DEMO REPORT04

BIOGENIQ

Sample number		**Report date**	2019-07-17
Date of birth	1990-01-01	**Specimen**	Saliva
Sex	Male		
Pharma Profile(s)	Mental Health		

Pharmacogenomic report

For more information, contact us:

Email: science@biogeniq.ca
Phone: 514 317-2240

The Pharma profile is a clinical decision support tool aimed at reducing the risks of adverse drugs reactions and therapeutic failure. The Pharma profile does not replace existing prescription guides. Response to medication can be influenced by factors not evaluated in this report. Response to treatment may be different than predicted in this report. The Pharma profile does not diagnose any disorder, condition or disease. Do not change your medication without prior approval from your treating clinician.

Antipsychotic

- **Haloperidol** (HALDOL®)
- **Perphenazine** (TRILAFON®)
- **Pimozide** (ORAP®)
- **Zuclopenthixol** (CLOPIXOL®)

Atypical Antipsychotic

- **Aripiprazole** (ABILIFY®)
- **Brexpiprazole** (REXULTI®)
- ⚠ **Clozapine** (CLOZARIL®)
- (!) **Lurasidone** (LATUDA®)
- ⚠ **Olanzapine** (ZYPREXA®)
- (!) **Quetiapine** (SEROQUEL®)
- **Risperidone** (RISPERDAL®)
- (!) **Ziprasidone** (ZELDOX®)

Atypical antidepressant

- (!) **Bupropion** (WELLBUTRIN®, ZYBAN®)
- **Mirtazapine** (REMERON®)
- (!) **Trazodone** (DESYREL®)
- (!) **Vilazodone** (VIIBRYD®)
- **Vortioxetine** (TRINTELLIX®)

Atypical antidepressant (SNRI)

- **Duloxetine** (CYMBALTA®)
- (!) **Levomilnacipran** (FETZIMA®)
- **Venlafaxine** (EFFEXOR XR®)

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

Benzodiazepine

- **Alprazolam** (XANAX®)
- **Clobazam** (FRISIUM®)
- (!) **Clonazepam** (RIVOTRIL®)
- ⚠ **Diazepam** (DIASTAT®, VALIUM®)
- (!) **Midazolam** (VERSED®)

Hypnotic

- (!) **Zolpidem** (SUBLINOX®)
- **Zopiclone** (IMOVANE®)

SSRI antidepressant

- ⚠ **Citalopram** (CELEXA®)
- ⚠ **Escitalopram** (CIPRALEX®)
- **Fluoxetine** (PROZAC®)
- **Fluvoxamine** (LUVOX®)
- **Paroxetine** (PAXIL®)
- ⚠ **Sertraline** (ZOLOFT®)

Tricyclic antidepressant

- ⚠ **Amitriptyline** (ELAVIL®)
- ⚠ **Clomipramine** (ANAFRANIL®)
- **Desipramine** (NORPRAMIN®)
- ⚠ **Doxepin** (SINEQUAN®)
- ⚠ **Imipramine** (TOFRANIL®)
- **Nortriptyline** (AVENTYL®)
- ⚠ **Trimipramine** (SURMONTIL®)

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

PHARMACOGENOMIC RECOMMENDATIONS

Alprazolam (XANAX®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to alprazolam therapy

Although your body may metabolize and eliminate alprazolam at a slower rate than expected, your genetic results do not suggest any change to alprazolam therapy.

- No change to recommended dose.
- Be alert to adverse reactions due to reduced metabolism.

⚠ **Amitriptyline** (ELAVIL®) GENES: ***CYP2C19, CYP2D6*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of amitriptyline

Your body may metabolize and eliminate amitriptyline at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve your treatment.
- Consult your healthcare provider to optimize your therapy.

Aripiprazole (ABILIFY®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to aripiprazole therapy

Your body should metabolize and eliminate aripiprazole normally. Therefore, your genetic results do not suggest any change to aripiprazole therapy.

- No change to the recommended dose.

Brexpiprazole (REXULTI®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to brexpiprazole therapy

Your body should metabolize and eliminate brexpiprazole normally. Therefore, your genetic results do not suggest any change to brexpiprazole therapy.

- No change to the recommended dose.

(!) **Bupropion** (WELLBUTRIN®, ZYBAN®) GENES: ***CYP2B6, POR*** LEVEL OF EVIDENCE: **3**

Increased risk of adverse drug reactions with standard dosing of bupropion

Your body may metabolize and eliminate bupropion at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., dry mouth, constipation, dizziness, tremors, nausea).
- Consult your healthcare provider to optimize your therapy.

⚠ **Citalopram** (CELEXA®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of citalopram

Your body may metabolize and eliminate citalopram at a faster rate than expected.

- The use of an alternative medication or a dose adjustment could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

Clobazam (FRISIUM®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to clobazam therapy

Although your body may metabolize and activate clobazam at a faster rate than expected, your genetic results do not suggest any change to clobazam therapy.

- No change to the recommended dose.
- Be alert to insufficient response due to increased metabolism.

⚠ **Clomipramine** (ANAFRANIL®) GENES: ***CYP2C19, CYP2D6*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of clomipramine

Your body may metabolize and eliminate clomipramine at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

(!) **Clonazepam** (RIVOTRIL®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **3**

Increased risk of adverse drug reactions with standard dosing of clonazepam

Your body may metabolize and eliminate clonazepam at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., confustion, hypotension, dizziness, drowsiness, headache).
- Consult your healthcare provider to optimize your therapy.

⚠ **Clozapine** (CLOZARIL®) GENE: ***CYP1A2*** LEVEL OF EVIDENCE: **3**

Increased probability of treatment failure with standard dosing of clozapine

Your body may metabolize and eliminate clozapine at a faster rate than expected. Please note that tobacco smoke and high caffeine intake may increase clozapine metabolism and the risk of therapeutic failure.

- Be alert to insufficient response.
- Consult your healthcare provider to optimize your therapy.

Desipramine (NORPRAMIN®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to desipramine therapy

Your body should metabolize and eliminate desipramine normally. Therefore, your genetic results do not suggest any change to desipramine therapy.

- No change to the recommended dose.

⚠ **Diazepam** (DIASTAT®, VALIUM®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **4**

Increased probability of treatment failure with standard dosing of diazepam

Your body may metabolize and eliminate diazepam at a faster rate than expected.

- Be aware of insufficient response.
- Consult your healthcare provider to optimize your therapy.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

⚠ **Doxepin** (SINEQUAN®) GENES: ***CYP2C19, CYP2D6*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of doxepin

Your body may metabolize and eliminate doxepin at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve your treatment.
- Consult your healthcare provider to optimize your therapy.

Duloxetine (CYMBALTA®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to duloxetine therapy

Your body should metabolize and eliminate duloxetine normally. Therefore, your genetic results do not suggest any change to duloxetine therapy.

- No change to the recommended dose.

⚠ **Escitalopram** (CIPRALEX®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of escitalopram

Your body may metabolize and eliminate escitalopram at a faster rate than expected.

- The use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Fluoxetine (PROZAC®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to fluoxetine therapy

Your body should metabolize and eliminate fluoxetine normally. Therefore, your genetic results do not suggest any change to fluoxetine therapy.

- No change to the recommended dose.

Fluvoxamine (LUVOX®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to fluvoxamine therapy

Your body should metabolize and eliminate fluvoxamine normally. Therefore, your genetic results do not suggest any change to fluvoxamine therapy.

- No change to the recommended dose.

Haloperidol (HALDOL®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to haloperidol therapy

Your body should metabolize and eliminate haloperidol normally. Therefore, your genetic results do not suggest any change to haloperidol therapy.

- No change to the recommended dose.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

⚠ **Imipramine** (TOFRANIL®) GENES: ***CYP2C19, CYP2D6*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of imipramine

Your body may metabolize and eliminate imipramine at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve your treatment.
- Consult your healthcare provider to optimize your therapy.

(!) **Levomilnacipran** (FETZIMA®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of levomilnacipran

Your body may metabolize and eliminate levomilnacipran at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, constipation, heart palpitations).
- Consult your healthcare provider to optimize your therapy.

(!) **Lurasidone** (LATUDA®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of lurasidone

Your body may metabolize and eliminate lurasidone at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., tremors, nausea, drowsiness, restlessness).
- Consult your healthcare provider to optimize your therapy.

(!) **Midazolam** (VERSED®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of midazolam

Your body may metabolize and eliminate midazolam at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., dizziness, drowsiness, confusion, amnesia).
- Consult your healthcare provider to optimize your therapy.

Mirtazapine (REMERON®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **2**

No genetic variation identified that would prompt changes to mirtazapine therapy

Your body should metabolize and eliminate mirtazapine normally. Therefore, your genetic results do not suggest any change to mirtazapine therapy.

- No change to the recommended dose.

Nortriptyline (AVENTYL®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to nortriptyline therapy

Your body should metabolize and eliminate nortriptyline normally. Therefore, your genetic results do not suggest any change to nortriptyline therapy.

- No change to the recommended dose.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

⚠ **Olanzapine** (ZYPREXA®) GENE: ***CYP1A2*** LEVEL OF EVIDENCE: **3**

Increased probability of treatment failure with standard dosing of olanzapine

Your body may metabolize and eliminate olanzapine at a faster rate than expected. Please note that smoking or high coffee consumption may further increases metabolism of olanzapine and therefore the probability of treatment failure.

- Be alert to insufficient response.
- Consult your healthcare provider to optimize your therapy.

Paroxetine (PAXIL®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to paroxetine therapy

Your body should metabolize and eliminate paroxetine normally. Therefore, your genetic results do not suggest any change to paroxetine therapy.

- No change to the recommended dose.

Perphenazine (TRILAFON®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to perphenazine therapy

Your body should metabolize and eliminate perphenazine normally. Therefore, your genetic results do not suggest any change to perphenazine therapy.

- No change to the recommended dose.

Pimozide (ORAP®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to pimozide therapy

Your body should metabolize and eliminate pimozide normally. Therefore, your genetic results do not suggest any change to pimozide therapy.

- No change to the recommended dose.

(!) **Quetiapine** (SEROQUEL®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of quetiapine

Your body may metabolize and eliminate quetiapine at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, headache, dizziness, drowsiness, tremors).
- Consult your healthcare provider to optimize your therapy.

Risperidone (RISPERDAL®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to risperidone therapy

Your body should metabolize and eliminate risperidone normally. Therefore, your genetic results do not suggest any change to risperidone therapy.

- No change to the recommended dose.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

⚠ **Sertraline** (ZOLOFT®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of sertraline

Your body may metabolize and eliminate sertraline at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

(!) **Trazodone** (DESYREL®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of trazodone

Your body may metabolize and eliminate trazodone at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, constipation, dizziness, drowsiness).
- Consult your healthcare provider to optimize your therapy.

⚠ **Trimipramine** (SURMONTIL®) GENES: ***CYP2C19, CYP2D6*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of trimipramine

Your body may metabolize and eliminate trimipramine at a faster rate than expected.

- Be alert to insufficient response.
- The use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Venlafaxine (EFFEXOR XR®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to venlafaxine therapy

Your body should metabolize and eliminate venlafaxine normally. Therefore, your genetic results do not suggest any change to venlafaxine therapy.

- No change to the recommended dose.

(!) **Vilazodone** (VIIBRYD®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of vilazodone

Your body may metabolize and eliminate vilazodone at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, insomnia, diarrhea, dizziness).
- Consult your healthcare provider to optimize your therapy.

Vortioxetine (TRINTELLIX®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to vortioxetine therapy

Your body should metabolize and eliminate vortioxetine normally. Therefore, your genetic results do not suggest any change to vortioxetine therapy.

- No change to the recommended dose.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

(!) **Ziprasidone** (ZELDOX®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of ziprasidone

Your body may metabolize and eliminate ziprasidone at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, drowsiness, headache, tremors).
- Consult your healthcare provider to optimize your therapy.

(!) **Zolpidem** (SUBLINOX®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of zolpidem

Your body may metabolize and eliminate zolpidem at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., nausea, drowsiness, headache).
- Consult your healthcare provider to optimize your therapy.

Zopiclone (IMOVANE®) GENE: ***CYP3A4*** LEVEL OF EVIDENCE: **4**

Increased risk of adverse drug reactions with standard dosing of zopiclone

Your body may metabolize and eliminate zopiclone at a slower rate than expected.

- Be alert to adverse drug reactions (e.g., confusion, dizziness, loss of consciousness, drowsiness).
- Consult your healthcare provider to optimize your therapy.

Zuclopenthixol (CLOPIXOL®) GENE: ***CYP2D6*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to zuclopenthixol therapy.

Your body should metabolize and eliminate zuclopenthixol normally. Therefore, your genetic results do not suggest any change to zuclopenthixol therapy.

- No change to the recommended dose.

Legend: (!) Increased risk of adverse drug reactions ⚠ Increased risk of therapeutic failure

RESULTS

GENES	PHENOTYPES	GENOTYPES	TESTED ALLELES
CYP1A2	Inducible	*1F/*1F	*1C, *1F, *1K
CYP2B6	Poor metabolizer	*6/*6	*4, *6, *18
CYP2C19	Rapid metabolizer	*1/*17	*2, *3, *4, *5, *6, *7, *8, *17
CYP2D6	Normal metabolizer	*1/*10	*2, *3, *4, *5, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *19, *41, *69, CNV
CYP3A4	Poor metabolizer	*17/*17	*2, *17, *22
POR	Normal metabolizer	GG	rs2868177

CYP1A2: Cytochrome P450 1A2; CYP2B6: Cytochrome P450 2B6; CYP2C19: Cytochrome P450 2C19; CYP2D6: Cytochrome P450 2D6; CYP3A4: Cytochrome P450 3A4; POR: Cytochrome P450 oxidoreductase

Levels of evidence

1 - Recommendation based on pharmacogenetic information on the drug label approved by Health Canada and/or the US Food and Drug Administration (FDA). A level 1 will also be attributed if the recommendation originates from a clinical guideline published by the Clinical Pharmacogenetics Implementation Consortium (CPIC) or the Dutch Pharmacogenomics Working Group (DPWG).

2 - Recommendation based on the results of multiple studies showing a statistically significant effect of a genetic variant on drug response.

3 - Recommendation based on the results of a single study showing a statistically significant effect of a genetic variant on drug response and/or drug pharmacokinetics.

4 - Recommendation based only on knowledge of the principal metabolizing enzyme without in vivo or in vitro data demonstrating the impact that genetic variability has on drug response or pharmacokinetics.

Approved by: Jérome Maheux
PhD, Chemist 2016-081

Date: 2019-07-17