

# Genetic Testing Optimizes Medication Match for Patients

Pharmacogenetics can help determine how a person will respond to medications and can be used to adjust therapy as needed.

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**MANAGING A CHRONIC** condition can be frustrating when trialing medications. Sometimes, it can take months or years to find a medication that effectively treats a condition, especially without unwanted side effects. Therefore, streamlining the process with genetic testing can help to avoid stress, while also saving money, time and energy.

A person's genetic (inherited) makeup determines how the body will react to a medication. Differences in genetic makeup among individuals affect what the body does to a drug and what the drug does to the body. The study of genetic differences in response to drugs is called pharmacogenetics. Also known as personalized medicine, pharmacogenetics is becoming more widely used as more is discovered about the connection between genetics and how each person is affected by medicine. In fact, it is a major component to simplifying and streamlining therapy.

## Pharmacogenetics

Pharmacogenetics is the study of how genes affect the body's response to certain medicines.

Genes are parts of DNA passed down from the mother and father that determine a person's unique traits such as height and eye color. For medications, genes serve several purposes, including determining:

- Internal and external characteristics
- How a person responds to medicine
- Whether a person may inherit conditions and diseases

Pharmacogenetics analyzes drug-gene interactions to optimize medication therapy for an individual. The purpose is to discover the best drug at the best dose at the best time for a person based on his or her genetic makeup. Indeed, the science can determine which medication works best and worst and which may increase or decrease a person's risk of

side effects. It can also provide suggestions for alternative medications to improve therapy. Tailoring therapy to personalized gene information provides easier, cheaper and more effective treatment for many conditions.

## Benefits and Risks of Genetic Testing

Genetic testing can be used for many different types of medications to make informed decisions regarding therapy. The goal of this type of personalized medicine is to better assist with prevention, diagnosis and treatment of diseases and conditions. Specific benefits of genetic testing include:

- Overcoming drug trial challenges
- Gaining a better quality of life
- Reducing side effects/adverse drug events
- Saving money
- Providing information about a person's health that may assist in future healthcare decisions

However, there are risks associated with genetic testing. Physical risks related to most genetic tests are small, particularly for those that require only a blood sample or buccal smear (a method that samples cells from the inside surface of the cheek). But, testing can be expensive, a proper DNA sample must be collected for accurate results and it may result in a change in therapy.

## Is Genetic Testing Needed?

If a person can answer yes to any of the following, he or she may benefit from genetic testing for medications:

- Is the medication working well for the condition?
- Is the person experiencing intolerable or unwanted side effects?
- Could medication costs be reduced?
- Does the medication require a genetic test before starting? Some medications are so specific they cannot be initiated until a genetic test is completed.

## How Does Genetic Testing Work?

Genetic testing is simple. Once a credible company is located and a test kit is requested, it is sent via mail. The kit contains specific instructions for how to collect a sample (usually saliva), which is then mailed back to the testing company as instructed. Results are typically provided within a week, at which time a consultation with a genetic counselor

or pharmacist can be made to review the report in detail and obtain answers to any questions. Finally, if there is an intervention that can be made regarding therapy, the report can be provided to the individual's primary care or specialty doctor for help with adjusting therapy if needed.

## Who Provides Genetic Testing?

Genetic tests are provided by doctors and pharmacogenetic testing companies. If it is already known which medication needs evaluating, the doctor or company chosen must be able to test for it. See Genetic Testing Sources for a short list of the many companies that offer pharmacogenetic testing.

## Talking to a Doctor Regarding Genetic Testing

Just as an individual would see a cardiologist for heart issues, a neurologist for neurological issues or a gastroenterologist for gastrointestinal issues, a genetic counselor or pharmacist is essential to review the pharmacogenetics report to ensure results are not misinterpreted and treatment or health is not compromised.

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If the test was completed by the patient, he or she should provide the results to a doctor (either a primary care physician or specialist) for review with a genetic counselor or pharmacist for their opinion pertaining to the specific condition. Overall patient state of health must be taken into consideration, and the benefits versus risks of changing treatment must be weighed.

Following are tips for how patients can most effectively present this information to their doctor:

- All information and reports should be furnished to the doctor in either a paper or digital copy for review during the appointment.
- The patient should be open and willing to discuss any suggested changes to treatment.
- If the patient desires to make changes, he or she should be prepared to advocate for them.



## The Pharmacogenetics Report

At first glance, the pharmacogenetics report may seem to be an overwhelming amount of information; however, it is organized in an easy-to-understand format. Typically, results are divided into green, yellow and red categories to indicate the severity of a drug-gene interaction. The report lists medications in each category, detailing the significance of the drug-gene interaction (minimal, moderate or severe), and it will provide suggestions for how to adjust medications to achieve the optimal effect based on the interaction. This can include a suggestion to:

- Increase current dose
- Decrease current dose
- Take the dose at a different time of day
- Switch to a new medication
- Discontinue current medication (this typically means the medication has no significant beneficial effect or does not work)

## What Does Genetic Testing Cost?

Generally, pharmacogenetics testing companies will provide a list of insurance companies they work with that will provide assistance or cover the cost of the test. It is best for a patient to obtain the current procedural terminology and International Classification of Diseases billing codes the testing company will use to cover the cost of the test, which can be provided to the insurance company to obtain an exact cost. Typically, the tests cost between a few hundred to several hundred dollars out of pocket. Some companies charge separate fees for the testing kit, processing the test and providing results. The results review is included in the total cost.

## Is the Report Applicable for Relatives?

Because a person's genes are specific to each individual, for most situations, the report isn't applicable to relatives. However, since genes are hereditary, it is possible a person's

response and his or her family members' response to a medication may be similar. Therefore, it can be useful to share information with relatives to find correlations in how they respond to therapy.

## Medications Requiring Genetic Testing

Common medications for genetic testing include:

- Chemotherapy/cancer
- Psychiatry (anxiety/depression/mood disorders)
- Pain
- Heart disease
- Maintenance medications

It should be noted genetic testing is not appropriate for over-the-counter medications such as aspirin or pain relievers.

## What Else Do I Need To Know?

Genetic testing can be a good investment, and results are lifelong since genes don't change. However, results should be thoroughly evaluated by an individual's provider and a specialist to streamline therapy and adjust it based on results, other health concerns, medications, lifestyle and personal preferences.

Also, the report does not have to lead to an intervention in therapy. It can simply be used to better understand how the body works and how current therapy is proceeding. Ultimately, if an individual is stable and doing well on a current medication regimen, genetic testing should be used for informational purposes only so current therapy isn't interrupted. 

### Genetic Testing Sources

The RightMed Test: [oneome.com/rightmed-test](https://oneome.com/rightmed-test)  
PGxOne Plus: [www.admerahealth.com/pgxone-plus](https://www.admerahealth.com/pgxone-plus)  
GENETWORx: [genetworx.com/services/pharmaco-genetic-testing](https://genetworx.com/services/pharmaco-genetic-testing)  
Genelex PGx: [www.genelex.com/test-menu](https://www.genelex.com/test-menu)

### Resource

1. Heller, F. Genetics/Genomics and Drug Effects. *Acta Clinica Belgica*, 2013 Mar-Apr;68(2):77-80. Accessed at [pubmed.ncbi.nlm.nih.gov/23967712](https://pubmed.ncbi.nlm.nih.gov/23967712).

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