

# THE TEST

## How Is Molecular Testing Performed?

Your physician will order a test to be performed for you. A simple swab will be used to collect cells from the inside of your mouth. The swab is sent to Natural Molecular Testing's laboratory. DNA will be extracted from the swab and the genetic test(s) will be performed using that sample. After the testing is done the results will be delivered to your physician who will explain the test results to you.

## What Genetic Tests Do We Perform Relating To Drug Metabolism?

Cytochrome P450 Enzymes:

- ▶ 2C9 + VKORC1
- ▶ 2C19
- ▶ 2D6
- ▶ 3A4
- ▶ 3A5

Genetic testing for these enzymes identifies which variation each patient has.



## Where can I find more information?

Log on to [www.naturalmolecular.com](http://www.naturalmolecular.com) for more information regarding genetic testing.



# Testing for Medication Metabolism & Sensitivity

## Making Your Medication Work for You

# MOLECULAR TESTING AND DRUG METABOLISM

A family of liver enzymes, the Cytochrome P450 enzymes, are involved in the metabolism of about 90% of all pharmaceutical drugs. Before prescribing a drug to you, your physician may want to know about your genetic make-up, and may use this information in establishing your treatment.

The Cytochrome P450 (CYP450) genes 2C19, 2C9, 2D6, 3A4, and 3A5 are involved in processing many drugs, including: Plavix, Coumadin, Beta Blockers, Statins, Pain Medications, and Anti-Depressants to name just a few.

Variations in the genes coding for these enzymes can have profound effects on the ability of the enzyme to effectively metabolize these drugs. Testing provides your physician with valuable information regarding whether or not you will be able to process the drug and will respond to treatment normally.

The FDA has recommended genetic testing for many medications and categorized various metabolic status of enzymes which relates to the effectiveness of these medications. For example, if the genetic test determines you are a 'poor metabolizer' of a certain drug this may affect your physician's choice of optimal dosing for certain drugs or the choice of an alternative therapeutic treatment.





### How Long Does It Take To Complete The Tests?

It usually takes 2 to 5 days to complete the tests from the time we receive the sample. It may take longer if the sample received does not contain sufficient cheek cells for DNA extraction and the tests need to be repeated.

### What Type Of Results Can I Expect?

With each genetic test, your doctor will receive two results:

▶ **Genotype:**

The genotype tells you what form of the gene you carry. The genotype can be normal (wildtype), heterozygous (one normal form and one mutant form), or homozygous mutant (both copies of the gene are mutated).

▶ **Phenotype:**

The phenotype tells you how your genotype relates to how well your body metabolizes certain drugs.

### Why Is Genetic Testing For Drug Metabolism Helpful?

- ▶ Differences in the enzymes responsible for the metabolism of medications helps your doctor determine the types and appropriate doses of medicines you should be taking.
- ▶ Certain medications are broken down and cleared from the body by these enzymes. Depending on your variation, it may be possible that you are not able to use these medications correctly, or need a different dosage.
- ▶ Some medications need to be converted to active forms inside your body. If you have a certain variation of one of these enzymes, you will not benefit from taking these medications.

### Who Should Have Drug Metabolism/ Sensitivity Testing Performed?

- ▶ A patient who is on medications (prescribed or over-the-counter) that are metabolized by these enzymes.
- ▶ Anyone taking multiple medications that are metabolized by these enzymes.

### What Are The Different Types Of Drug Metabolism?

**Normal Metabolism:**

Results that indicate you are a normal metabolizer indicate that the enzyme being tested should perform its metabolic functions at normal rates.

**Intermediate Metabolism:**

Results that indicate you are an intermediate metabolizer indicate that the enzyme being tested carries a reduced ability to perform its metabolic function (approximately half of normal).

**Poor Metabolism:**

Results that indicate you are a poor metabolizer indicate the enzyme being tested has significantly impaired function and has little ability to perform its metabolic function.

**Rapid Metabolism:**

Results that indicate you are a rapid metabolizer indicate the enzyme being tested has a higher than normal level of function and that it will display enhanced metabolic activity versus a normal form.

# INSURANCE

## Will My Insurance Cover This Test?

Natural Molecular Testing bills Medicare, Medicaid, and private health insurance. Natural Molecular will bill your insurance company.

For more information, please call us at 1.800.422.8881 or visit our website at: [www.naturalmolecular.com](http://www.naturalmolecular.com).

## Can My Health Insurance Company Or Employer Discriminate Against Me Based On My Genetic Test Results?

No. The Genetic Information Nondiscrimination Act of 2008, also referred to as GINA, is a federal law that protects Americans from discrimination by health insurance companies and employers based on their genetic information. The President signed the act into federal law on May 21, 2008. The parts of the law relating to health insurers took effect on May 2009, and those relating to employers took effect on November 2009. However, this law does not cover life insurance, disability insurance, or long-term care insurance.

For more information, please visit : [www.genome.gov/10002328](http://www.genome.gov/10002328).

## What If I Don't Have Insurance?

For patients who do not have health insurance or cannot afford to pay the full cost of testing, Natural Molecular Testing provides a generous financial assistance program, including a significantly discounted price.

For more information, call us at: 1.888.442.8881.