Did You Know?

HEALTHDIRECT PHARMACY SERVICES

Pharmacogenomic Testing Partnership

March 2024

What is Pharmacogenomics (PGx) testing?

PGx is rapidly evolving science focused on how an individual's genes may affect his or her response to medications. While many patients may metabolize a medication appropriately, others may metabolize it too quickly, too slowly, or not well at all.

PGx testing identifies genetic variants that indicate potential drug-gene interactions – information providers can use to help guide clinical decision-making and ensure medications in the individual's treatment plan are providing optimal therapeutic benefit. It can also help avoid unwanted adverse events that may result from errant medication metabolism.

When should I consider PGx testing for my community?

Per CMS, PGx tests are indicated when medications are being considered for use, or already being administered, that are medically necessary, appropriate, and approved for use in the patient's condition and are known to have a gene(s)-drug interaction that has been demonstrated to be clinically actionable as defined by the FDA or Clinical Pharmacogenetic Implementation Consortium (CPIC) guidelines category A and B. For additional information, see FDA – Table of Pharmacogenetic Associations and CPIC- Guidelines.

Put another way, when medications are being prescribed with established potential for drug-gene interactions that can impact treatment success, PGx testing should be considered by clinical decision-makers to help guide therapy.

HealthDirect has partnered with leading PGx providers, Singulab and AccessDx Laboratory, to help facilitate access to precision medicine solutions via PGx for our partner communities.

How do HealthDirect & SinguLab deliver actionable PGx testing results?

Using validated gene-drug interaction data to create an individualized risk assessment, you will receive a comprehensive report for each patient detailing any anomalies to their genetic profile that may impact medications that are currently prescribed. Samples are obtained on site from a quick buccal swab.

SinguLab currently analyzes 39 genes based on the most recent evidenced-based data from internationally recognized PGx research organizations and bodies such as CPIC, the FDA, PharmGKB, and KNMP.

This drug-gene interaction panel provides analysis on over 200 medications across 13 clinical specialties, some examples are highlighted in the table below, many of these medications are common therapies we see in everyday practice.

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Antidepressants

Medication	Gene(s)
Amitriptyline (Elavil®)	CYP2D6, CYP2C19
Bupropion (Wellbutrin®, Contrave®)	CYP2B6, ANKK1
Citalopram (Celexa®)	CYP2C19, SLC6A4, GRIK4, FKBP5, HTR2A
Clomipramine (Anafranil®)	CYP2D6, CYP2C19
Desvenlafaxine (Pristiq®)	CYP2D6
Doxepin (Silenor®)	CYP2D6, CYP2C19
Escitalopram (Lexapro®)	CYP2C19, SLC6A4
Fluoxetine (Prozac®, Sarafem®)	CYP2D6
Fluvoxamine (Luvox®)	CYP2D6, SLC6A4
Imipramine (Tofranil®)	CYP2D6, CYP2C19
Nefazodone (Serzone®)	CYP2D6
Nortriptyline (Pamelor®)	CYP2D6
Paroxetine (Paxil®, Brisdelle®)	CYP2D6
Sertraline (Zoloft®)	CYP2C19
Venlafaxine (Effexor®)	CYP2D6
Vortioxetine (Trintellix®)	CYP2D6

Neurology

Medication	Gene(s)
Brivaracetam (Briviact®)	CYP2C19
Clobazam (Onfi®)	CYP2C19
Diazepam (Valium)	CYP2C19
Dronabinol (Marinol®)	CYP2C9
Lorazepam (Ativan®)	UGT2B15
Oxazepam (Serax®)	UGT2B15
Phenobarbital (Luminal®)	CYP2C19
Phenytoin (Dilantin®)	CYP2C9
Primidone (Mysoline®)	CYP2C19
Zonisamide (Zonegran®)	CYP2C19
Dextromethorphan / Quinidine (Nuedexta®)	CYP2D6
Donepezil (Aricept®)	CYP2D6
Galantamine (Razadyne®)	CYP2D6
Deutetrabenazine (Austedo®)	CYP2D6
Tetrabenazine (Xenazine®)	CYP2D6
Valbenazine (Ingrezza®)	CYP2D6

Cardiovascular

Medication	Gene(s)
Atorvastatin (Lipitor®)	SLCO1B1, CYP3A4
Fluvastatin (Lescol®)	CYP2C9, SLCO1B1
Lovastatin (Mevacor®, Advicor®)	CYP3A4, SLCO1B1
Pitavastatin (Livalo®)	SLCO1B1
Pravastatin (Pravachol®)	SLCO1B1
Rosuvastatin (Crestor®)	SLCO1B1, ABCG2
Simvastatin (Zocor®)	SLCO1B1, CYP3A4
Carvedilol (Coreg®)	CYP2D6
Irbesartan (Avapro®)	CYP2C9
Losartan (Cozaar®, Hyzaar®)	CYP2C9
Metoprolol (Lopressor®)	CYP2D6
Nebivolol (Bystolic®)	CYP2D6
Propranolol (Inderal®)	CYP2D6
Timolol (Timoptic®)	CYP2D6
Clopidogrel (Plavix®)	CYP2C19
Ranolazine (Ranexa®)	CYP2D6
Warfarin (Coumadin®)	CYP2C9, VKORC1, CYP4F2, CYP2C

** Not a complete list. For additional details on the medications and genotypes analyzed please contact your HealthDirect or Singulab / AccessDx laboratory representative.*

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ADHD

Medication	Gene(s)
Amphetamine (Adderall®, Evekeo®)	COMT, CYP2D6
Atomoxetine (Straterra®)	CYP2D6
Dexmethylphenidate (Focalin®)	COMT, ADRA2A
Dextroamphetamine (Dexedrine®)	COMT, CYP2D6
Lisdexamfetamine (Vyvanse®)	COMT, CYP2D6
Methylphenidate (Ritalin®, Concerta®)	COMT, ADRA2A

Proton Pump Inhibitor (PPI)

Medication	Gene(s)
Dexlansoprazole (Dexilant®, Kapidex®)	CYP2C19
Esomeprazole (Nexium®)	CYP2C19
Lansoprazole (Prevacid®)	CYP2C19
Omeprazole (Prilosec®)	CYP2C19
Pantoprazole (Protonix®)	CYP2C19
Rabeprazole (Aciphex®)	CYP2C19

Antipsychotics

Medication	Gene(s)
Aripiprazole (Abilify®, Aristada®)	CYP2D6
Brexpiprazole (Rexulti®)	CYP2D6
Chlorpromazine (Thorazine®)	CYP2D6
Clozapine (Clozaril®)	CYP1A2, CYP2D6, HTR2C
Haloperidol (Haldol®)	CYP2D6
Iloperidone (Fanapt®)	CYP2D6
Olanzapine (Zyprexa®)	CYP1A2, HTR2C
Paliperidone (Invega®)	CYP2D6
Perphenazine (Trilafon®)	CYP2D6
Risperidone (Risperdal®)	CYP2D6, HTR2C, DRD2
Thioridazine (Mellaril®)	CYP2D6

Central Nervous System

Medication	Gene(s)
Meclizine (Antivert®)	CYP2D6
Metoclopramide (Reglan®)	CYP2D6
Naltrexone (Vivitrol®, Contrave®)	OPRM1
Ondansetron (Zofran®, Zuplenz®)	CYP2D6, ABCB1, SLC6A4

Analgesics

Medication	Gene(s)
Celecoxib (Celebrex®)	CYP2C9
Codeine (Codeine; Tussin AC®)	CYP2D6
Fentanyl (Actiq®)	OPRM1
Hydrocodone (Vicodin®)	CYP2D6, OPRM1
Ibuprofen (Advil®, Motrin®)	CYP2C9
Meloxicam (Mobic®)	CYP2C9
Methadone (Dolophine®)	CYP2B6
Morphine (MS Contin®)	OPRM1, COMT
Oxycodone (Percocet®, Oxycontin®)	CYP2D6
Piroxicam (Feldene®)	CYP2C9
Tramadol (Ultram®)	CYP2D6

Urology

Medication	Gene(s)
Fesoterodine (Toviaz®)	CYP2D6
Mirabegron (Myrbetriq®)	CYP2D6
Tamsulosin (Flomax®)	CYP2D6
Tolterodine (Detrol®)	CYP2D6
Torsemide (Demadex®)	CYP2C9

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How to access pharmacogenomic (PGx) testing for your community

- **Ask your HealthDirect representative for more information on PGx opportunities and next steps. HealthDirect will coordinate with Singulab to run a free risk assessment report for your community.**
- Following a review of your community's risk assessment results, a SinguLab representative will schedule a time to collect the buccal swab specimens from your residents.
- Comprehensive PGx analysis results for tested residents will be received within a week of laboratory receipt later and will be reviewed with any clinical staff that wish to be involved.

What is the cost of this service to my residents and community?

PGx testing is covered by Medicare and other major payors when medically necessary. PGx testing is also covered by most commercial insurance providers with a copay. HealthDirect has secured a discounted rate of $249 for any uninsured individuals that have a medical need for PGx testing. Contact your HealthDirect or SinguLab representative for any questions on coverage determination.

Singulab

SinguLab® is on a purpose-driven mission to optimize, innovate, and empower precision medicine programs nationwide by developing a comprehensive and programmatic approach to personalized patient care. With the strength of our multidisciplinary team of experts and carefully-curated Partner Network, we blend personalized diagnostics, evidence-based medicine, and clinical decision support to create sustainable and affordable personalized medicine programs for long-term care communities, pharmacies, and providers nationwide.

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