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# DNA *Today*

ADDRESSING THE DNA TESTING NEEDS OF MEDICAL PROFESSIONALS AND THE GENERAL PUBLIC SINCE 1987.

## Twins - Identical? Fraternal? Only DNA Testing Can Tell



Approximately one in every eighty births results in the delivery of twins. Although the misconception persists, the number of placentas cannot determine if same-sex twins are fraternal or identical - only DNA testing can. One third of identical twins have two placentas and more than 40% of fraternal twins have a single, fused placenta.

DNA testing to determine if twins are identical or fraternal is called twin zygosity testing. Twins that are dizygotic or fraternal are the result of two different sperm fertilizing two different eggs and share only the same amount of DNA as full siblings born at different times. Monozygotic or identical twins are the result of one egg fertilized by a single sperm that splits in two and have identical DNA.

Most twins have zygosity testing performed simply to satisfy curiosity. However, knowing if twins are identical or fraternal can be a safeguard for possible future medical emergencies—identical twins are perfect organ and tissue donors for one another.

Although identical twins often look so much alike that we have difficulty recognizing one from the other, many do not because their genes express themselves in different ways. Alternatively, fraternal twins can appear to be identical when they are not, like the famous Olsen twins pictured above. If you are a twin or know a twin that has ever wondered, DNA testing is the only way to answer the question with certainty.



## DNA in the News

The remains of Notre Dame's first All-American, of "win one for the Gipper" fame, were exhumed last month for DNA testing - 87 years after his death. Test results showed he wasn't the father of his former girlfriend's daughter, born five days after his death.

The headlines aren't over yet. Recently, relatives of Gipp filed a lawsuit against another family member, ESPN, and sports writer Mike Bynum over the exhumation of Gipp's body.

# A Simple DNA Test Helps Physicians Tailor Breast Cancer Treatment



This suggests that widespread genetic testing and careful analysis of overall drug regimens could result in successful outcomes for many of the 35% of ER positive breast cancer patients who currently fail tamoxifen treatment. With more than 500,000 women currently taking tamoxifen, this research has wide-reaching implications.

According to the American Cancer Society, one in eight women in the United States will develop breast cancer in her lifetime and 1 in 33 will die from it. Every year, nearly 180,000 additional women are diagnosed with breast cancer and more than 40,000 die. It is the second leading cause of cancer death in women, after lung cancer.

Genetic testing may hold the key to improving these odds. About two-thirds of newly diagnosed breast cancer patients are ER (estrogen-receptor) positive and are candidates for hormonal therapy. Tamoxifen is a likely choice of treatment in these cases but one third of breast cancer patients currently fail tamoxifen treatment. Genetic testing identifies patients that are at risk for failure. This vital information gives medical providers a tool to better manage treatment and drug regimens.

Tamoxifen is converted to the active compound endoxifen in the liver by an enzyme called CYP2D6 (CytochromeP450 2D6). Endoxifen is 30-100 times more effective than tamoxifen. A DNA test can determine a person's genetic ability to create levels of this enzyme. The more of the 2D6 enzyme a woman has the better she can absorb tamoxifen and convert it, thereby avoiding relapse.

About 7-10% of women are CYP2D6 poor metabolizers with absent or greatly reduced levels of this enzyme. Another 35% are intermediate metabolizers that have slightly lowered levels of the enzyme. Intermediate metabolizers and even normal metabolizers can also be at an increased risk of relapse when certain other medications are taken at the same time.

A common side effect of tamoxifen treatment is hot flashes, commonly treated with anti-depressants such as Paxil. A few years ago several doctors wondered if the anti-depressants were making Tamoxifen less effective. That is, were they preventing the enzyme 2D6 from doing its job?

The answer is yes. Many anti-depressants such as Paxil reduce the ability of the 2D6 enzyme to work, so women taking the medication - especially those that were poor or intermediate metabolizers of 2D6 – were not getting the needed benefit from tamoxifen.

This suggests that widespread genetic testing and careful analysis of overall drug regimens could result in successful outcomes for many of the 35% of ER positive breast cancer patients who currently fail tamoxifen treatment. With more than 500,000 women currently taking tamoxifen, this research has wide-reaching implications.

"I hope that this technology is quickly adopted in the medical community. This is a simple and fairly inexpensive test that can help physicians improve breast cancer survival rates," stated Howard Coleman, Genelex CEO.

## Who Should Be Tested?

The CYP2D6 test for tamoxifen is considered appropriate for postmenopausal women who are currently taking or considering tamoxifen to prevent the recurrence of breast cancer. It is especially important if the patient is also taking or considering co-administration with anti-depressants.

**"I hope this technology is quickly adopted by the medical community. This is a simple and fairly inexpensive test that can help physicians improve breast cancer survival rates."**

**-Howard Coleman,  
Genelex CEO**





# Giving the Gift of Genetic Inheritance This Holiday Season

It's a challenge we face every year -- what to do about gifts for the holidays. Our loved ones deserve something fun and thoughtful. Consider a gift that helps a person explore what makes them unique - their DNA.

With Genelex DNA Testing Gift Certificates your family and friends can:

- Trace family history back thousands of years through the male or female line with our common male or common female ancestor test.
- Confirm Native American, European, East Asian, or African ancestry with our Ethnicity DNA Test.
- Determine what medications are unsafe or ineffective, or require lower doses

with our DNA Drug Reaction Panel.

- Verify family relationships.
- Receive personalized nutritional and lifestyle recommendations through DNA analysis with our Nutritional Genetic test or DNA Diet™.

Common male or female ancestry tests offer another advantage, one test is identical for multiple family members. Last year, Gladys ordered a Common Female Ancestor test and submitted her own DNA sample. Because her mother, brother,

and sister have the same mitochondrial DNA as Gladys, she requested 3 additional certificates with her family members names along with the detailed explanation of the

**Few gifts are more meaningful than a gift that helps a person explore what makes them unique - their DNA.**

start and expansion of their female line or haplogroup. "My family loved the gift. We now know that our female ancestry is Native American and can pass this as knowledge, not just lore, to our children and grandchildren."

Make this a holiday to remember, with a unique gift that lasts a lifetime. Call 800-837-8362 for DNA Testing Gift Certificates.



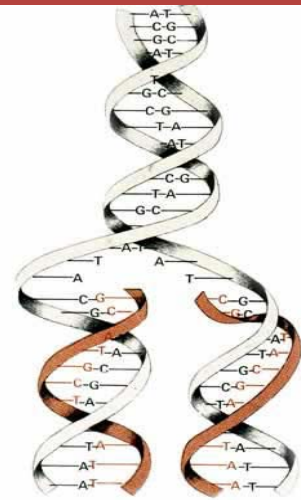
## FDA and AMA Release Personalized Medicine CME

Interested in learning more about personalized medicine?

Have you had DNA Drug Reaction Testing performed and your physician is unfamiliar with how to use the results?

The American Medical Association (AMA) and the Food and Drug Administration (FDA) have developed a free, online Continuing Medical Education course "Pharmacogenomics and Personalized Medicine" that can help. This CME introduces pharmacogenomics and the influence of a patient's genetic background on drug response. The course was designed for physicians and other healthcare providers; however, the content is accessible to anyone with a science background. The course can be accessed free of charge at <http://ama.learn.com>.

## DID YOU KNOW?



Identical twins come from one fertilized egg that splits in two, resulting in same-sex twins who share 100% of their DNA. Although their DNA is identical, they do not have identical fingerprints; fingerprints are unique to each individual.

Fraternal twins result when two separate sperms fertilize two separate eggs. These twins share only 50% of their DNA, just like regular siblings, and can be the same gender or one boy and one girl.

A third type, polar body twinning, is thought to occur when a single egg splits prior to fertilization and a separate sperm fertilizes each half. These twins share 75% of their DNA and, like fraternal twins, can be same gender or one boy and one girl.





# Use Your FSA for DNA Tests That Last a Lifetime

FSA's allow employees to use tax-free money for qualified medical expenses typically reducing out of pocket cost by about 30%.

The final few months of the year are the open-enrollment season for benefits at many companies. If you have considered genetic testing but have not budgeted testing in, this is the ideal time to consider opening a medical flexible spending account (FSA) to cover this and other medical expenses. If you already have an FSA, genetic testing is also a great way to spend any remaining funds so you don't lose them.

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FSA's have different guidelines so we recommend checking with your plan

administrator, but the following DNA tests are typically covered:

- Pharmacogenetic DNA Drug Reaction Testing that can determine your genetic ability to process about one half of medications.
- Nutritional Genetic Testing as long as the test is physician recommended and the indication is to treat a diagnosed illness (e.g. obesity, heart disease, diabetes, hypertension).
- Predictive Genetic Testing including Celiac, Narcolepsy, Periodontal, and Hemochromatosis.

FSA's are one of the most versatile yet underutilized benefits, consider using yours for DNA tests that last a lifetime.

## Questions? Comments?

Call a Genelex DNA Testing Consultant  
800 TEST-DNA  
(800-837-8362)  
or visit us online  
[www.genelex.com](http://www.genelex.com)



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