SLC30A8, SLC38A9, SLC39A11, SLC39A8, SLC41A1, SLC7A5, SLC9B1, SLCO4A1, SLIT2, SLX4, SMARCA, D1, SMIM29, SP9, SPHK, AP, SPRY2, SREBF1, SRP54, SSPN, ST6GAL1, STAU2, STEAP2, STK31, STK35, STRN, STXBP6, SUGCT, SV2A, SYT10, TATTB, CET, CF12, TCF19, POU5F1, TCF3, TCF4, TCF7L2, TENT5C, TET1, TET2, TEX29, TFAP2B, TFRCTH, THADATHBS1, TLE1, TLE4, TM4SF4, TM6SF2, TMBIM1, TMEM106B, TMEM161B, TMEM18, TMEM219, TMEM81, TMEM87B, TNKSTNRC6B, TOM1, TPCN2, TRIM27, TRIM32, TRIM63, TRIM66, TRPS1, TRPV5, TSC22D2, TSEN15, TSHZ2, TSHZ3, TSPAN8, TTN, UBE2E2, UBE2E3, UBE2L5, UBE2O, UBE3C, UGT3A2, UNC5C, UNC5D, USP49, VEGFA, VGLL3, VPS53, VWA5B1, WBP1L, WDR11, WDR7, WFS1, WNT8A, WSCD2, XKR6, YTHDF2, ZBED3, ZBTB20, ZBTB26, ZBTB38, ZBTB46, ZC3H11B, ZC3H13, ZEB2, ZFAT, ZFHX3, ZFP64, ZFPM1, ZFPM2, ZHX3, ZMIZ1, ZNF10, ZNF169, ZNF236, ZNF239, ZNF654, ZNF703, ZNF746, ZNF799*

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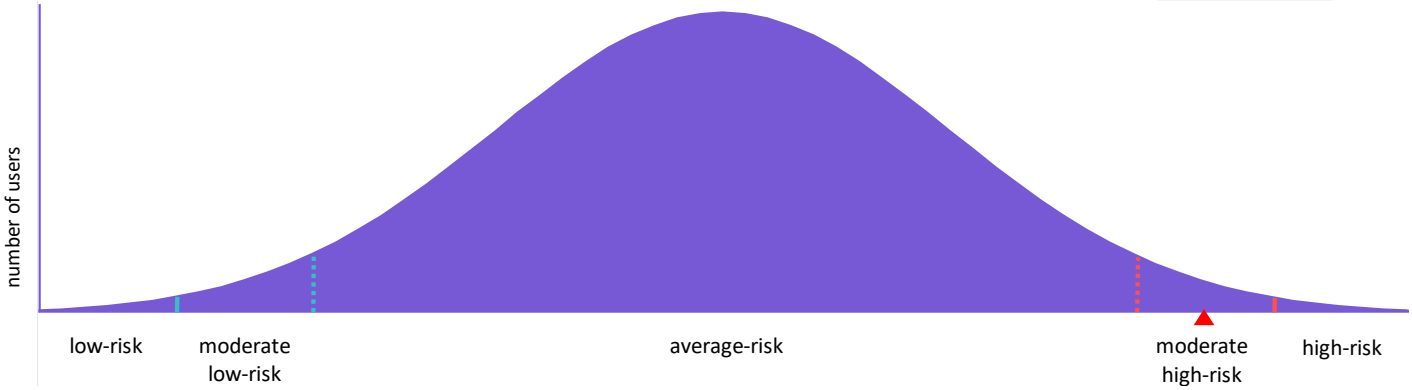
4. CATARACT

Your Polygenic Risk Scores (PRS) calculation and analysis show that you belong to a moderate-high risk group for developing cataracts - your risk is higher than 94% of our users.



To calculate your Polygenic Risk Scores (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

A cataract is a common eye condition that affects the lens of the eye, resulting in a loss of vision clarity. It is characterized by the clouding of the natural lens in the eye, leading to decreased visual acuity. The condition typically occurs in both eyes and as the proteins in the lens break down and accumulate, it becomes increasingly opaque. Cataract is a common age-related problem, with over 60% of people aged 75 and above affected. Symptoms of cataracts develop slowly over time and can include a sensitivity to light, cloudy, blurred/hazy vision, trouble seeing at night, double vision, loss of colour intensity, difficulty seeing outlines, and seeing halos around lights.

▻ Causes and risk factors

Cataract is a common eye condition that causes clouding of the eye's natural lens, leading to decreased vision. Several factors can increase the risk of developing cataracts, including ageing, as the natural process of ageing can cause changes in the eye's lens over time. Other risk factors include exposure to ultraviolet (UV) radiation from the sun, smoking, certain medications such as corticosteroids, and medical conditions such as diabetes or high blood pressure. Additionally, genetics and family history may also play a role in the development of cataracts. Taking precautions to protect the eyes from UV radiation and maintaining a healthy lifestyle can help reduce the risk of developing cataracts.

▻ Diagnosis and treatment

A cataract is diagnosed through a comprehensive eye examination, which includes visual acuity tests, dilation of the pupils to examine the lens, and tonometry to measure the intraocular pressure. Once diagnosed, treatment options may include surgery to remove the cloudy lens and replace it with an artificial lens. However, if the cataract is not causing significant vision problems, non-surgical management may be recommended, such as corrective lenses or brighter lighting. It is important to monitor cataracts regularly to ensure they do not worsen and affect vision. Early diagnosis and treatment can prevent significant vision loss and improve quality of life.

▻ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Scores (PRS) calculation and analysis show you show that you belong to a moderate high-risk group for cataracts - your risk is higher than 94% of our users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent cataracts that will consider your specific needs and factors and may include a combination of lifestyle changes, medical management, monitoring, and special considerations. Your healthcare provider might recommend the following:

1. **Lifestyle changes**

- *Wear sunglasses and a hat when going out*: wear sunglasses with UV protection and a hat whenever you're outside to protect your eyes from harmful UV rays that can damage them and increase your risk of cataracts.

- *Eat a healthy diet:* a diet high in antioxidants, such as vitamins A, C, and E, can help reduce the risk of cataracts. Eat plenty of fruits and vegetables, including leafy greens, citrus fruits, and berries.
- *Quit smoking:* smoking is a significant risk factor for cataracts. Quit smoking or avoid exposure to secondhand smoke to reduce your risk.

2. Medical management

- *Control chronic conditions:* chronic conditions such as diabetes and hypertension can increase the risk of cataracts. Work with your healthcare provider to manage these conditions effectively.
- *Manage medications:* Certain medications, such as corticosteroids and diuretics, can increase the risk of cataracts. If you're taking these medications, talk to your healthcare provider about how to manage their effects.
- *Consider surgery:* If you develop cataracts, surgery may be an option to remove the cloudy lens and replace it with an artificial lens. Consult with your eye doctor to determine if surgery is necessary.

3. Monitoring

- *Schedule regular eye exams:* regular eye exams can help detect cataracts early before they significantly impact your vision. Schedule eye exams with your eye doctor as recommended
- *Be aware of symptoms:* blurred or dim vision, halos around lights, and sensitivity to light. These may be signs of cataracts and require prompt evaluation by an eye doctor.

4. Special considerations

- *Avoid or manage eye trauma***:** eye trauma can increase the risk of cataracts. Avoid situations that may cause eye trauma, such as playing contact sports without proper eye protection, and seek prompt medical attention if you experience an eye injury.
- *A job with potential eye hazards:* if you work in construction or manufacturing, wear protective eyewear to prevent eye injuries that can increase the risk of cataracts.
- *Protect your eyes from blue light:* blue light from digital devices and computer screens can increase the risk of cataracts. Use blue light-blocking glasses or software to protect your eyes.
- *Avoid sun lamps and tanning booths:* exposure to UV radiation from sun lamps and tanning booths can increase the risk of cataracts. Avoid using these devices or wear protective eyewear when using them.
- *Manage your blood sugar levels:* high blood sugar levels can increase the risk of developing cataracts. If you have diabetes, it's important to manage your blood sugar levels through diet, exercise, and medication, if necessary.
- *Limit alcohol consumption:* heavy alcohol consumption can increase the risk of cataracts. Limit your alcohol consumption to moderate levels or avoid alcohol altogether.
- *Avoid the use of corticosteroids when possible:* corticosteroids can increase the risk of cataracts, especially when used for long periods. Avoid using these medications unless necessary and talk to your healthcare provider about alternative treatments if possible.
- *Consider nutritional supplements:* some supplements, such as lutein, zeaxanthin, and vitamin C, may help reduce the risk of cataracts. Consult with your healthcare provider before taking any to ensure they are safe.

▻ Technical details

Cataract development is associated with ageing, but certain genetic factors have been found to increase the risk of developing this condition. In an association study with over 77,000 affected individuals and around 670,000 controls, researchers identified 24 loci. These loci include the *SLC24A3* gene, which encodes a transporter critical in retinal cells, transcription factors such as *SOX2*, and proteins involved in the function of the retinal epithelium, such as *OCA2*.

Table 8. An overview of the Polygenic Risk Scores (PRS) analysis for cataracts.

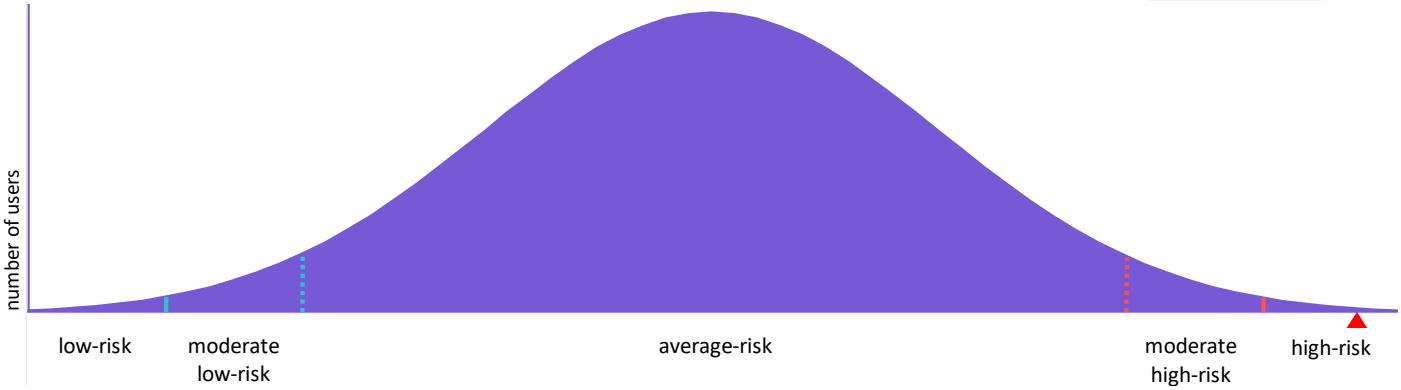
Loci	Genes analyzed
24	*ARMS2, BAMBI, C3orf49, CASZ1, CDKN2B, COA1, COQ8A, IGFBP3, KYNU, LRIG3, METRNL, MMAB, MVK, OCA2, PLCG1, PRXL2A, QKI, SCGB1C1, SLC24A3, SMIM38, SOX2, ST6GALNAC4, TSPAN10, TYR, VSTM4*

▻ References

- Sakaue, S. et al. (2021). A cross-population atlas of genetic associations for 220 human phenotypes. Nature Genetics, 53(10), 1415.
- Prokofyeva, E. et al. (2012). Cataract prevalence and prevention in Europe: A literature review.
- Shichi, H. (2005). Cataract formation and prevention. Pages 691-701.

5. CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a high-risk group for developing chronic obstructive pulmonary disease - your risk is higher than 99% of our users.



To calculate your Polygenic Risk Score (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

COPD is one of the most common respiratory diseases, characterized by chronic lung inflammation that obstructs airflow. It is also associated with an increased risk of developing other diseases such as respiratory infections and lung cancer. The worldwide prevalence of COPD is estimated to be 13%, and while it is a progressive condition, proper management can help maintain the quality of life and reduce the risks of other pathologies.

COPD typically appears around the age of 40-50 years, and its progression is slow but continuous. Symptoms may not become apparent until significant lung damage has occurred, and they often worsen over time, especially if there is continued exposure to tobacco. As the disease advances, it can significantly limit a person's ability to perform daily activities, and in severe cases, it can even hinder basic tasks. Common symptoms include shortness of breath, particularly during physical activity, wheezing or whistling sounds in the chest, a feeling of tightness in the chest, chronic cough that may produce mucus, frequent respiratory infections, lack of energy, and unintentional weight loss. Proper management and lifestyle changes are essential for improving the prognosis and quality of life.

▻ Causes and risk factors

Emphysema and chronic bronchitis are the primary conditions that contribute to chronic obstructive pulmonary disease (COPD). Emphysema involves the destruction of the bronchioles, the crucial respiratory structures responsible for oxygen and carbon dioxide exchange, due to harmful exposure to tobacco smoke and other irritating gases and particles. On the other hand, chronic bronchitis is a result of inflammation in the lining of the bronchi.

In developed countries, the leading cause of COPD is smoking, which can also include exposure to secondhand smoke. However, various other irritants can contribute to the development of chronic obstructive pulmonary disease, such as environmental pollution and workplace exposure to dust, smoke, or toxic gases. In developing countries, COPD is predominantly associated with exposure to fumes from burning fuels for cooking and heating in poorly ventilated homes. These risk factors highlight the importance of avoiding exposure to harmful substances and improving air quality to prevent and manage COPD effectively. Smoking cessation and minimizing exposure to environmental pollutants are vital steps in reducing the risk and progression.

▻ Diagnosis and treatment

The diagnosis of COPD involves a combination of clinical evaluation, lung function tests, and imaging studies. Doctors typically assess the patient's medical history, symptoms, and exposure to risk factors like smoking or environmental pollutants. Lung function tests, such as spirometry, measure how well the lungs are working and can help confirm the diagnosis. Chest X-rays or CT scans may also be used to evaluate lung damage and rule out other conditions.

Treatment for COPD focuses on managing symptoms, slowing disease progression, and improving overall quality of life. Lifestyle modifications, such as smoking cessation and avoiding exposure to irritants, are critical in managing the condition. Medications play a vital role and can include bronchodilators to relax the airway muscles and corticosteroids to reduce inflammation. Pulmonary rehabilitation programs can help patients improve their lung function, exercise capacity, and breathing techniques.

In more severe cases, supplemental oxygen therapy may be necessary to maintain adequate oxygen levels in the blood. Patients are also encouraged to stay up-to-date with vaccinations to prevent respiratory infections, which can worsen COPD symptoms. In advanced stages, surgical interventions like lung volume reduction surgery or lung transplantation may be considered for select patients.

Regular follow-ups with healthcare providers are essential to monitor the disease's progression, adjust treatment plans as needed, and provide ongoing support and education to help individuals effectively manage their COPD.

⤜ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a high-risk group for COPD - your risk is higher than 99% of our users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent COPD that will consider your specific needs and risk factors and may include a combination of lifestyle changes, medical management, and special considerations. Your healthcare provider might recommend the following.

1. **Lifestyle modifications**
- *Smoking cessation*: The most important thing is to quit smoking and avoid exposure to secondhand smoke. Seek support from healthcare providers, quit-smoking programs, or support groups. Nicotine replacement therapies and medications can aid in smoking cessation.
- *Healthy lifestyle:* Eat a balanced diet rich in fruits, vegetables, and whole grains. Engage in regular physical activity to improve lung function and overall health. Maintain a healthy weight to reduce strain on the respiratory system. Avoid large meals, especially dinner, and alcoholic beverages, and limit carbonated beverages.

2. **Medical management**
- *Vaccinations*: Stay up-to-date with vaccinations, especially for influenza. Vaccinations can prevent respiratory infections that may exacerbate COPD symptoms.
- *Early detection and management:* If you experience persistent cough, shortness of breath, or other respiratory symptoms, seek medical evaluation promptly. Early diagnosis and treatment can help manage COPD and prevent further complications.
- *Manage allergies:* Identify and manage any allergies that may trigger respiratory symptoms. Consult an allergist for proper diagnosis and treatment.

3. **Special considerations**
- *Avoid respiratory infections:* Practice good hygiene, such as frequent handwashing, to reduce the risk of infections. Avoid close contact with individuals who have respiratory infections.
- *Avoid indoor air pollutants*: Use smokeless options for cooking and heating. Keep indoor areas ventilated to reduce exposure to pollutants. Invest in an air purifier if you live in a city with bad air quality, especially in the winter.
- *Environmental protection:* Avoid exposure to air pollutants, such as smoke, dust, fumes, and chemicals. Ensure proper ventilation at home and workplace to reduce indoor air pollution. Avoid exposure to cold weather.
- *Occupational safety:* Follow workplace safety guidelines and use protective equipment if exposed to harmful substances. Use protective masks or respirators when working in hazardous environments. Employers should ensure a safe working environment and minimize exposure to respiratory hazards.

⤜ Technical details

Environmental risk factors, mainly smoking, are responsible for much of the risk, relegating genetic factors to 20-40% of disease susceptibility. The GWAS study, which included more than 200,000 controls and nearly 36,000 cases, combined previous analyses by the International Consortium of COPD Genetics (ICGC) and the UK Biobank. This comprehensive study has identified 81 risk loci related to lung function, tissue structure, smooth muscle tissue, and cell structure, as well as others related to the development of asthma or pulmonary fibrosis.

Table 9. An overview of the Polygenic Risk Score (PRS) analysis for COPD.

Loci	Genes analyzed
80	*ADAM19, ADAMTSL3, ADGRG6, AGER, ARMC2, ASAP2, BCAR1, BTC, C1orf87, CCDC69, CCDC91, CDC123, CHRM3, CHRNA5, CITED2, COL15A1, DENND2D, DMWD, EEFSEC, EFCAB5, EML4, EMP2, EPOP, FAM13A, FAM227B, FGF18, GLIS3, GNA12, HHIP, HSPA4, HTR4, ID4, IER3, ITGA1, ITGB8, KCNE2, LRMDA, LRTM1, ME3, MECOM, MED13L, MED24, MFAP2, MFHAS1, MICAL3, MTCL1, MYCN, NPNT, NR4A2, PABPC4, PRL, RASSF10, ARNTL, RBMS3, RFX6, RIN3, RREB1, SERP2, SMIM2, SFTPD, SLC30A10, SLMAP, SNRPF, SOX9, SPATA31D1, SPATA9, SPHKAP, SPPL2C, STN1, SYN3, TESK2, TGFB2, THSD4, TNPO1, TNS1, TOP2B, TRIM32, TWIST2, USB1, VGLL4, ZBTB38, ZSCAN21*

⊱ References

- Sakornsakolpat, P. et al. (2019). The genetic landscape of chronic obstructive pulmonary disease identifies heterogeneous cell-type and phenotype associations. Nature Genetics, 51(3), 494-505.
- Blanco, I. et al. (2019). Geographic distribution of COPD prevalence in the world displayed by Geographic Information System maps. European Respiratory Journal, 54(1), 1900610.
- Mannino, D.M. & Buist, A.S. (2007). Global burden of COPD: risk factors, prevalence, and future trends. The Lancet, 370(9589), 765-773.

6. PSORIASIS

Your Polygenic Risk Scores (PRS) calculation and analysis show that you belong to a moderate-high risk group for developing psoriasis - your risk is higher than 94% of our users.

To calculate your Polygenic Risk Scores (PRS) we use a statistical method called imputation and estimate the genotype of variants not analyzed with our test, by leveraging patterns of genetic variation in a reference population, as determined with Genome-Wide Association Studies (GWAS). This allows us to expand the number of analyzed variants from ~750,000 to ~13 million, providing a wider and more accurate assessment of your potential risk of common diseases.

▻ Description and symptoms

Psoriasis is a chronic disease characterized by hyperactivity of the immune system, primarily affecting the skin and nails. It follows a pattern of periods with no or mild symptoms, alternating with more severe episodes that can significantly impact the individual's quality of life. This common disorder is estimated to have a worldwide prevalence of approximately 2-3%.

Symptoms of psoriasis typically manifest between the ages of 15 and 35, although it can also affect children and older individuals. Various types of psoriasis exist, including plaque psoriasis or vulgaris, which is the most common form primarily affecting the skin. Other types include scalp psoriasis, nail psoriasis, guttate psoriasis (often triggered by streptococcal throat infections), inverse psoriasis (affecting skin folds), pustular psoriasis, and erythrodermic psoriasis. Additionally, psoriatic arthritis, a condition affecting the joints, is closely associated with psoriasis.

Psoriasis often follows a cyclic pattern, with flare-ups lasting weeks or months followed by periods of remission or improvement. While signs and symptoms can vary among individuals and types of psoriasis, some common manifestations include reddish patches of skin covered with thick, silvery scales, small scaly spots, dry and cracked skin that may itch or bleed, itching, burning or irritation, thickened or pitted nails, and swollen and stiff joints. The most frequently affected areas include the back, elbows, knees, legs, soles of the feet, scalp, face, and palms of the hands.

▻ Causes and risk factors

Psoriasis occurs when there is an abnormal acceleration of the skin cell turnover process. Normally, new skin cells are generated in the deep layers of the skin and gradually ascend to the surface, where older cells are shed. In psoriasis, this process is significantly accelerated, taking only 3-7 days instead of the usual 4 weeks. As a result, immature cells accumulate in the superficial layers of the skin, leading to the characteristic symptoms.

The underlying cause of this accelerated turnover and immune system activation is not fully understood. However, in addition to genetic factors, several triggers and risk factors have been identified that can initiate psoriasis flare-ups:

- Skin lesions such as cuts, scratches, insect bites, or sunburns.
- Skin infections and certain respiratory infections, particularly those caused by streptococcus bacteria.
- Weather conditions, especially cold and dry environments.
- Excessive alcohol consumption.
- Smoking and exposure to secondhand smoke.
- Psychological stress.
- Hormonal changes, especially in women during puberty and menopause.

- Certain medications, including lithium, antimalarials, antihypertensives, antiarrhythmics, and nonsteroidal anti-inflammatory drugs (NSAIDs). Abrupt discontinuation of oral or systemic corticosteroids can also trigger flare-ups.
- Coexistence of other immune disorders.
- While these factors can contribute to the onset or exacerbation of psoriasis, it is important to note that individual responses may vary, and not everyone with these risk factors will develop the condition.

▻ Diagnosis and treatment

Diagnosing psoriasis typically involves a thorough examination of the affected skin, along with a review of the patient's medical history and symptoms. In some cases, a skin biopsy may be performed to confirm the diagnosis and rule out other skin conditions. Additionally, healthcare professionals may consider the impact of psoriasis on a patient's quality of life and assess any associated joint symptoms to determine the presence of psoriatic arthritis.

The treatment of psoriasis aims to control symptoms, reduce inflammation, and prevent flare-ups. The approach to treatment can vary depending on the severity of the condition and the individual's response. Common treatment options include:

- Topical medications: Creams, ointments, or gels containing corticosteroids, vitamin D analogues, retinoids, or other immunosuppressants are applied directly to the affected skin to reduce inflammation and promote healing.
- Phototherapy: Controlled exposure to ultraviolet (UV) light, either natural sunlight or artificial UV light sources, can help improve symptoms by slowing down the excessive growth of skin cells. Phototherapy is often used in combination with other treatments.
- Systemic medications: In more severe cases, oral or injected medications may be prescribed to suppress the immune response and reduce inflammation throughout the body. These medications may include retinoids, methotrexate, cyclosporine, or newer biological agents that target specific immune system pathways.
- Lifestyle modifications: Maintaining a healthy lifestyle can help manage psoriasis symptoms. This includes avoiding triggers such as stress, excessive alcohol consumption, smoking, and certain medications. Moisturizing the skin, maintaining a balanced diet, and practising stress-reduction techniques can also be beneficial.

▻ Prevention and personalized recommendations

Seek advice from your healthcare provider before taking any action. Your Polygenic Risk Score (PRS) calculation and analysis show that you belong to a moderate high-risk group for COPD - your risk is higher than 94% of our users. It is important to work closely with your healthcare provider to develop a personalized plan to prevent COPD that will consider your specific needs and risk factors and may include a combination of lifestyle changes. Your healthcare provider might recommend the following:

1. **Lifestyle modifications**

- *Keep the skin moisturized:* Regularly apply thick creams or lotions to maintain skin moisture to prevent the development of psoriasis or flare-ups. For scalp psoriasis, use appropriate topicals.
- *Practice good hygiene:* Keep the skin clean to prevent infections. Use mild soaps, avoid harsh/irritating cleansers.
- *Protect against dry and cold weather:* Limit exposure to dry and cold environments. Use UV-appropriate clothing to protect the skin and consider using a humidifier at home to maintain moisture levels.
- *Sun protection:* Limit skin exposure to sunlight and use appropriate sun protection measures, such as applying sunscreen and wearing protective clothing, to prevent sunburn and potential development or flare-ups.
- *Avoid triggers:* Try to identify specific triggers that worsen psoriasis symptoms for you. This may include stress, certain foods, or lifestyle factors. Take steps to avoid or manage these triggers to prevent flare-ups.
- *Maintain a healthy weight:* Engage in regular physical exercise and follow a balanced diet rich in fruits and vegetables to promote overall health and manage weight.

▻ Technical specifications

Psoriasis is a multifactorial genetic disease for which genetic factors explain about 70% of disease susceptibility. The largest meta-analysis of GWAS association studies performed for psoriasis to date on nearly 12,000 cases and more

than 200,000 controls have provided an outline of the genetic architecture of common psoriasis variants identifying 55 association loci for psoriasis. The largest meta-analysis of GWAS association studies for psoriasis to date on nearly 12,000 cases and over 200,000 controls has provided an outline of the genetic architecture of common psoriasis variants identifying 55 susceptibility loci highlighting interferon and NFκB signaling pathways, and regulatory elements of different T-cell subtypes.

Table 10. An overview of the Polygenic Risk Scores (PRS) analysis for psoriasis.

Loci	Genes analyzed
54	*ATXN2, B3GNT2, BAD, BLOC1S2, CAMK2G, CARD14, CDKAL1, DDX58, DNM2, ELMO1, ERAP1, ETS1, EXOC2, FASLG, FUT2, GIPC2, ICAM3, IFIH1, IFNLR1, IKBKE, IL12B, IL13, IL23R, KLF13, KLF4, KLRC2, LCE3A, LRRC43, MUCL3, NFKBIA, NFKBIZ, NOS2, PLCL2, POLI, PPIF, PTPN2, REL, RNF114, RUNX3, SLC45A1, SNX32, SOCS1, STAT2, STAT3, STX1B, TAGAP, TNFAIP3, TNIP1, TRAF3IP2, TRIM65, TSC22D1, UBAC2, YDJC, ZC3H12C, ZNF365*

⌲ References

- Tsoi, L.C. et al. (2017). Large-scale meta-analysis characterizes genetic architecture for common psoriasis-associated variants. Nature Communications, 8, 15382.
- Kamiya, K. et al. (2019). Risk Factors for the Development of Psoriasis. International Journal of Molecular Sciences, 20(18), 4347.
- Huerta, C. et al. (2007). Incidence and Risk Factors for Psoriasis in the General Population. Archives of Dermatology, 143(12), 1559-1565.
- Raychaudhuri, S.P. et al. (2000). Psoriasis risk factors: role of lifestyle practices. Cutis, 66(5), 348-352.

⚠ VITAL CONSIDERATIONS

Our test is informational and educational. It is not diagnostic, and it is not intended to diagnose or treat any diseases. Do not use the results from the risk of common diseases section to explain current health conditions, make medical decisions, or affect treatments. The test doesn't detect all possible genetic variants that affect disease risks; many factors can affect disease risks, such as variants not covered with this test, and extrinsic factors such as lifestyle, medical history, and the environment. The test cannot replace regular medical check-ups, screenings, analyses, and appropriate consultations with a healthcare provider. Your healthcare provider should be the only source of medical advice and treatment, we do not provide them. To confirm any findings, your healthcare provider should refer you to an independent genetic test in a clinical setting.

III. TRAITS AND WELLNESS

In this section, you will find your traits and wellness results. What makes you stand out from the crowd? We delve into the quirks that make you... well, you! Learn more about the physical and behavioural aspects that make you unique.

Table 11. An overview of your traits.

Physical characteristics

Birth weight	Lower birth weight
Body mass index (BMI)	Average body mass index (BMI)
Ear lobe type	Lower probability of an attached earlobe
Earwax type and armpit odour	Damp earwax and habitual armpit odour
Eye colour	Green or light brown
Hair colour	Blonde and light brown
Hair texture	Higher probability of straight hair
Height	Shorter stature
Male baldness	Higher probability of baldness
Nasion prominence	Non-prominent nasion
Permanent teeth eruption	Increased probability of slightly delayed eruption
Pigmented rings on the iris	Less pronounced iris ring pigmentation
Visceral adipose tissue	Higher volume of visceral adipose tissue
Red hair	Lower probability of being a redhead
Skin melanin levels	Average skin melanin levels
Teeth morphology	Incisors without shovel shape

Biological markers and physiology

Basal metabolic rate (BMR)	Lower basal metabolic rate (BMR)
Blood coagulation: factor V Leiden and F2 20210G-A	Factor V Leiden and F2 20210G-A not detected
Blood glucose levels	Lower glucose levels
Blood Group ABO/Rh	Inconclusive result
C-reactive protein (CRP) levels	Higher CRP levels
Duffy antigen, malaria resistant	Lower resistance
Genetic predisposition to peanut allergy	Slightly higher predisposition to peanut allergy
HDL cholesterol levels	Lower levels of HDL cholesterol
LDL cholesterol levels	Lower levels of LDL cholesterol
HLA-B27 antigen	Not detected
Levels of vitamin A (beta carotene)	Slightly higher levels of vitamin A
Long-chain omega fatty acids levels	Average levels of long-chain omega fatty acids
MTHFR gene variants (A1298C and C667T)	Two copies of A1298C in *MTHFR (*homozygous)
Persistence of fetal haemoglobin	Lower persistence
Prostate Specific Antigen (PSA) levels	Average PSA levels
QT intervals	Long QT intervals
Secretor status and ABH antigens (*FUT2* gene)	Secretory state

Sex hormone-binding globulin (SHBG) levels	Higher SHBG levels
Thyroid function (TSH levels)	Average TSH levels
Vitamin B12 levels	Average vitamin B12 levels
Vitamin C levels	Lower vitamin C levels
Vitamin D levels	Lower vitamin D levels
Vitamin E levels	Slightly higher vitamin E levels

Earthly pleasures 🍸 🧉 🥦 🍫 🌸

Alcohol consumption	Average likelihood of excessive alcohol consumption
Alcohol flush reaction	Lower probability of alcohol flush reaction
Asparagus odour detection	Reduced ability to detect asparagus odour in urine
Bitter taste perception	Able to perceive bitter taste
Caffeine cravings	Average caffeine cravings
Caffeine dependence after prolonged consumption	Higher likelihood of caffeine dependence
Celiac disease predisposition	No predisposition for celiac disease
Food intake control	Higher tendency to overeat
Histamine intolerance	Probability of mild DAO deficiency and intolerance
Lactose intolerance	Higher probability of being intolerant
Nicotine dependence	Average probability of nicotine dependence
Preference for sweets	Higher probability of increased cravings for sweets
Sense of smell	Able to perceive floral aromas

🏃‍♀️ Physical performance and exercise 🏋️‍♂️ 🚴‍♂️

Exercise-induced muscle damage (initial phase)	Higher risk of damage (initial phase)
Exercise-induced muscle damage (regeneration capacity)	Slower regeneration capacity after damage
Exercise-induced muscle damage (second phase)	Lower risk of damage (second phase)
Muscle endurance	Increased probability of being a sprinter
Tendinopathies in lower extremities (legs)	Higher risk of tendinopathies in legs
Tendinopathies in upper extremities (arms)	Average risk of tendinopathies in arms

Behavioural patterns and tendencies 😴 🌙 🔆

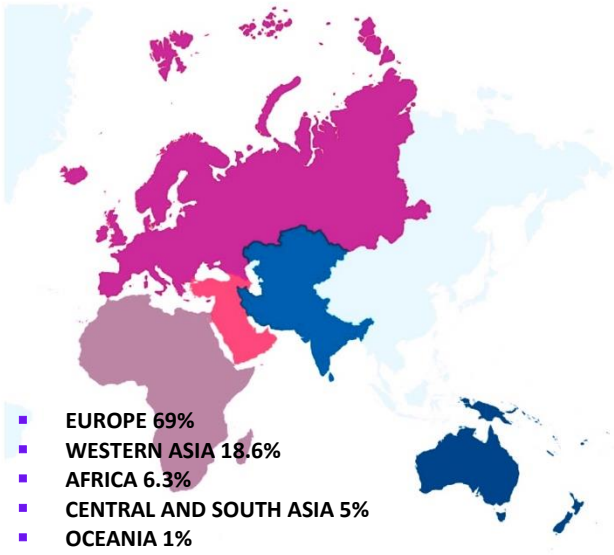
Sleep duration	Long sleep duration
Photic sneeze reflex	Higher probability of having a photic sneeze reflex

Cognition and abilities 💡 🧠

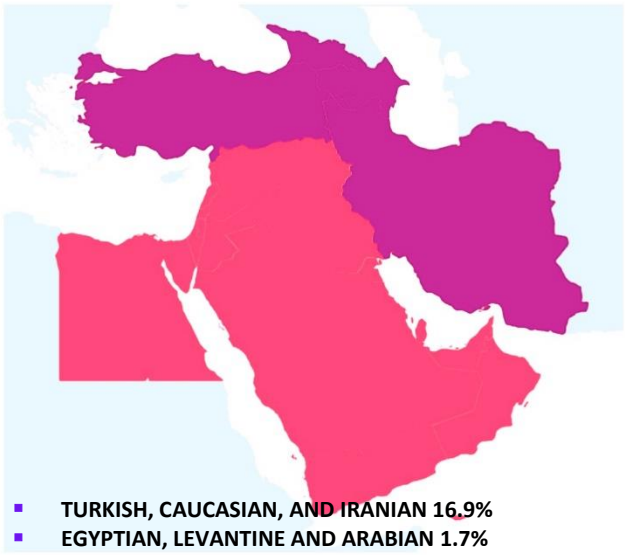
Cognitive ability	Higher cognitive ability

IV. ANCESTRY

Your ancestry

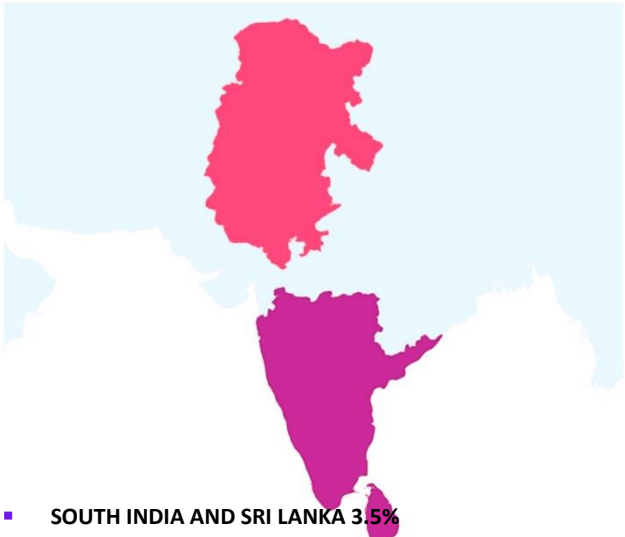


- EUROPE 69%
- WESTERN ASIA 18.6%
- AFRICA 6.3%
- CENTRAL AND SOUTH ASIA 5%
- OCEANIA 1%

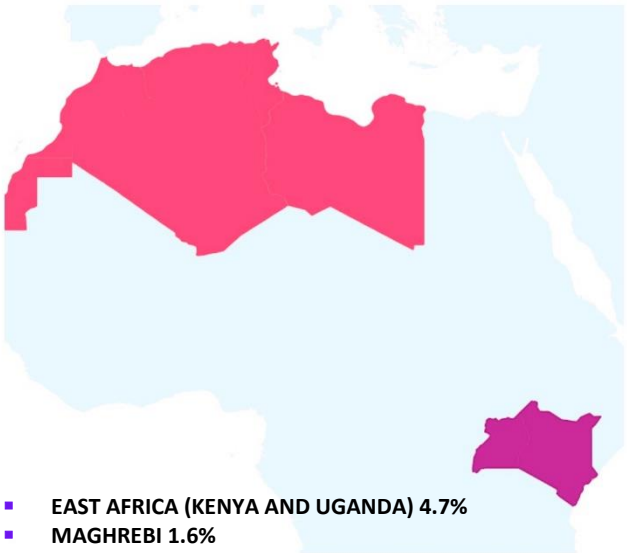


- TURKISH, CAUCASIAN, AND IRANIAN 16.9%
- EGYPTIAN, LEVANTINE AND ARABIAN 1.7%

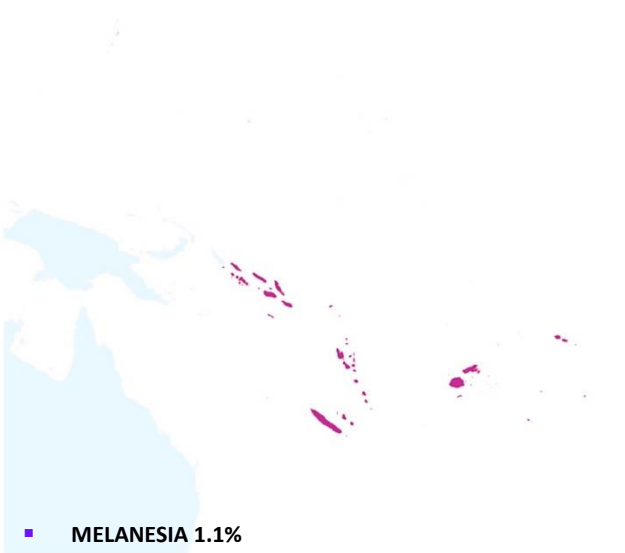
- BALKAN 67.4% (ROMANIA, GREECE, BULGARIA)
- SARDINIA 1.6%



- SOUTH INDIA AND SRI LANKA 3.5%
- PUNJABI AND NORTH INDIAN 1.5%



- EAST AFRICA (KENYA AND UGANDA) 4.7%
- MAGHREBI 1.6%

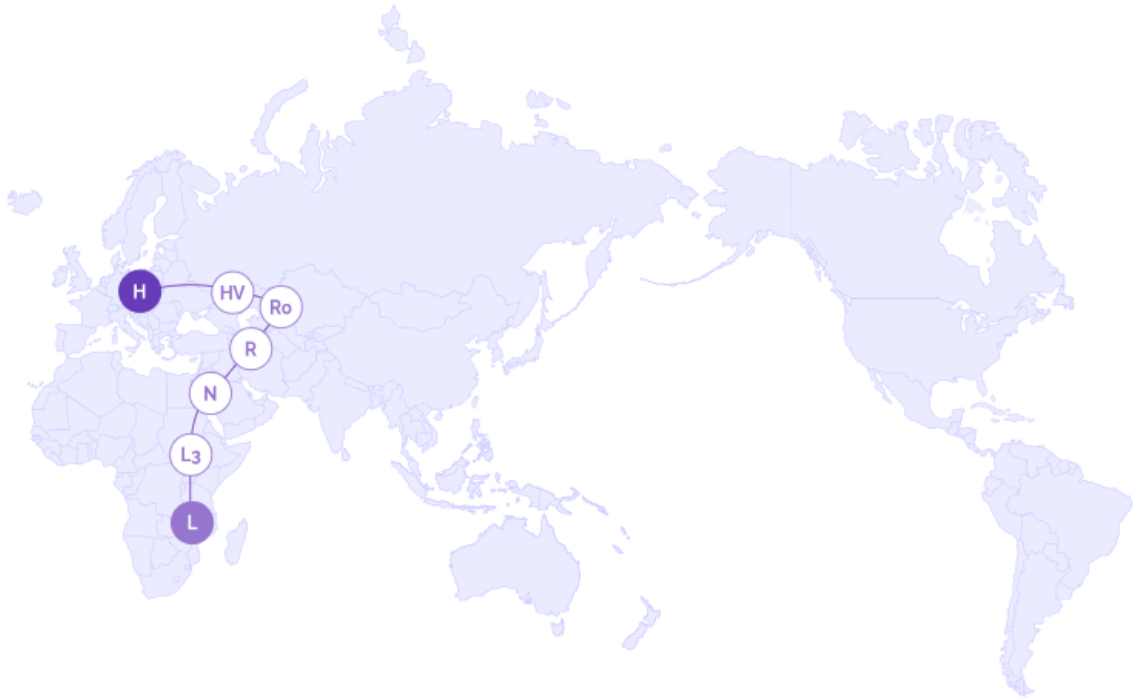


- MELANESIA 1.1%

⫸ Maternal lineage

By analyzing mitochondrial DNA, we can obtain information about our maternal ancestors, whose origins can be traced back to East Africa more than 150,000 years ago. The study of mitochondrial DNA allows us to learn more about our origins and describe the path taken by our maternal ancestors.

Your maternal haplogroup is H.



- L - more than 150,000 years ago

Macrohaplogroup L represents the African mitochondrial ancestry of all humanity and is known as mitochondrial Eve. It consists of groups L1 to L6, which represent 96% of the mitochondrial genetics of sub-Saharan Africa.

- L3 - between 70,000 and 80,000 years ago

Haplogroup L3 is considered a macrohaplogroup as it makes up more than a quarter of the African population, particularly among Nigerians and Congolese. It is estimated to be between 70,000 and 80,000 years old and represents the initial migration of humans from Africa to other continents. It is therefore considered the Eurasian Eve.

- N - about 65,000 years ago

Haplogroup N is present on all continents. It is considered a macrohaplogroup due to its vast diversity. This haplogroup is divided into various mitochondrial DNA haplogroup subtypes, such as A, S, I, W, Y, and R subgroups. It originated somewhere along the South Asian coastal migration 65,000 years ago. The distribution of haplogroup N includes Europe and Oceania, although it is less common in Africa.

- R - about 60,000 years ago

Haplogroup R is widely distributed throughout Eurasia, Oceania, and America, but is especially predominant in Europe, with an average of 89%. It is estimated to be about 60,000 years old and is derived from haplogroup N. The diversification of this haplogroup is related to the expansion of mankind out of Africa. In the Hindustan region, R exhibits wide diversity among different ethnic groups. It is considered a macrohaplogroup as it contains a multitude of important subgroups. Diana of Wales and her children belong to haplogroup R30b, a rare lineage of Indian origin, which Diana inherited from one of her great-great-grandmothers.

- R0 - about 40,000 years ago

Haplogroup R0 evolved from macrohaplogroup R about 40,000 years ago in South Arabia. It is the most important haplogroup in the West, predominant in Europe, the Middle East, North Africa, and Central Asia. It is divided into two

subgroups, R0a'b, found mostly in Yemen, Pakistan, Saudi Arabia, and Oman, and HV, the most important group in the West. This haplogroup has been reported in bone remains dating back 24,000 years in northern Italy.

- HV - about 30,000 years ago

Haplogroup HV is descended from macrohaplogroup R0 and is the most important haplogroup in Western Eurasia. It originated about 30,000 years ago in the Caucasus region. The highest frequencies of this haplogroup are found in Iran, especially among Gilakis (24%), Kurds (20%), and Persians (19%). It has several subgroups, with subgroup H being the most important and the most frequent in Europe.

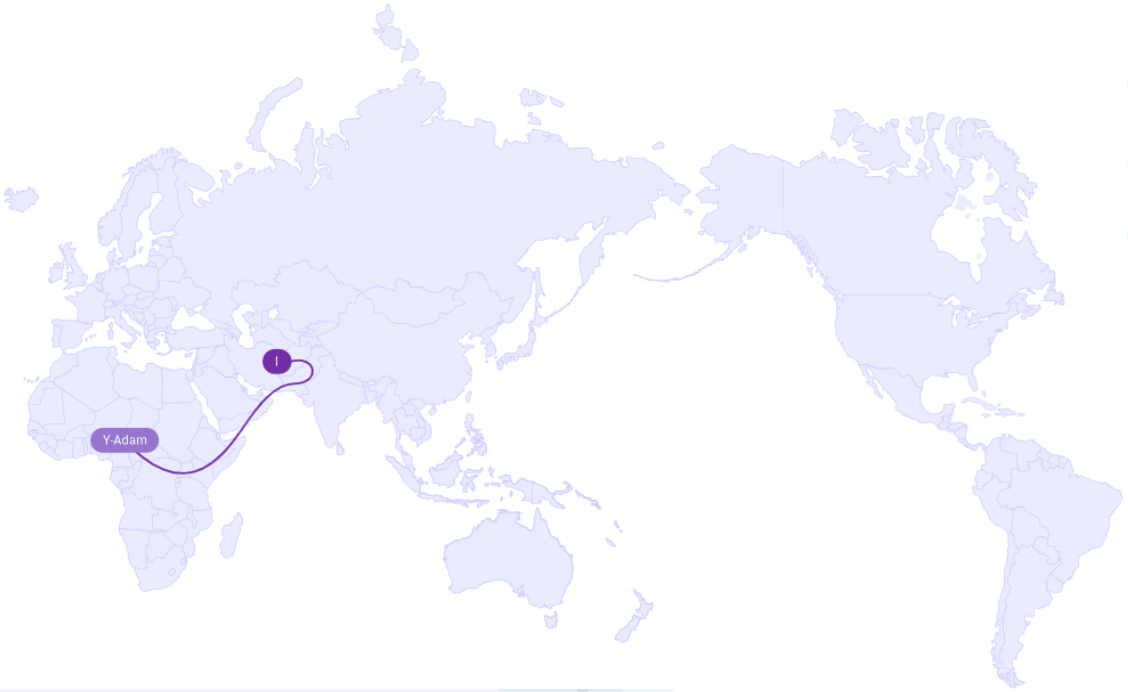
- H - about 20,000 years ago

Haplogroup H originated in Southwest Asia approximately 20,000 years ago during the Ice Age. It has spread across the European continent, where it is predominantly found. Today, more than 40% of Europeans' mtDNA belongs to this haplogroup. It is also prevalent in North Africa and the Middle East. This mtDNA group has diversified into numerous subtypes known as H1-H8, H10, H11, H13, H18, H20-H23, and H95a. Haplogroup H1 is the most common haplogroup, representing 50% of all H haplogroups. Since it is a common haplogroup in Europe, several famous people belong to this haplogroup, such as the emperor Napoleon Bonaparte, the Austrian Marie Antoinette (wife of Louis de Bourbon), or more modern figures like Bernie Sanders or the actress Susan Sarandon.

➢ Paternal lineage

Through the analysis of the Y chromosome, we can reconstruct the phylogenetic history of your paternal lineage. In this history, you will find detailed information about the path taken by your paternal ancestors, which began in Africa more than 250,000 years ago.

Your paternal haplogroup is I.



- Y Adam - 300,000 years ago

According to population genetics, the chromosomal Adam was an African male, analogous to mitochondrial Eve. All current human males directly descend from the Y chromosome of this ancestor. He emerged in Africa approximately 300,000 years ago, aligning with the appearance of *Homo sapiens.*

- A0T - about 160,000 years ago

This haplogroup originates from West-Central Africa, while rare cases have been reported in populations such as the Bakola pygmies (southern Cameroon), Berbers (Algeria), Ghana, and Jamaica.

- A1 - 160,000 years ago

The presence of haplogroup A is limited to native African populations. However, isolated cases have also been found in Europe and Western Asia.

- A1b - 130,000 years ago

Haplogroup A1b is exclusively found among the Bakola Pygmies in southern Cameroon and the Berbers of Algeria.

- BT - between 88,000 and 130,000 years ago

Haplogroup BT descends from A1b and is a sibling of haplogroup A1b1. This haplogroup is considered the common ancestor of all humans, except for the descendants of paragroup A.

- CT - 70,000 to 100,000 years ago

This haplogroup is known as the Eurasian Adam, as its descendants (DE and CF) were involved in the migration process out of Africa. Consequently, it is present in all modern human male lineages except haplogroups A and B.

- CF - about 68,000 years ago

Its origin is still under study, but evidence suggests an area between the Near East and South Asia. The haplogroups descending from CF are prevalent in most of the male lineages found in populations of Eurasia, Oceania, and America. Several studies highlight the importance of this haplogroup in the colonization process of Eurasia.

- F - between 49,000 and 66,000 years ago

This haplogroup and its descendants constitute most paternal lineages known today, excluding Africans.

- GHIJK - between 49,000 and 59,000 years ago

Although this haplogroup has not been identified in living males or ancient remains, the HIJK subclade and its descendants (H and HIJK) are present in most of the male population worldwide.

- HIJK - between 49,000 and 59,000 years ago

Haplogroup HIJK is a sister haplogroup to haplogroup G. It branches into two direct descendants: IJK and H. These subclades are widely dispersed geographically and present in most of the male population.

- IJK - between 49,000 and 59,000 years ago

Haplogroup IJK originated in Asia but is currently distributed across various geographic areas. Two direct descendants arise from this haplogroup: IJ and K.

- K - about 47,000 years ago

Haplogroup K is exceptionally rare, and while limited information is available, some studies suggest its descendant lineages are found among native populations in Europe, the Far East, the Indian subcontinent, Oceania, and America.

- IJ - 47,000 ago

Haplogroup IJ is widely distributed in Europe and the Near East from its descendants: haplogroups I and J. Its origin goes back to South Asia.

- I - about 43,000 years ago

The origin of haplogroup I resides in Asia Minor. It is a haplogroup with a high diffusion in the countries of northern and southeastern Europe (Balkans, Nordic peoples, Sardinia, etc.). It is so common that it is present in one-fifth of the European population. Well-known personalities such as Bill Clinton, Warren Buffet, Jimmy Carter, Novak Djokovic, Bill Gates, Chuck Norris, and Stephen King are also part of this haplogroup.

⫸ Neanderthal DNA

Between 0% and 4% of our genome comes from Neanderthals. This phenomenon occurs because *Homo sapiens* species interbred with *Homo neanderthalensis.* You have 2% of Neanderthal DNA. We have analyzed approximately 6,000 genetic variants from Neanderthals, of which 810 are present in your DNA. These results indicate that you have 1.22% more Neanderthal genetic material than the average of our clients.

▪ Origin and extinction

Neanderthals emerged as a species approximately 230,000 years ago in Europe, the Near East, the Middle East, and Central Asia. It is estimated that the Neanderthal population remained relatively constant, with no more than 7,000 individuals across the continent, reaching its peak 100,000 years ago.

On the other hand, their extinction dates to 40,000 years ago, and the exact causes are not fully known. Most studies suggest that the expansion of our species, Homo sapiens, from Africa was the main cause of their decline and eventual disappearance, despite the interbreeding that occurred between the two species.

▪ Physical features

Neanderthals had a stocky build, weighing around 70 kg, and short stature, not exceeding 1.65 meters. Their bodies were adapted to low temperatures. They had short limbs, a wide pelvis, and skeletal robustness that indicated a high musculature, superior to that of Homo sapiens. Facially, Neanderthals had elongated skulls, low-sloping foreheads, and lacked a prominent chin. They had prominent teeth. Recent studies suggest that the shape of their larynx would have allowed them to articulate speech.

▪ Lifestyle

Neanderthals lived in small clans consisting of between 5 and 15 individuals. They led a nomadic lifestyle, resulting in a life expectancy that did not exceed 30 years for women and 40 years for men. Neanderthal settlements were mainly found in mountainous regions in warmer environments and caves in colder ones. These settlements exhibited a complex structure with a central hearth primarily used for cooking food. Remains indicate that they used stone and flint tools, which they crafted for their various activities. Regarding social aspects, evidence of burial rituals and the presence of tools for caregiving suggests that Neanderthals established strong emotional bonds between individuals within the same clan.

▪ Food

While it was long believed that Neanderthals relied heavily on a meat-based diet, more recent studies indicate that their diet was diverse and adapted to their environment. They centred their diet primarily on hunting (large and small mammals, birds, fish, and reptiles) and gathering fruits and vegetables. Neanderthals were also skilled in using fire, utilizing it for cooking their food as well as for basic pharmaceutical purposes.

▪ Culture

Debate exists regarding the artistic abilities of Neanderthals. One perspective argues that certain objects found with marks and notches served decorative and artistic functions. Others contend that these marks resulted from the practical use of the objects rather than artistic intentions on the part of Neanderthals. Thus, they deny Neanderthal's artistic abilities and attribute such capabilities solely to Homo sapiens. The most well-known example of possible Neanderthal art is the Berekhat Ram Venus. This figure, measuring a small length of 3.5 cm, was carved into volcanic rock and dates back 250,000 years in the Golan Heights (between Israel, Lebanon, Jordan, and Syria). Technological studies demonstrate that this figure was created through a series of incisions using a sharpened tool. However, recent studies suggest that this artefact originated from natural erosion and that there was no artistic intent in its manipulation. This topic remains an ongoing debate.

V. PHARMACOGENETICS

Pharmacogenetics, or drug response, examines how a person's genetics influences their medication response. Healthcare providers use pharmacogenetics information to customize treatment and choose the most appropriate medication and dose for a particular individual, minimizing the risk of adverse reactions and enhancing treatment outcomes. In this section, you will find out how your genetic makeup may impact your medication response.

Table 12. An overview of your pharmacogenetics findings analyzed with GenoScope.

MEDICATION	MEDICATION CLASS	DISEASE CATEGORY	EFFECT	RESULT
Esomeprazole	Proton Pump Inhibitors (PPIs)	Acid reflux (GERD)	Efficacy	Normal *CYP2C19* metabolizer.
Lansoprazole	Proton Pump Inhibitors (PPIs)	Acid reflux (GERD)	Dosage	Normal *CYP2C19* metabolizer.
Omeprazole	Proton Pump Inhibitors (PPIs)	Acid reflux (GERD)	Efficacy	Normal *CYP2C19* metabolizer.
Pantoprazole	Proton Pump Inhibitors (PPIs)	Acid reflux (GERD)	Efficacy	Normal *CYP2C19* metabolizer.
Rabeprazole	Proton Pump Inhibitors (PPIs)	Acid reflux (GERD)	Efficacy	Normal *CYP2C19* metabolizer.
Bupropion (smoking cessation)	Norepinephrine and Dopamine Reuptake Inhibitors (NDRIs)	Addiction	Efficacy	Probably a more effective response.
Disulfiram (alcohol dishabituation)	Psychiatry Agents	Addiction	Efficacy	Effective response.
Methadone	Opioid Agonists	Addiction	Dosage	Probably higher doses are required for opiate withdrawal.
Naltrexone (alcohol dishabituation)	Opioid Antagonists	Addiction	Efficacy	No variations in the response to naltrexone
Floxacillin	Penicillin Antibiotics	Antibiotics	Adverse reactions	No variations in the risk of developing a severe liver injury.
Clobazam	Benzodiazepines	Anxiety	Efficacy	Normal *CYP2C19* metabolizer.
Diazepam	Benzodiazepines	Anxiety	Efficacy	Normal *CYP2C19* metabolizer.
Methotrexate (rheumatoid arthritis)	Immunomodulators	Autoimmune diseases	Efficacy	Decreased response to treatment.
Methotrexate (rheumatoid arthritis)	Immunomodulators	Autoimmune diseases	Adverse reactions	No variations in the risk of toxicity.

Methotrexate (transplant rejection)	Immunomodulators	Autoimmune diseases	Efficacy	No variations in the risk of transplant rejection.
Vaccination	Immunomodulators	Autoimmune diseases	Adverse reactions	Likely an increased risk of adverse reactions after vaccination.
Cyclosporine	Immunomodulators	Autoimmune diseases	Dosage	Decreased metabolism. Dose adjustment recommended.
Tacrolimus	Immunomodulators	Autoimmune diseases	Dosage	Decreased metabolism. Dose adjustment recommended.
Thioguanine, Azathioprine, Mercaptopurine	Immunomodulators	Autoimmune diseases	Dosage	Normal *TPMT* and *NUDT15* metabolizer. Use standard dose.
Bevacizumab (colorectal cancer)	Antineoplastics	Cancer	Efficacy	Increased response.
Docetaxel	Antineoplastics	Cancer	Adverse reactions	Decreased risk of adverse reactions, leukopenia, and neutropenia (in Asians).
Gefitinib (non-small cell lung cancer)	Antineoplastics	Cancer	Adverse reactions	No variations in the risk of diarrhoea.
Gemcitabine (non-small cell lung cancer)	Antineoplastics	Cancer	Efficacy	Significantly decreased response.
Gemcitabine (pancreatic cancer)	Antineoplastics	Cancer	Adverse reactions	Increased risk of toxicity.
Gemcitabine (pancreatic cancer)	Antineoplastics	Cancer	Efficacy	Slightly decreased response.
Gemcitabine (breast cancer)	Antineoplastics	Cancer	Efficacy	Decreased response.
Gemcitabine (malignant mesothelioma)	Antineoplastics	Cancer	Efficacy	Effective response.
Methotrexate (chemotherapy)	Antineoplastics	Cancer	Adverse reactions	No variations in the risk of toxicity.
Paclitaxel	Antineoplastics	Cancer	Dosage	Increased risk of toxicity. Consideration of dose adjustment is recommended.
Paclitaxel	Antineoplastics	Cancer	Efficacy	No variations in response to treatment
Paclitaxel (ovarian cancer)	Antineoplastics	Cancer	Adverse reactions	Associated with an increased risk of myelotoxicity.
Paclitaxel (solid cancers)	Antineoplastics	Cancer	Adverse reactions	Associated with an increased risk of neuropathy.
Bleomycin (testicular germ cell cancer)	Antineoplastics	Cancer	Efficacy	No variations in response in testicular germ cell cancer (x5).

Cisplatin	Antineoplastics	Cancer	Efficacy	Poor *TPMT* metabolizer, decreased metabolizer. It is recommended to consider other possible therapies.
Cyclophosphamide, Fluorouracil, Methotrexate	Antineoplastics	Cancer	Adverse reactions	No variations in expected adverse effects.
Cyclophosphamide, Fluorouracil, Methotrexate (breast cancer)	Antineoplastics	Cancer	Efficacy	Significantly decreased response in breast cancer treatment.
Fluorouracil	Antineoplastics	Cancer	Adverse reactions	No variations in expected adverse reactions.
Fluorouracil, Capecitabine, Tegafur	Antineoplastics	Cancer	Adverse reactions	Normal *DPYD* metabolizer.
Irinotecan	Antineoplastics	Cancer	Adverse reactions	No variation in the risk of developing neutropenia.
Olaparib (breast and ovarian cancer)	Antineoplastics	Cancer	Efficacy	Treatment with olaparib is not recommended.
Tamoxifen (breast cancer)	Antineoplastics	Cancer	Efficacy	Intermediate *CYP2D6* metabolizer. Possibly increased risk of recurrence in the treatment of breast cancer. It is recommended to consider other possible therapies.
Trastuzumab	Antineoplastics	Cancer	Efficacy	No variations in the likelihood of resistance in its use as an adjuvant use in primary breast cancer chemotherapy.
Vincristine	Antineoplastics	Cancer	Adverse reactions	Decreased risk of developing peripheral neuropathy.
Vincristine	Antineoplastics	Cancer	Dosage	Poor *CYP3A5* metabolizer. Associated with an increased risk of adverse effects. Considering dose adjustment is recommended.
Vincristine	Antineoplastics	Cancer	Efficacy	Decreased risk of relapse in acute lymphoblastic leukaemia.
Flecainide	Antiarrhythmics	Cardiovascular diseases	Dosage	Normal or extensive *CYP2D6* metabolizer. Dose adjustment and monitoring are recommended.
Acenocoumarol, Phenprocoumon	Anticoagulants	Cardiovascular diseases	Dosage	Intermediate *CYP2C9* metabolizer. INR monitoring is recommended for initiation, dose adjustment and after completion of treatment.
Acenocoumarol, Phenprocoumon	Anticoagulants	Cardiovascular diseases	Adverse reactions	No change in sensitivity. Risk of adverse effects unchanged.
Clopidogrel	Antiplatelets	Cardiovascular diseases	Dosage	Normal or extensive *CYP2C19* metabolizer. Use standard dose.
Prasugrel	Antiplatelets	Cardiovascular diseases	Adverse reactions	Normal or extensive *CYP2C19* metabolizer. Bleeding risk decreased but not absent.
Prasugrel, Ticagrelor, Clopidogrel	Antiplatelets	Cardiovascular diseases	Efficacy	Normal or extensive *CYP2C19* metabolizer. If clopidogrel is being considered, use the standard dose.

Ticagrelor	Antiplatelets	Cardiovascular diseases	Efficacy	Normal *CYP3A4* metabolizer. No variation in expected plasma levels.
Warfarin	Anticoagulants	Cardiovascular diseases	Dosage	Reduce initial dose and titrate increase according to INR.
Warfarin	Anticoagulants	Cardiovascular diseases	Adverse reactions	No change in sensitivity. Risk of adverse effects unchanged.
Atenolol	Beta-blockers	Cardiovascular diseases	Efficacy	Decreased response.
Bisoprolol	Beta-blockers	Cardiovascular diseases	Efficacy	No variations in the antihypertensive response.
Carvedilol	Beta-blockers	Cardiovascular diseases	Dosage	Normal *CYP2D6* metabolizer.
Metoprolol	Beta-blockers	Cardiovascular diseases	Dosage	Normal *CYP2D6* metabolizer.
Metoprolol, Carvedilol, Propranolol	Beta-blockers	Cardiovascular diseases	Efficacy	Decreased response to treatment.
Propranolol	Beta-blockers	Cardiovascular diseases	Efficacy	Normal *CYP2D6* metabolizer.
Acetylsalicylic acid (CVD events prevention)	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Cardiovascular diseases	Efficacy	No variations in the risk of cardiovascular events.
Acetylsalicylic acid (colorectal cancer prevention)	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Cardiovascular diseases	Efficacy	No association with preventive effects or variations in the colorectal cancer risk in treatment with ASA.
Acetylsalicylic acid	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Cardiovascular diseases	Adverse reactions	Increased risk of induced asthma.
Acetylsalicylic acid (antiplatelet therapy)	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Cardiovascular diseases	Efficacy	Increased likelihood of resistance to ASA at antiaggregant doses.
Antidepressants	Antidepressants	Depression	Efficacy	Antidepressant access to the Central Nervous System through the blood-brain barrier and response significantly increased. Caution in dosage.
Bupropion	Norepinephrine and Dopamine-Reuptake Inhibitor (NDRIs)	Depression	Adverse reactions	No variations in the expected adverse reactions.
Duloxetine	Selective Serotonin and Norepinephrine Reuptake Inhibitors (SSNRIs)	Depression	Efficacy	Slightly increased response.
Mirtazapine	Tetracyclic Antidepressants (TeCA)	Depression	Efficacy	No variations in the response.
Venlafaxine	Selective Serotonin and Norepinephrine Reuptake Inhibitors (SSNRIs)	Depression	Efficacy	Significantly increased response to treatment
Venlafaxine	Selective Serotonin and Norepinephrine Reuptake Inhibitors (SSNRIs)	Depression	Dosage	Normal *CYP2D6* metabolizer.

Amitriptyline	Tricyclic Antidepressants (TCA)	Depression	Adverse reactions	Normal *CYP2D6* metabolizer/Normal *CYP2C19* metabolizer.
Amitriptyline	Tricyclic Antidepressants (TCA)	Depression	Dosage	Normal *CYP2D6* metabolizer/Normal *CYP2C19* metabolizer.
Citalopram	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Dosage	Normal *CYP2C19* metabolizer.
Clomipramine	Tricyclic Antidepressants (TCA)	Depression	Dosage	*CYP2D6* Normal metabolizer/*CYP2C19* Normal metabolizer.
Desipramine	Tricyclic Antidepressants (TCA)	Depression	Adverse reactions	Normal *CYP2C19* metabolizer.
Escitalopram	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Dosage	Normal *CYP2C19* metabolizer.
Fluoxetine	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Efficacy	Normal *CYP2D6* metabolizer.
Fluoxetine, Citalopram, Escitalopram	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Efficacy	Slightly increased response.
Fluvoxamine	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Dosage	Normal *CYP2D6* metabolizer.
Nortriptyline	Tricyclic Antidepressants (TCA)	Depression	Dosage	Normal *CYP2D6* metabolizer.
Paroxetine	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Dosage	Normal *CYP2D6* metabolizer.
Selective Serotonin Reuptake Inhibitors	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Adverse reactions	No variations in the likelihood of sexual dysfunction associated with SSRI treatment.
Sertraline	Selective Serotonin Reuptake Inhibitors (SSRIs)	Depression	Dosage	Normal *CYP2C19* metabolizer.
Metformin	Biguanide Antidiabetics	Diabetes	Efficacy	No variations in the response.
Oral sulfonylureas	Sulfonylurea Antidiabetics	Diabetes	Efficacy	No variations in the response.
Oral sulfonylureas	Sulfonylurea Antidiabetics	Diabetes	Dosage	Intermediate *CYP2C9* metabolizer. Monitoring of hypoglycemic response is recommended.
Rosiglitazone	Thiazolidinedione Antidiabetics	Diabetes	Efficacy	Increased response.
Glimepiride, Glyburide, Glyburide, Gliclazide, Glipizide	Sulfonylurea Antidiabetics	Diabetes	Efficacy	Intermediate *CYP2C9* metabolizer. Monitoring of the hypoglycemic effect is recommended.
Tolbutamide	Sulfonylurea Antidiabetics	Diabetes	Efficacy	Intermediate *CYP2C9* metabolizer. Monitoring of the hypoglycemic effect is recommended.

Brivaracetam	Antiepileptics	Epilepsy	Dosage	Normal *CYP2C19* metabolizer.
Gabapentin (migraines)	Antiepileptics	Epilepsy	Efficacy	Likely an effective analgesic response in migraine treatment.
Phenytoin	Antiepileptics	Epilepsy	Dosage	Intermediate *CYP2C9* metabolizer. Initiate treatment with the recommended starting dose. Subsequent doses should be adjusted based on therapeutic drug monitoring.
Phenytoin	Antiepileptics	Epilepsy	Efficacy	Slightly increased response.
Valproic acid	Antiepileptics	Epilepsy	Adverse reactions	No variations in liver toxicity risk.
Sildenafil	Phosphodiesterase Type 5 (PDE5) Inhibitors	Erectile dysfunction	Efficacy	Normal response.
Voriconazole	Antifungals	Fungal infections	Adverse reactions	Augmented plasma concentrations. Increased adverse reactions would be expected.
Voriconazole	Antifungals	Fungal infections	Dosage	Normal *CYP2C19* metabolizer.
Gonadotrophins and Ovulation Stimulants	Ovulation Stimulants	Hormonal diseases	Efficacy	Likely an effective response.
Simvastatin	HMG-CoA Reductase Inhibitors	Hyperlipidemia	Dosage	Normal *CYP3A4* metabolizer.
Mipomersen	Antisense Oligonucleotide (ASO) Inhibitors	Hyperlipidemia	Efficacy	Not recommended in familial hypercholesterolemia treatment.
Pravastatin	HMG-CoA Reductase Inhibitors	Hyperlipidemia	Efficacy	Effective lipid-lowering response. Lower risk of developing coronary heart disease.
Statins	HMG-CoA Reductase Inhibitors	Hyperlipidemia	Adverse reactions	No variations in the risk of developing myopathy.
Hydrochlorothiazide	Thiazide Diuretics	Hypertension	Efficacy	Probably decreased response.
Hydrochlorothiazide	Thiazide Diuretics	Hypertension	Adverse reactions	Increased risk of developing diabetes mellitus during antihypertensive treatment. Individual follow-up is recommended.
Arterial Hypertension Common Medications	Arterial Hypertension Common Medications	Hypertension	Efficacy	Increased response and lower incidence of cardiovascular events in treatment with calcium channel blockers (amlodipine).
Chlorthalidone	Thiazide Diuretics	Hypertension	Efficacy	No variations in the response.
Furosemide, Torsemide	Loop Diuretics	Hypertension	Efficacy	No variations in the response.

Eliglustat	Enzyme Inhibitors	Metabolic diseases (Gaucher's Disease)	Dosage	Normal *CYP2D6* metabolizer.
Triptans	5-HT1 Receptor Agonists	Migraines	Efficacy	Likely increased response. Monitoring is recommended for dose adjustment.
Carisoprodol	Skeletal Muscle Relaxants	Musculoskeletal pain	Adverse reactions	Normal *CYP2C19* metabolizer.
Palonosetron	5-HT3 Receptor Antagonists	Nausea and vomiting	Efficacy	Normal *CYP2D6* metabolizer.
Galantamine, Donepezil, Rivastigmine	Acetylcholinesterase Inhibitors	Neurodegenerative diseases	Efficacy	Decreased response.
Donepezil, Galantamine	Acetylcholinesterase Inhibitors	Neurodegenerative diseases	Dosage	Normal *CYP2D6* metabolizer.
Paracetamol (headaches/migraines)	Analgesics/Antipyretics	Pain and inflammation	Efficacy	Medium efficacy response in headache and migraine treatment.
Celecoxib	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Pain and inflammation	Dosage	Intermediate *CYP2C9* metabolizer. Initiate treatment with the recommended starting dose. Use the lowest effective dose for the shortest duration according to the clinical indication.
Ibuprofen	Non-Steroidal Anti-inflammatory Drugs (NSAIDs)	Pain and inflammation	Dosage	Intermediate *CYP2C9* metabolizer. Initiate treatment with the recommended starting dose. Use the lowest effective dose for the shortest duration according to the clinical indication.
Fentanyl	Opioid Analgesics	Pain and inflammation	Efficacy	Prolonged analgesic effect in the organism.
Morphine, Oxycodone, Fentanyl	Opioid Analgesics	Pain and inflammation	Dosage	Response to opioid pain management increased. May require dose adjustment.
Codeine	Opioid Analgesics	Pain and inflammation	Dosage	Normal *CYP2D6* metabolizer.
Morphine	Opioid Analgesics	Pain and inflammation	Adverse reactions	Increased risk of toxicity.
Tramadol	Opioid Analgesics	Pain and inflammation	Dosage	Normal *CYP2D6* metabolizer.
Lithium (bipolar disorder)	Mood stabilizers	Psychiatric diseases	Efficacy	Increased response.
Quetiapine	Antipsychotics	Psychiatric diseases	Dosage	Normal or extensive *CYP3A4* metabolizer.
Risperidone	Antipsychotics	Psychiatric diseases	Efficacy	Increased response.
Risperidone	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.

Aripiprazole	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.
Brexpiprazole	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.
Haloperidol	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.
Iloperidone	Antipsychotics	Psychiatric diseases	Adverse reactions	Increased risk of cardiac QT prolongation.
Iloperidone	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.
Iloperidone	Antipsychotics	Psychiatric diseases	Efficacy	Increased response to treatment.
Olanzapine	Antipsychotics	Psychiatric diseases	Adverse reactions	Significantly increased risk of weight gain.
Olanzapine	Antipsychotics	Psychiatric diseases	Efficacy	No variation in the response to schizophrenia treatment.
Perphenazine	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer
Pimozide	Antipsychotics	Psychiatric diseases	Dosage	Normal *CYP2D6* metabolizer.
Zuclopenthixol	Antipsychotics	Psychiatric diseases	Efficacy	Normal *CYP2D6* metabolizer.
Amisulpride, Aripiprazole, Clozapine, Olanzapine, Haloperidol, Quetiapine, Risperidone, Ziprasidone, Paliperidone	Antipsychotics	Psychiatric diseases	Adverse reactions	Significantly increased risk of weight gain.
Atomoxetine	Selective Norepinephrine Reuptake Inhibitors (SNRIs)	Psychiatric diseases, ADD	Dosage	Normal *CYP2D6* metabolizer. May require dose adjustment.
Atomoxetine	Selective Norepinephrine Reuptake Inhibitors (SNRIs)	Psychiatric diseases, ADD	Adverse reactions	Intermediate *CYP2D6* metabolizer. Possible adverse reactions.
Methylphenidate	Central Nervous System (CNS) Stimulants	Psychiatric diseases, ADD	Efficacy	Likely decreased response to treatment.
Amifampridine	Potassium Channel Blockers/ Cholinergic Agonists	Psychiatric diseases, ADD	Dosage	Rapid *NAT2* metabolizer. Standard dosage.
Arformoterol	Beta-2 Adrenergic Agonist/ Bronchodilators	Respiratory diseases	Efficacy	Normal *CYP2D6* metabolizer/Poor *UGT1A1* metabolizer. It is recommended to consider other possible therapies.
Montelukast	Leukotriene Receptor Antagonists	Respiratory diseases	Efficacy	Effective bronchodilator response.

Montelukast	Leukotriene Receptor Antagonists	Respiratory diseases	Dosage	Rapid *CYP2C8* metabolizer. Monitoring is recommended.
Ivacaftor	Cystic Fibrosis Transmembrane Conductance Regulators (CFTR)	Respiratory diseases	Efficacy	In cystic fibrosis treatment, ivacaftor would not be the therapy of choice.
Inhaled Corticosteroids	Corticosteroids	Respiratory diseases	Efficacy	Response to asthma treatment probably increased. Follow-up recommended.
Caffeine	Central Nervous System (CNS) Stimulants	Stimulation	Adverse reactions	Rapid *CYP1A2* metabolizer. Coffee intake does not increase the risk of myocardial infarction.
Alfentanil	Opioid Analgesics	Surgery	Efficacy	Effective analgesic response.
General Anesthetics	Anaesthetics	Surgery	Adverse reactions	Risk of postoperative nausea and vomiting increased.
Pseudocholinesterase Deficiency	A condition that results in increased sensitivity to certain muscle relaxant medications used during general anaesthesia	Surgery	Adverse reactions	Metabolism of general anaesthetics by pseudocholinesterase without variations. Not associated with an increased risk of prolonged apnea.
Acetaldehyde	Toxic Alcohol Metabolites	Toxins	Adverse reactions	No variations in the risk of toxicity.
Fesoterodine	Antimuscarinics	Urinary incontinence	Dosage	Normal *CYP2D6* metabolizer.
Abacavir	Antivirals	Viral infections	Adverse reactions	No variations in the hypersensitivity reactions risk.
Atazanavir	Antivirals	Viral infections	Adverse reactions	Poor *UGT1A1* metabolizer. Significantly increased likelihood of developing hyperbilirubinemia.
Atazanavir, Ritonavir	Antivirals	Viral infections	Adverse reactions	Normal or extensive *CYP2C19* metabolizer for antifungals. Co-administration with atazanavir or ritonavir without further interactions.
Nelfinavir	Antivirals	Viral infections	Efficacy	Normal *CYP2C19* metabolizer.
Nelfinavir (lymphocytes count)	Antivirals	Viral infections	Efficacy	The efficacy in augmenting T-lymphocytes (CD4) count may be increased.
Peginterferon and Ribavirin with Boceprevir/Telaprevir	Antivirals	Viral infections	Efficacy	Response to interferon-ribavirin in double or triple therapy together with boceprevir in the treatment of Hepatitis C increased.

⚠ VITAL CONSIDERATIONS

The pharmacogenetics results are informational and educational and should not affect medication treatments. The test doesn't detect all possible variants associated with medication response. Many factors determine medication response, such as genetic variants not covered with this test, and extrinsic factors such as other medications, lifestyle, medical history, and the environment. To confirm any findings, your healthcare provider should refer you to an independent genetic test in a clinical setting. It is important to consult with a healthcare professional before making any changes to your medication regimen or healthcare plan.