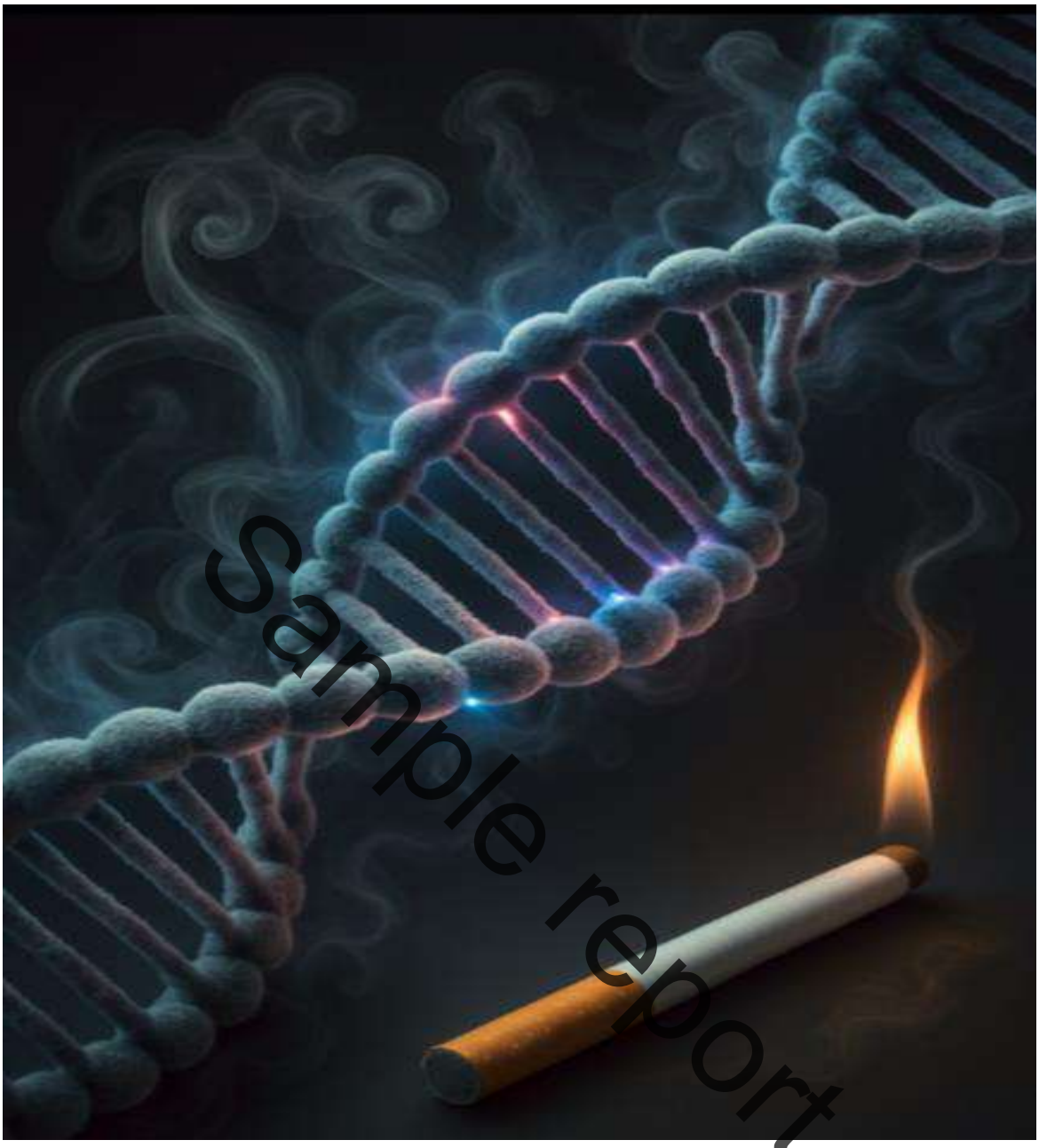

NICOTINE DEPENDENCE

XXXXXXXXXXXX

Date of birth: XXXXXXX

Code: XXXXXX

WHAT THE REPORT INCLUDES

- Detailed EXPLANATION of the test performed and recommendations to be followed.
- SUMMARY TABLE presenting the metabolic areas analysed and the results from the DNA analysis, providing a quick overview of an individual's overall health status and highlighting any potential issues.
- BIBLIOGRAPHY providing scientific references for the test.

COLOURS USED

It indicates that the variants identified in the analysis do not unfavourably alter enzymatic activity of the proteins they encode and/or the risk associated with certain diseases.

It indicates that the variants identified in the analysis slightly unfavourably alter enzyme activity and/or the risk associated with certain disorders or diseases.

It indicates that the variants identified in the analysis alter enzyme activity in a particularly unfavourable way, resulting in an increased risk of developing certain disorders or associated diseases.

The results shown, as well as the considerations and explanations contained in the following pages of this booklet, should not be regarded as a medical diagnosis. It is important to bear in mind that genetic information is only a part of the total information needed to gain a complete picture of a person's state of health, and the data reported here is therefore a tool available to the treating physician to formulate a correct assessment of the patient's physiological state and suggest an appropriate personalised treatment.

INTRODUCTION

Nicotine is a natural chemical primarily found in tobacco plants, though it also occurs in smaller amounts in other plants of the Solanaceae family, such as potatoes and tomatoes. It is an alkaloid that acts as a stimulant on the central nervous system, producing significant psychoactive effects. When consumed, particularly through smoking cigarettes or other tobacco products, nicotine is quickly absorbed into the bloodstream and reaches the brain within seconds, where it influences mood, concentration, energy levels, and behaviour.

Nicotine is most recognized for its **addictive** properties. It stimulates the release of neurotransmitters, including dopamine, which are associated with pleasure and reward, creating a temporary feeling of well-being. This pleasurable sensation encourages repeated use, leading to both physical and psychological dependence - making quitting smoking a particularly challenging task.

In addition to its addictive nature, nicotine also exerts several physiological effects on the body. As a potent **vasoconstrictor**, it causes blood vessels to constrict, temporarily increasing blood pressure and heart rate. Over time, regular nicotine use can have detrimental effects on cardiovascular health, elevating the risk of conditions like hypertension and heart disease.

Although nicotine's risks are well-documented, some studies suggest it may offer potential therapeutic benefits in certain neurological conditions, such as Parkinson's disease, due to its neuroprotective properties. However, these potential benefits do not outweigh the significant health risks associated with habitual nicotine use, especially when delivered through smoking.

In conclusion, nicotine is a chemical that plays a central role in tobacco consumption behaviours, affecting both the body and the mind in immediate and long-term ways. Its addictive nature makes cigarette smoking a major public health issue globally.

PREDISPOSITION TO NICOTINE ADDICTION

The **CYP2A6 gene** (rs1801272) codes for an enzyme within the cytochrome P450 family, which plays a key role in metabolizing various compounds, including nicotine. Specifically, CYP2A6 is the primary enzyme responsible for breaking down nicotine in the liver, converting it into cotinine, its main metabolite. Cotinine is then further metabolized in the body.

- **C/C**: Slow nicotine metabolism, often linked to lower nicotine dependence.
- **C/T**: Moderate nicotine metabolism, typically associated with a medium level of nicotine dependence.
- **T/T**: Normal nicotine metabolism, commonly correlated with higher nicotine dependence.

YOUR RESULT:

ID Gentras	Gene	Allelic variants	Genotype		Predisposition to addiction
Predisposition to nicotine addiction					
GTS007	CYP2A6	T	C	C	LOW
		C			

Interpretation of the result:

1. C/C Genotype: Slow Nicotine Metabolism

If you have the C/C genotype for the gene associated with nicotine metabolism (likely the **CYP2A6** gene), it means that your body processes nicotine very slowly. This has several important implications:

- **Nicotine stays in your system longer**, meaning it takes more time for your body to eliminate it compared to those with faster metabolisms.
- As a result, **you may feel the need to smoke less frequently** than those who metabolize nicotine more quickly.
- People with a slower metabolism tend to **smoke fewer cigarettes per day** and generally have a **lower risk of developing a strong addiction** to nicotine.

Impact on Nicotine Addiction:

- Because nicotine remains in your body for longer, your brain does not require frequent doses, helping to reduce cravings.
- Studies suggest that those with this type of metabolism **are more likely to succeed in quitting** smoking compared to those with a faster metabolism.

What This Means for You:

- If you smoke, you likely have **a lighter addiction** compared to those with a fast nicotine metabolism.
- If you wish to quit, your path may be **easier** than those who metabolize nicotine quickly (e.g., those with the A/A or A/C genotype for **CYP2A6**).
- If you don't smoke, your risk of developing an addiction when exposed to nicotine is **lower** compared to others.

Recommendations:

- **Gradual Approach:** You might be able to **gradually reduce your cigarette intake** without needing heavy drug treatments.
- **Nicotine Substitutes:** Nicotine patches or gum may help, but they can also be gradually reduced over time.
- **Psychological Support:** Focus on **behavioral or mindfulness approaches** (such as CBT - Cognitive Behavioral Therapy) to manage cravings.
- **Physical Activity & Meditation:** Exercise and relaxation techniques can help reduce cravings and enhance overall well-being.

2. C/T Genotype: Intermediate Nicotine Metabolism

If you have the C/T genotype for the gene associated with nicotine metabolism, it means that your body processes nicotine at an **intermediate rate**:

- **Your body eliminates nicotine neither too quickly nor too slowly**, leading to a balanced metabolism.
- As a result, you may feel the need to smoke **more often** than those with a slower metabolism (C/C), but **less frequently** than those with a fast metabolism (T/T).
- The risk of developing nicotine addiction is **moderate**, sitting between those who metabolize nicotine quickly and those who metabolize it slowly.

Impact on Nicotine Addiction:

- You may **smoke a moderate number of cigarettes** compared to smokers with fast metabolisms, who tend to smoke more frequently to maintain nicotine levels.
- Quitting may not be too difficult or too easy, as **cravings are moderate** but not extreme.

What This Means for You:

- If you smoke, you likely have **moderate addiction**, with a balanced desire to smoke compared to those with faster metabolisms.

- If you want to quit, strategies like **nicotine patches** or gum may be effective because your intermediate metabolism allows for a gradual reduction.
- If you don't smoke, your risk of developing an addiction is higher than someone with a C/C genotype, but lower than someone with T/T.

Recommendations:

- **Gradual Reduction:** Since your addiction level is moderate, a **gradual reduction in cigarette consumption** could be effective. Start by decreasing your daily cigarette intake.
- **Nicotine Substitutes:** Nicotine patches or gum may help manage cravings and can be gradually reduced.
- **Support Groups:** Join **support groups** (online or in person) for emotional and motivational support.
- **Exercise & Relaxation:** Regular physical activity and meditation can help **reduce stress** and improve impulse control.

3. T/T Genotype: Fast Nicotine Metabolism

If you have the T/T genotype for the gene associated with nicotine metabolism, it means that your body metabolizes nicotine **very quickly**. This has significant implications for your nicotine use and potential addiction:

- **Nicotine is quickly eliminated from your body**, so its effects wear off rapidly.
- As a result, your body may **require more frequent doses** of nicotine to keep levels in your blood stable, thus prolonging the pleasurable or stimulating effects.

Impact on Nicotine Addiction:

- People with a **fast nicotine metabolism** tend to **smoke more cigarettes per day** in order to maintain nicotine levels, which increases the risk of developing a stronger addiction.
- Nicotine addiction is generally higher due to the rapid elimination of nicotine, leading to a more frequent need to smoke to **compensate for withdrawal**.
- You may experience **stronger cravings** and greater difficulty reducing or quitting smoking.

What This Means for You:

- If you smoke, your nicotine addiction is likely **high**, and quitting smoking may be more difficult, as your body is accustomed to constant nicotine levels.
- You may find it more challenging to replace nicotine with alternatives because your body adapts quickly to nicotine doses.
- **Quitting smoking** may require more intensive support, such as nicotine replacement therapies (patches, gum) or medications to manage cravings and withdrawal symptoms.

Recommendations:

- **Pharmacological Treatment:** Consider **prescription medications** such as **bupropion (Zyban)** or **varenicline (Champix)**, which can help reduce cravings and improve the chances of success.
- **Nicotine Substitutes:** Use **nicotine patches, gums, or inhalers** to maintain a stable nicotine level and manage withdrawal symptoms.
- **Professional Support:** Participate in **tobacco cessation programs** that offer psychological and therapeutic support to address both physical and psychological addiction.
- **Behavioural Techniques: Cognitive Behavioural Therapy (CBT)** can help change smoking habits and manage emotional or social triggers.
- **Intense Exercise:** Physical activity can help reduce stress and cravings, so staying active is crucial in controlling the urge to smoke.

General Tips for All Genotypes:

- **Set Clear Goals:** Develop a clear and realistic plan for quitting, with measurable goals.
- **Track Your Progress:** Keep track of your journey and celebrate every small victory.
- **Avoid Triggers:** Identify situations that make you want to smoke (e.g., stress, social events, coffee breaks) and find strategies to avoid or cope with them differently.
- **Seek Support:** Talk to a doctor, counsellor, or participate in support groups to help manage challenges together.

BIBLIOPHRAPHY

Wang, L., et al. (2003). "Polymorphisms in CYP2A6 and their effect on nicotine metabolism and dependence." Pharmacogenetics, 13(8), 493-504.

Riegelman, A. (2015). "CYP2A6 Gene Variants and Their Role in Nicotine Dependence and Smoking Cessation." Pharmacology & Therapeutics, 148, 20-32.

Tyndale, R. F., & Sellers, E. M. (2002). "Genetic variation in CYP2A6 and its role in the smoking behavior of smokers." Clinical Pharmacology & Therapeutics, 72(3), 247-253.

Nakajima, M., et al. (2006). "Polymorphisms in the CYP2A6 gene that affect nicotine metabolism." Journal of Pharmacology and Experimental Therapeutics, 317(2), 1059-1065.

Bierut, L. J., et al. (2007). "CYP2A6, smoking, and nicotine dependence." The Pharmacogenomics Journal, 7(1), 1-8.