

# Pharmacogenetics (PGx)

## A General Practitioner's Guide

Pharmacogenetics (PGx), an important part of precision medicine, is the study of how genetic variability influences drug treatment outcomes. Recommended by Guidelines, pharmacotherapeutic genotyping is one of multiple pieces of information that clinicians should consider when making their therapeutic choice for each patient.

### Pharmacogenetic (PGx) Testing with Clinical Labs

Clinical Labs' **Comprehensive PGx Gene Panel** provides clinicians and healthcare providers with comprehensive information to help determine the most appropriate treatment for each individual, particularly in areas such as mental health, pain management, cardiology and oncology. For example, *CYP2D6*, *CYP2C19*, *CYP2C9*, and *SLCO1B1* variants are responsible for the metabolism of a large number of commonly prescribed medications, including warfarin, analgesics, clopidogrel, codeine, tamoxifen, some antidepressants, statins, proton pump inhibitors (PPIs) and anti-emetics. Our Comprehensive PGx Gene Panel can detect polymorphisms in genes coding for drug metabolising enzymes that predispose individuals to metabolising drugs inadequately. *To view our full pharmacogenetics offering, scan the QR code below.*

Genes included in our Comprehensive PGx Panel	
<i>CYP2D6</i>	<i>CYP2C9</i>
<i>CYP2C19</i>	<i>CYP3A4</i>
<i>CYP3A5</i>	<i>CYP1A2</i>
<i>SLCO1B1</i>	<i>VKORC1</i>

*To view a listing of the genes tested and examples of drugs metabolised as part of our Comprehensive PGx Gene Panel, please see the reverse of this flyer.*

### Your Comprehensive Report

With our Comprehensive PGx Gene Panel, you will receive a comprehensive report that will indicate the genotype and the predicted phenotypes, such as the metaboliser status, along with potential drug-gene interactions and Guidelines' recommendations. Please specify any medications of interest if you want them to be included in the report. The genes can be ordered separately or together - for individual genes, only genotyping/phenotyping will be reported.

### When to order

Physicians may order pharmacogenetic testing at the time of drug prescribing and dispensing for patients with genotypes that require action, such as dose reductions. The preemptive use of testing could significantly optimise drug outcomes and be particularly useful for patients undergoing multiple treatments or experiencing poor drug responses.

### How to order our Comprehensive PGx Gene Panel

- **What to put on the request form:** Fill out our routine Clinical Labs request form, list the gene required or group of genes and prescribed medications if available.
- **Turnaround time:** Results available 2-3 weeks after the sample receipt date.
- **Specimen details:** 2x EDTA blood samples.
- **Test cost:** An out-of-pocket fee applies. For more information, including pricing, scan the QR code or visit [clinicallylabs.com.au/pharmacogeneticstesting](https://clinicallylabs.com.au/pharmacogeneticstesting)



# Comprehensive Pharmacogenetic (PGx) Testing Gene Panel

## Examples of drugs metabolised and genes tested

Medication	Gene(s)
<b>Cardiology</b>	
Carvedilol	CYP2D6
Clopidogrel	CYP2C19
Flecainide	CYP2D6
Metoprolol	CYP2D6
Warfarin	VKORC1, CYP2C9
<b>Lipid Lowering Medication</b>	
Atorvastatin	SLCO1B1, CYP3A4
Fluvastatin	SLCO1B1, CYP2C9
Lovastatin	SLCO1B1
Pitavastatin	SLCO1B1
Pravastatin	SLCO1B1
Rosuvastatin	SLCO1B1
Simvastatin	SLCO1B1
<b>Gastroenterology</b>	
<b>Anti-Emetic</b>	
Metoclopramide	CYP2D6
Ondansetron	CYP2D6
Tropisetron	CYP2D6
<b>Proton Pump Inhibitors</b>	
Esomeprazole	CYP2C19
Lansoprazole	CYP2C19
Omeprazole (Losec)	CYP2C19
Pantoprazole	CYP2C19
Rabeprazole	CYP2C19
<b>Mental Health</b>	
<b>Anti-ADHD</b>	
Atomoxetine	CYP2D6
Dextroamphetamine	CYP2D6
Lisdexamfetamine	CYP2D6
<b>Anti-Depressants (MOAs)</b>	
Moclobemide	CYP2C19
<b>Anti-Depressants (SNRIs)</b>	
Venlafaxine	CYP2D6
<b>Anti-Depressants (SSRIs)</b>	
Citalopram	CYP2C19
Escitalopram	CYP2C19
Fluoxetine (Prozac)	CYP2D6
Fluvoxamine	CYP2D6
Paroxetine	CYP2D6
Sertraline (Zoloft)	CYP2C19

Medication	Gene(s)
<b>Mental Health</b>	
<b>Anti-Depressants (TCAs)</b>	
Amitriptyline	CYP2D6, CYP2C19
Clomipramine	CYP2D6, CYP2C19
Desipramine	CYP2D6, CYP2C19
Dosulepin	CYP2D6, CYP2C19
Doxepin	CYP2D6, CYP2C19
Imipramine	CYP2D6, CYP2C19
Nortriptyline	CYP2D6
Trimipramine	CYP2C19
<b>Anti-Depressants (Other)</b>	
Vortioxetine	CYP2D6
<b>Anti-Psychotics</b>	
Aripiprazole	CYP2D6
Brexpiprazole	CYP2D6
Chlorpromazine	CYP2D6
Haloperidol	CYP2D6
Olanzapine	CYP1A2
Quetiapine	CYP3A4
Risperidone	CYP2D6
Zuclopenthixol	CYP2D6
<b>Benzodiazepines (Anxiolytics)</b>	
Clobazam	CYP2C19
Diazepam (Valium)	CYP2C19

Please note that this is a guide for gene selection. Some specific medications may not be reported if they are listed under a drug class that is metabolised by the relevant gene.

Medication	Gene(s)
<b>Neurology</b>	
<b>Anti-Dementia</b>	
Donepezil	CYP2D6
Galantamine	CYP2D6
<b>Anti-Epileptics</b>	
Phenytoin/ Fosphenytoin	CYP2C9
<b>Multiple Sclerosis</b>	
Siponimod	CYP2C9
<b>Oncology</b>	
Gefitinib	CYP2D6
Tamoxifen	CYP2D6
<b>Organ Transplant</b>	
Tacrolimus	CYP3A5
<b>Pain Management</b>	
<b>NSAIDs</b>	
Celecoxib	CYP2C9
Flurbiprofen	CYP2C9
Ibuprofen	CYP2C9
Piroxicam	CYP2C9
Meloxicam	CYP2C9
<b>Opioids</b>	
Codeine (prodrug)	CYP2D6
Dihydrocodeine	CYP2D6
Tramadol	CYP2D6
<b>Urology</b>	
Darifenacin	CYP2D6
Mirabegron	CYP2D6
Tamsulosin	CYP2D6
Tolterodine	CYP2D6
<b>Anti-Fungal</b>	
Voriconazol	CYP2C19

### About the author:



**Assoc. Prof. Mirette Saad**  
MBBS (HONS) MD (HONS) MAACB FRCPA PHD

*National Director of Molecular Genetics  
Australian Clinical Labs*

**Lab:** Clayton (Vic)

**Speciality:** Chemical Pathology

**Areas of Interest:** Molecular genetics, precision medicine, cancer genetics, antenatal screening, NIPT, endocrine, fertility testing and research, medical teaching

**Phone:** (03) 9538 6777

**Email:** mirette.saad@clinicallabs.com.au