- Patient's name: Jane Doe
- Sample code: TRI43472AA
- Report date: 03-27-2023

Fagron TrichoTest™

Results report

TrichoTest™ Genetic report

LEGAL DISCLAIMER

METHODOLOGY AND LIMITATIONS:
Testing for genetic variation/mutation on listed genes was performed using Real-Time PCR with TaqMan® allele-specific probes on the QuantStudio 12K Flex. All genetic testing is performed by GX Sciences, 805 Las Climas Pkwy, Ste 430, Austin, TX. 78746. This test will not detect all the known alleles that result in altered or inactive tested genes. This test does not account for all individual variations in the individual tested. Test results do not rule out the possibility that this individual could be a carrier of other mutations/variations not detected by this gene mutation/variation panel. Rare mutations surrounding these alleles may also affect our detection of genetic variations. Thus, the interpretation is given as a probability. Therefore, this genetic information shall be interpreted in conjunction with other clinical findings and familial history for the administration of specific treatments. Patients should receive appropriate genetic counseling to explain the implications of these test results. The analytical and performance characteristics of this laboratory developed test (LDT) were determined by GX Sciences' laboratory pursuant to Clinical Laboratory Improvement Amendments (CLIA) requirements. CLIA #: 45D2144988 Laboratory Director: James Jacobson, PhD

DISCLAIMER:
This test was developed and its performance characteristics determined by GX Sciences. It has not been cleared or approved by the FDA. The laboratory is regulated under CLIA and qualified to perform high-complexity testing. This test is used for clinical purposes. It should not be regarded as investigational or for research. rsIDs for the alleles being tested were obtained from the dbSNP database.

DISCLAIMER:
Report contents and report recommendations are created based on the consultation, advice and direction of Dr. Gorana Kuka, Medical Director for GX Sciences' TrichoTest protocols. Sole responsibility for the proper use of the information on the GX Sciences report rests with the user, or those professionals with whom the user may consult. Report contents and report recommendations are intended to be informational only. Report contents and report recommendations are not intended and should not be interpreted to make claims regarding the use, efficacy or safety of products, formulas and/or services listed herein. Only a doctor or other appropriately licensed health care professional, as a learned intermediary, can determine if a formula, product or service described herein is appropriate for a specific patient. Sole responsibility for the proper use of the information on the GX Sciences report rests with the user, or those professionals with whom the user may consult.

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I.
Patient identification data

1.
Patient identification data

Ordering physician	**Development Testing**
Patient's name	**Jane Doe**
Gender	**Female**
Date of birth	**02-10-1987**
Sample type	**Buccal Swab**
Sample code	**TRI43472AA**
Collection date	**02-20-2023**
Received date	**02-24-2023**
Report date	**03-27-2023**

II.
Recommendation of the most suitable drugs and supplements

2.
Recommendation of the most suitable drugs and supplements

The **genetic test** uses an automated qualitative pharmacogenetic algorithm that analyzes the patient's genetic data and combines this information with relevant patient history to recommend the most suitable active ingredients. Next, we show on a color scale which compounds the algorithm recommends the most. The transition from white to dark green indicates drugs from least recommended to most recommended. Medications blocked due to intolerances or contraindications are shown in red.

Anti-alopecic drugs

Prostaglandins	
• Minoxidil	67%
• Latanoprost Fagron	44%
• Cetirizine Hcl	

Antiandrogenic	
• Dutasteride	75%
• Finasteride	75%
• Spironolactone	65%
• Melatonin	50%

Anti-inflammatory	
• Triamcinolone acetonide	
• Hydrocortisone	
• Betamethasone dipropionate	
• Desonide	
• Fluocinolone acetonide	

Immunomodulator	
• Tacrolimus	

Hair care supplements

Circulation
• Arginine
• Caffeine
• L-Carnitine L-tartrate

Collagen synthesis
• Cystine

Blocked — Recommended

Vitamin, mineral and antioxidant supplements

Vitamin deficiency	
• Vitamin B12 (Cianocobalamin)	100%
• Vitamin C (Ascorbic Acid)	67%
• Vitamin D	67%
• Vitamin C (Ascorbic Acid)	67%
• Vitamin B9 (Folate)	67%
• Vitamin E (Tocoferol)	67%
• Vitamin B7 (Biotin)	
• Lysine	

Minerals	
• Iron sulfate	67%
• Magnesium Gluconate	67%
• Zinc gluconate	
• Zinc acetate	

Keratolytic	
• Tretinoin	50%

III.
Complete data

3.
Complete data
Data from the medical questionnaire

Patient demographics

Gender	**Female**
Age (years)	**36**
Family history of alopecia	**Siblings**
Irregular menstruation	**No**

Hair loss data

Type of alopecia	**Androgenic alopecia**
Grade of alopecia	**Grade 1D**

Degree of androgenic alopecia (Ludwig scale)

Clinical examination

Amount of hair loss	**Little bit**
Complaints associated with alopecia	**No**
Patchy alopecia	**No**

3.
Complete data
Pharmacogenetic results

1. Anti-alopecic drugs

Treatment efficacy with prostaglandin inhibitors

Prostaglandin D2			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
GPR44-1	rs545659	**TT**	Genetic result: Predisposition to normal GPR44 mRNA stability. Interpretation: Prostaglandin D2 receptor 2 (GPR44 or CRTH2) variants are associated with an increased GPR44 mRNA stability leading to an increased responsiveness to prostaglandin D2 and hair follicle regression. Treatment/dosage: SNP analysis does not indicate the necessity to treat with prostaglandin D2 inhibitors.
GPR44-2	rs533116	**CC**	Genetic result: Predisposition to normal GPR44 mRNA stability. Interpretation: Prostaglandin D2 receptor 2 (GPR44 or CRTH2) variants are associated with an increased GPR44 mRNA stability leading to higher responsiveness to prostaglandin D2 and hair follicle regression. Treatment/dosage: SNP analysis does not indicate the necessity to treat with prostaglandin D2 inhibitors.

Latanoprost			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
PTGFR-1	rs6686438	**GG**	Genetic result: Increased likelihood of not having a positive response to Latanoprost. Interpretation: Prostaglandin F receptor (PTGFR) variants are related with Latanoprost treatment efficacy (prostaglandin analog) . Treatment/dosage: Treatment with Latanoprost at normal doses is not recommended.
PTGFR-2	rs1328441	**CT**	Genetic result: Increased likelihood of having a positive response to Latanoprost. Interpretation: Prostaglandin F receptor (PTGFR) variants are related with Latanoprost treatment efficacy (prostaglandin analog) . Treatment/dosage: Treatment with Latanoprost at normal doses is recommended.
PTGFR-3	rs10782665	**GT**	Genetic result: Increased likelihood of having a positive response to Latanoprost. Interpretation: Prostaglandin F receptor (PTGFR) variants are related with Latanoprost treatment efficacy (prostaglandin analog) . Treatment/dosage: Treatment with Latanoprost at normal doses is recommended.

Treatment efficacy with minoxidil

Minoxidil			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
PTGES2	rs13283456	**CC**	Genetic result: Predisposition to normal PGE2 levels. Interpretation: Prostaglandin E synthase 2 (PTGES2) variants are associated with lower prostaglandin E2 production (hair growth promoter). Treatment/dosage: SNP analysis does not indicate a necessity to treat with Minoxidil.
SULT1A1	rs9282861	**GG**	Genetic result: Predisposition to normal SULT1A activity. Interpretation: Minoxidil Sulfotransferase Enzyme (SULT1A1) variants predict response to minoxidil treatment. Treatment/dosage: Minoxidil at normal doses would be highly recommended.

Treatment efficacy with glucocorticoid anti-inflammatories

Glucocorticoides			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
GR-alpha	rs6198	**TT**	Genetic result: Predisposition to normal sensibility to glucocorticoid anti-inflammatory treatments. Interpretation: Glucocorticoid Receptor (GR or NR3C1) variants are associated with resistance or sensitivity to corticosteroids. Treatment/dosage: SNP analysis indicates that normal doses of glucocorticoids should be effective.

Treatment efficacy with antiandrogenics

17-α estradiol			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
CYP19A1	rs2470152	**AG**	Genetic result: Predisposition to reduced CYP19A1 activity. Interpretation: Aromatase (CYP19A1) variants are associated to low conversion of testosterone in estrogens and to high conversion into DHT (hair growth inhibitor). Treatment/dosage: Treatment with topical 17-α Estradiol (aromatase inducer) at normal doses is recommended.

Dutasteride			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
SRD5A1	rs39848	**CT**	Genetic result: Predisposition to slightly increased SRD5A1 activity leading to moderately increased DHT levels. Interpretation: Steroid 5α-Reductase 1 (SRD5A1) variants are associated with increased SRD5A1 activity leading to increased DHT levels and hair growth inhibition. Treatment/dosage: Treatment with Dutasteride at normal doses is recommended.

Finasteride			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
SRD5A2	rs523349	**CG**	Genetic result: Predisposition to increased SRD5A2 activity leading to increased levels of DHT Interpretation: Steroid 5α-Reductase 2 (SRD5A2) variants are associated with increased SRD5A2 activity leading to increased DHT levels and hair growth inhibition. Treatment/dosage: Treatment with Finasteride at normal doses is recommended.

2. Hair care supplements

Vasodilatation and blood circulation

Circulation stimulators			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
ACE	rs4343	**AA**	Genetic result: Predisposition to a normal Angiotensin conversion activity. Interpretation: Angiotensin-converting enzyme (ACE) variants are associated with increased plasma levels of angiotensin 2, an extremely potent vasoconstrictor. Treatment/dosage: SNP analysis does not indicate the necessity to supplement with circulation stimulators.

Collagen synthesis

Hair strengthening supplements			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
COL1A1	rs1800012	**CC**	Genetic result: Predisposition to normal collagen stability. Interpretation: Collagen, type I, alpha 1 (COL1A1) variants are associated with collagen instability. Treatment/dosage: SNP analysis does not indicate the necessity to supplement with hair strengthening composites.

Reduction of IGF-1 levels

Hair strengthening supplements			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
IGF1R	rs2229765	**AG**	Genetic result: Predisposition to moderately reduced IGF-1 levels. Interpretation: Insulin-like growth factor-I (IGF-I) variants are associated with lower plasma IGF-1 levels leading to hair loss. Treatment/dosage: A treatment with Igrantine-F1 and TrichoXidil (IGF-1 inducers) at normal doses would be recommended.

3. Vitamin, mineral and antioxidant supplements

Vitamins

Vitamin A			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
CRABP2	rs12724719	**AG**	Genetic result: Predisposition to reduced retinoic acid intracellular transport. Interpretation: Cellular retinoic acid-binding protein 2 (CRABP2) variants are associated with lower retinoic acid (vitamin A) intracellular transport. Treatment/dosage: Normal doses of vitamin A would be recommended.

Vitamin B7			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
BTD	rs13078881	**GG**	Genetic result: Predisposition to normal biotinidase activity. Interpretation: Biotinidase (BTD) variants are associated with low biotin (vitamin B7) uptake from the diet. Treatment/dosage: SNP analysis does not indicate the necessity to supplement with vitamin B.

Vitamin C			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
SLC23A1	rs33972313	**TC**	Genetic result: Predisposition to intermediate vitamin C serum level. Interpretation: Solute carrier family 23 member 1 (SLC23A1) variants are associated with lower serum concentration of vitamin C. Treatment/dosage: Vitamin C supplementation should be considered.

Vitamin B9			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
MTHFR	rs1801133	**GA**	Genetic result: Increased predisposition to folate deficiency. Interpretation: Methylene tetrahydrofolate reductase (MTHFR) variants are associated with risk of folate deficiency. Treatment/dosage: Folate supplementation should be considered. Test serum levels of folate prior to supplementation.

Vitamin D			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
GC	rs2282679	**GT**	Genetic result: Predisposition to slightly lower vitamin D serum level. Interpretation: Vitamin D-binding protein (GC or DBP) variants are associated lower vitamin D serum level. Treatment/dosage: Supplementation should be considered.Test serum levels of vitamin D prior to supplementation.

Vitamin B12			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
FUT2	rs602662	**GG**	Genetic result: Predisposition to low vitamin B12 serum level. Interpretation: Galactoside 2-alpha-L-fucosyltransferase 2 (FUT2) variants are associated lower vitamin B12 serum level. Treatment/dosage: Supplementation with vitamin B12 is highly recommended.

Vitamin E			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
ZPR1	rs964184	**CG**	Genetic result: Predisposition to slightly lower vitamin E serum levels. Interpretation: Zinc Finger Protein ZPR1 variants are associated with low alpha-tocopherol (vitamin E) serum level. Treatment/dosage: Vitamin E supplementation should be considered. Test serum levels of vitamin E prior to supplementation.

Antioxidants

Antioxidants			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
NQO1	rs1800566	**AG**	Genetic result: Predisposition to lower NQO1 enzyme activity. Interpretation: NAD(P)H dehydrogenase [quinone] 1 (NQQ1) variants are associated with lower NQO1 enzyme activity and may have less effective protection against oxidative stress. Treatment/dosage: Supplementation with antioxidants would be recommended. Test serum levels of selenium prior to supplementation.

Minerals

Magnesium			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
MUC1	rs4072037	**CT**	Genetic result: Predisposition to intermediate magnesium serum level. Interpretation: Mucin 1, cell surface associated (MUC1) variants are associated with lower magnesium serum level. Treatment/dosage: Magnesium supplementation should be considered. Test serum levels of magnesium prior to supplementation.

Zinc sulfate			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
SLC30A3	rs11126936	**GT**	Genetic result: Predisposition to higher serum zinc level. Interpretation: Solute carrier family 30 member 3 (SLC30A3) variants are associated with lower zinc blood level. Treatment/dosage: SNP analysis does not indicate the necessity to supplement with Zinc Sulfate. Test serum levels of zinc prior to supplementation.

Iron			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
TMPRSS6	rs855791	**AG**	Genetic result: Predisposition to slightly reduced serum levels of tranferrin and iron. Interpretation: Transmembrane protease, serine 6 (TMPRSS6 or matriptase-2) variants are associated with decreased serum levels of transferrin and iron. Treatment/dosage: Supplementation should be considered. Test serum levels of iron prior to supplementation.

Selenium			
Gene	**SNP (transition)**	**Patient genotype**	**Pharmacogenetic result**
DMGDH	rs921943	**CC**	Genetic result: Predisposition to lower selenium serum level. Interpretation: Dimethylglycine dehydrogenase (DMGDH) variants are associated with low selenium serum level. Treatment/dosage: Selenium supplementation should be considered. Test serum levels of selenium prior to supplementation.

IV.
Methodology

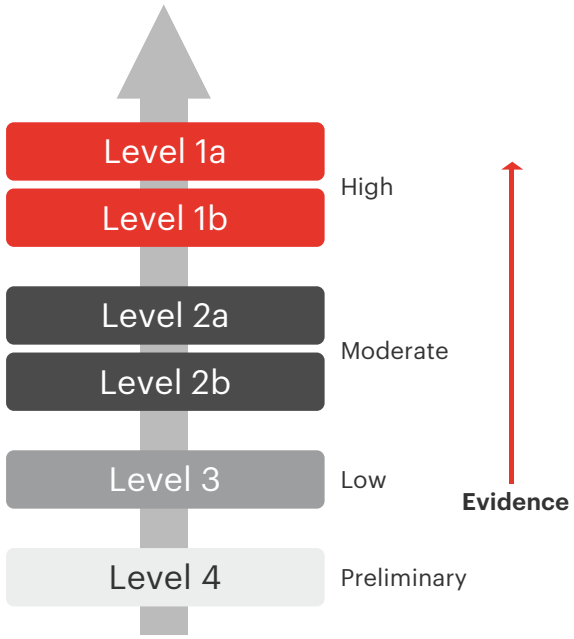
4. Methodology

How were the genetic variants studied selected and evaluated?

The **genetic test** was developed by a multidisciplinary team of medical doctors, pharmacists, geneticists, and programmers, following the highest quality standards. In particular, an expert team specialized in the curation of genetic variants reviewed each variant to ensure that selection, interpretation and impact of variants in the algorithms are based on the highest scientific evidence. Relevant patient's anamnesis (intolerances, diseases, medication, blood pressure, among others) that can affect recommendations was taken into account through medical questionnaires elaborated by health professionals.

- **Level 1A:** Annotation for a variant in medical society-endorsed or implemented in a major health system.
- **Level 1B:** Annotation for a variant where the preponderance of evidence shows an association. The association must be replicated in more than one cohort with significant p-values, and preferably will have a strong effect size.
- **Level 2A:** Annotation for a variant that qualifies for level 2B where the variant is within a Very Important known gene, so functional significance is more likely.
- **Level 2B:** Annotation for a variant with moderate evidence of an association. The association must be replicated but there may be some studies that do not show statistical significance, and/or the effect size may be small.
- **Level 3:** Annotation for a variant based on a single significant (not yet replicated) study or annotation for a variant evaluated in multiple studies but lacking clear evidence of an association.
- **Level 4:** Annotation based on a case report, non-significant study or in vitro, molecular or functional assay evidence only.

Only variants from level 1a to 2b were selected.



How was this test performed?

DNA was extracted from the buccal swab sample provided and was analyzed by our clinical analysis laboratory. DNA was extracted using the KingFisher Flex® robotic extraction system (Thermo Fisher Scientific). The study of the genetic variants was carried out using a custom-designed microfluidic card to measure for the chemiluminescent detection of each of them using TaqMan® technology. TaqMan® technology for genotyping testing is proven and widely used in clinical and research settings. The sensitivity (detection limit) of this study is 99%.

Genetic test algoritm

The **genetic test** qualitative pharmacogenetic algorithm analyzes single nucleotide polymorphisms (SNPs) associated with metabolic pathways involved in alopecia predisposition and treatment and combines this data with relevant patient history to predict treatment responses and recommends the most appropriate active ingredients.

The **genetic test** is an in vitro diagnostic medical device developed by **Fagron Genomics** and marketed underthe CE-IVD mark in conformity with European Directive 98/79/EC and the transitional provisions (article 130) of European Regulation 2017/746.

Fagron Genomics S.L.U.,
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What are the limits of this report?

Each genetic marker tested is just one factor that predicts the likelihood of a particular outcome. However, the lifestyle, diet, and environment to which the patient is exposed may impact the expected outcomes. These external factors cannot be taken into account in this report.

The information in this report is not used to diagnose genetic diseases or abnormalities, as it does not predict the risk and likelihood of certain genetic outcomes. It is also not intended to diagnose or cure any disease. The **genetic test** is intended to assist health professionals in making patient-specific care decisions regarding the treatment or prevention of androgenetic alopecia, areata alopecia, and telogen effluvium.

Our clinical laboratory has standard and effective procedures to protect against technical and operational problems. However, problems may occur in the shipment to the laboratory or in the handling of the sample, including, but not limited to, damage to the sample, mislabeling, and loss or delay in receiving the sample. In such cases, the medical laboratory may need to request a new sample.

As with all medical laboratory tests, there is a small chance that the laboratory may provide inaccurate information.

It is the responsibility of the professional who requests a test from us to guarantee the interested party appropriate genetic counseling in accordance with Law 14/2007, of July 3, on Biomedical Research.

Fagron Genomics S.L.U. declines all responsibility derived from the use and interpretation of the results of our tests by the requesting health professional.

Fagron Genomics S.L.U. does not access data identifying the patient from whom the sample comes, so it is also the responsibility of the requesting professional to comply with the applicable data protection regulations.

V.
References

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