



## PHARMACOGENOMICS (PGX) TESTING

### WHY CHOOSE MEDEX LABORATORIES

- TARGETED TREATMENTS
- ACCURATE OUTCOMES
- EMR INTEGRATIONS
- ACCEPTS MOST INSURANCES
- PHLEBOTOMIST AVAILABLE
- QUICK TURN AROUND TIME

The reports and content within should be considered referenced suggestions.  
Ultimately, final medical decisions are made by your respective healthcare provider

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## PHARMACOGENOMICS (PGx) TESTING

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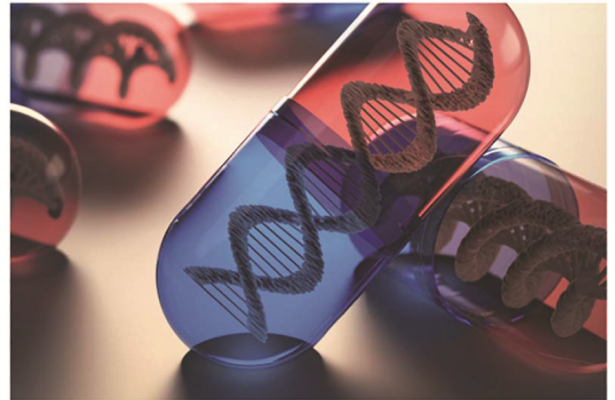
“The PGx test is your one test for life.

The test will cover your metabolic response to medications at all stages in life, and can be referred back to at any time regardless of your age or health status.”

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Pharmacogenomics is the analysis of how genes affect a person's response to drugs. Most drugs are broken down (metabolised) in the body by drug-metabolising enzymes (DMEs). Specific genes code for these enzymes, and variations in these genes can cause significant differences to drug-metabolising enzymes, drug transporters and drug targets.

As everyone has a unique genetic makeup, this can affect how you will respond or react to certain medications. A medication or dose that works for one person may be ineffective or cause harmful side effects in another. Through pharmacogenomics testing, individualised medicine treatment plans can be developed based on each patient's genetic makeup, to determine optimal drugs and dosages, and limit harmful side effects.



## POTENTIAL BENEFITS OF PGx TESTING

Using the results from PGx testing, health care providers can individualize drug therapy selection and dosages for patients based on their genetic makeup. Testing patients prior to beginning treatment may help determine their response to certain drug classes and help avoid drugs that may be ineffective or cause harmful side effects. For patients currently on treatment, it may identify new treatment options or identify why current treatments aren't working.

Advantages of PGx testing may include

- Decreasing and potentially eliminating the need for a "trial and error" approach to find effective therapy and dosages
- Decreasing the number of adverse drug reactions a patient experiences
- Saving patients time and money on ineffective medications
- Decreasing the amount of time patients are on medication





# WHAT WILL THE RESULTS FROM PGX TELL ME?

## How you process different types of drugs

- Variations in genes influence how quickly or how thoroughly individuals metabolize specific drugs. Individuals may be classed as poor, intermediate, normal, or ultra-rapid metabolizer for certain drugs.
- More than 75% of people have variations in drug metabolism that fall outside of what is regarded as "normal" metabolizers.

In some cases, these differences can cause significant side effects ]or mean the medication is ineffective. In severe cases, side effects may be life-threatening.

## Likelihood to respond to a given medication

- In a patient classified as a "poor" metabolizer, some drugs will not be processed effectively by the body, resulting in no response or minimal response which may require the selection of alternative medication
- In patients who are classified as an "ultra-rapid" metabolizer, the drug is processed and removed from the body rapidly. This may mean that the drug is less effective at the standard dose, requiring a higher dose to be effective.

## Risk of an adverse drug response (side effects)

- In a patient classified as a "poor" metabolizer, drugs may be eliminated slowly and accumulate in the body, requiring a lower than normal dose to avoid adverse reactions.
- For patients who are classified as an "ultra-rapid" metabolizer, some drugs may be processed quickly leading to the rapid onset of the drug's effect and increased side effects, requiring a reduction in the drug dosage to achieve the desired outcome.

## Who Should Have PGx Testing done?

PGx testing is available to everyone but maybe most useful for patients who are currently on or about to begin taking medications for any of the conditions covered. It may also be useful for people who have tried numerous drugs to find one that may effectively treat their symptoms.

PGx is particularly relevant in psychiatry where antidepressants are essential components in treatment. 30-50% of patients do not respond to their first antidepressant, and lengthy trials are often required before the optimal treatment type and dose are identified.

Patients who have had genetically guided prescribing may have a greater chance of remission compared to patients without genetic prescribing. What Medications are covered by PGx Testing?

The following chart illustrates impacted medications analyzed by the Medex Laboratories pharmacogenomics test with supporting clinical evidence. Lists are updated periodically to incorporate new medications and clinical evidence as appropriate. Please also refer to established clinical resources, including the FDA's Table of Pharmacogenomic Associations and the Clinical Pharmacogenomics Implementation Consortium (CPIC®) Guidelines for Genes-Drugs Pairs, for the latest information regarding pharmacogenomics test interpretations and interventions. A pharmacogenomics report is one of the multiple pieces of information that a clinician should consider in guiding their therapeutic choice for each patient.



CARDIOVASCULAR & DIABETES	ANTIARRHYTHMICS	Flecainide (Tam bocor) Mexiletine (Mexi til) Propafenone (Rythmol)	CYP2D6 CYP2D6 CYP2D6
	ANTICOAGULANTS	Warfarin (Coumadin)	CYP2C9
	ANTIHYPERTENSIVES	Azilsartan (Edarbi, Edarby clor) Irbesartan (Avapro) Losartan (Cozaar, Hyzaar) Metoprolol (Lopressor) Nebivolol (Bystolic) Torsemide (Demadex)	CYP2C9 CYP2C9 CYP2C9 CYP2D6 CYP2D6 CYP2C9
	ANTIPLATELETS	Clopidogrel (Plavix)	CYP2C19
	ANTIDIABETICS	Nateglinide (Starlix) Repaglinide (Prandin)	CYP2C9, SLCO1B1 SLCO1B1
	STATINS	Atorvastatin (Lipitor) Fluvastatin (Lescol) Lovastatin (Mevacor) Pitavastatin (Livalo) Pravastatin (Pravachol) Rosuvastatin (Crestor) Simvastatin (Zocor)	SLCO1B1 CYP2C9 CYP3A4, SLCO1B1 SLCO1B1 SLCO1B1 SLCO1B1 SLCO1B1
	THROMBOPHILIA	Thrombosis Hyperhomocysteinemia	F2, F5 MTHFR
	PAIN MEDICINE	MUSCLE RELAXANTS	Carisoprodol (Soma) Tizanidine (Zanaflex)
NSAIDs		Celecoxib (Celebrex) Flurbiprofen (Ansaid) Ibuprofen (Advil, Motrin) Meloxicam (Mobic) Piroxicam (Feldene)	CYP2C9 CYP2C9 CYP2C9 CYP2C9 CYP2C9
OPIOIDS		Benzhydrocodone (Apadaz) Codeine (Codeine; Fioricet with Codeine) Fentanyl (Actiq) Hydrocodone (Vicodin) Methadone (Dolophine) Morphine (MS Contin) Oxycodone (Percocet, Oxycontin) Tramadol (Ultram)	CYP2D6 CYP2D6 OPRM1 CYP2D6 CYP2B6 OPRM1 CYP2D6 CYP2D6
ONCOLOGY	ANTINEOPLASTIC AGENTS	Azathioprine (Imuran) Capecitabine (Xeloda) Erdafitinib (Balversa) Fluorouracil (Efudex) Gefitinib (Iressa) Mercaptopurine (Purinethol) Methotrexate (Trexall) Tamoxifen (Nolvadex) Thioguanine (Tabloid)	TPMT DPYD CYP2C9 DPYD CYP2D6 TPMT MTHFR CYP2D6 TPMT
NEUROPSYCHIATRY	ANTIDEPRESSANTS	Amitriptyline (Elavil) Ampexapline (Amoxapline) Bupropion (Wellbutrin) Citalopram (Celexa) Clomipramine (Anafranil) Desipramine (Norpramin) Desvenlafaxine (Pristiq) Imipramine (Tofranil) Imipramine (Tofranil) Nefazodone (Serzone) Nortriptyline (Pamelor) Paroxetine (Paxil) Protriptyline (Vivactil) Sertraline (Zoloft) Trimipramine (Surmontil) Venlafaxine (Effexor) Vortioxetine (Trintellix)	CYP2D6, CYP2C19 CYP2D6 CYP2B6 CYP2C19 CYP2D6, CYP2C19 CYP2D6 CYP2D6 CYP2D6, CYP2C19 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2C19 CYP2D6, CYP2C19 CYP2D6 CYP2D6
	ANTIPSYCHOTICS	Aripiprazole (Abilify, Istadia) Brexpiprazole (Rexulti) Chlorpromazine (Thorazine) Clozapine (Clozaril) Doxepin (Silenor) Escitalopram (Lexapro) Fluoxetine (Prozac) Fluvoxamine (Luvox) Haloperidol (Haldol) Iloperidone (Fanapt) Olanzapine (Zyprexa) Paliperidone (Invega) Perphenazine (Trilafon) Plimozide (Orap) Risperidone (Risperdal) Tetrabenazine (Xenazine) Thioridazine (Mellaril)	CYP2D6 CYP2D6 CYP2D6 CYP1A2 CYP2D6, CYP2C19 CYP2C19 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6 CYP2D6
	ADD & ADHD AGENTS	Amphetamine (Adderall) Atomoxetine (Strattera) Dexamethylphenidate (Focalin) Dextroamphetamine (Dexedrine) Lisdexamfetamine (Vyvanse) Methylphenidate (Ritalin)	COMT, CYP2D6 CYP2D6 COMT COMT, CYP2D6 COMT, CYP2D6 COMT
	ANTICONVULSANTS	Brivaracetam (Briviact) Clobazam (Onfi) Fosphenytoin (Cerebyx) Phenobarbital (Luminal) Phenytoin (Dilantin) Primidone (Myosoline) Zonisamide (Zonegran)	CYP2C19 CYP2C19 CYP2C9 CYP2C19 CYP2C9 CYP2C19 CYP2C19
	ANTIDEMENTIA AGENTS	Donepezil (Aricept) Galantamine (Razadyne)	CYP2D6 CYP2D6
	OTHER	Dextromethorphan/Quinidine (Nuedexta) Diazepam (Vallium) Oxazepam (Serax) Pitolisant (Wakix) Valbenazine (Ingrezza)	CYP2D6 CYP2C19 UGT2B15 CYP2D6 CYP2D6



## OTHER SPECIALTIES

GASTROENTEROLOGY	Dexlansoprazole (Dexilant, Kapidex)	CYP2C19
	Dolasetron (Anzemet)	CYP2D6
	Dronabinol (Marinol)	CYP2C9
	Esomeprazole (Nexium)	CYP2C19
	Fosnetupitant/Palonosetron (Akynzeo-IV)	CYP2D6
	Lansoprazole (Prevacid)	CYP2C19
	Metoclopramide (Reglan)	CYP2D6
	Netupitant / Palonosetron (Akynzeo-oral)	CYP2D6
	Omeprazole (Prilosec)	CYP2C19
	Ondansetron (Zofran, Zuplenz)	CYP2D6
	Palonosetron (Aloxi)	CYP2D6
	Pantoprazole (Protonix)	CYP2C19
	Rabeprazole (Aciphex)	CYP2C19
	Efavirenz (Sustiva)	CYP2B6
	Flucytosine (Ancobon)	DPYD
INFECTIONS	Proguanil (Malarone)	CYP2C19
	Voriconazole (Vfend)	CYP2C19
	Bupropion (Wellbutrin, Contrave)	CYP2B6
	Lofexidine (Lucemyra)	CYP2D6
ADDICTION MEDICINE	Methadone (Dolophine)	CYP2B6
	Naltrexone (Vivitrol, Contrave)	OPRM1

For a full list of conditions and drug classes covered, or to find out if the medications you are currently taking are covered in the PGx panel, please contact Medex Laboratories.

### Limitations of Testing

The PGx report provides information on how your body will metabolize drugs, which may be helpful in choosing medications. It is, however, only one component of how a person may react to any particular drug. Drug reactions may be caused by other mechanisms apart from the known effect of the drug itself. These include hypersensitivity reactions (allergies), intolerance, and drug interactions.

The PGx report can be used as an aid in choosing medications but must be used in conjunction with a previous medical history and other medical information available to your health care practitioner.

### PANEL GENE LIST:

CYP1A2, DPYD, ACE, F2, IFNL4, CYP2B6, AGTR1, HTR2C, TPMT, HTR2A, LDLR, UGT1A, GRIK4, F5, CYP2C19, RYR1, SLCO1B1, CYP2C8, CYP2C9, CYP2D6, CACNA1C, MTHFR, UGT1A1, CYP3A4, APOE, UGT1A4, CYP4F2, CI 1 orf65, DPYD, CYP2D6, OPRM1, APOB, COMT, CYP3A5, CYP2A13, CYP3A43, NUDT15, CACNA1S, ZSCAN25, HCP5, CYP2R1, UGT1A1 0, RARG, SLC28A3, CYP2F1, CFTR, CYP3A7, CYP2A



**Specimen Requirements:**  
Buccal swab (Wet/Dry) or Extracted DNA (5ug)  
**Turnaround Time:**  
1-2 weeks

## TEST INFORMATION

Description	Pharmacogenomics (PGX) Panel
Method	Next Generation Sequencing
Specimen	Buccal swab shipped at room temperature
Requirements	temperature
Turnaround Time	3 to 4 Weeks
Shipping	Pickup/FedEx Service Available Monday - Friday
Testing Performed	Monday - Saturday

Medex Laboratories is a full service, national diagnostic testing laboratory headquartered in Houston, Texas with concentrations in clinical diagnostics, toxicology, genetic sequencing and molecular testing. Medex Laboratories is devoted to redefining diagnostic services by providing medical practitioners and their patients with exceptional customer service paired with the most advanced and informative medical analytics to assist them in making effective treatment decisions.

Medex Laboratories fully automated laboratory utilizes state-of-the-art technologies to deliver high quality test results and service while exceeding the turnaround time requirements and demands of our physician clients. Medex Laboratories currently analyzes samples for hundreds of thousands of patients per year from providers and healthcare facilities all across the nation.

As our clients have trusted our laboratory with being an analytical and integral part of their patients' diagnosis and treatment process, we believe in respecting that trust with continuous dedication to customer satisfaction and support. We join our clients and physicians in their belief that patient care is and always will be the number one priority. Medex Laboratories' personalized support and professional service continue to exceed the expectations of our valued clients, providers and facilities. More healthcare facilities and providers, in private practices, in hospitals and in long term care facilities, are placing their trust in Medex Laboratories; and, together we are transforming advanced diagnostic information into knowledge and superior treatment options for more and more patients every day.



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CLIA # 45D222222 | NPI # 1740886449 | Lab Director : Dr. Rodolfo J. Nudelman  
Lab Address : 9525 Bissonnet Street, Suite # 250, Houston TX 77036  
Tel : 844 963 1574 | Fax : 832 345 1629  
Email : [contact@medexdiagnosticservices.com](mailto:contact@medexdiagnosticservices.com)