# myDNA Pharmacogenomic (PGx) Medications Test
Clinician FAQs

## The Science and Mechanism

### What is pharmacogenomics (PGx)?

Pharmacogenomics (PGx) is the study of how genetic variations influence an individual's response to medications.

It enables clinicians to test for specific genetic changes that affect how a person metabolises and responds to certain medications.

### How does genetics influence drug response?

- Drug response is highly variable. While factors like age, weight, and renal function matter, an individual's genetics can also influence drug exposure and action.
- The liver metabolises drugs via specific enzymes (such as the CYP450 family) that are encoded by CYP genes. Often, the gene and the enzyme share the same name (e.g., the CYP2D6 gene encodes the CYP2D6 enzyme).
- Genetic variations in these genes can result in the activity of the encoded enzyme to increase or decrease, resulting in enzymes that work too slowly, too quickly or not at all.
- Genetic variations can also affect drug transporters (e.g. SLCO1B1), which control how drugs enter and exit various cells. For example, a reduction in function in the SLCO1B1 encoded drug transporter can prevent statins from entering the liver cells to be metabolised, raising the blood concentrations of the statin and increasing the risk of statin-induced myopathy.

### What is the "Metaboliser" Status of an enzyme?

We assign a metaboliser status per drug metabolising enzyme based on the genetic variations detected following a pharmacogenomic test.

The metaboliser status has different effects on **Active drugs* (works immediately)** and **Pro-drugs^ (needs activation in the body)**.

The table below provides a summary of the common metaboliser statuses encountered of drug metabolising enzymes and their effect on active and pro-drugs:

| Metaboliser Status (predicted phenotype) | Enzyme Activity | Predicted Effect on Active Drugs* (e.g., SSRIs) | Predicted Effect on Pro-drugs^ (e.g., Codeine) |
|---|---|---|---|
| Poor | Absent / Minimal | **Side Effects and Toxicity:** Impaired clearance leads to drug accumulation and increased risk of adverse effects and toxicity. | **Lack of Treatment Response:** Reduced conversion to active metabolite results in poor efficacy. |
| Intermediate | Reduced | **Increased Risk of Side Effects:** Slower metabolism may necessitate lower-than-standard dosing. | **Sub-therapeutic Response:** Reduced conversion rate may limit clinical benefit. |
| Normal | Standard | **Expected Response:** Standard metabolism rate; conventional dosing typically applies. | **Expected Response:** Standard conversion rate; conventional dosing typically applies. |
| Rapid / Ultrarapid | Increased | **Lack of Treatment Response:** Rapid clearance may prevent drugs from reaching therapeutic levels. | **Risk of Toxicity:** Accelerated conversion causes a rapid increase in active metabolite levels. |

*Active Drugs: Medications that exert a therapeutic effect in their ingested form and require enzymes primarily for inactivation and clearance.
^Prodrugs: Pharmacologically inactive compounds that require enzymatic conversion (bioactivation) within the body to become therapeutically active.

## What is the relationship between an allele, genotype and phenotype?

- **Allele:** A specific variant form of a gene.
- **Genotype:** This is the combination of the two (or more) inherited alleles (e.g., CYP2C19 *1/*17).
- **Phenotype:** This is the predicted function of the gene based on the genotype result —for example, the speed at which the patient metabolises medications (e.g., Rapid Metaboliser).

## What is the phenotype frequency of key drug metabolising enzymes in the Australian population?

Genetic variability in drug metabolism is common within the Australian population. An Australian study[1] of 5,408 patients who underwent PGx testing demonstrated notable variation in key drug-metabolising enzymes. For example, approximately 6% of individuals were poor metabolisers (PMs) for CYP2D6, while 30% were rapid or ultrarapid metabolisers (RMs/UMs) for CYP2C19.

The phenotype frequencies of CYP2D6, CYP2C19 and CYP2C9 enzymes are summarised in the table below:

| ENZYME | POOR METABOLISER | INTERMEDIATE METABOLISER | NORMAL METABOLISER | RAPID METABOLISER | ULTRARAPID METABOLISER |
|---|---|---|---|---|---|
| CYP2D6 | 5.7% | 37.6 | 53.2 | - | 2.8% |
| CYP2C19 | 3.1% | 26.9% | 39.7 | 25.8 | 4.2% |
| CYP2C9 | 4.2% | 31.0% | 64.8 | - | - |

**INCREASING ENZYME ACTIVITY**

[1] Mostafa S, Kirkpatrick CMJ, Byron K, Sheffield L. An analysis of allele, genotype and phenotype frequencies, actionable pharmacogenomic (PGx) variants and phenoconversion in 5408 Australian patients genotyped for CYP2D6, CYP2C19, CYP2C9 and VKORC1 genes. J Neural Transm (Vienna). 2019 Jan;126(1):5-18.

# Indications for Testing

## Which patients could benefit from pharmacogenomic testing?

Testing is beneficial for any patient commencing a medication that has a reliable PGx test available. However, it is particularly useful for addressing specific clinical challenges, including:

- A history of 'sensitivity' to medications.
- Experiencing significant side-effects.
- Poor therapeutic response to medications.
- Taking multiple medications.
- Potential suitability for using doses outside the usual range.

## Why is PGx testing particularly helpful to guide prescribing of psychotropic medications in treating mental health conditions?

Pre-emptive PGx testing is helpful for patients commencing psychotropic medications.

- **Reduces Trial and Error:** Antidepressants often have a long lag time beforethey have provide the desired therapeutic effect. Knowing a patient's metabolic status before prescribing helps avoid months of ineffective treatment.
- **Better Management:** Selecting a PGx guided medication from the start may improve compliance and treatment outcomes.

# The Test: Scope and Reports

## What is the myDNA Multiple Category Medication Pharmacogenomic Test and which genes does it test?

The myDNA Multiple Category Medication Pharmacogenomic test analyses common genetic variations that influence how a patient processes a wide range of medications, including: psychotropics, analgesics, cardiovascular, and gastrointestinal medications.

**Genes Analysed:** The test examines a specific panel of pharmacogenes:

- Genes encoding Drug-Metabolising Enzymes:
    - *CYP2D6, CYP2C19, CYP2C9, CYP3A4, CYP3A5, and CYP1A2, CYP2B6*
- Genes encoding Transporters & Receptors:
    - *SLCO1B1* (Statin myopathy (muscle pain) risk.)
    - *VKORC1* (Warfarin sensitivity and dosing)
    - *OPRM1* (Opioid sensitivity)
    - *ABCG2* (Drug transport and clearance)

## What is the myDNA Mental Health Medication Pharmacogenomic Test and which genes does it test?

The myDNA Mental Health Medication Pharmacogenomic test is a targeted pharmacogenomic test designed to to guide the prescribing of psychotropic medications. It identifies genetic variations that influence how a patient metabolises and responds to antidepressants, antipsychotics, and other mental health medications.

**Genes Analysed:** The test analyses a specific panel of genes relevant to the metabolism of psychotropic medications:

- Genes encoding Drug-Metabolising Enzymes:
    - *CYP2D6, CYP2C19, CYP2C9, CYP3A4, CYP1A2, CYP2B6*

## What information does the myDNA PGx medication report provide?

The myDNA PGx medication report translates complex genetic data into practical, actionable recommendations. It is designed to be easily navigated by the requesting clinician, consisting of six key sections:

1. **Medications of Interest:** If a patient's current medication list is provided, the report opens with a targeted summary of prescribing considerations specific to those medications, flagging any specific clinical recommendations.
2. **Personalised Medication Guide:** This is a quick-reference tool that categorises all medications covered by the test based on the level of clinical significance. It allows for a rapid assessment of the results, enabling the immediate identification of medications requiring specific considerations (Major/Minor) versus those that can be prescribed as per usual.
3. **Genetic Test Results Summary:** A concise table presenting the patient's specific genotypes for the relevant genes.
4. **Actionable Medication Tables:** Detailed tables arranged by prescribing category:
    - **MAJOR:** Significant prescribing changes recommended (e.g., avoid drug or reduce dose).
    - **MINOR:** Caution or monitoring recommended.
    - **USUAL:** Standard prescribing guidelines apply.

5. **Detailed Pharmacogenomic Results:** An in-depth explanation of the genotype results, explaining why a specific recommendation is made (e.g., describing the predicted effect on drug exposure or response).

6. **References:** A list of the key peer-reviewed literature and guidelines (CPIC, DPWG) used to generate the recommendations.

**Clinical Value:**

This structured approach helps you to:

- Pre-emptively predict a patient's response.
- Facilitate personalised prescribing.
- Improve the chance of therapeutic success.
- Reduce the risk of adverse effects.

## Is PGx testing evidence-based?

Yes. PGx is based on a growing body of randomised controlled trials (RCTs) and international guidelines that are routinely published in peer reviewed journals. Key resources include:

- **CPIC** (Clinical Pharmacogenetics Implementation Consortium).
- **DPWG** (Dutch Pharmacogenetics Working Group).
- **CPIC** and **DPWG** International Guidelines are accessible at www.clinpgx.org
- **FDA Table of Pharmacogenetic Associations** (lists gene-drug pairs with prescribing information) Visit: https://www.fda.gov/medical-devices/precision-medicine/table-pharmacogenetic-associations).
- **The Royal College of Pathologist of Australia (RCPA)**, in collaboration with other professional bodies, has developed indications for PGx Testing to support clinicians. https://www.rcpa.edu.au/Library/Practising-Pathology/Pharmacogenomic-Indications-in-Australia.
- **The Lancet** in 2023, found that using pharmacogenomics to guide prescribing reduced clinically relevant adverse drug reactions by 30%. https://pubmed.ncbi.nlm.nih.gov/36739136/.
- A recent meta-analysis reviewed **13 Randomised Controlled Trials (RCTs)** and showed that patients prescribed medications with PGx guidance were 1.41 times more likely to achieve symptom remission in major depression vs those with unguided therapy. https://pubmed.ncbi.nlm.nih.gov/36111494/.

## Are the results relevant for all medications?

The test provides useful guidance for many medications used in clinical practice, but not all. Some medications do not yet have a reliable genetic test to inform prescribing. For a full list of covered medications, please email help@mydna.life.

## How accurate is the test?

Testing is performed in a NATA-accredited laboratory, adhering to rigorous quality assurance protocols to ensure high reliability and validity. All reports and clinical recommendations are developed in strict accordance with internationally recognised pharmacogenomic guidelines.

## Should testing be repeated when a new drug is prescribed?

Typically, no. A patient's genetic result does not change over their lifetime. A single test can guide both current and future prescriptions involving the analysed genes. However, as new genetic markers are discovered, future testing may be warranted to cover additional genes or medications.

## Is the Multiple Category and Mental Health tests covered by Medicare or private health insurance?

Currently, there is no Medicare rebate available for these two PGx tests in Australia. However, some patients may be eligible for coverage through private health insurers such as Bupa or Medibank, depending on their policy level. Additionally, reimbursement may be possible through WorkCover or DVA in specific circumstances.

## Do I need to change a medication if the patient is stable on it, but it appears in the Red or Orange section?

Typically, no. The myDNA PGx report is a clinical decision support tool designed to guide prescribing, but it should not override your clinical judgment.

- If a patient has been stable on a medication for years (such as an SSRI), is tolerating it well without side effects, and is achieving the desired therapeutic outcomes, there is usually no need to adjust the dose or switch medications based solely on the PGx results.
- A "Red" or "Orange" categorisation indicates a genetic predisposition to altered drug response. If the patient is stable, they may have already overcome this risk through empirical dose adjustments made over the years, or due to other clinical factors.

## What if I need support with the report or have a specific question related to testing or results?

myDNA provides dedicated, ongoing support for practitioners through our expert Clinical Team. Whether you need help interpreting a complex PGx report or understanding the clinical application of PGx, the clinical team is available to assist you.

**Our Clinical Team Includes:**

- Clinical Pharmacists
- Clinical Pharmacologists
- Clinical Geneticists

**How to Reach Us:**

- **Phone:** 1300 436 373
- **Email:** clinical@mydna.life

**Additional Practitioner Resources:** In addition to direct clinical support, practitioners have access to downloadable resources designed to assist with patient consultations. These include the myDNA Medication List, Doctor's Overview, and Patient Education guides, all available via the myDNA Practitioner Resource Centre via: https://www.mydna.life/pgx-resource-centre/.

# Logistics: Ordering and Cost

## How to Order the Test?

There are two equally reliable methods for sample collection: a Buccal Swab (Home Kit) or a Blood Sample (Pathology Collection).

**Option 1: Buccal Swab (Home Collection)**

This option allows the patient to collect the sample in the comfort of their own home.

1. **Download Form:** Download the myDNA PGx Medication Test Request Form here:
2. **Select Test:** Indicate the preferred test on the form.
3. **Patient Payment:** The request form includes a QR code. Instruct the patient to scan this code to securely purchase the test/buccal kit.
4. **Kit Delivery & Registration:** The kit is mailed directly to the patient. During online registration, the patient designates you as their nominated doctor.
5. **Sample Collection:** The patient performs the simple cheek swab at home and returns it to the laboratory using the enclosed reply-paid envelope.
6. **Results:** Results are released to you, and the patient is notified via email to schedule a follow-up consultation.

**Option 2: Blood Sample (Pathology Collection)**

You can order the test using standard pathology request forms from our partners.

1. **Request the Test:** Simply write "myDNA PGx test" on a standard request form from Genomic Diagnostics or 4Cyte Pathology.
    - *Genomic Diagnostics brands include: Laverty, Dorevitch, QML, Western, Abbott, and TML Pathology.*
2. **Collection:** The patient attends any accepted collection centre across Australia for a standard blood draw.

## What is the cost?

- myDNA Multiple Category Pharmacogenomic Test: $198
- myDNA Mental Health Pharmacogenomic Test: $149

*Note:* The cost remains the same regardless of the sample collection method (blood or buccal).

**Private Health & Rebates**: There is currently no Medicare rebate. However, funding is available for eligible patients through:

- Bupa: Supported via the Blua platform.
- Medibank: Rebates available for eligible members (*refer to How to Claim*).

## What is the Turnaround Time?

Results are available within 7–10 working days from sample receipt at our Melbourne-based, NATA-accredited laboratory.

**What is Result Delivery Method:**

Results are securely delivered via the myDNA provider portal, Healthlink, or encrypted email, ensuring immediate and confidential access.

## Are results more accurate with a blood test compared to a buccal swab?

No. The final genetic results are exactly the same, whether the DNA is collected via a blood sample or a buccal (cheek) swab. Neither method is more accurate than the other.

- **Identical DNA:** A person's DNA is exactly the same in their cheek cells as it is in their white blood cells.
- **Equally Reliable:** Once the laboratory extracts the DNA from the sample, the analysis process is identical, yielding the exact same results.
- **Sufficient Quantity:** While a blood draw can sometimes provide a larger volume of DNA, modern laboratory techniques ensure that a simple, properly collected cheek swab provides more than enough high-quality DNA for our PGx testing.

## Are there any test limitations to be aware of?

There are several important limitations to keep in mind:

- **Scope:** It does not cover all medications in clinical use and cannot detect allergic reactions.
- **Complexity:** Genetics is only one factor in drug response; a "normal" result doesn't guarantee a perfect response or zero side effects.
- **External Factors:** Age, liver disease, and drug-drug interactions also influence enzyme function and must be considered.
- **Genetic Coverage:** The test screens for common variants in Caucasian, African, and Asian backgrounds but may miss **rare** variants, potentially leading to inaccurate phenotype reporting.

## What happens to the patient's DNA and data?

There are several important limitations to keep in mind:

- **Data Security & Ownership:** myDNA regards patient privacy as paramount. All genetic results and personal information are encrypted and stored on highly secure servers. The patient retains full ownership of their data, which is never shared with insurers or third parties without explicit consent.
- **Sample Retention:** Post-analysis, NPAAC requires samples to be stored for a minimum of three months before they are destroyed. Samples are securely stored at -84°C.
- **Scope of Analysis:** The analysis is strictly limited to the genes and markers required for medication insights.

*For further details, please refer to our Privacy Policy.*

## Does myDNA screen for disease risk?

While the standard PGx tests focus solely on medication response and do not screen for disease risk, myDNA does offer a separate suite of advanced Whole Genome Sequencing (WGS) and Whole Exome Sequencing (WES) services that can offer screening for disease risk.

These advanced disease-risk tests are available exclusively through 4Cyte Pathology. They must be ordered using a standard 4Cyte request form.

To order, please write the specific test name exactly as listed below in the "Tests Requested" section of the form:

- **Heart Health:** *"myDNA Comprehensive Cardiovascular Screen" (Screens 174 genes for Cardiomyopathy, Arrhythmia, Familial Hypercholesterolemia, etc. Private Cost to Patient: $580)*
- **Cancer Risk:** "myDNA Comprehensive Hereditary Cancer Screen" (Screens 113 genes for Breast, Ovarian, Colorectal, and other hereditary cancers. Private Cost to Patient: $580)
- **Brain Health:** "myDNA Comprehensive Parkinson's, Alzheimer's and Dementia Screen" (Screens 47 genes for early-onset dementia and neurological conditions. Private Cost to Patient: $580)
- **General Proactive Screening:** "myDNA Proactive Genetic Health Screen" (Screens 311 genes for a broad range of actionable genetic conditions. Private Cost to Patient: $860)

**Collection Requirement:** Patients must attend a 4Cyte collection centre for a blood draw. These specific tests cannot be performed via a home buccal swab.

**Turn Around Time:** Results for these comprehensive genetic screens are typically available within 21–25 business days from the time the sample is received by the laboratory.

# Nutrigenomics Testing

## Does myDNA offer Nutrigenomics (NGx) testing?

Yes. myDNA offers practitioner-only Nutrigenomics (NGx) tests, available exclusively through our functional pathology partner, NutriPATH (not directly through myDNA).

All reports are delivered as clear, clinically relevant, easy-to-interpret PDFs designed to support personalised care.

## What NGx reports are available?

myDNA offers a Comprehensive Health Report as well as several targeted reports focusing on specific clinical areas:

- Comprehensive Health
- Methylation
- Detoxification
- Longevity
- Fertility (Male & Female)

## What is the myDNA Comprehensive Health Report?

The Comprehensive Health Report is the most extensive NGx test, designed to support a holistic and preventative approach to health. It helps practitioners guide behaviour change, identify root causes, and personalise interventions.

**Key features:**

- **Genes analysed:** 92 genes (113 SNPs)
- **Focus areas include:**
  - Nutrients & energy
  - Hormones
  - Stress & cognitive performance
  - Inflammation
  - Athletic performance
  - DNA protection & repair
  - Detoxification

***Clinical utility:*** *Complements other functional testing (e.g. blood tests, microbiome, hormones) by providing a broader view of metabolic health and supporting targeted, long-term interventions.*

## What are the targeted reports?

The targeted reports provide deeper, more focused insights into specific biological pathways. They are ideal for practitioners who want a more streamlined or topic-specific approach.

- **Methylation Report (Test Code: 8014)** Insights into methylation pathways, micronutrient needs, and related health risks to support personalised interventions.
- **Detoxification Report (Test Code: 8018)** Assesses genetic variations involved in detox pathways to guide targeted detox and lifestyle strategies.

- **Longevity Report (Test Code: 8015)** Explores genetic influences on ageing, including oxidative stress, DNA damage, lipid metabolism, and overall longevity pathways.
- **Fertility Reports (Test Code: 8019)** A comprehensive and highly specialised report available for both female and male fertility, focusing on key genetic factors influencing reproductive health.
    - **Female:** ovarian function, hormone balance, oxidative stress, reproductive health
    - **Male:** sperm production, motility, morphology, DNA integrity, hormone balance

## How are the tests ordered?

- **Ordering:** Via NutriPATH (practitioner-only)
- **Collection:** Simple at-home cheek swab
- **Note:** Not available through standard pathology request forms (e.g. 4Cyte)

**Cost:** Pricing is managed through your clinic or NutriPATH account. Please refer to your provider portal for details.