# Genecept Assay® Report

Genomind, Inc, 2200 Renaissance Blvd, Suite 100 King of Prussia, PA 19406. CLIA number 39D2088097, CAP number 9046391, David Robbins, PhD, DABCC, MT (AAB), Lab Director

| | | | |
|---|---|---|---|
| **Patient:** | John Doe | **Sample ID:** | 0000109320 |
| **Patient DOB:** | 7/31/1973 | **Accession ID:** | 97597 |
| **Ordering Clinician:** | David Green, MD | **Sample Collection Date:** | 03/20/2017 |
| **Sample Type:** | Buccal | **Sample Received Date:** | 03/21/2017 |
| **Panel Ordered:** | Genecept Assay 2.0 | **Report Date:** | 03/24/2017 12:24 PM |

**Electronically Signed By**
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**Literature Information Reviewed By**
Jay Lombard, D.O., Medical Director for Genomind, Inc.

## How to read this Report

The information contained in this report is based upon research related to common genetic polymorphisms and their influence on behavior, psychiatric states and drug response. Interpretive comments focus only on psychotropic therapies. Implications related to non-psychotropic therapies may vary and are not considered in this report. These results are not intended to diagnose or make specific treatment recommendations. All images are for illustrative purposes only. The medications and treatments within this report are not intended to be comprehensive or prescriptive.

**Personalized Consultation Available for Clinicians**
Our Clinical Support Team is available to provide clinical interpretation of the biomarkers and translate the genetic test results to potential treatment strategies, as well as answer questions you may have concerning the report. This complimentary service is included with all Genecept Assay tests. Clinical consultations can be scheduled directly from the Genomind Portal.

**Contact us to arrange a consult at your convenience:**
**Phone:** 877-895-8658
**Email:** customerservice@genomind.com

**References:**
The citations contained in this report correspond to references found in the Genomind Literature Summary. The Literature Summary can be found at http://portal.genomind.com or you can contact Genomind to request a copy at customerservice@genomind.com or 877-895-8658.

# RESULTS REPORT: Pharmacodynamic Gene Variations; Drug Target Sites

 Use caution with related therapies  Therapeutic options  No known gene-drug interaction

| GENE RESULT | THERAPEUTIC IMPLICATIONS | INTERACTION | CLINICAL IMPACT |
|---|---|---|---|
| Serotonin Transporter (SLC6A4)<br>S/S<br>[Higher risk of non-response] | *SLC6A4 is a presynaptic transmembrane protein responsible for serotonin reuptake*<br>• SSRIs act by blocking this transporter to produce a therapeutic response<br>• Higher risk of poor response, slow response or intolerance to SSRIs<br>• Potential for increased cortisol release in response to stress in S/S, L(G)/S or L(G)/L(G) patients<br>• Therapeutic options such as SNRIs or other non-SSRI antidepressants may be used if clinically indicated |  | **Use caution** with SSRIs<br><br>**Therapeutic options: SNRIs** or **non-SSRI antidepressants** may be used if clinically indicated |
| Calcium Channel (CACNA1C)<br>A/A<br>[Increased risk of altered neuronal signaling] | *CACNA1C is a subunit of L-type voltage gated calcium channels which is involved in excitatory signaling in the brain*<br>• Altered calcium signaling may be clinically associated with impairment of mood or cognition |  | **Therapeutic options: atypical antipsychotics, mood stabilizers** and/or **omega-3 fatty acids** may be used if clinically indicated |
| Serotonin Receptor 2C (5HT2C)<br>C/C<br>[Weight gain risk] | *5HT2C is a receptor involved in the regulation of satiety*<br>• Atypical antipsychotics act by blocking this receptor<br>• Patients with the C/C genotype have risk of weight gain with atypical antipsychotics, however, this is the most common genotype<br>• Metformin, lorcaserin or other anti-obesity interventions may be beneficial to mitigate weight gain |  | **Use caution** with atypical antipsychotics<br><br>**Therapeutic options: metformin, lorcaserin** or other **anti-obesity interventions** may be used if clinically indicated |
| Melanocortin 4 Receptor (MC4R)<br>A/A<br>[High weight gain risk] | *MC4R is a receptor that plays a central role in the control of food intake*<br>• Risk of increased weight gain and BMI in healthy individuals and this risk may be further exacerbated with atypical antipsychotics<br>• Metformin, lorcaserin or other anti-obesity interventions may be beneficial to mitigate weight gain<br>**High risk**: Clozapine; Olanzapine<br>**Medium risk**: Aripiprazole; Iloperidone; Paliperidone; Quetiapine; Risperidone<br>**Lower risk**: Asenapine; Brexpiprazole; Cariprazine; Lurasidone; Ziprasidone |  | **Use caution** with atypical antipsychotics<br><br>**Therapeutic Options: metformin, lorcaserin** or other **anti-obesity interventions** may be used if clinically indicated |
| Catechol-O-Methyltransferase (COMT)<br>Met/Met<br>[Low activity] | *COMT is an enzyme responsible for breakdown of dopamine in the frontal cortex of the brain*<br>• Risk for reduced COMT enzyme activity and a parallel ↑ in frontal cortex dopamine<br>• Met/Met patients may derive less executive function benefit from dopaminergic stimulants<br>• Met/Met patients with psychotic disorders may demonstrate an improved response to atypical antipsychotics compared to Val/Val patients<br>• Met/Met patients with psychotic disorders may experience cognitive improvement with atypical antipsychotics compared to Val/Val patients |  | **Use caution** with dopaminergic stimulants<br><br>**Therapeutic options: atypical antipsychotics** may be used for psychotic-related disorders if clinically indicated |
| Methylenetetrahydro-folate Reductase (MTHFR)<br>C677T:<br>C/T<br>A1298C:<br>A/C<br>[Intermediate activity] | *MTHFR is an enzyme responsible for the conversion of folic acid to methylfolate which is a precursor needed for serotonin, norepinephrine and dopamine synthesis*<br>• Risk for reduced MTHFR enzyme activity and reduced methylfolate production<br>• L-methylfolate supplementation of SSRIs and SNRIs show improved symptom reduction and medication adherence compared to SSRIs/SNRIs alone in Major Depressive Disorder<br>• L-methylfolate may be an effective monotherapy for patients with Major Depressive Disorder |  | **Therapeutic options: L-methylfolate** may be used if clinically indicated |
| Brain-derived Neurotrophic Factor (BDNF)<br>Val/Met | *BDNF is a protein involved in neuronal development and neural plasticity*<br>• Potential risk for increased depression symptoms, impaired working memory, and altered stress response<br>• Studies have shown that Met carriers may have less satisfactory response to SSRIs in Caucasians, but not Asians, however larger studies need to be conducted to confirm these findings<br>• Exercise has been linked to improvements in cognition, and recent studies show that Met allele carriers may demonstrate enhanced effects of exercise on working memory compared to Val/Val patients |  | **Therapeutic options:** increased levels of **physical activity/exercise** if clinically appropriate |




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Use caution with related therapies | Therapeutic options | No known gene-drug interaction

| GENE RESULT | THERAPEUTIC IMPLICATIONS | INTERACTION | CLINICAL IMPACT |
|---|---|---|---|
| μ-Opioid Receptor (OPRM1)<br>A/G<br>[Intermediate risk for non-response] | *OPRM1 is an opioid receptor which is affected by natural and synthetic compounds*<br>• Risk for decreased analgesia with opioids; Patients carrying the G allele may require an increased dose of opioids<br>• G allele carriers may respond better to treatment with Naltrexone for alcohol use disorders | | **Use caution** with Opioids<br>**Therapeutic options: non-opioid analgesics** may be used if clinically indicated. **Naltrexone** for alcohol use disorders may be used if clinically indicated |
| Sodium Channel (ANK3)<br>C/C<br>[Normal] | *ANK3 is a protein that plays a role in sodium ion channel function and is involved in excitatory signaling in the brain*<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| Dopamine 2 Receptor (DRD2)<br>C/C<br>[Normal] | *DRD2 is a receptor affected by dopamine in the brain*<br>• DRD2 is involved in response to antipsychotics<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| Alpha-2A Adrenergic Receptor (ADRA2A)<br>C/C<br>[Normal response] | *ADRA2A is a receptor which plays an important role in neurotransmitter release*<br>• ADRA2A is involved in response to stimulants<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| Glutamate Receptor Kainate 1 (GRIK1)<br>A/A<br>[Normal] | *GRIK1 is an excitatory neurotransmitter receptor*<br>• GRIK1 is involved in response to topiramate for alcohol abuse<br>• Patients of European descent with the A allele may be less likely to respond to topiramate for alcohol abuse | | There are no known gene-drug interactions for this genotype |

## RESULTS REPORT: Pharmacokinetic Gene Variations; CYP450 Drug Metabolism

| GENE RESULT | THERAPEUTIC IMPLICATIONS | INTERACTION | CLINICAL IMPACT |
|---|---|---|---|
| CYP1A2<br>UM<br>*1F/*1F<br>[High activity **in the presence of inducers**] | ***Ultrarapid Metabolizer:*** *↑ metabolism of drugs leading to ↓ serum levels and poorer efficacy* ***in the presence of inducers****. Possible adverse events associated with toxic metabolites*<br>• A dose adjustment or alternate therapy may be necessary<br>• CYP1A2 *1F is highly induced by certain substances including tobacco/marijuana smoke or other medications; if patient uses these substances, a higher dose of CYP1A2 substrates may be required (see the Genecept Assay Report Interpretation Guide for full list of inducers) | | **Use caution** with medications metabolized by CYP1A2 when inducer is present<br>*See Drug Interaction Summary for Details* |
| CYP2B6<br>IM<br>*5/*5<br>[Intermediate activity] | ***Intermediate metabolizer:****↑ risk of elevated serum levels, drug interactions, and ↓ production of active moieties*<br>• A dose adjustment or alternate therapy may be necessary | | **Use caution** with medications metabolized by CYP2B6<br>*See Drug Interaction Summary for details* |
| CYP2C9<br>EM<br>*1/*1<br>[Normal activity] | *Variations in the CYP2C9 liver enzyme can result in altered drug metabolism and unexpected drug serum levels*<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| CYP2C19<br>EM<br>*1/*1<br>[Normal activity] | *Variations in the CYP2C19 liver enzyme can result in altered drug metabolism and unexpected drug serum levels*<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| CYP2D6<br>EM<br>*1/*3<br>[Normal activity] | *Variations in the CYP2D6 liver enzyme can result in altered drug metabolism and unexpected drug serum levels*<br>• This genotype confers normal activity | | There are no known gene-drug interactions for this genotype |
| CYP3A4<br>*1/*1<br>CYP3A5<br>*1/*6<br>[Normal activity] | *Variations in the CYP3A4/5 liver enzymes can result in altered drug metabolism and unexpected drug serum levels*<br>• This genotype confers normal activity<br>• CYP3A activity is determined by the sum activity of the CYP3A family of genes; in adults the most influential are CYP3A4 and 3A5 | | There are no known gene-drug interactions for this genotype |




All references are described in the Literature Summary found at http://portal.genomind.com

## Drug Interaction Summary:

This summary provides a listing of implications for psychotropic and pain medications specific to your patient's genetic profile

| | Medication | Primary metabolizing enzyme(s) | Use as Directed: No known gene-drug interactions | Therapeutic Options: Options which may be used if clinically indicated | Use with Caution: CYP450 Serum levels may be ↑ [reduced dose may be required] | Use with Caution: CYP450 Serum levels may be ↓ [increased dose may be required] | Use with Caution: Increased risk for adverse events or poor response |
|---|---|---|---|---|---|---|---|
| | **Antidepressants** | | | SLC6A4 | | | SLC6A4 |
| SSRIs | Citalopram (Celexa®) ℞ | 2C19, 3A4/5, 2D6 | | | | | ✓ |
| SSRIs | Escitalopram (Lexapro® ) | 2C19, 2D6 | | | | | ✓ |
| SSRIs | Fluoxetine (Prozac®) | 2D6, 2C9 | | | | | ✓ |
| SSRIs | Fluvoxamine (Luvox®) | 2D6, 1A2 | | | | With Inducers[6] | ✓ |
| SSRIs | Paroxetine (Paxil®) | 2D6 | | | | | ✓ |
| SSRIs | Sertraline (Zoloft®) | MultiCYP [11] | | | | | ✓ |
| SNRIs | Desvenlafaxine (Pristiq®) | -- | ✓ | ✓ | | | |
| SNRIs | Duloxetine (Cymbalta®) | 1A2, 2D6 | | ✓ | | With Inducers[6] | |
| SNRIs | Levomilnacipran (Fetzima®) | 3A4/5 | ✓ | ✓ | | | |
| SNRIs | Milnacipran (Savella®) | -- | ✓ | ✓ | | | |
| SNRIs | Venlafaxine (Effexor®) [1] | 2D6, 2C19 | ✓ | ✓ | | | |
| Other | Bupropion (Wellbutrin®) [1] | 2B6 | | ✓ | Prodrug [1] | | |
| Other | Mirtazapine (Remeron®) | 2D6, 3A4/5, 1A2 | | ✓ | | With Inducers[6] | |
| Other | Nefazodone | 3A4/5, 2D6 | ✓ | ✓ | | | |
| Other | Trazodone (Desyrel®, Oleptro®) | 3A4/5 | ✓ | ✓ | | | |
| Other | Vilazodone (Viibryd®) | 3A4/5 | ✓ | ✓ | | | |
| Other | Vortioxetine (Trintellix®) ℞ | 2D6 | ✓ | ✓ | | | |
| TCAs | Amitriptyline (Elavil®) | 2D6, 2C19 | ✓ | | | | |
| TCAs | Amoxapine (Asendin®) | 2D6 | ✓ | | | | |
| TCAs | Clomipramine (Anafranil®) | 2D6, 2C19, 1A2 | | | | With Inducers[6] | |
| TCAs | Desipramine (Norpramin®) | 2D6 | ✓ | | | | |
| TCAs | Doxepin (Sinequan®) | 2D6 | ✓ | | | | |
| TCAs | Imipramine (Tofranil®) | 2D6, 2C19, 1A2 | | | | With Inducers[6] | |
| TCAs | Nortriptyline (Pamelor®) | 2D6 | ✓ | | | | |
| TCAs | Protriptyline (Vivactil®) | 2D6 | ✓ | | | | |
| TCAs | Trimipramine (Surmontil®) | 2D6, 2C19, 3A4/5 | ✓ | | | | |
| MAOIs | Phenelzine (Nardil®) | -- | ✓ | | | | |
| MAOIs | Selegiline (Eldepryl®, Emsam®) | 2B6 | | | ✓ | | |
| MAOIs | Tranylcypromine (Parnate®) | -- | ✓ | | | | |
| | **Mood Stabilizers/Anticonvulsants** | | | CACNA1C | | | |
| | Carbamazepine (Tegretol®) | 3A4/5 | ✓ | ✓ | | | |
| | Gabapentin (Neurontin®, Gralise®) | -- | ✓ | ✓ | | | |
| | Lamotrigine (Lamictal®) | -- | ✓ | ✓ | | | |
| | Lithium (Lithobid®, Eskalith®) | -- | ✓ | ✓ | | | |
| | Oxcarbazepine (Trileptal®) | -- | ✓ | ✓ | | | |
| | Pregabalin (Lyrica®) | -- | ✓ | ✓ | | | |
| | Topiramate (Topamax®) | -- | ✓ | ✓ | | | |
| | Valproate (Depakote®, Depakene®) | 2C9 | ✓ | ✓ | | | |

*See last page for drug interaction summary footnotes




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## Drug Interaction Summary:

This summary provides a listing of implications for psychotropic and pain medications specific to your patient's genetic profile

| Medication | Primary metabolizing enzyme(s) | Use as Directed | Therapeutic Options | Use with Caution | | |
|---|---|---|---|---|---|---|
| | | | | CYP450 | | |
| | | No known gene-drug interactions | Options which may be used if clinically indicated | Serum levels may be ↑ [reduced dose may be required] | Serum levels may be ↓ [increased dose may be required] | Increased risk for adverse events or poor response |
| **Atypical Antipsychotic** | | | CACNA1C, COMT | | | 5HT2C, MC4R |
| Aripiprazole (Abilify®) | 2D6, 3A4/5 | | | | | Weight Gain[3] |
| Asenapine (Saphris®) | 1A2 | | ✓ | | With Inducers[6] | |
| Brexpiprazole (Rexulti®) | 2D6, 3A4/5 | ✓ | ✓ | | | |
| Cariprazine (Vraylar®) | 3A4/5 | ✓ | ✓ | | | |
| Clozapine (Clozaril®) | 1A2, 2D6, 3A4/5 | | | | With Inducers[6] | Weight Gain[3] |
| Iloperidone (Fanapt®) | 2D6 | | | | | Weight Gain[3] |
| Lurasidone (Latuda®) | 3A4/5 | ✓ | ✓ | | | |
| Olanzapine (Zyprexa®) | 1A2 | | | | With Inducers[6] | Weight Gain[3] |
| Paliperidone (Invega®) | -- | | | | | Weight Gain[3] |
| Quetiapine (Seroquel®) | 3A4/5 | | | | | Weight Gain[3] |
| Risperidone (Risperdal®) | 2D6 | | | | | Weight Gain[3] |
| Ziprasidone (Geodon®) | -- | ✓ | ✓ | | | |
| **Typical Antipsychotic** | | | | | | |
| Chlorpromazine (Largactil®, Thorazine®) | 2D6 | ✓ | | | | |
| Fluphenazine (Prolixin®) | 2D6 | ✓ | | | | |
| Haloperidol (Haldol®) | 2D6, 3A4/5 | ✓ | | | | |
| Loxapine (Loxitane®) | MultiCYP [11] | ✓ | | | | |
| Perphenazine (Trilafon®) | 2D6 | ✓ | | | | |
| Pimozide (Orap®) | 2D6, 3A4/5 | ✓ | | | | |
| Promethazine (Phenegran®) | 2D6 | ✓ | | | | |
| Thioridazine (Mellaril®) | 2D6 | ✓ | | | | |
| Thiothixene (Navane®) | 1A2 | | | | With Inducers[6] | |
| Trifluoperazine (Stelazine®) | 1A2 | | | | With Inducers[6] | |
| **Anxiolytic** | | | | | | |
| Alprazolam (Xanax®) | 3A4/5 | ✓ | | | | |
| Buspirone (Buspar®) | 3A4/5 | ✓ | | | | |
| Chlordiazepoxide (Librium®) | 3A4/5 | ✓ | | | | |
| Clonazepam (Klonopin®) | 3A4/5 | ✓ | | | | |
| Clorazepate (Tranxene®) | -- | ✓ | | | | |
| Diazepam (Valium®) | 2C19, 3A4/5 | ✓ | | | | |
| Hydroxyzine (Vistaril®) | -- | ✓ | | | | |
| Lorazepam (Ativan®) | -- | ✓ | | | | |
| Oxazepam (Serax®) | -- | ✓ | | | | |
| Propranolol (Inderal®) | 2D6, 1A2, 2C19 | | | | With Inducers[6] | |
| Temazepam (Restoril®) | -- | ✓ | | | | |

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|---|---|---|---|---|---|---|
| **Dopaminergic Stimulants Agents** | | | | | | COMT |
| Amphetamine-Dextroamphetamine (Adderall®, Evekeo®, Dyanavel®, Adzenys®) | 2D6 | | | | | ✓ |
| Dexmethylphenidate (Focalin®) | -- | | | | | ✓ |
| Dextroamphetamine (Dexedrine®, Procentra®, Zenzedi®) | -- | | | | | ✓ |
| Lisdexamfetamine (Vyvanse®) | -- | | | | | ✓ |
| Methamphetamine (Desoxyn®) | 2D6 | | | | | ✓ |
| Methylphenidate (Ritalin®, Concerta®, Daytrana®, Metadate®) | -- | | | | | ✓ |
| **Miscellaneous Stimulants; NRIs; a2-Agonists** | | | | | | |
| Armodafinil (Nuvigil®) | 3A4/5 | ✓ | | | | |
| Atomoxetine (Strattera®) | 2D6 | ✓ | | | | |
| Clonidine (Kapvay®) | 2D6 | ✓ | | | | |
| Guanfacine (Intuniv®) | 3A4/5 | ✓ | | | | |
| Modafinil (Provigil®) | 3A4/5 | ✓ | | | | |
| **Alternative/Complementary** | | | CACNA1C, MTHFR | | | |
| L-methylfolate (Deplin®, EnLyte®) | -- | ✓ | ✓ | | | |
| Omega-3-Fatty Acids | -- | ✓ | ✓ | | | |
| **Sleep Modulator** | | | | | | |
| Eszopiclone (Lunesta®) | 3A4/5 | ✓ | | | | |
| Ramelteon (Rozerem®) | 1A2 | | | | With Inducers[6] | |
| Suvorexant (Belsomra®) | 3A4/5, 2C19 | ✓ | | | | |
| Zaleplon (Sonata®) | 3A4/5 | ✓ | | | | |
| Zolpidem (Ambien®) | 3A4/5 | ✓ | | | | |

*See last page for drug interaction summary footnotes




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|---|---|---|---|---|---|---|---|
| | **Pain** | | | OPRM1 | | | OPRM1 |
| Non-opioid analgesics | Acetaminophen (Tylenol®) | -- | ✓ | ✓ | | | |
| Non-opioid analgesics | Celecoxib (Celebrex®) | 2C9 | ✓ | ✓ | | | |
| Non-opioid analgesics | Diclofenac (Voltaren®, Cataflam®) | 2C9 | ✓ | ✓ | | | |
| Non-opioid analgesics | Flurbiprofen (Ansaid®) | 2C9 | ✓ | ✓ | | | |
| Non-opioid analgesics | Ibuprofen (Advil®, Motrin®) | 2C9 | ✓ | ✓ | | | |
| Non-opioid analgesics | Ketorolac (Toradol®) | -- | ✓ | | | | |
| Non-opioid analgesics | Meloxicam (Mobic®) | 2C9 | ✓ | ✓ | | | |
| Non-opioid analgesics | Naproxen (Aleve®, Naprosyn®) | 1A2, 2C9 | | ✓ | | With Inducers[6] | |
| Non-opioid analgesics | Piroxicam (Feldene®) | 2C9 | ✓ | ✓ | | | |
| Opioids | Alfentanil (Afenta®) | 3A4/5 | | | | | ✓ [9] |
| Opioids | Codeine [1] | 2D6 | | | | | ✓ [9] |
| Opioids | Fentanyl (Duragesic®) | 3A4/5 | | | | | ✓ [9] |
| Opioids | Hydrocodone [1] | 2D6 | | | | | ✓ [9] |
| Opioids | Hydromorphone (Dilaudid®) | -- | | | | | ✓ [9] |
| Opioids | Meperidine (Demerol®) | 2B6, 3A4/5 | | | ✓ | | ✓ [9] |
| Opioids | Methadone (Dolophine®, Methadose®) | 3A4/5, 2B6 | | | ✓ | | ✓ [9] |
| Opioids | Morphine (MS Contin®, Kadian®) | -- | | | | | ✓ [9] |
| Opioids | Oxycodone (Oxycontin®) | 2D6, 3A4/5 | | | | | ✓ [9] |
| Opioids | Oxymorphone (Opana®) | -- | | | | | ✓ [9] |
| Opioids | Tapentadol (Nucynta®) | -- | | | | | ✓ [9] |
| Opioids | Tramadol (Ultram®) | 2D6, 3A4/5 | | | | | ✓ [9] |
| | **Miscellaneous** | | | 5HT2C, MC4R, OPRM1 | | | |
| | Baclofen (Lioresal®) | -- | ✓ | | | | |
| | Buprenorphine (Butrans®) | 3A4/5 | ✓ | | | | |
| | Buprenorphine/Naloxone (Suboxone®) | 3A4/5 | ✓ | | | | |
| | Carisoprodol (Soma®) | 2C19 | ✓ | | | | |
| | Cyclobenzaprine (Flexeril®) | 1A2 | | | | With Inducers[6] | |
| | Gabapentin enacarbil (Horizant®) | -- | ✓ | | | | |
| | Lorcaserin (Belviq®) | MultiCYP [11] | ✓ | ✓ | | | |
| | Metaxalone (Skelaxin®) | MultiCYP [11] | ✓ | | | | |
| | Metformin (Glucophage®) | -- | ✓ | ✓ | | | |
| | Methocarbamol (Robaxin®) | -- | ✓ | | | | |
| | Naltrexone (Revia®, Vivitrol®) | -- | ✓ | ✓ [10] | | | |
| | Tizanidine (Zanaflex®) | 1A2 | | | | With Inducers[6] | |
| | Tolcapone (Tasmar®) | -- | ✓ | | | | |

*See last page for drug interaction summary footnotes

This is based upon a review of the literature that is suggestive of treatments which may be appropriate and those that may be used with caution or avoided. Clinicians should review the full prescribing information of treatments being considered and should make their own treatment decisions based upon their knowledge as it relates to the patient. The selection of any therapeutic option is at the sole discretion of the prescriber. The physician is a learned intermediary and should be making all decisions based on experience and knowledge as related to the patient. The prescriber is expected to be well versed in the adverse effects and monitoring parameters of any medications prescribed or recommended to patients. Medications in this report are listed in alphabetical order; listing of medications is not meant to imply comparable efficacy or safety. Brand names are listed for exemplary purposes only; additional brand names exist and Genomind does not endorse or support any particular product. All registered trademarks are the property of their respective owners.




All references are described in the Literature Summary found at http://portal.genomind.com

## DRUG INTERACTION SUMMARY FOOTNOTES

[1] Prodrug or highly active metabolite - requiring activation by the liver; CYP450 IMs/PMs may experience lower efficacy due to reduced conversion to the active metabolite and higher levels of the parent drug; CYP450 UMs may experience increased conversion of the parent drug, and higher levels of the active metabolite

[3] This medication is listed to use with caution as there is a risk for weight gain because of a variation in 5HT2C, MC4R or both; these variations have not been shown to impact therapeutic efficacy and this medication may be used if clinically indicated

[6] This patient has a variation in CYP1A2 which may lead to increased metabolism of this drug **in the presence of CYP1A2 inducers**, use caution; see the Genecept Assay Report Interpretation Guide for information related to CYP1A2 inducers

[9] Opioids are not contraindicated, although, patients may require a higher dose due to an OPRM1 variation; use with caution

[10] May be more effective for the treatment of alcohol use disorders

[11] MultiCYP - This drug is metabolized by multiple CYP450 enzymes, each having a minor effect on the drug's overall metabolism; abnormal activity in any one CYP450 enzyme is unlikely to be clinically significant for this drug

Medication has manufacturer dose-administration FDA labeling; see the Genecept Assay Report Interpretation Guide

*References for the drug interaction summary are available upon request

## TEST METHODOLOGY

This test was developed and performance characteristics were validated by Genomind. It has not been cleared or approved by the US Food and Drug Administration. This test is used for clinical purposes. It should not be regarded as investigational or for research. This laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA) as qualified to perform high complexity clinical laboratory testing. Genomind performed the testing using standard and custom TaqMan reagents for all variants except for one, which was performed by PCR. The results are not intended to be used as the sole means for clinical diagnosis or patient management decisions.

**Test Methodology Limitations:** Factors influencing the amount and quality of DNA extracted include but are not limited to the amount of buccal cells extracted, patient oral hygiene, collection technique, and the presence of dietary or microbial sources of nucleic acids and nucleases. DNA quality and quantity are subject to matrix dependent influences. PCR inhibitors, extraneous DNA and nucleic acid degrading enzymes are all factors which must be considered in the evaluation of assay results. Some SNP assays are problematic due to multiple base repeats and other sequence aberrations which may hinder proper amplification and analysis. The gel based PCR assay is not sensitive enough to detect low expressed signals. DNA purity can influence the assay. SLC6A4 contains many polymorphisms and the assay was developed and validated as per the current available scientific information.

Variants tested include SLC6A4 rs25531 and 5-HTTLPR; CACNA1C; ANK3; 5HT2C; MC4R; DRD2; COMT; ADRA2A; MTHFR C677T and A1298C; BDNF; OPRM1; GRIK1; CYP1A2 *1C, *1D, *1E, *1F and *11; CYP2B6 *5, *6, and *7; CYP2C9 *2, *3, *4, *5, *6, *8, *11, *13, and *27; CYP2C19 *2, *3, *4, *5, *6, *7, *8, *9, *10, and *17; CYP2D6 *2, *3, *4, gene deletion (*5), gene duplication, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *29 and *41; CYP3A5 *3, *6, *7; and CYP3A4 *22.

## COMMENTS

Serotonin Transporter [SLC6A4] data was reviewed by Betsy Bove, PhD, Assistant Lab Director.

## LITERATURE REFERENCES

**THE LITERATURE INFORMATION UPON WHICH THIS REPORT RELIES WAS AGGREGATED AND REVIEWED BY GENOMIND, INC. SUMMARIES OF THESE NUMBERED REFERENCES BELOW ARE AVAILABLE UPON REQUEST OF GENOMIND'S COMPREHENSIVE LITERATURE SUMMARY [v2017-03].**

| Gene | References |
|---|---|
| **SLC6A4** | 1-24 |
| **CACNA1C** | 25-55 |
| **ANK3** | 26,28,30,35,37,46-49,56-64 |
| **5HT2C** | 7,65-75 |
| **MC4R** | 74,76-82 |
| **DRD2** | 83-87 |
| **COMT** | 88-117 |
| **ADRA2A** | 118-125 |
| **MTHFR** | 126-138 |

| Gene | References |
|---|---|
| **BDNF** | 139-161 |
| **OPRM1** | 162-172 |
| **GRIK1** | 173-177 |
| **CYP1A2** | 72,178-206 |
| **CYP2B6** | 178-182,199,203,207-220 |
| **CYP2C9** | 178-182,186,203,207,221-232 |
| **CYP2C19** | 7,178-182,199,203,207,216,222-224,231-244 |
| **CYP2D6** | 7,72,178-183,186,199-200,203,207,222-224,231-232,235,245-266 |
| **CYP3A4/5** | 7,72,178-183,186,199-200,203,207,216,267-269 |