

MONTHLY Feature

The Evolving World of Genetic Testing



For many neuromuscular diseases, genetic testing is the best way to confirm a diagnosis and determine the most effective course of treatment.

One example is Duchenne muscular dystrophy (DMD). Christopher Cunniff, MD, Clinical Geneticist at Weill Cornell Medicine in New York, recommends that any provider who sees a boy with delayed gross motor, cognitive, speech and language, or social adaptive skills should order a test to measure the level of creatine kinase (CK), which is the enzyme that leaks out of



Christopher Cunniff, MD

damaged muscle. “A CK level is not a genetic test, but it is a direct line to genetic testing,” Dr. Cunniff says. “Any time that the CK level is substantially elevated, following up with genetic testing of the dystrophin gene is important.”

DMD is caused by mutations in the dystrophin gene (DMD) on the X chromosome that result in little or no production of dystrophin, a protein essential to keeping muscle cells intact. Multidisciplinary care can help boys and men with DMD maintain function and prolong life. In addition, since 2016, the US Food and Drug Administration (FDA) has approved three gene-targeted therapies that could slow the progression of DMD. Each drug is designed to target a specific type of DMD mutation. Genetic testing is crucial for identifying boys with DMD who could benefit from these therapies, and which one might be most effective.

Better genetic testing

Advances in genetic testing have led to tests for conditions like DMD that go beyond just detecting a gene mutation.

“Results of genetic testing are now able to tell us whether the gene change is likely to result in a Duchenne kind of phenotype or a Becker muscular dystrophy type,” Dr. Cunniff says. “The laboratory report also provides information about whether a child might benefit from a medication that is designed to promote exon-skipping and improve their muscle function. The genetic testing available now can even tell you down to the exact nucleotide what the deletion looks like.”

Collecting samples for genetic testing has also changed for the better. A blood draw usually is not needed. “We can almost always use either a saliva kit or a cheek swab to do testing,” Dr. Cunniff says. “That has been a real bonus, especially for kids.”

When to test

While using genetic testing to make an accurate diagnosis is important, genetic testing can also be used to spot genetic conditions early, or the possibility of them.

A family history of DMD, Becker muscular dystrophy (BMD), or an unknown cause of muscular dystrophy is a clear indication for genetic testing. Dr. Cunniff believes all adults considering becoming parents should also consider carrier screening.

“I am a proponent of expanded carrier screening,” Dr. Cunniff says. “The kind of carrier screening that’s available now is very robust. For example, in our own clinic we use a carrier screening panel that screens for more than 250 genetic conditions, with dystrophin being one of those. We have found that in helping people understand their risk, we sometimes identify carriers where there’s no family history.”

Dr. Cunniff also advocates for newborn screening, which can provide an early diagnosis of a genetic condition, allowing families to know what to expect in their child’s development. It also allows children the chance for an early start on existing or emerging therapies.

Better access to genetic testing

With so many benefits to genetic testing, it’s not surprising that laboratories and insurance companies

NO-COST GENETIC TESTING

MDA is **partnering** with Invitae, a leading medical genetics company, to offer sponsored, no-charge genetic testing to patients through the **Detect Muscular Dystrophy** program in MDA’s Care Center network. Clinicians can learn who qualifies and start an order **here**.

alike are interested in expanding access.

“One of the great things that’s happened in the last five or six years is that many laboratories have a very strong customer service base where you can submit a sample to the laboratory, and the laboratory then runs a benefits investigation with the insurance company of the patient,” Dr. Cunniff says. “They do a lot of the legwork that we used to spend hours and tons of resources on. That has really lowered the barriers to this kind of testing.”

Dr. Cunniff has noticed that insurance companies are more willing to cover genetic testing than they used to be, although coverage varies from state to state. But the lowered cost of genetic testing makes it affordable for many families even when insurance doesn’t cover it. “For private pay testing for these conditions, some laboratories offer reduced pricing that may be \$300 or less,” he says.

Telemedicine is also expanding access to genetic testing. “The capabilities that have been developed in telehealth, especially since March 2020, have really accelerated our ability to provide quality services to people who wouldn’t necessarily have had that opportunity,” he says. “We can call up the laboratory and have them send a kit to the family, and the family can be told how to collect the cheek swab, so they don’t even have to go into a doctor’s office.” While the test results should be communicated by a physician and/or genetic counselor, often that can be done via telemedicine.

Looking ahead

So many of the anticipated advances in genetic testing — greater accuracy, lower cost, expanded access — have arrived. But Dr. Cunniff sees the field continuing to evolve.

“At some point I believe we’re going to have a lot more fetal testing available,” he says. “There is a substantial amount of fetal DNA circulating in the serum of a pregnant woman, and we’re already testing for chromosome abnormalities. Those tests, regardless of whether we like it or whether society or science is ready for it, will go into genetic disease at some point. And that is another advance that might identify boys who have DMD or BMD.”