

## Cytochrome P450 2D6 (CYP2D6) and medicines

When you take a medicine (drug), your body has to have a way to handle the medicine. One way is for enzymes to metabolize (break down) the medicine. A family of enzymes called cytochrome P450s have the ability to break down certain medicines. By metabolizing a medicine, cytochrome P450 enzymes make the medicine either more or less active, depending upon the medicine. Cytochrome P450 2D6 (CYP2D6) is part of the cytochrome P450 family of proteins in the body. It is responsible for breaking down many medicines that are commonly used.

### Pharmacogenetic testing

DNA is like a set of instructions for your body that can help decide how well your enzymes will work. Each person differs from another at the DNA (gene) level. This means that each person has small differences in the genes that code for enzymes. The part of DNA that instructs how well the CYP2D6 enzyme will work is called the *CYP2D6* gene. The study of how genes like *CYP2D6* affect the way you break down medicines is called pharmacogenetics (FAR mah coh je NEH tiks).

Differences in your DNA that make up the *CYP2D6* gene can change how well you are able to break down certain medicines. If you break down a medicine too fast or too slowly, this may cause a bad reaction to the medicine. By testing your DNA (with a pharmacogenetic test), we may find DNA differences that can allow us to predict how well your CYP2D6 enzyme will work. The result of this test will guide your doctor to choose the correct dose of medicine to give you. The results of your CYP2D6 test will place you into one of four groups:

- **Poor metabolizers** – People in this group have little or no active CYP2D6 enzyme. People who are poor metabolizers break down some medicines slowly and are likely to need altered doses or even a different medicine in some cases. About 10 percent of people are poor metabolizers.
- **Intermediate metabolizers** – People in this group break down some medicines at a rate in between the poor and extensive metabolizers. About 10 percent of people are intermediate metabolizers.
- **Extensive metabolizer** – People in this group have normal working CYP2D6 enzymes. About 78 percent of people are extensive metabolizers.
- **Ultra-rapid metabolizers** – People in this group have very high activity of CYP2D6 enzymes. People who are ultra-rapid metabolizers break down some medicines rapidly and are likely to need

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different doses or even a different medicine in some cases. About 2 percent of people are ultra-rapid metabolizers.

#### Medicines that may be affected

CYP2D6 enzymes break down many commonly used medicines, including: codeine and some other pain relievers; some antidepressants and other psychiatric medicines; and beta blockers (used for heart conditions and high blood pressure). The result of your CYP2D6 test will place you into one of the four groups above. Knowing what group you are in may help your doctor to pick the right medicine and right dose for you.

For example, for codeine and some other pain relievers:

- Poor metabolizers are not likely to get pain relief from codeine or tramadol.
- Ultra-rapid metabolizers may have more side effects from a normal dose of codeine or tramadol. Nursing mothers who are ultra-rapid metabolizers should tell their doctor before deciding on which pain medicines they can take.
- Intermediate metabolizers and extensive metabolizers don't normally need dose changes of these medicines based on their CYP2D6 test result.

Scientists continue to find new information about which medicines are affected by gene test results. For details about which medicines are broken down by CYP2D6, please go to [www.stjude.org/pg4kds](http://www.stjude.org/pg4kds) or [www.pharmgkb.org](http://www.pharmgkb.org).

#### Questions?

If you have questions or concerns about pharmacogenetic testing at St. Jude, call one of the Pharmaceutical Sciences research nurses at 901-595-2482 or email [phnurses@stjude.org](mailto:phnurses@stjude.org). If you are calling from outside the Memphis area, dial toll-free 1-866-2ST-JUDE (1-866-278-5833), then dial extension 2482.

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