DEMO REPORT04

BIOGENIQ

Sample number		**Report date**	2019-06-17
Date of birth	1990-01-01	**Specimen**	Saliva
Sex	Male		
Pharma Profile(s)	Pain		

Pharmacogenomic report

For more information, contact us:

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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.

Atypical antidepressant (SNRI)

Duloxetine (CYMBALTA®)

Nonsteroidal anti-inflammatory drug (NSAID)

Celecoxib (CELEBREX®)
Diclofenac (VOLTAREN®)
Etodolac (ULTRADOL®)
Flurbiprofen (ANSAID®)
Ibuprofen (ADVIL®, MOTRIN®)
Indomethacin (INDOCID®)
Meloxicam (MOBICOX®)
Naproxen (NAPROSYN®)
Piroxicam (FELDENE®)

Muscle Relaxant

Cyclobenzaprine (FLEXERIL®)

Opioid

Buprenorphine (BUTRANS®)
Codeine
Fentanyl (DURAGESIC®)
Hydrocodone (HYCODAN®)
Hydromorphone (DILAUDID®)
(!) **Meperidine** (DEMEROL®)
(!) **Methadone** (METADOL®)
Morphine (STATEX®, KADIAN®)
Oxycodone (SUPEUDOL®, OXYNEO®)
Tramadol (RALIVIA®, DURELA®)

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

Opioid Antagonist

⚠ **Naloxone** (NARCAN®)

Tricyclic antidepressant

⚠ **Amitriptyline** (ELAVIL®)

Nortriptyline (AVENTYL®)

Proton pump inhibitor (PPI)

⚠ **Esomeprazole** (NEXIUM®)

⚠ **Lansoprazole** (PREVACID®)

⚠ **Omeprazole** (LOSEC®)

⚠ **Pantoprazole** (PANTOLOC®)

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

PHARMACOGENOMIC RECOMMENDATIONS

⚠ **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.

Buprenorphine (BUTRANS®) GENE: ***OPRM1*** LEVEL OF EVIDENCE: **3**

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

Analysis of the OPRM1 gene did not identify any variant associated with nonresponse. Therefore, your genetic results do not suggest any change to buprenorphine therapy.

- No change to the recommended dose.

Celecoxib (CELEBREX®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **2**

No genetic variation identified that would prompt changes to celecoxib therapy

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

- No change to the recommended dose.

Codeine GENES: ***CYP2D6, OPRM1*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to codeine therapy

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

- No change to recommended dose.
- Nevertheless, be alert to insufficient response.
- If response is insufficient, the use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Cyclobenzaprine (FLEXERIL®) GENES: ***CYP1A2, CYP3A4*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to cyclobenzaprine therapy

Your genetic results do not suggest any change to cyclobenzaprine therapy.

- No change to recommended dose.
- Be alert to adverse reactions due to reduced metabolism.
- Avoid tobacco smoke and high caffeine intake.

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

Diclofenac (VOLTAREN®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **2**

No genetic variation identified that would prompt changes to diclofenac therapy

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

- No change to the recommended dose.

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.

⚠ **Esomeprazole** (NEXIUM®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of esomeprazole

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

- Be alert to insufficient response.
- A dose adjustment could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Etodolac (ULTRADOL®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to etodolac therapy

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

- No change to the recommended dose.

Fentanyl (DURAGESIC®) GENE: ***OPRM1*** LEVEL OF EVIDENCE: **2**

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

Analysis of the OPRM1 gene did not identify any variant associated with nonresponse. Therefore, your genetic results do not suggest any change to fentanyl therapy.

- No change to the recommended dose.

Flurbiprofen (ANSAID®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to flurbiprofen therapy

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

- No change to the recommended dose.

Hydrocodone (HYCODAN®) GENES: ***CYP2D6, OPRM1*** LEVEL OF EVIDENCE: **3**

No genetic variation identified that would prompt changes to hydrocodone therapy

Your body should metabolize and activate hydrocodone normally. The results of your genetic analysis do not suggest any change to hydrocodone therapy.

- No change to recommended dose.

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

Hydromorphone (DILAUDID®) GENE: ***OPRM1*** LEVEL OF EVIDENCE: **3**

No genetic variation identified that would prompt changes to hydromorphone therapy

Your genetic results do not suggest any change to hydromorphone therapy.

- No change to the recommended dose.

Ibuprofen (ADVIL®, MOTRIN®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **4**

No genetic variation identified that would prompt changes to ibuprofen therapy

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

- No change to the recommended dose.

Indomethacin (INDOCID®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **3**

No genetic variation identified that would prompt changes to indomethacin therapy

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

- No change to the recommended dose.

⚠ **Lansoprazole** (PREVACID®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of lansoprazole

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

- Be alert to insufficient response.
- A dose adjustment could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Meloxicam (MOBICOX®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **3**

No genetic variation identified that would prompt changes to meloxicam therapy

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

- No change to the recommended dose.

(!) **Meperidine** (DEMEROL®) GENES: ***CYP2B6, CYP2C19, CYP3A4*** LEVEL OF EVIDENCE: **3**

Increased risk of adverse drug reactions with standard dosing of meperidine

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

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

(!) **Methadone** (METADOL®) GENE: ***CYP2B6*** LEVEL OF EVIDENCE: **2**

Increased risk of adverse drug reactions with standard dosing of methadone

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

- Be alert to adverse drug reactions (e.g., tremors, fainting, irregular heart beat).
- Consult your healthcare provider to optimize your therapy.

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

Morphine (STATEX®, KADIAN®) GENE: ***OPRM1*** LEVEL OF EVIDENCE: **2**

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

Your genetic results do not suggest any change to morphine therapy.

- No change to the recommended dose.

⚠ **Naloxone** (NARCAN®) GENE: ***OPRM1*** LEVEL OF EVIDENCE: **2**

increased risk of nonresponse

Analysis of your OPRM1 gene has identified the presence of a variant associated with an increased risk of nonresponse to naloxone.

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

Naproxen (NAPROSYN®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **3**

No genetic variation identified that would prompt changes to naproxen therapy

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

⚠ **Omeprazole** (LOSEC®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of omeprazole

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

- Be alert to insufficient response.
- A dose adjustment could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Oxycodone (SUPEUDOL®, OXYNEO®) GENES: ***CYP2D6, OPRM1*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to oxycodone therapy

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

- No change to recommended dose.
- Nevertheless, be alert to insufficient response.
- If response is insufficient, consult your healthcare provider to optimize your therapy.

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

⚠ **Pantoprazole** (PANTOLOC®) GENE: ***CYP2C19*** LEVEL OF EVIDENCE: **1**

Increased probability of treatment failure with standard dosing of pantoprazole

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

- Be alert to insufficient response.
- A dose adjustment could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

Piroxicam (FELDENE®) GENE: ***CYP2C9*** LEVEL OF EVIDENCE: **1**

No genetic variation identified that would prompt changes to piroxicam therapy

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

- No change to the recommended dose.

Tramadol (RALIVIA®, DURELA®) GENES: ***CYP2D6, OPRM1*** LEVEL OF EVIDENCE: **1**

No genetic variations were identified that would prompt changes to tramadol therapy.

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

- No change to recommended dose.
- Nevertheless, be alert to insufficient response.
- If response is insufficient, the use of an alternative medication could improve treatment efficacy.
- Consult your healthcare provider to optimize your therapy.

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
CYP2C9	Normal metabolizer	*1/*1	*2, *3, *4, *5, *6, *8, *11, *12, *13, *15, *25, *27
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
OPRM1	-	AA	rs1799971

CYP1A2: Cytochrome P450 1A2; CYP2B6: Cytochrome P450 2B6; CYP2C19: Cytochrome P450 2C19; CYP2C9: Cytochrome P450 2C9; CYP2D6: Cytochrome P450 2D6; CYP3A4: Cytochrome P450 3A4; OPRM1: Opioid Receptor mu 1

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: 2019-06-17