OneOme RightMed® comprehensive test report overview

The RightMed comprehensive test is a pharmacogenomic test (also called a medication response test) that analyzes a patient’s DNA to determine how he or she may respond to hundreds of medications. The RightMed comprehensive test report contains all of the patient’s results and may be used to guide a healthcare provider’s prescription decisions.

WHAT INFORMATION IS INCLUDED IN THE RIGHTMED COMPREHENSIVE TEST REPORT?

The RightMed comprehensive test report contains a lot of valuable information, including:

- A legend of the icons used throughout the report to help you interpret the results
- If applicable, a personalized medication summary of results for any medications entered during the order process as most relevant to the patient, with these medications additionally highlighted in the body of the report
- Medications organized by medical specialty and classified based on how severe the patient’s predicted gene-drug interaction is (major, moderate, minimal, or limited pharmacogenetic impact)
- The patient’s genotype and their predicted metabolic status across each gene
- The patient’s analytical test results

HOW DO I ORDER A RIGHTMED COMPREHENSIVE TEST?

Providers can go to portal.oneome.com to place their first order or can download our test requisition form at www2.oneome.com/order-form. Patients can purchase a test at oneome.com/buy-test (an independent provider will order the test for you, if appropriate) or you can discuss the test with your doctor.

DO YOU OFFER SUPPORT WITH INTERPRETING RESULTS?

If you are a provider or pharmacist, we offer one-on-one consultations with pharmacogenomic experts. Contact support@oneome.com to set up a consultation.

In addition to consultations, providers also get access to the RightMed Advisor, an online, interactive tool which provides further insights into a patient’s results. Learn more at oneome.com/rightmed-advisor.

If you are a patient and you purchase the test on OneOme’s website, a consult with a genetic counselor is included in the cost of the test. If your doctor orders the test for you, please refer them to the information above.

DOES ONEOME OFFER OTHER REPORTS?

In addition to the comprehensive test report, providers can get access to specialty reports (for specialty areas like oncology or psychiatry), RightMed custom reports (with a subset of medications selected by the provider’s institution), and RightMed Advisor reports (with more in-depth information on a subset of medications selected by the provider for an individual patient). Learn more at oneome.com/rightmed-reports.

I HAVE A QUESTION; WHO SHOULD I CONTACT?

We’d love to help. Please contact our customer support team at 844-ONEOME-5 (844-663-6635) or support@oneome.com. The team will put you in touch with the right person.

© 2019 OneOme LLC. All rights reserved. OneOme and RightMed are trademarks of OneOme LLC.
The RightMed comprehensive test is a pharmacogenomic test that identifies how a patient's DNA affects their response to hundreds of medications. This report can be used to help determine safer, more effective medications and doses tailored to a patient's genomic profile.

Patient and report summary

Patient name: Jane Doe       
Patient date of birth: 1972-07-08       
OneOme report date: 2019-01-16

Ordering provider: Sample Doctor       
Ordering facility: Healthcare Institution       
Product type: Comprehensive       
Report type: Original

Report legend

Based on this patient's genetic profile, medications are reported according to genotype-predicted interactions described below.

**Icon legend**

Some medications are reported with icons to indicate that specific clinical annotations and/or dosing guidelines provided by FDA, CPIC, or other professional associations are available in the RightMed Advisor.

- **Increased exposure**
  - Total exposure to active compound(s) may be increased. Monitor for adverse effects.

- **Decreased exposure**
  - Total exposure to active compound(s) may be decreased. Monitor for lack of therapeutic response, Difficult to predict

- **Reduced response**
  - Response to medication may be lowered due to genetic changes impacting mechanisms other than exposure (e.g. receptor function).

- **Additional testing**
  - According to FDA labeling, additional laboratory testing may be indicated.

- **Professional guideline**
  - Medication has professional guidelines associated with this patient's genetic test results. Avoidance, dose adjustment, or heightened monitoring may be indicated.
Personalized medication report summary

This list was generated from the medications entered during the order process. Providers can find more information about each medication in the Personalized medication report or in the RightMed Advisor.

Note: The associated genes listed for each medication do not imply that a specific gene-drug interaction exists, as some genes may only be informative in nature.

| Medication        | PGx result | Overview                                                                 | Associated gene(s) |
|-------------------|------------|--------------------------------------------------------------------------|-------------------|
| Carbamazepine     | ⚠️         | Normal metabolism of carbamazepine predicted. Negative for the presence of the HLA-B*15:02 allele. Increased risk of hypersensitivity reactions related to HLA-A*31:01 genotype. Professional guidelines exist for the use of carbamazepine in patients with this genotype and/or phenotype. | CYP3A5 HLA-A HLA-B |
|                   | ⚠️         | Increased metabolism of carbamazepine predicted. Decreased exposure to carbamazepine predicted. Typical to increased expression of the SLC6A4 transporter. Professional guidelines exist for the use of carbamazepine in patients with this genotype and/or phenotype. |                  |
| Citalopram        | ⚠️         | Reduced metabolism of phenytoin predicted. Increased exposure to phenytoin predicted. Negative for the presence of the HLA-B*15:02 allele. Increased risk of hypersensitivity reactions related to HLA-A*31:01 genotype. Professional guidelines exist for the use of phenytoin in patients with this genotype and/or phenotype. | CYP2C9 HLA-A HLA-B |
|                   | ⚠️         | Normal metabolism of bupropion predicted. Normal exposure to bupropion predicted. Allele(s) have demonstrated substrate-specific function with bupropion, therefore cytochrome P450 phenotype may differ from bupropion-specific phenotype. | CYP2B6 |
| Fluoxetine        |           | Normal exposure to fluoxetine predicted. Typical to increased expression of the SLC6A4 transporter. | CYP2C9 CYP2D6 SLC6A4 |
|                   |           |                                                                          |                  |
Genotype-predicted interactions for medications

Allergy/Pulmonology

- **Major gene-drug interaction**
  - Dextromethorphan
  - Indacaterol
  - Loratadine
  - Salmeterol
  - Sildenafil
  - Tadalafil

- **Moderate gene-drug interaction**
  - Montelukast

- **Minimal gene-drug interaction**
  - Dextromethorphan
  - Indacaterol
  - Loratadine
  - Salmeterol
  - Sildenafil
  - Tadalafil

- **Limited pharmacogenetic impact**
  - Montelukast

Analgesic/Anesthesiology

- **Major gene-drug interaction**
  - Buprenorphine
  - Codeine
  - Hydrocodone
  - Methadone
  - Midazolam
  - Oxycodone
  - Tramadol

- **Moderate gene-drug interaction**
  - Morphine
  - Celecoxib
  - Diclofenac
  - Flurbiprofen

- **Minimal gene-drug interaction**
  - Buprenorphine
  - Codeine
  - Hydrocodone

- **Limited pharmacogenetic impact**
  - Naloxone

Anti-inflammatory

- **Major gene-drug interaction**
  - Celecoxib
  - Diclofenac
  - Flurbiprofen

- **Moderate gene-drug interaction**
  - Buprenorphine
  - Codeine
  - Hydrocodone

- **Minimal gene-drug interaction**
  - Buprenorphine

- **Limited pharmacogenetic impact**
  - Celecoxib
  - Diclofenac
  - Flurbiprofen
### Anti-inflammatory (cont.)

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|-------------------------------|
| Meloxicam (Mobic®) | Piroxicam (Feldene®) |  |  |

### Anticoagulant/Antiplatelet

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|-------------------------------|
| Clopidogrel (Plavix®) | Warfarin (Coumadin®, Jantoven®) | Apixaban (Eliquis®) | Dalteparin (Fragmin®) |
| | | Cilostazol (Pletal®) | Enoxaparin (Lovenox®) |
| | | Ticagrelor (Brilinta®) | Prasugrel (Effient®) |
| | | | Tirofiban (Aggrastat®) |

### Cardiovascular

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|-------------------------------|
| Labetalol (Trandate®) | Azilsartan (Edarbi®) | Aliskiren (Tekturna®) | Alirocumab (Praluent®) |
| | Fluvastatin (Lescol®) | Amiodarone (Cordarone®, Pacerone®) | Colesevelam (Welchol®) |
| | Guanabenz (Wytensin®) | Amlodipine (Norvasc®) | Digoxin (Digitek®, Digox®, Lanoxin®) |
| | Irbesartan (Avapro®) | Atorvastatin (Lipitor®) | Gemfibrozil (Lopid®) |
| | Losartan (Cozaar®) | Carvedilol (Coreg®) | Lisinopril (Prinivil®, Zestril®) |
| | | Clonidine (Catapres®, Kapvay®) | Nitroglycerin (Minitran®, Nitrostat®) |
| | | Diltiazem (Cardizem®, Cartia®) | Sotalol (Betapace®, Sorine®) |
| | | Disopyramide (Norpace®) | Spironolactone (Aldactone®) |
| | | Dofetilide (Tikosyn®) | Telmisartan (Micardis®) |
| | | Dronedarone (Multaq®) |  |
| | | Eplerenone (Inspra®) |  |
| | | Felodipine (Plendil®) |  |
| | | Flecainide (Tambocor®) |  |
Cardiovascular (cont.)

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|--------------------------------|
| Lidocaine (Xylocaine®)      | Lomitapide (Juxtapid®)        | Lovastatin (Mevacor®)         |                                |
| Metoprolol (Lopressor®, Toprol XL®) | Nifedipine (Adalar®, Nifedical®, Procardia®) | Pravastatin (Pravachol®)      |                                |
| Nisoldipine (Sular®)        | Pravastatin (1,137) (Pravachol®) | Propafenone (Rythmol®)        |                                |
| Propranolol (Inderal®)      | Quinidine (Quin-G®)           | Ranolazine (Ranexa®)          |                                |
| Simvastatin (1,97,159,177,204,219) | Insulin aspart (Novolog®) | Insulin aspart/Insulin degludec (Ryzodeg 70/30®) |                                |
| Timolol (Blocadren®)        | Insulin degludec (Tresiba®)   | Insulin detemir (Levemir®)    |                                |
| Verapamil (Calan®, Verelan®) | Insulin glargine (Lantus®, Toujeo®) |                                |                                |

Endocrinology

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|--------------------------------|
| Chlorpropamide (Amaryl®)    | Glimepiride (Amaryl®)         | Ethinyl estradiol (1,2)      | Ibandomonate (Boniva®)         |
| Glipizide (Glucofr®)        | Glyburide (Diabeta®, Micronase®) |                                | Insulin aspart (Novolog®)      |
| Nateglinide (Starlix®)      | Tolbutamide (1,90,95,201)     |                                | Insulin aspart protamine/Insulin aspart (Novolog mix®) |
|                            |                                |                                | Insulin aspart/Insulin degludec (Ryzodeg 70/30®) |
|                            |                                |                                | Insulin degludec (Tresiba®)    |
|                            |                                |                                | Insulin detemir (Levemir®)     |
|                            |                                |                                | Insulin glargine (Lantus®, Toujeo®) |
Endocrinology (cont.)

- **Major gene-drug interaction**
  - Insulin glulisine (Apidra®)
  - Insulin lispro (Humalog®)
  - Insulin lispro protamine/Insulin lispro (Humalog mix®)
  - Insulin NPH (Humulin N®, Novolin N®)
  - Insulin NPH/Insulin regular (Humulin 70/30®, Novolin 70/30®)
  - Insulin regular (Humulin R®, Novolin R®)
  - Insulin regular (oral inhalation) (Afrezza®)
  - Levothyroxine (Levoxy® Synthroid®)
  - Metformin (Fortamet®, Glucophage®)
  - Pamidronate (Aredia®)
  - Risedronate (Actonel®, Atelvia®)
  - Vasopressin (Vasostrict®)

- **Moderate gene-drug interaction**
  - Esomeprazole (Nexium®)
  - Lansoprazole (Prevacid®)
  - Omeprazole (Prilosec®)
  - Pantoprazole (Protonix®)
  - Dexlansoprazole (Dexilant®)
  - Dronabinol (Marinol®, Syndros®)
  - Rabeprazole (Aciphex®)
  - Aprepitant 1, 127 (Cinvanti®, Emend®)
  - Dolasetron 1 (Anzemet®)
  - Fosaprepitant 1, 127 (Emend Injection®)
  - Ondansetron 1, 15, 79, 207 (Zofran®)

- **Minimal gene-drug interaction**
  - Eliglustat 1 (Cerdelga®)
  - Sapropterin (Kuvan®)

- **Limited pharmacogenetic impact**
Genetic disease (cont.)

- Major gene-drug interaction
- Moderate gene-drug interaction
- Minimal gene-drug interaction
- Limited pharmacogenetic impact

- Ivacaftor
  (Kalydeco®)
- Sodium phenylbutyrate
  (Buphenyl®)
- Velaglucerase alfa
  (Vpriv®)

Hematology/Oncology

- Major gene-drug interaction
- Moderate gene-drug interaction
- Minimal gene-drug interaction
- Limited pharmacogenetic impact

- Mercaptopurine
  (Purixan®)
- Bortezomib
  (Velcade®)
- Axitinib
  (Inlyta®)
- Afinitor®
  (Zortress®)
- Erlotinib
  (Tarceva®)
- Gefitinib
  (Iressa®)
- Iแรกosfamide
  (Ilex®)
- Imatinib
  (Gleevec®)
- Irinotecan
  (Camptosar®)

- Buphenyl®
- Velcare®
- Velcade®
- Velcade®
- Velcade®
### Hematology/Oncology (cont.)

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|----------------------------|--------------------------------|-------------------------------|-------------------------------|
| ▶ Ixabepilone 1            |                                 | -                              |                               |
| (Ixempra®)                 |                                 | *                              |                               |
| ◼ Lapatinib 1, 174         |                                 | -                              |                               |
| (Tykerb®)                  |                                 | *                              |                               |
| ◼ Methotrexate 1, 158, 160, 203, 233 |                       | -                              |                               |
| (Rheumatrex®)              |                                 | *                              |                               |
| ◼ Nilotinib 1, 4           |                                 | -                              |                               |
| (Tasigna®)                 |                                 | *                              |                               |
| ◼ Paclitaxel 1             |                                 | -                              |                               |
| (Abraxane®)                |                                 | *                              |                               |
| ◼ Pazopanib 1              |                                 | -                              |                               |
| (Votrient®)                |                                 | *                              |                               |
| ◼ Ponatinib 1              |                                 | -                              |                               |
| (Iclusig®)                 |                                 | *                              |                               |
| ◼ Regorafenib 1            |                                 | -                              |                               |
| (Stivarga®)                |                                 | *                              |                               |
| ◼ Ruxolitinib 1            |                                 | -                              |                               |
| (Jakafi®)                  |                                 | *                              |                               |
| ◼ Sorafenib 1              |                                 | -                              |                               |
| (Nexavar®)                 |                                 | *                              |                               |
| ◼ Sunitinib 1              |                                 | -                              |                               |
| (Sutent®)                  |                                 | *                              |                               |
| ◼ Temsirolimus 1           |                                 | -                              |                               |
| (Torisel®)                 |                                 | *                              |                               |
| ◼ Teniposide 98, 166       |                                 | -                              |                               |
| (Vumon®)                   |                                 | *                              |                               |
| ◼ Trabectedin 1            |                                 | -                              |                               |
| (Yondelis®)                |                                 | *                              |                               |
| ◼ Vemurafenib              |                                 | -                              |                               |
| (Zelboraf®)                |                                 | *                              |                               |
| ◼ Vinorelbine 1            |                                 | -                              |                               |
| (Navelbine®)               |                                 | *                              |                               |

### Immunosuppression

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|-------------------------------|
| ▶ Azathioprine 2, 110, 164, 165 |                                 | -                              |                               |
| (Imuran®)                   |                                 | *                              |                               |
| ◼ Ciclosporine 1            |                                 | -                              |                               |
| (Gengraf®, Neoral®, Sandimmune®) |                         | *                              |                               |
| ◼ Everolimus 1, 204         |                                 | -                              |                               |
| (Afinitor®, Zortress®)      |                                 | *                              |                               |
| ◼ Sirolimus 1               |                                 | -                              |                               |
| (Rapamune®)                 |                                 | *                              |                               |
| ◼ Mycophenolate sodium 1    |                                 | -                              |                               |
| (Myfortic®)                 |                                 | *                              |                               |
Immunosuppression (cont.)

- Major gene-drug interaction
  - Tacrolimus (Prograf®)

- Moderate gene-drug interaction
  - Nelfinavir (Viracept®)
  - Peginterferon alfa-2a-containing regimens (Pegasys®)
  - Peginterferon alfa-2b-containing regimens (Pegintron®)

- Minimal gene-drug interaction
  - Abacavir 1, 2, 43, 115, 116, 120, 121, 171, 195 (Ziagen®)
  - Atazanavir 45, 74 (Reyataz®)
  - Clarithromycin 1, 204 (Biaxin®)
  - Darunavir 1 (Prezista®)
  - Delavirdine 1 (Rescriptor®)
  - Efavirenz 1 (Sustiva®)
  - Erythromycin 204 (E.E.S.®, Ery-Tab®)
  - Fosamprenavir 1 (Lexiva®)
  - Indinavir 1, 204 (Crixivan®)
  - Isavuconazole 1 (Cresemba®)
  - Itraconazole 1 (Onmel®, Sporanox®)
  - Ivermectin 1, 232 (Stromecto®)
  - Ketoconazole 1
  - Maraviroc 1 (Selzentry®)
  - Mefloquine 1 (Lariam®)
  - Nevirapine 1 (Viramune®)
  - Quinidine 1 (Quin-G®)
  - Quinine (Qualaquin®)
  - Ritonavir 1 (Norvir®)
  - Saquinavir 1, 204 (Invirase®)
  - Simeprevir 1 (Olysio®)
  - Atovaquone/Proguanil (Malarone®)
  - Voriconazole (Vfend®)
  - Abacavir 1, 2, 43, 115, 116, 120, 121, 171, 195 (Ziagen®)
  - Atazanavir 45, 74 (Reyataz®)
  - Clarithromycin 1, 204 (Biaxin®)
  - Darunavir 1 (Prezista®)
  - Delavirdine 1 (Rescriptor®)
  - Efavirenz 1 (Sustiva®)
  - Erythromycin 204 (E.E.S.®, Ery-Tab®)
  - Fosamprenavir 1 (Lexiva®)
  - Indinavir 1, 204 (Crixivan®)
  - Isavuconazole 1 (Cresemba®)
  - Itraconazole 1 (Onmel®, Sporanox®)
  - Ivermectin 1, 232 (Stromecto®)
  - Ketoconazole 1
  - Maraviroc 1 (Selzentry®)
  - Mefloquine 1 (Lariam®)
  - Nevirapine 1 (Viramune®)
  - Quinidine 1 (Quin-G®)
  - Quinine (Qualaquin®)
  - Ritonavir 1 (Norvir®)
  - Saquinavir 1, 204 (Invirase®)
  - Simeprevir 1 (Olysio®)
  - Atovaquone (Mepron®)
  - Cefdinir (Omnicef®)
  - Ceftriaxone (Rocephin®)
  - Fluconazole (Diflucan®)
  - Fluocytosine (Ancobon®)
  - Levofolexacin (Levaquin®)
  - Meropenem (Merrem®)
  - Moxifloxacin (Avelox®)
  - Nystatin (Bio-Statin®)
  - Piperacillin (Pipracil®)
  - Posaconazole (Noxafil®)
  - Vancomycin (Vancocin®)
  - Zanamivir (Relenza®)
### Infectious disease (cont.)

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|-------------------------------|-------------------------------|-------------------------------|
| Telithromycin 1 (Ketek®)   | Terbinafine 1 (Lamisil®)      | TPF 1 (Aptivus®)              |                                |

### Neurology

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|-------------------------------|-------------------------------|-------------------------------|
| Brivaracetam (Tegretol®)    | Caffeine 1 (No Dox®, Valparin®) | Dextromethorphan/Quinidine 1 (Nuedexta®) | Gabapentin (Neurontin®) |
| Carbamazepine 6, 29, 30, 62, 105, 117, 125, 128, 138, 149, 153, 157, 178, 230 (Carbatro®) | Elscilcarbazepine 6, 81, 153 (Aptix®) | Donepezil 1 (Aricept®) | Levetiracetam (Keppra®) |
| Clobazam (Onfr®)            | Frovatriptan (Frova®)         | Eletriptan 1 (Relpax®)        | Memantine (Namenda®) |
| Fosphenytoin 2, 6, 21, 28, 117, 139 (Cerebyx®) | Lamotrigine 6, 117, 153 (Lamictal®) | Ethosuximide 10, 150 (Zarontin®) | Pramipexole (Mirapex®) |
| Phenytoin 2, 6, 21, 28, 117, 139 (Dilantin®) | Oxcarbazepine 6, 153 (Trileptal®) | Tetrabenazine 1 (Xenazine®) | Pregabalin (Lyrica®) |

### Psychiatry

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|-------------------------------|-------------------------------|-------------------------------|
| Amitriptyline 1, 2, 56, 218 (Elavil®) | Asenapine 1 (Saphris®) | Alprazolam 1, 204 (Xanax®) | Desvenlafaxine (Pristiq®) |
| Citalopram 2, 7, 18, 41, 55, 59, 60, 61, 65, 85, 86, 101, 104, 107, 119, 124, 128, 136, 146, 152, 155, 222 (Celexa®) | Clozapine 8, 12, 194 (Clozaril®) | Amphetamine/Dextroamphetamine mixed salts 1, 52, 65, 123 (Adderall®) | Lithium (Lithobid®) |
| Clomipramine 2, 57 (Anafranil®) | Duloxetine (Cymbalta®) | Aripiprazole 1, 2 (Abilify®) | Milnacipran (Savella®) |
| Diazepam 68 (Valium®) | Nicotine 33, 37, 77, 130 (Nicoderm C-Q®, Nicorette®, Nicotrol®) | Atomoxetine 1, 2 (Strattera®) | Paliperidone (Invega®) |
| Doxepin 2, 57 (Silenor®) | Olanzapine 2, 103, 114 (Zydis®, Zyprexa®) | Brexiprazole 1 (Rexulti®) | Varenicline (Chantix®) |
| Escitalopram 2, 7, 18, 41, 55, 60, 61, 66, 101, 107, 119, 128, 136, 155, 222 (Lexapro®) | Sertraline 8, 80, 173 (Eldipryl®, Emsam®) | Bupropion (Wellbutrin®) |                                |
| Imipramine 2, 57, 215 (Tofranil®) | Varenicline 1, 2, 139 (Zoloft®) | Buspirone 1, 204, 237 (Buspar®) |                                |
|                            |                               | Cariprazine 1, 3, 19, 31, 133 |                                |
Psychiatry (cont.)

Major gene-drug interaction

- Risperidone (Risperdal®)
- Trimipramine (Surmontil®)

Moderate gene-drug interaction

- Chlorpromazine 1, 148, 190 (Thorazine®)
- Desipramine 1, 2, 57 (Norpramin®)
- Dextroamphetamine 1, 52, 65, 123 (Dexedrine®)
- Flibanserin 1

Limited pharmacogenetic impact

- Fluoxetine 30, 66, 72, 111, 118, 151, 162, 188, 227 (Prozac®, Sarafem®)
- Fluvoxamine 1, 55, 71, 82, 83, 179, 180, 186, 187, 188, 196, 231 (Luvox®)
- Guanfacine 1, 122 (Intuniv®, Tenex®)
- Haloperidol 1, 2, 147, 181, 209 (Haldol®)
- Iloperidone 1 (Fanapt®)
- Levomilnacipran 1 (Fetzima®)
- Lisdexamfetamine 1, 52, 65, 123 (Vyvanse®)
- Lurasidone 1 (Latuda®)
- Mirtazapine 1, 2, 93, 112, 191, 200 (Remeron®)
- Nefazodone 1, 168, 212 (Serzone®)
- Nortriptyline 1, 2, 57, 144, 210 (Pamelor®)
- Paroxetine 1, 2, 55, 70, 84, 131, 156, 170, 188, 202, 226 (Paxil®)
- Perphenazine 1, 143 (Etrafon®)
- Pimozide 1, 209 (Orap®)
- Protriptyline 1 (Vivactil®)
- Quetiapine 1, 11, 91, 204, 208 (Seroquel®)
- Thioridazine 1
- Trazodone 1 (Desyrel®)
- Venlafaxine 1, 2, 213 (Effexor®)
Psychiatry (cont.)

- **Major gene-drug interaction**
  - Vilazodone 1, 17 (Viibryd®)
  - Vortioxetine 1 (Trintellix®)

- **Moderate gene-drug interaction**
  - Abilify MAO Inhibit 30, 191 (Abilify®)

- **Minimal gene-drug interaction**
  - Symbyax 1, 23 (Symbyax®)

- **Limited pharmacogenetic impact**
  - Valproate 1, 17 (Depakene®)

Rheumatology

- **Major gene-drug interaction**
  - Lesinurad 1 (Zurampic®)

- **Moderate gene-drug interaction**
  - Allopurinol 39, 54, 63, 88, 172 (Aloprim®, Zyloprim®)

- **Minimal gene-drug interaction**
  - Cevimeline 1 (Evoxac®)

- **Limited pharmacogenetic impact**
  - Belimumab (Benlysta®)

Sleep medicine

- **Major gene-drug interaction**
  - Ramelteon 1 (Rozerem®)

- **Moderate gene-drug interaction**
  - Armofin 1 (Nuvigil®)

- **Minimal gene-drug interaction**
  - Temazepam 1, 13, 212 (Restoril®)

- **Limited pharmacogenetic impact**
  - Zolpidem 1, 13, 212 (Ambien®)

Urology

- **Major gene-drug interaction**
  - Darifenacin 36, 87 (Enablex®)

- **Moderate gene-drug interaction**
  - Fesoterodine 1 (Toviaz®)

- **Minimal gene-drug interaction**
  - Finasteride 1 (Propecia®, Proscar®)
• Oxybutynin 1
  (Ditropan®, Oxytrol®)
Urology (cont.)

| Major gene-drug interaction | Moderate gene-drug interaction | Minimal gene-drug interaction | Limited pharmacogenetic impact |
|-----------------------------|--------------------------------|-------------------------------|--------------------------------|
| Sildenafil 1                | Tadalafil 1                    | Vardenafil 1                 |                                |
| (Revatio®, Viagra®)        | (Adcirca®, Cialis®)            | (Levitra®)                   |                                |
| Tamsulosin 1               |                                |                               |                                |
| (Flomax®)                  |                                |                               |                                |
| Tolterodine 1              |                                |                               |                                |
| (Detrol®)                  |                                |                               |                                |

Genotype-derived classification of medications is provided as a service by OneOme and is intended solely for use by a medical professional who has reviewed and understands all sections within this report, including possible limitations of the services provided by OneOme. The relationships between the drugs and pharmacogenes annotated in this report are supported by scientific evidence that meets OneOme’s criteria for inclusion. The order in which drugs are listed does not have any clinical or medical implications. Commonly used trade names for medications are listed for reference only. The list may not be inclusive of all trade names available and does not indicate preference or recommendation by OneOme of one medication product over another. For more information on these medications, for a list of additional medications curated but not annotated by OneOme, or to evaluate possible drug-to-drug interactions, please consult the RightMed Advisor, which is accessible through the provider portal at oneome.com.
## Gene and phenotype summary

| Gene        | Genotype     | Phenotype summary / Metabolic status | Description                                                                 |
|-------------|--------------|-------------------------------------|-----------------------------------------------------------------------------|
| CYP1A2      | *1A/*1F      | Rapid                              | Increased activity. Drugs converted to active metabolite(s) may cause side effects or toxicity. Active drugs converted to inactive metabolite(s) may lack efficacy. |
| CYP2B6      | *1/*5        | Intermediate to Normal             | Decreased activity. Drugs converted to active metabolite(s) may have reduced efficacy. Active drugs converted to inactive metabolite(s) may cause side effects or toxicity. |
| CYP2C9      | *1/*3        | Intermediate                        | Decreased activity. Drugs converted to active metabolite(s) may have reduced efficacy. Active drugs converted to inactive metabolite(s) may cause side effects or toxicity. |
| CYP2C19     | *17/*17      | Ultrarapid                          | Increased activity. Drugs converted to active metabolite(s) may cause side effects or toxicity. Active drugs converted to inactive metabolite(s) may lack efficacy. |
| CYP2C Cluster | rs12777823 GG | Normal                              | Normal warfarin clearance associated with CYP2C rs12777823, independent of CYP2C9*2 and *3, CYP2C rs12777823, together with CYP4F2, CYP2C9, and VKORC1, influences response to warfarin therapy. |
| CYP2D6      | *1/*1        | Normal                              | Normal level of activity. Drugs metabolized at a normal rate.               |
| CYP3A4      | *1/*1        | Normal                              | Normal level of activity. Drugs metabolized at a normal rate.               |
| CYP3A5      | *3/*3        | Poor                                | Normal dosing may be required because original dosing guidelines for drugs have been established on patients with poor metabolizer phenotype. |
| CYP4F2      | *1/*1        | Normal activity                     | Normal activity of the CYP4F2 enzyme, which catalyzes the metabolism of vitamin K, in counterpoint to the activity of VKORC1. CYP4F2, together with CYP2C9, VKORC1, and a variant in CYP2C Cluster, influences response to warfarin therapy. |
| COMT        | rs4680 GG    | High activity                       | COMT activity with GG (Val/Val) genotype is predicted to be higher than with AA (Met/Met) or GA (Val/Met) genotypes at rs4680. |
| DPYD        | *1/*1        | Normal risk                         | Normal metabolizer with a dihydropyrimidine dehydrogenase (DPD) activity score of 2. Fully functional DPD enzyme activity. Normal risk of toxicities related to the administration of fluoropyrimidines (5-fluorouracil, capecitabine, and tegafur). |
| DRD2        | rs1799978 GG |                                     |                                                                             |
Reduced response

Genotype is associated with a lower likelihood of improvement in schizophrenia symptoms with risperidone compared to the AA or AG genotypes.

Other clinical and/or genetic factors may influence response.
Gene and phenotype summary (cont.)

| Gene | SNP | Description |
|------|-----|-------------|
| F2   | rs1799963 GG | Normal risk<br>Normal risk of thrombosis associated with Factor II (prothrombin). Other genetic and clinical factors contribute to the risk for thrombosis. |
| F5   | rs6025 GG | Normal risk<br>Normal risk of thrombosis associated with Factor V. Other genetic and clinical factors contribute to the risk for thrombosis. |
| GRIK4| rs1954787 CC | Normal response<br>Genotype predicts a normal response to citalopram in patients with major depressive disorder related to the GRIK4 genotype alone. Other clinical and genetic factors may influence response. |
| HLA-A*31:01 | Positive for | Increased risk<br>Increased risk of carbamazepine-induced hypersensitivity associated with the HLA-A*31:01 allele. Cross-reactivity with oxcarbazepine, eslicarbazepine, phenytoin, fosphenytoin, and lamotrigine cannot be excluded. Hypersensitivity and severe cutaneous reactions may occur regardless of the presence of the HLA-A*31:01 allele, in particular the presence of the HLA-B*15:02 allele has been associated with severe cutaneous reactions induced by certain antiepileptic agents. |
| HLA-B | Negative | Normal risk<br>Negative for the presence of the HLA-B*15:02, HLA-B*57:01, and HLA-B*58:01 alleles. Normal risk of severe cutaneous reactions induced by carbamazepine, oxcarbazepine, eslicarbazepine, phenytoin, fosphenytoin, lamotrigine, and allopurinol. Normal risk of abacavir-induced hypersensitivity reaction. No increased risk of pazopanib-induced severe hepatotoxicity related to HLA-B*57:01 genotype. Hypersensitivity, severe cutaneous reactions, and severe hepatotoxicity may occur regardless of the presence of HLA-B*15:02, HLA-B*57:01, or HLA-B*58:01 alleles, in particular the presence of the HLA-A*31:01 allele has been associated with hypersensitivity reactions induced by carbamazepine and possibly other antiepileptic agents. |
| HTR2A | rs7997012 AA | Intron 2 genotype AA<br>Genotype predicts an increased likelihood of response to citalopram related to the HTR2A genotype alone. Other clinical and genetic factors may influence response. |
| HTR2C | rs3813929 CC | Normal risk<br>Genotype predicts a normal risk of weight gain with clozapine or olanzapine treatment. Other clinical and/or genetic factors may influence response. The HTR2C gene is located on the X chromosome. In patients with only one X, result should read rs3813929 C-. |
| IFNL4 | rs12979860 CT | Reduced response<br>Genotype predicts a reduced likelihood of sustained virologic response (SVR) with peginterferon-containing regimens. |
| NUDT15 | rs116855232 CC | Normal risk<br>No increased risk of severe toxicities with thiopurine administration related to the NUDT15 genotype. Toxicities with thiopurines can also occur due to impaired TPMT activity, regardless of the NUDT15 status. |
### Gene and phenotype summary (cont.)

**OPRM1**
- **GG**
  - **rs1799971**
  - **Asp/Asp isoform**
  - OPRM1 Asp/Asp (GG) genotype associated with decreased sensitivity to the analgesic effects of alfentanil, codeine, fentanyl, morphine, and tramadol compared to patients with the OPRM1 Asn/Asn (AA) and Asn/Asp (AG) genotypes at rs1799971. A class effect association of opioids and OPRM1 genotype has been suggested, however evidence for other opioids is limited. Additional studies are required for specific drug-gene pairs to confirm an association.

**SLC6A4**
- **L/L**
  - **Typical to increased expression**
  - Genotype predicts a typical to increased expression of the SLC6A4 transporter compared to patients with other genotypes. The L/L genotype has been associated with increased likelihood and potentially quicker response to the SSRIs fluoxetine, fluvoxamine, and possibly citalopram and escitalopram. The opposite trend in response has been observed in East Asian populations, showing increased likelihood and potentially quicker response in carriers of the S allele.

**SLCO1B1**
- ***1A/*1A**
  - **Normal risk**
  - Normal function of SLCO1B1. Normal risk of simvastatin-induced myopathy. Likelihood of normal response with pravastatin. Normal risk of methotrexate-induced toxicities when used at high dose.

**TPMT**
- ***1/*4**
  - **Increased risk**
  - Intermediate TPMT metabolizer. Increased risk of myelotoxicity with azathioprine, mercaptopurine, and thioguanine. Toxicities with thiopurines can also occur due to impaired NUDT15 activity independently of the TPMT status.

**UGT1A1**
- ***1/*1**
  - **Normal risk**
  - Normal metabolizer with fully functional UGT1A1 enzyme activity. No increased risk for severe neutropenia while taking irinotecan or for toxicity and/or hyperbilirubinemia while taking atazanavir, nilotinib, pazopanib or belinostat. Consult drug labeling for dosing recommendations.

**VKORC1**
- **rs9923231 GG**
  - **Normal activity**
  - Normal activity of the vitamin K epoxide reductase enzyme, associated with c.-1639GG (rs9923231). VKORC1, together with CYP2C9, CYP4F2, and a variant in CYP2C Cluster, influences response to warfarin therapy.

### CYP phenotype abbreviations
- **PM** Poor metabolizer
- **IM** Intermediate metabolizer
- **NM** Normal metabolizer
- **RM** Rapid metabolizer
- **UM** Ultrarapid metabolizer
Test information

Specimen ID: BU20190100000
Specimen type: Buccal swab
Collection date: 2019-01-12
Receive date: 2019-01-14
Clinical Testing Performed By: OneOme
Lab director: Bronwyn R. Hartung, PhD

Test results

The following analytical results were interpreted by OneOme to produce the pharmacogenomic interpretations and annotations described in the Gene and phenotype summary. Method-specific analytical limitations or inferred haplotypes may limit the ability to produce a definitive phenotype interpretation. See Methodology and limitations and/or the Report and laboratory comments sections for additional information.

**CYP1A2**  *1A/*1F

| rs2069534 | NG_008431.2:g.28338G>A | GG |
| rs2069526 | NM_000761.4:c.-10+103T>G | TT |
| rs12720461 | NM_000761.4:c.-10+113C>T | TT |
| rs35694136 | NM_000761.4:c.-1653delT | CA |
| rs7672551 | NM_000761.4:c.-9.-154C>A | |

**CYP2B6**  *1/*5

| rs3211371 | NM_000767.4:c.1519C>T | CT |
| rs3452724 | NM_000767.4:c.516G>T | GG |
| rs2279343 | NM_000767.4:c.785A>G | AA |
| rs28399499 | NM_000767.4:c.983T>C | TT |

**CYP2C9**  *1/*3

| rs28371685 | NM_000771.3:c.1003C>T | CC |
| rs1057910 | NM_000771.3:c.1073A>C | AC |
| rs56165452 | NM_000771.3:c.1075A>T | TT |
| rs28371686 | NM_000771.3:c.1089C>G | CC |
| rs72585819 | NM_000771.3:c.1190A>C | AA |
| rs1057911 | NM_000771.3:c.1421G>A | AT |
| rs1799853 | NM_000771.3:c.430C>T | CC |
| rs7900194 | NM_000771.3:c.449G>A | GG |
| rs9332131 | NM_000771.3:c.817delA | AA |

**CYP2C19**  *17/*17

| rs12248560 | NM_000771.3:c.3806C>T | TT |
| rs28399504 | NM_000769.2:c.1A>G | AA |
| rs4986893 | NM_000769.2:c.636G>A | GG |
| rs6413438 | NM_000769.2:c.680C>T | CC |
| rs42424285 | NM_000769.2:c.681G>A | GG |

**CYP2C Cluster**  rs12777823 GG

| rs1277723 | NC_000010.10:g.96405920C>A | GG |

**CYP2D6**  *1/*1

| rs1080895 | NM_000105.5:c.-1584C>G | CC |
| rs1085852 | NM_000105.5:c.100C>T | CC |
| rs59421388 | NM_000105.5:c.1012G>A | GG |
| rs72549346 | NM_000105.5:c.1088_1089insGT | -- |
| rs5030962 | NM_000105.5:c.1240G>A | GG |

**DPYD**  *1/*1

| rs5586062 | NM_000110.3:c.1679T>G | TT |
| rs3918290 | NM_000110.3:c.1905+1G>A | GG |
| rs67376798 | NM_000110.3:c.2846 A>T | TT |

**CYP3A4**  *1/*1

| rs76576661 | NM_000106.5:c.1411_1412insTGCCCCACTG | GTGCCACGTGGCCAC |
| rs1135840 | NM_000106.5:c.1457G>C | GG |
| rs201577835 | NM_000106.5:c.181-1ID>C | GG |
| rs769258 | NM_000106.5:c.330C>T | CC |
| rs28371706 | NM_000106.5:c.454delAT | TT |
| rs5030655 | NM_000106.5:c.454delAT | TT |
| rs1372046 | NM_000106.5:c.505G>A | TT |
| rs72549353 | NM_000106.5:c.632_633insG | GG |
| rs59729217 | NM_000106.5:c.972T>C | AA |
| rs83731725 | NM_000106.5:c.985G>A | GG |

**CYP3A5**  *3/*3

| rs4303343 | NM_000106.5:c.1035_1036insT | -- |
| rs776746 | NM_000106.5:c.219_230insT | GG |
| rs10264272 | NM_000106.5:c.624G>A | GG |

**CYP4F2**  *1/*1

| rs210622 | NM_001082.4:c.1297G>A | GG |
| rs4680 | NM_000754.3:c.472G>A | GG |

**COMT**  rs4680 GG

| rs4680 | NM_000754.3:c.472G>A | GG |

**DPYD**  *1/*1

| rs267608319 | NM_000106.5:c.1319G>A | GG |
| rs774671100 | NM_000106.5:c.1319G>A | GG |

Making prescriptions personal.
| rs799978 | NM_000795.3:c.-585A>G | GG |
|----------|------------------------|----|

**DRD2** rs1799978 GG
### Test results (cont.)

| Test | Genotype | Genotype | Genotype |
|------|----------|----------|----------|
| F2   | rs1799963 GG | NUDT15 rs116855232 CC | |
|      | rs179963 NM_000506.4:c.*97G>A | rs116855232 NM_018283.3:c.415C>T | |
| F5   | rs6025 GG | OPRM1 rs1799971 GG | |
|      | rs6025 NM_000130.4:c.1601G>A | rs1799971 NM_000914.4:c.118A>G | |
| GRIK4| rs1954787 CC | SLC6A4 L/L (La/La) | |
|      | rs1954787 NM_001282470.2:c.83-10039T>C | rs774676466 NM_001045.5:c.-1917_-1875del43 | |
|      | HLA-A Positive for *31:01 | | |
|      | HLA00997 NM_002116 (interrogated at exon 2) | rs25531 NM_001045.5:c.-15936A>G | |
|      | HLA-A Negative | SLCQ1B1 *1A/*1A | |
|      | HLA00386 NM_005514 (interrogated at exon 2 and intron 2) | rs4149015 NM_006446.4:c.-910G>A | |
|      | HLA00381 NM_005514 (interrogated at exon 3) | rs2306283 NM_006446.4:c.388A>G | |
|      | rs144012689 NM_005514.7:c.1012+104A>T | rs4149056 NM_006446.4:c.521T>C | |
| HTR2A| rs7997012 AA | TPMT #1/#4 | |
|      | rs7997012 NM_000621.4:c.614-2211T>C | rs1800462 NM_000367.3:c.238G>C | |
|      | HTR2C rs3813929 CC | rs1800460 NM_000367.3:c.400G>A | |
|      | rs3813929 NM_000868.3:c.759C>T | rs1800584 NM_000367.3:c.626-1G>A | |
|      | IFNL4 rs12979860 CT | UGT1A1 #1/#1 | |
|      | rs12979860 NM_001276254.2:c.151-152G>A | rs1448323 NM_001072.3:c.862-6506G>A | |
|      | VKORC1 rs9923231 GG | rs1976391 NM_001072.3:c.862-9697A>G | |
|      | rs9923231 NM_001311311.1:c.-16930G>A | AA | |
Methodology and limitations

Analytical results were produced using tests developed and validated by OneOme, LLC, a clinical laboratory located at 807 Broadway Street NE Suite 100, Minneapolis, MN 55413. These tests have not been cleared or approved by the U.S. Food and Drug Administration. OneOme is certified under CLIA-88 and accredited by the College of American Pathologists as qualified to perform high-complexity testing. This test is used for clinical purposes and should not be regarded as investigational or for research.

Genomic DNA was analyzed by PCR using Thermo Fisher TaqMan® and/or LGC Biosearch BHQ® probe-based methods to interrogate the variant locations listed in the Test results table above. In addition, CYP2D6 copy number status was assessed at sites within the promoter, intron 2, intron 6, and exon 9. The test detects CYP2D6 deletions, duplications/multiplications, and hybrid alleles, but cannot differentiate duplications in the presence of a deletion.

Haplotypes, or combinations of inherited variants on a chromosome, are annotated according to legacy nomenclature for the genes and alleles in the table below. Less frequent haplotypes or novel alleles may be reported when appropriate.

| CYP1A2 | *1C, *1D, *1E, *1F, *1J, *1K, *1L, *1V, *1W |
| CYP2B6 | *4, *5, *6, *7, *9, *16, *18 |
| CYP2C9 | *2, *3, *4, *5, *6, *8, *11 |
| CYP2C19 | *2, *3, *4, *4B, *10, *17 |
| CYP2D6 | *2A, *2, *3, *4, *4D, *4M, *4N, *5, *6, *6C, *7, *9, *10, *12, *13, *14A, *14B, *15, *17, *18, *19, *29, *31, *34, *35, *36, *39, *41, *42, *59, *61, *63, *64, *68, *69, *70, *91, *109 |
| CYP3A4 | *1B, *22 |
| CYP3A5 | *3, *6, *7 |
| CYP4F2 | *3 |
| DPYD | *2A, *13 |
| SLC01B1 | *5, *15, *17, *21 |
| TPMT | *2, *3A, *3B, *3C, *4 |
| UGT1A1 | *6, *28 |

The test does not detect all known and unknown variations in the gene(s) tested, nor does absence of a detectable variant (designated as *1 for genes encoding drug metabolizing enzymes) rule out the presence of other, non-detected variants.

As with other common SNP genotyping techniques, these assays cannot differentiate between the maternal and paternal chromosomes. In cases where observed variants are associated with more than one haplotype, OneOme infers and reports the most likely diplotype based on published allele frequency and/or ethnicity data. Inferences with potential clinical impact are reported in the Report and laboratory comments section.

The variant detection methods validated by OneOme provide >99.9% accuracy; however, PCR may be subject to general interference by factors such as reaction inhibitors and low quality or quantity of extracted DNA. When present, these interferents typically yield no result rather than an inaccurate one. Very infrequent variants or polymorphisms occurring in primer- or probe-binding regions may also affect testing and could produce an erroneous result or assay failure. Variant locations tested by the assay but not assigned a genotype call are reported as “No Call.” Test results and clinical interpretation may be inaccurate for individuals who have undergone or are receiving non-autologous blood transfusions, tissue, and/or organ transplant therapies. Although extremely rare, results could also be impacted by other factors not addressed above, such as laboratory error.

Due to the complexity of interpreting some genetic test results, such as those that may carry a probabilistic risk of disease, patients and providers should consider the benefits of consulting with a trained genetic counseling professional, physician, or pharmacogenomic specialist. Patients and providers are also encouraged to visit oneome.com to explore the tools and resources available to help understand these test results. For additional support, contact OneOme through the website or by calling 844-663-6635.
OneOme liability disclaimer

The interpretations and clinical annotations provided by OneOme are intended solely for use by a medical professional and do not constitute medical advice by OneOme. The treating provider remains ultimately responsible for all diagnosis and treatment decisions for the patient. OneOme disclaims liability for any errors, omissions or ambiguities in any translation or interpretation of a report by a third party, including without limitation direct, indirect, incidental, special, consequential or exemplary damages, whether such damages arise in contract, negligence, tort, under statute, in equity, at law or otherwise. Information included in this report is based upon scientific literature and does not take into account other genetic variants and environmental or social factors that may affect a patient's response. Other factors not included in this report include, but are not limited to, environmental factors (e.g., smoking), health factors (e.g., diet), social and familial factors, various medical conditions, and drug-to-drug interactions. Administration of any medication, including the ones listed in the OneOme reports, requires careful therapeutic monitoring regardless of the phenotype or genotype-predicted interaction reported. As a matter of practice, OneOme will routinely update its pharmacogenomic database as new information becomes available to the scientific community. Genotype-predicted interactions and annotations found on the patient's RightMed comprehensive test report, RightMed Advisor reports, or RightMed specialty reports are therefore dependent on the date of generation and/or the database version used to generate that report. Providers may access these reports with updated annotations using OneOme’s latest released version through the provider portal at portal.oneome.com.
References

100. Klepstad P, Rakvåg TT, Knasa S, et al. Acta Anaesthesiol Scand. 2004;48(10):1323–9.
101. Kraft J, Peters E, Slager S, et al. Biol Psychiatry. 2007;61(6):734–42.
102. Kuj A, Zandvliet ML, Keelen SL, et al. Br J Clin Pharmacol. 2017;83(2):294–313.
103. Laia B, Leucht S, Heres S, et al. Pharmacogenomics J. 2010;10:20–29.
104. Laj A, Perlis RH, Rush AJ, et al. Psychiatr Serv. 2009;60(11):1446–57.
105. Leckband SG, Kelsey JR, Dunnenberger HM, et al. Clin Pharmacol Ther. 2013;94(3):324–8.
106. Lee MG, Kim HJ, Lee KH, et al. Korean J Pain. 2016;29(1):34–9.
107. Lewis G, Mulligan J, Wiles N, et al. Br J Psychi. 2011;198(6):646–71.
108. Li Y, Coller JK, Hutchinson MR, et al. Drug Metab Dispos. 2013;41(6):1264–72.
109. Li Y, Jackson KA, Shon B, et al. Br J Clin Pharmacol. 2015;80(2):276–84.
110. Liang JJ, Geske JR, Bosiljan BA, et al. Pharmacogenet Genomics. 2013;23(12):658–655.
111. Lim S, Won H, Kim H, et al. PLoS ONE. 2014;9(9):e107098.
112. Lind AB, Reis M, Bengtsson F, et al. Clin Pharmacokinet. 2009;48(1):63–70.
113. Liu YC, Wang WS. Cancer. 2012;118:1718–25.
114. Ma X, Manmaitiviettai T, Zhang R, et al. Int J Psychiatry Clin Pract. 2014;18(4):229–42.
115. Mallal S, Nolan D, Witt C, et al. Lancet. 2002;359(9308):727–32.
116. Mallal S, Phillips E, Curvo G, et al. N Engl J Med. 2008;358(6):568–79.
117. Man CB, Kwan P, Baum L, et al. Epilepsia. 2007;48(5):1015–18.
118. Manoharan A, Shewade D, Rajkumar R, et al. Eur J Clin Pharmacol. 2016;72(10):1215–20.
119. Maron E, Tamjiste A, Kallassalu K, et al. Eur Neuropsychopharmacol. 2009;19(6):451–6.
120. Martin MA, Hoffman JM, Freimuth RR, et al. Clin Pharmacol Ther. 2014;95(5):499–500.
121. Martin MA, Klinn TE, Dong BJ, et al. Clin Pharmacol Ther. 2012;91(4):734–8.
122. Martinez-Raga J, Knecht C, de Alvaro R. Neuropsychiatr Dis Treat. 2015;11:1359–70.
123. Matiy V, Goldberg TE, Feir F, et al. Prox Natl Acad Sci U S A. 2003;100(10):6186–91.
124. McMahon FF, Buervenich S, Chanrey D, et al. Am J Hum Genet. 2006;78(5):804–14.
125. Meng H, Ren J, Lu Y, et al. Neurology Asia. 2011;16(1):39–45.
126. Milovanovic D, Radiosavljevic I, Radiosavljevic M, et al. Serbian J Exp Clin Res. 2015;16(2):93–9.
127. Morohashi S, Min Y, Hori K, et al. Bio Pharm Bull. 2013;36(4):676–81.
128. Muezek D, Rush A, Biermack J, et al. Am J Med Genet B Neuropsychiatr Genet. 2009;150B(3):341–51.
129. Murray AF, Gong L, Johnson SG, et al. Clin Pharmacol Ther. 2014;95(2):141–6.
130. Munafò M, Johnstone E, Guo B, et al. Pharmacogenet Genomics. 2008;18(2):121–8.
131. Murphy G, Hollander S, Rodrigues H, et al. Arch Gen Psychiatry. 2004;61(1):1163–9.
132. Munch Q, Aal A, Margoo M, et al. J Affect Disord. 2012;136(3):955–62.
133. Nakamura T, Kubota T, Iwakai A, et al. Drug Des Devel Ther. 2016;10:327–38.
134. Nattomi Y, Tanahashi S, Kayama A. Xenobiotica. 2004;34(5):415–27.
135. Ng C, Eastral S, Tan S, et al. Prog Neuropsychopharmacol Biol Psychiatry. 2008;32(5):953–7.
136. Ng C, Saini J, Singh A, et al. Hum Psychopharmacol. 2013;28(5):516–22.
137. Niemi M, Neuvonen PJ, Hofmann U, et al. Pharmacogenet Genomics. 2003;5(5):303–9.
138. Nihara H, Kakuma T, Fujita Y, et al. J Dermatol. 2012;39(7):594–601.
139. Ninema Y, Saito T, Takahashi M, et al. Pharmacogenomics J. 2014;14:107–14.
140. Ohashi RS, Cox LM, Tremaine LM. Drug Metab Dispos. 2005;33(2):262–70.
141. Oda Y, Hamasaka N, Hirots T, et al. Br J Clin Pharmacol. 2001;51(3):281–5.
142. Oertel BG, Schmidt R, Schneider A, et al. Pharmacogenet Genomics. 2006;16(9):625–36.
143. Olson OV, Linnet K. Br J Clin Pharmacol. 2000;50(6):563–571.
144. Olson OV, Linnet K. Drug Metab Dispos. 1997;25(6):740–44.
145. Orlando R, Piccoli P, De Martin S, et al. Clin Pharmacol Ther. 2004;75(1):80–8.
146. Padlock S, Laj A, Charney D, et al. Am J Psych. 2007;164:1181–8.
References (cont.)

167. SHARQ Collaborative Group; Link E, Parish S, et al. Neur J Mol. 2008;359(7):879-99.
168. Sato T, Nakada N, Ueda N, et al. Clin Pharmacol Ther. 2006;79(5):599-60.
169. Serretti A, Cusin C, Rossini D, et al. Am J Med Genet. 2004;128B(1):36-40.
170. Serretti A, Zanardi R, Rossini D, et al. Mol Psychiatry. 2001;6(5):586-92.
171. Shimoda K, Somaya T, Morita S, et al. Progress Neuropsychopharmacol Biol Psychiatry. 2001;25(3):587-90.
172. Parvin E, Wijman P, De Vries C, et al. Br J Clin Pharmacol. 1997;44(6):557-64.
173. Phillips EJ, Slager SL, Jenkins GD, et al. Pharmacogenet Genomics. 2009;19(1):1-10.
174. Phelan EP, Skaasen C, Wiel-Carrillo M, et al. Clin Pharmacol Ther. 2018;105(2):150-62.
175. DOI:10.1002/cpt.1004
176. Phammasone A, Kharasch ED. Clin Pharmacol Ther. 2001;70(6):505-17.
177. Rassner M, Rassner EJ, Ooteman -52.
178. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
179. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
180. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
181. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
182. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
183. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
184. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
185. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
186. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
187. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
188. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
189. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
190. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
191. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
192. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
193. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
194. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
195. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
196. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
197. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
198. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
199. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
200. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
201. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
202. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
203. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
204. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
205. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
206. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
207. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
208. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
209. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
210. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
211. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
212. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
213. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
214. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
215. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
216. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
217. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
218. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
219. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
220. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
221. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
222. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
223. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
224. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
225. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
226. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
227. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.
228. Rausch M, Siskind M, et al. Neuropsychopharmacol Clin Life Ther. 2000;38(6),461.