DNA tests allow doctors to see into the future

By Minneapolis Star Tribune, adapted by Newsela staff on 02.05.14

~ Word Count 983 ~

Dr. Louis J. Elsas, head of the University of Miami's Dr. John T. Macdonald Foundation Center for Medical Genetics, in Florida, studies a gene sequence he believes may predict illness before symptoms occur, on Aug. 29, 2003. Photo: Chuck Fadely/Miami Herald

MINNEAPOLIS — Denis Keegan was suffering from kidney disease, but his doctors were struggling to pinpoint the cause, and he was out of answers. That's when he turned to genetic testing to try and find out what was going wrong.

Doctors at the Mayo Clinic in Rochester, Minn., extracted his DNA from a blood sample and examined it. DNA controls how every part of the human body develops and functions. Deep inside Keegan's genetic code the doctors discovered the source of his kidney problems — a mutant gene.

This told them that he was suffering from an extremely rare kidney disorder and, armed with that knowledge, his doctors were able to tailor the treatment for his condition. Keegan said that the result of the test was "really reassuring."

The human genome was mapped in 2003, revealing for the first time the entire genetic makeup of our bodies. Since then, genetic testing has become a booming industry. It is also an option for patients, such as Keegan, to learn more about their bodies' internal mysteries and help solve illness.

Looking At A Person's Genes

Advancements in the testing are coming rapidly, slashing the price and time it takes to get results. The X-ray machine made it possible to peer inside the human body, now genetic testing is changing the way doctors diagnose and treat diseases.

Testing is available through a doctor or by kits that can be bought online or at a drugstore. By the end of the decade, Americans are expected to spend as much as $25 billion a year on genetic tests. They can check for everything from kidney diseases to breast cancer risk to good health during pregnancy.

But genetic testing is a complicated issue, as it could cause needless anxiety among healthy people. Or it could start family problems if one member's test reveals troubling findings about the whole family's genetic makeup.

Genetic testing involves looking at a person's genes to help prevent, diagnose or treat a disease. It also can be used to determine whether a person is a carrier of a disease and if there is a risk of passing it to their children. The DNA can be collected from a blood sample or from a person's saliva.

Genetic testing jumped into the spotlight last year when Angelina Jolie chose to have both her breasts removed. A genetic test had revealed that she had a high risk of developing breast cancer.

Melissa Truelson is a genetic counselor at the University of Minnesota Medical Center. She explained that everything our body does is because of genes and that many diseases have a genetic basis.

Determining The Best Medicines

The cost of genetic testing varies widely, from $99 for at-home kits to thousands of dollars for tests conducted at hospitals and clinics.

Insurance companies will usually cover tests that are ordered by doctors, but home test kits are not covered. Critics say these tests are limited in their ability to diagnose health risks accurately. So they could lead users to undergo unnecessary medical procedures.

Doctors say that genetic testing can be very effective in determining the best medicines for someone with a defined disease.

A 44-year-old woman with gall bladder cancer is among the success stories at the Mayo Clinic, said Dr. Alexander Parker. Her tumor was not responding to the standard medicine used to treat the cancer. Through genetic testing, doctors discovered that drugs used on leukemia patients might work for her. They tried it and her tumor started to shrink, Parker said.

But for healthy people, who he calls the “worried well,” there is little to no value in having the genome mapped. It may cause harm by raising anxiety about the odds of developing a disease.

Parker said that the test just informs you about risk of disease. We all want answers, he says, but "we can never say that we know exactly what will happen to anyone.”

Parker encourages those curious about testing to talk to their primary doctor first. Truelson said she tells patients to think about how the information they will get might affect them both medically and emotionally.

Testing Can Affect Family Members

Nada Maalouli of Eagan, Minn., has wrestled with these questions for years. Her mother died of ovarian cancer, and her grandmother and an aunt on her mother’s side died of breast cancer. A genetic test would tell Maalouli if she carries a mutant gene associated with higher risks of those cancers.

She has agonized over the decision to get tested, in part because she fears that the test could bring bad news. Now 51, Maalouli and her three sisters — who are all healthy so far — have made a pact. They will get regular examinations for cancer, and if any of them finds something wrong, then the sisters will all get tested.

One person’s choice to get tested may also reveal information about his or her relatives, who may prefer not to know. Keegan's decision to have his genome mapped affected several members of his family. Mayo doctors asked his older brother and father to also submit a DNA sample to find out if Keegan had inherited his father’s disease. His father previously had a kidney transplant.

Keegan, 30, and his wife were also thinking about starting a family and wanted to know what their chances were of passing on the mutant gene to their children. It turns out there is a 50 percent chance their offspring will inherit it.

The couple talked about checking the fertilized egg to see if it had the faulty gene before deciding to continue with the pregnancy. But Keegan said they thought this would be "playing God." In the end, they decided that they’ll roll the dice and have children the old-fashioned way.

Keegan figures that even if his child does get the disease, there’s a good chance that medical advancements will improve treatment in the future.