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Glitchy Genes and Psychiatry

The Impact of DNA On Medication Therapy

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- Genes can affect the way medications work in our bodies.
- Many medications, including those used for psychiatric or neurologic problems, are affected by genes.
- Some medications can cause harm to people with certain genes.
- Your health care provider can help you determine if genetic testing is right for you.

What is genetic testing?

A genetic test is a blood or saliva test that your health care provider can order to better understand how your body works. Genetic testing typically involves looking at specific genes in the body, including those that may impact how medications work.[1] Genes are the instruction manuals for the body, and are written in the "language" of DNA. Because genes do not change, you only need to test a specific gene once. Genes are passed down from generation to generation, but mutations can sometimes happen during the process. Mutations are changes in the DNA language of a gene, like how sentences change during a game of telephone. Small mutations can lead to big effects. Just look at what a big impact a small difference can make!

"Let's eat grandma!" vs. "Let's eat, grandma!"

How do genes affect how medications work?

Genes can affect how medications work in two ways. First, genes can impact how a medication does its job. This means that some medications may work for certain people better than others, even at the same dose. Second, genes impact how the body breaks down medications. This is called metabolism, and not everyone metabolizes medications at the same rate. Some people can metabolize medications faster than others, called rapid metabolizers, leading to a shorter duration of effect, or they may experience less benefit. Other people may metabolize medications slower than others, called poor metabolizers, leading to a longer duration of effect, or they may experience more side effects. Genetic differences can cause people to have varying sensitivity to medications as compared to others.

What medications are affected by genes?

Scientists have discovered that many medications are affected by genes. Some genetic differences are common, whereas others are more rare. Here are a few medications that are known to be affected by genes:

Medication	What is it usually used for?
Medications used to treat psychiatric or neurologic conditions	
Amitriptyline (Elavil®)	Depression, migraines
Aripiprazole (Abilify®)	Schizophrenia, bipolar disorder
Atomoxetine (Strattera®)	ADHD
Carbamazepine (Tegretol®)	Epilepsy, bipolar disorder
Citalopram (Celexa®)	Depression, anxiety
Tramadol (Ultram®)	Pain
Venlafaxine (Effexor XR®)	Depression, anxiety
Medications used to treat other conditions	
Allopurinol (Zyloprim®)	Gout
Celecoxib (Celebrex®)	Pain, inflammation
Metoprolol (Lopressor®)	High blood pressure, heart failure
Omeprazole (Prilosec®)	Heartburn
Simvastatin (Zocor®)	High cholesterol
Warfarin (Coumadin®)	High clotting risk

How might this affect my care?

Not everyone needs genetic testing. However, you may want to ask your health care provider about genetic testing if:

- You have experienced significant side effects from low or usual doses of medications.
- You have tried many medications, but have not experienced relief from your symptoms.
- Anyone in your family has experienced either of the above.

Your health care provider will explain the risks, benefits, and costs of genetic testing. You should also contact your insurance company to verify your coverage for genetic counseling and testing. There is no single test that will determine how you will respond to all medications, and many medications (including over-the-counter medications) are not labeled with specific recommendations for genetic testing. It is important that you do not stop taking any medications before talking to your health care provider.

Based on the results of a genetic test, your health care provider may decide that some medications are safer for you than others, or that some medications may work better than others. However, psychiatric and neurologic conditions are complex, and genetics are just one factor in determining the best treatment for your health condition. Your health care provider can help you decide what medication is best for you.

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Go online to find more information about the impact of DNA on medication therapy and to view the references for this toolkit.

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