ProMedicDNA

# Lactose Sensor

Jane Doe
DEMO_DS

ProGenom
www.progenom.com

**COVER LETTER**

## Dear Ms. Doe,

Your sample for the analysis arrived on in the laboratory and was evaluated according to the highest laboratory quality standards. The results were evaluated and released by two independent geneticists and molecular biologists. After obtaining the results, your personal report was compiled. We hereby convey the results to you in the format of your choice.

We would like to thank you for your trust and hope that you are satisfied with our service. We are always open to questions and suggestions. Please do not hesitate to contact us. We value your feedback. This is the only way we can continuously improve our services.

We hope the analysis meets your expectations.

Kind regards,

Dr. Daniel Wallerstorfer BSc.
Laboratory Director

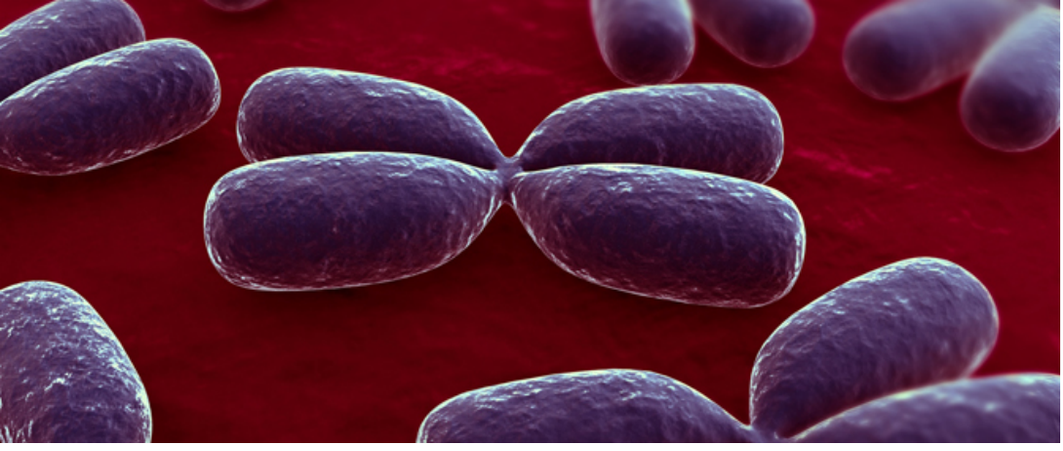
Florian Schneebauer, MSc.
Laboratory Manager

# Lactose Sensor

Personal analysis results for:
**Jane Doe | Date of birth: 01/01/1990**

Order number:
**DEMO_DS**

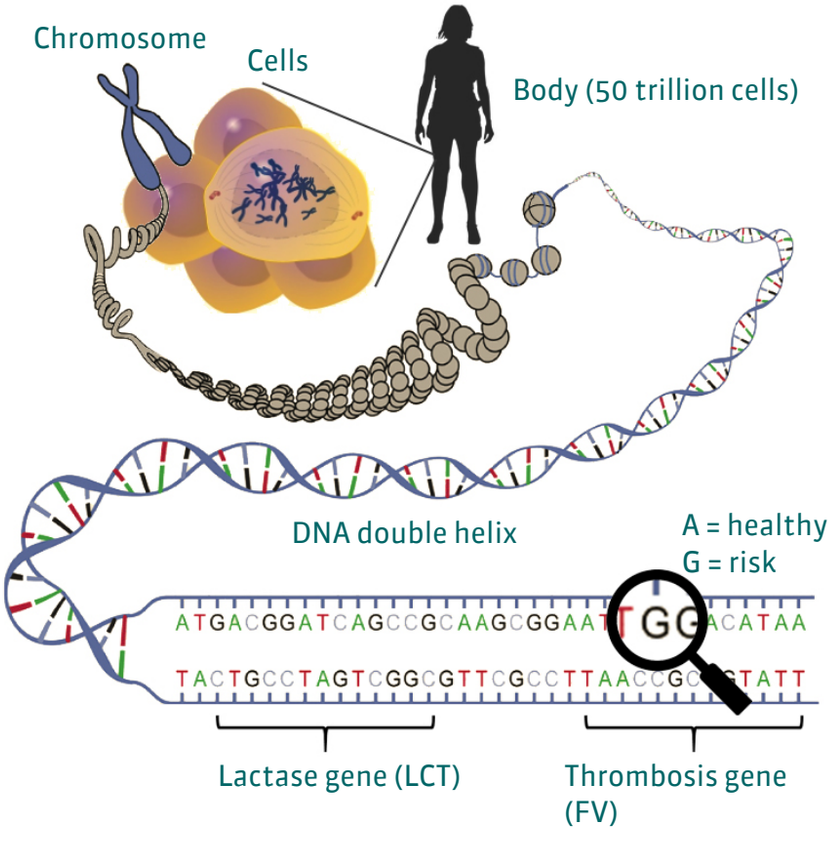
**This report contains personal medical information that is highly confidential. Data protection must be ensured.**





# How genes influence our health

**The human body consists of about 50 trillion individual cells. Most of these cells have a nucleus, which contains 46 chromosomes. A chromosome consists of a very closely wound thread, the DNA "double helix."**




DNA, the genetic code, is the blueprint of the human body. This genetic code consists of approximately 3.1 billion molecules, which are each represented by a letter. About 1% of this code makes up the genes. Each gene is an instruction for the body, usually with a single function. For example, some genes tell the body how to colour the iris and differences in these genes produce different eye colors. Every function of the body is controlled by one or more genes, including the way we break down food or medication.

Our genes are not completely error-free. The genes of each person are altered slightly by environmental effects. Most of these changes have no effect but a small number have a harmful effect. An even tinier number can produce a beneficial effect. Parents pass these changes, including defects, to their children. Thus most of our genetic defects are inherited from our parents.

In addition, our genes evolved to help us live in a completely different world, and some of our genetic traits can interact with our modern environment to create negative effects on the body. For example, the genetic predisposition to store dietary fat quickly and lose it slowly is beneficial for people who go through times when food is scarce: they have a better chance of surviving because their bodies use fat efficiently and store it for later. However, in the modern world, this trait is harmful because it programs the body to gain weight quickly and lose weight

slowly. Genes increase our risk of heart attacks, trigger asthma and allergies, cause lactose intolerance, and many other disorders.

Genetic traits can affect our health. While some genetic defects cause disease in all cases, most genetic traits just increase our risk of developing a disease. For example, a person may have genes that increase their risk for diabetes. However, not everyone at risk for diabetes actually develops the disease. Furthermore, even people with a high risk of diabetes can lower their risk with the right diet and exercise plan. Other genetic traits only cause illness when they are triggered by a specific environmental feature. For example, lactose intolerance is a genetic condition that causes a person who drinks milk to have digestive issues. A lactose-intolerant person who never drinks milk will not have any symptoms.

Thanks to the latest technologies, it is now possible to test specific genes to determine if you have genetic traits that are linked to various diseases. Based on the results of the analysis, we can develop a prevention program that significantly reduces your personal disease risk and helps you stay healthy.

A healthy lifestyle will decrease your risk of many diseases whether or not you have specific information about your genetic traits. However, we provide you with additional information that may point out other changes to your lifestyle that are not part of the standard medical advice. There are many examples, but one of the traits we test for is a gene that increases your body's ability to absorb iron. If you have this trait, you must not take iron supplements as the iron would accumulate and cause a life-threatening disease called haemochromatosis.

Experts estimate that every person carries about 2,000 genetic defects, which may affect their health, and in some cases, cause illnesses. A variety of factors can cause changes in our genes (also called mutations). In a few cases, these mutations can benefit us. However, the vast majority either have no effect or have a negative impact on our health. The best-known cause of mutations is radioactivity. Radioactive rays and particles actually impact the DNA in our cells and physically alter our genes. They mostly go unnoticed or cause deadly diseases, such as cancer, or congenital abnormality in newborns. Mutations are also caused by substances in burned food. The substances enter the cells and damage our genes, which can lead to colon cancer, among other forms of cancer. UV radiation from the sun can also damage our genes and cause diseases, such as skin cancer.

External influences can affect individual genes and disrupt their function, but the majority of our defective genes are inherited from our parents. Each embryo receives half of its genes from the father and half from the mother, resulting in a new human being with some characteristics of each parent. Whether a genetic defect is passed on, is determined randomly, and it may be that some of the children carry the defective gene and others do not.

Each person is the unique product of generations of accumulation and combination of different genetic traits. Some of those traits have negative effects on our health. With the latest technology, it is now finally possible to examine genes and determine personal health risks and strengths. In many cases, taking advantage of this knowledge, and following some precautionary measures, the diseases may be prevented. This is the next step in preventive medicine and a new generation of health care.

# Action index

Discuss risks marked in orange or red with your doctor. All other results do not require any further attention assuming there are no current medical conditions.

**Lactose Sensor**

## PHARMACO GENETICS
*Not ordered*

## ONCOLOGY
*Not ordered*

## CARDIOVASCULAR SYSTEM
*Not ordered*

## NEUROLOGY
*Not ordered*

## METABOLISM
*Not ordered*

## MOVEMENT
*Not ordered*

## DIGESTION

## OPHTHALMOLOGY
*Not ordered*

## ODONTOLOGY
*Not ordered*

## OTHERS
*Not ordered*

## SCIENCE

## ADDITIONAL INFORMATION

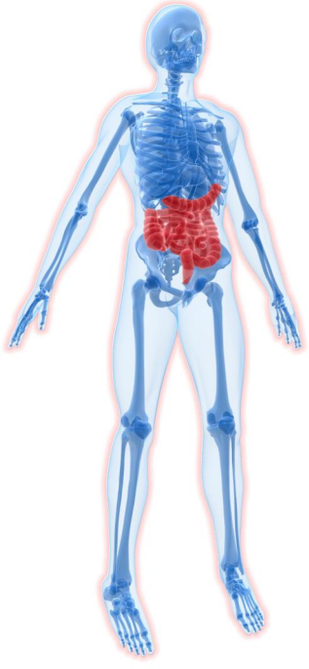
# Lactose Sensor

## Early detection and nutritional adjustments



# Lactose intolerance

**Lactose intolerance is the most common food intolerance in the European population: 1 in 6 Europeans are affected. Before lactose can be absorbed into the bloodstream, it must first be broken down by lactase, an enzyme in the intestine. The intestine produces lactase in childhood because newborns must be able to digest breast milk. As the child's body prepares to digest other foods, the genes responsible for the production of lactase are gradually deactivated.**



As such, even infants who have the ability to digest lactose early on will gradually build up an intolerance to lactose. Eventually, the body is no longer able to digest lactose at all, and consumption of lactose can precipitate a broad range of symptoms. Non-digested lactose is an excellent source of nutrients for intestinal bacteria, which seize the opportunity to multiply rapidly in the digestive tract. The lactose is broken down into different acids and fermentation produces various gases. This process results in diverse symptoms that vary in intensity from person to person. Symptoms include digestive problems such as abdominal bloating, cramps and diarrhoea, as well as a number of nonspecific complaints such as fatigue or skin problems.

Most people in the world are lactose intolerant. However, genes that continued to produce lactase through childhood and adulthood spread through populations of ancient people who raised cattle. As a result, most adults from populations with a history of dairy farming have the ability to digest lactose. Today, 5 out of 6 Europeans can enjoy dairy products. Due to this figure, Europeans view lactose tolerance as the norm, whereas persons that cannot digest lactose are considered to suffer from a food intolerance. Thus, we list lactose intolerance as a disease.

A lactose-free diet can prevent all symptoms of lactose intolerance. Individuals should familiarize themselves with foods that contain lactose. Unfortunately, lactose intolerance is often misdiagnosed for years as the severity of symptoms depends on the amount of lactose one consumes. As symptoms of lactose intolerance are often misinterpreted as general digestive discomfort, gene testing to determine lactose intolerance can help clear up any personal intolerance you may have and prevent further complications.



# Genes associated with lactose intolerance

More than 99% of cases of lactose intolerance are caused by a genetic variation of the gene LCT/MCM6. A person with two copies of this variation will most likely develop lactose intolerance in their lifetime. When symptoms arise and their severity depends on many other factors, including the environment. The analysis of associated polymorphisms shows the following:

**Genetic traits**

| SYMBOL | rs NCBI | POLYMORPH | GENOTYPE |
|---|---|---|---|
| LCT | rs4988235 | T>C | T/T |

*LEGEND: rsNCBI = description of examined genetic variation, POLYMORPHISM = form of the genetic variation, GENOTYPE = personal analysis result*

# Summary of effects

- You do not have an elevated risk of lactose intolerance
- Your daily calcium uptake is average

Your risk of lactose intolerance

LOW AVERAGE RISK HIGHER

Your typical calcium absorption

NORMAL REDUCED



# Nutritional Genes - Milk

Your nutrition is very important. Based on your genes and their associated strengths and weaknesses you should increase or decrease certain foods and nutrients. These recommendations are calculated based on your genetic profile.

## Your personalized recommendations based on this section:

Calcium | Vitamin D3 | Lactose

*Legend: GREEN ARROWS > this nutrient or substance is classed as healthy for your genetic profile. Try to increase the intake of this substance. RED ARROWS > this substance is classed as unhealthy for your genetic profile. Try to reduce your intake of the substance. NO ARROWS > There is no effect of the nutrient on the genetics of this section. PLEASE NOTE! This interpretation only considers your genetic profile of this section.*



# Prevention

**You do not have an increased genetic risk for lactose intolerance. Therefore, you do not have to take any special precautions or follow a lactose-free diet.**

If you do have problems, provide details to your doctor so you can get an accurate diagnosis.

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# SCIENCE

**This chapter shows the science behind the test.**



# Lactose Sensor

## LCT - lactase (rs4988235)

The LCT gene encodes for the protein lactase, an enzyme in the small intestine that splits the milk sugar (lactose) so that it can be absorbed. If the LCT gene is defective, the lactose consumed can either be absorbed insufficiently, or not at all. This is known as lactose intolerance. The avoidance of dairy products usually leads to a reduced absorption of calcium.

| RES | Genotype | POP | Possible results |
|---|---|---|---|
| X | T/T | 55% | No increased risk for lactose intolerance<br>Normal calcium intake from food |
| | C/T | 36% | No increased risk for lactose intolerance<br>Normal calcium intake from food |
| | C/C | 9% | Very high risk for lactose intolerance later in life<br>Reduced calcium intake from food |

### References


Enattah et al. Identification of a variant associated with adult-type hypolactasia. Nat Genet. 2002 Feb,30(2):233-7.

Bersaglieri et al. Genetic Signatures of Strong Recent Positive Selection at the Lactase Gene. The American Journal of Human Genetics, 74(6), 1111–1120.

Rasinperä et al. Transcriptional downregulation of the lactase (LCT) gene during childhood. Gut. Nov 2005, 54(11): 1660–1661.

Matlik L et al. Perceived milk intolerance is related to bone mineral content in 10- to 13-year-old female adolescents. Pediatrics 2007.


*LEGEND: RES = your personal analysis result (marked with an X), GENOTYPE = different variations of the gene (called alleles),*
*POP = percent of the general population that have this genetic result,*
*POSSIBLE RESULTS = influence of the genetic variation.*

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# ADDITIONAL INFORMATION

**In this chapter you will receive useful information**




# Certifications

Our laboratory is one of the most modern and automated laboratories in Europe and has numerous certifications and quality assurance systems that meet, and even exceed, international standards. The various areas of business are certified separately to the highest standards.

## Laboratory diagnostics, manufacturing & sales

Quality management system in accordance with ISO 9001:2015

qualityaustria
SYSTEM CERTIFIED
ISO 9001:2015 No.14365/0

## Licensed for medical genetics

Approved by the Federal Ministry of Health, Austria

BUNDESMINISTERIUM FÜR GESUNDHEIT

## Cosmetic/genetic diagnostics and cosmetics manufacturing

Good manufacturing practice (GMP) in accordance with ISO 22716:2007

qualityaustria
SYSTEM CERTIFIED
EN ISO 22716:2007 No.00010/0

## Food supplement manufacturing

Management system for food safety in accordance with ISO 22000:2018

qualityaustria
SYSTEM CERTIFIED
ISO 22000:2018 No.00521/0



# Customer Service

## Questions or comments about our service?

Our customer service team is happy to help with any enquiries or problems. You can contact us in the following ways:

- Phone +41 (0) 41 525 100.1
- office.ch@progenom.com

Our team is looking forward to your call. Customer satisfaction is our first priority. If you are not fully satisfied with our service, please let us know. We will do our best to help find a satisfactory solution to your problem.

**Contact | Impressum**
ProGenom GmbH
Riedstrasse 1
6343 Rotkreuz
SWITZERLAND



# Technical details

**Order number**
DEMO_DS

**Date of birth**
01/01/1990

**Established analysis methods**
qRT-PCR, DNA sequencing, fragment length analysis, CNV assay, GC-MS, Immunocap ISAC, Cytolisa

**Report generated**
19/03/2021 17:13:50

**Product codes**
M2LAC

**Current version**
V538

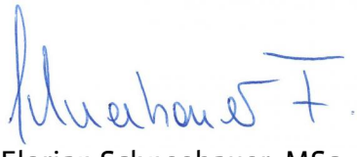
**Ordering company**
ProGenom GmbH
Riedstrasse 1
6343 Rotkreuz
SWITZERLAND

**Analyzing company**
DNA Plus - Zentrum für Humangenetik
Georg Wrede Strasse 13
83395 Freilassing
Deutschland

**Laboratory Director**

Dr. Daniel Wallerstorfer Bsc.

**Laboratory Manager**



Florian Schneebauer, MSc.

**NOTES:**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