Personalized Drug Therapy through Genetic (DNA) testing

Iverson Genetic Diagnostics is helping to lead the way into the new era of personalized medicine. We offer rapid advanced genetic testing to health care providers to help physicians with selection of the most effective drugs, avoid drug toxicity and in some cases provide information to aid in dosing.

Not all patients respond appropriately to a standard, “One Size Fits All” dose.

Why order the DME Genotype Panel (CYP2C9, CYP2D6, CYP2C19)?

- All enzymes are produced by specific genes that contain a DNA code for the construction of the enzyme.
- It is common for an enzyme’s DNA code to have an error. Typically this is caused by a single incorrect nucleotide in the DNA code. This error is referred to as a “Single Nucleotide Polymorphism” or “SNP” for short.
- A gene (allele) with a SNP is referred to as a “variant” gene (or “variant” allele).
- Over 50% (one of every two patients) will have a variant gene that alters the rate at which a drug-metabolizing enzyme functions.
- Variants usually result in enzymes having a significant loss-of-function (poor or intermediate metabolizers). In a few cases, a variant will create an enzyme with an unusually high rate of metabolism (ultra-rapid metabolizer).
- Patients with gene variants are 8 times more likely to experience an adverse drug reaction (toxicity or lack of efficacy) to their prescribed medications.

Polypharmacy patients are at the greatest risk.

Minimize Adverse Drug Reactions!
This simple genetic test, which looks at liver enzymes, will determine your patients drug sensitivity.

Testing can be important for medications prescribed to treat even the most common conditions:

- Mental Health conditions
- Pregnancy
- High Cholesterol
- Post MI Surgery
- Heart Failure
- Enlarged Prostate
- Acid Reflux
- High Blood Pressure
- Asthma/COPD
- Cancer
- Migraine Headaches
- Depression
- Organ Transplant
- Peptic Ulcer
- Cancer

Other Assays available through Iverson Genetics:

- MTHFR Panel (C677T, A1298C)
- Warfarin GenoSTAT (CYP2C9, VKORC1)
- Clopidogrel GenoSTAT (CYP2C19)
- Tamoxifen Response (CYP2D6)
- Cystic Fibrosis Carrier Screen
- E-Metab Estrogen Gene Panel (Breast Cancer Risk Estimate) (CYP1A1, CYP1B1, COMT) plus risk estimate
DNA provides a lifetime of protection against drug toxicity or lack of drug efficacy.

The vast majority of drugs are metabolized through the liver. The liver’s primary mechanism for metabolizing drugs is the P450 cytochrome system of enzymes which include CYP2D6, CYP2C9, and CYP2C19. Over 50% of the most commonly prescribed medications today are metabolized through the P450 System.

How a patient responds to medications depends on how well metabolizing enzymes function.

<table>
<thead>
<tr>
<th>TYPE OF METABOLIZER</th>
<th>CAUSE OF ALTERED ENZYME FUNCTION</th>
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<tbody>
<tr>
<td><strong>POOR</strong></td>
<td>There are two variants present. Typically one is on the maternal-derived chromosome, and a second variant on the paired paternal-derived chromosome. The alleles on both chromosomes produce “loss-of-function enzymes.”</td>
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<tr>
<td><strong>INTERMEDIATE</strong></td>
<td>There is only one variant present, located either on the maternal-derived chromosome, or on the paternal-derived paired chromosome. The variant allele produces “loss-of-function” enzymes, while the normal allele on the paired chromosome generates normal enzymes.</td>
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<tr>
<td><strong>EXTENSIVE (NORMAL)</strong></td>
<td>No variant alleles present on either patient’s paired chromosomes. All enzymes produced by these alleles have normal activity.</td>
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<tr>
<td><strong>ULTRA-RAPID</strong></td>
<td>In CYP2C19 the presence of a single *17 variant causes a slight increase in CYP2C19 enzyme activity. Patients homozygous for *17 (*17/*17 having two copies) have a greater increase in enzyme activity. In CYP2D6 the presence of a *2 variant in some patients exists in multiple copies on the same DNA strand. This results in an increase in total CYP2D6 enzyme activity.</td>
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1. For many drugs, a cytochrome enzyme with reduced function (activity), leads to a higher than normal (or even toxic) level of a drug due to the slow rate of metabolism and removal of the parent drug.
2. “Pro-drugs” require enzyme metabolism to be converted to the active form of the drug. A slower rate of metabolism results in lower than expected blood levels of the active form of the drug.

**Will insurance pay for the DME Genotype Panel testing?**

Medicare, Tricare and VA have shown insurance coverage acceptance for the cost of testing, if a physician feels it is medically necessary. The main reason for private insurance denials is that genetic testing is not a covered benefit; your patient can call their insurer to ask if this is a concern.

**The Testing Process:**

The process is simple and conveniently done right in your office. We provide all the necessary test kits (either buccal swab or blood collection) supplies at “No Cost” to the provider.

- Easy-to-Read DNA Lab Test Results with useful drug interaction and dosing data
- All shipping supplies with prepaid return labels are included
- Test turnaround time: 24 hours delivered to you conveniently from our lab
- No “long-term” contracts necessary

**How can I order the DME (Drug Metabolizing Enzymes) Genotype Panel for my patients?**

Simply contact your Iverson Genetics local representative at (866) 900-0903 or email us at info@iversongenetics.com.