# Testing for Huntington Disease: Making an Informed Choice

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*The decision of whether or not to have testing for Huntington disease (HD) is a very complex and personal one. Each individual in a family with HD will feel differently about testing. There are no right or wrong choices. It is important, however, that the person who is thinking about being tested make an informed choice. This pamphlet is intended to help the individual considering testing for HD reflect on some of the issues involved in testing and in dealing with the test results. Family, friends and professional support people may also find this material useful in supporting those considering testing.*

## WHAT IS HUNTINGTON DISEASE (HD)?

Huntington disease (HD) is a hereditary condition which affects the brain and nervous system. The symptoms of HD include uncontrolled movements (called chorea) and problems with coordination, judgement, and thinking. The symptoms usually do not occur until people are in their thirties and forties. However, people can develop signs of HD at younger or older ages. Even in the same family, people's symptoms can begin at different ages. Unfortunately, there is no cure for HD, and the problems get slowly worse over a period of 10 to 20 years. Research is advancing at a rapid pace and offers hope for the future.

## TRANSMISSION OF HUNTINGTON DISEASE

Huntington disease is inherited in an autosomal dominant pattern. This means a person with HD has a 50:50 chance to pass the genetic change or mutation that causes HD to *each* son or daughter. A person who has *not* inherited this genetic change will not develop HD and cannot pass HD on to a child.

DNA (deoxyribonucleic acid) makes up the genes which are the basic units of heredity. Genes contain the code of instructions which determines each individual's development, growth and functions. Genes are located on threadlike structures called chromosomes. Each person has 23 pairs of chromosomes, half from their father and half from their mother. There are 50,000 to 100,000 genes packaged on the chromosomes. Each gene occupies a particular location on a specific chromosome. The gene for HD is located on the tip of chromosome 4, and is called the IT-15 gene.

Everyone has a specific piece of DNA on chromosome 4 that makes up the HD gene. This segment of DNA repeats in units of three, and is called a CAG trinucleotide repeat. *Tri* means three, and *nucleotides* are the building blocks of DNA. People who have inherited the gene change or mutation that causes HD have a CAG trinucleotide that repeats too many times. People who have CAG repeats in the normal range, have not inherited HD.

## THE HUNTINGTON DISEASE DNA TEST

There is a DNA blood test that can determine whether an individual's CAG repeats on chromosome 4 are expanded. A sample of DNA can be obtained from a small amount of blood or sometimes even from a tissue sample.

### *There are three possible DNA test results–*

1. negative (normal), 2. positive (high risk), and 3. uncertain/reduced penetrance.

### *1. Negative/Normal:*

This individual will not develop HD.

- Both genes contain a CAG repeat in the normal range.
- The accuracy of this result is almost 100% if a parent or other affected relative is known to have the CAG expansion.
- Rarely, a person with a CAG repeat in the normal range seems to have physical signs of HD. This requires further medical investigation.

### *2. Positive/High Risk:*

This individual is at high risk for HD.

- The CAG repeat is expanded, usually to 40 or more repeats.

- The accuracy of this result is close to 100% that the person has inherited HD.
- The test does *not* tell

  –if a person has physical signs of HD or
  –at what age a person will start to have symptoms or
  –what those symptoms will be like.

A positive test result does not necessarily mean a person has "disease" symptoms. A positive or high risk result means that at some point in life, this person will begin to have symptoms of HD. However, there is a great deal of variability in the symptoms, their severity, and the age of onset, even within the same family.

Individuals with symptoms of HD should be examined by a neurologist who can confirm the diagnosis and provide continuing medical support and care.

### *3. Uncertain/Reduced Penetrance:*

There is an area of uncertainty or "gray area" in HD DNA testing.

- Some people with a CAG repeat from 36 to 39 never develop symptoms of HD, while others do develop symptoms. If symptoms do develop, it is often later in life.
- About 1% of people who are tested fall into this gray area.
- Each child of a parent who has a CAG repeat in this range is at 50% risk for inheriting the HD mutation.

Recently an *unstable* or *mutable* range from 27 to 35 CAG repeats has been identified. Individuals with a CAG repeat in this range will not develop HD, but there is a small possibility the CAG repeat may expand when passed from father to child and possibly from mother to child. More research is required before accurate risk figures can be given for this range.

## THE PROCESS OF HD TESTING

The process of DNA testing for HD involves more than providing a blood sample.

### *Confirming the diagnosis of HD in the family–*

It is important to make sure the diagnosis of HD is correct in the family. Often medical records on affected family members are requested. It is useful to perform the DNA blood test on an affected family member in order to confirm the presence of a CAG expansion.

### *DNA banking–*

Individuals may wish to discuss with a genetic counselor or medical geneticist the advisability of banking samples (obtained from blood) for possible future testing of other family members.

### *Education and counseling–*

Testing involves education and counseling about the implications of the testing by someone with expertise in genetic testing such as a genetic counselor or medical geneticist. A neurological examination is also performed. Individuals with symptoms may discuss testing with a neurologist. A person with depression, changes in behavior, or psychiatric illness should also be seen by a psychologist or psychiatrist. The Huntington Disease Society of America can provide

a list of approved HD testing centers as well as local support groups and contacts. The National Society of Genetic Counselors can also provide the name of a genetic counselor in your area. (See Resources.)

### *A support person–*

The decision of whether or not to have testing for HD can be stressful. Waiting for the results can also place strain on the individual. The results, even "good news," can take time for adjustment. Having a support person, such as a friend or spouse, who is present at all appointments is useful. This person can act, not only as a second set of ears, but also as a sounding board to talk through feelings about testing, and provide support after the test results are given.

### *Costs–*

Costs will vary among testing programs. Usually the cost of testing (DNA blood test, pre- and post-test counseling and neurological examination) is under $1000. Some insurance companies will pay for this testing.

## SHOULD I BE TESTED?

The decision to be tested is very personal and may be one of the most important decisions you ever face. Members of the same family will have different feelings about testing. It is important to respect each person's feelings. For individuals without symptoms of HD, the main benefit of "presymptomatic" DNA testing is psychological, since currently there is no medical intervention (for example, early treatment, specific diet, or lifestyle changes), that can slow or prevent Huntington disease. The test results have important implications for many life decisions. The following areas are just some of the issues to consider:

### *Relationship with spouse or significant other–*

- Is this person supportive of your decision to be tested or do they have a conflict with your decision?
- Have you discussed decisions that affect you as a couple that you might make differently depending on your test results, for example, decisions to have children, retirement, and long term care issues?
- Many people who are at risk for HD fear abandonment by their spouse or significant other when they develop HD. Have you discussed this fear or other fears with your partner?

### *Relationships with children–*

- Do your children know about HD?
- Are they pushing you to have testing or are you involving them in your decision making?
- Will you tell them your results? If so, how will you tell them?

### *Relationships with extended family–*

- How do you perceive the results of the testing will impact your interactions with your brothers and sisters, your parents and extended family?
- If the results show you have inherited the HD mutation, will this affect how you feel about your affected relatives, for example, feeling closer or more distant from them?
- If you do not have the HD mutation, you may experience "survival guilt," meaning that you wonder why you have "escaped" this disease whereas others in your family have been less fortunate. A person given a normal (negative)

result may also feel an increased responsibility to take care of affected family members that he or she may not have felt before testing.

- Who, if anyone, in your family do you plan to tell of your results? How would you tell each of them, for example, by phone, by letter, at a family meeting?

### *Relationships with friends–*

- Are there people in your life that you feel you can talk to about HD and about your decision regarding testing?
- Have you been through difficult periods in your life with them before?
- In what ways were they supportive to you?

### *Seeking professional support–*

If you have used professional support services (for example, a therapist, psychologist, religious professional, psychiatrist) through difficult times in the past, it may be helpful to discuss your decision to be tested with this person. This is particularly important if you have had problems with depression, anxiety, or thoughts of suicide.

### *Career decisions and telling colleagues at work–*

- Will your test results affect your decisions about the type of work you are doing now or plan to do in the future? Do you plan to tell the people you work with about your decision to be tested or test results?
- Many people at risk for HD fear they will be treated differently at work if they tell anyone about

HD. Some people fear they may even lose their job. Some companies have confidential employee services where you can discuss these concerns.

## *What about insurance and other financial planning?*

You should be comfortable with your insurance coverage (life, health and disability) before beginning testing. Potential problems may include: cancellation of existing benefits (unlikely), exclusions for coverage related to symptoms of HD, extended waiting periods for coverage, and an increase in costs for premiums. Some people may feel locked into a certain job to maintain insurance coverage.

## *Do you think you have inherited Huntington disease?*

Honestly considering your feelings about whether or not you believe you have or will develop HD is important. It can be more difficult to deal with the test results if the resultsare the oppositeof your inner feelings.

## *Assessing your own coping strategies–*

- How have you dealt with difficult situations in the past? What things do you do to get out of a slump, for example, call a friend or family member, go for a walk, work out, work in the garden?
- What strategies work well to help you out short term versus those that work more long term?
- How do you ask for help when you need it?

Recognizing what resources have worked for you in the past is helpful because you can start using them again when you need help in the future.

### *Timing of testing–*

The process of being tested for HD and dealing with the results will be stressful and is often disruptive to dealing with everyday problems. It is good to choose a time to be tested when complicating factors from the outside are at a minimum. For example, in the middle of a divorce or break up of a relationship, or at a stressful time at school or work is not a good time to be tested. Testing at a time of celebration may not be optimal, for example, directly before or after marriage, or in the middle of important holidays.

It is easy to become "obsessed" with thinking about testing for HD. It is useful to make a decision about whether or not to be tested even if the decision is not an absolute yes or no answer. For example, deciding not to be tested for a certain period of time (such as, "next year," or "after I turn 30") can help you put this aspect of HD aside for a period of time until you are ready to readdress testing issues.

## THE DECISION TO BE TESTED

If you decide to be tested, it is important to plan who you will tell. Will you tell them on the same day you are given your results? Exactly how and when will you plan to tell them? What if you change your mind and do not want them to know quite yet or at all? (One strategy is to tell them your results were uncertain.) Planning what you will do the day you are given the results can be helpful. Will you go directly home, and who will be there? Will you take some time off work or away from family responsibilities?

## THE IMPACT OF THE TEST RESULTS

You will most likely have strong emotional feelings when the results are given, regardless of the outcome. Many people feel relief at having an answer and disbelief that the answer is accurate. Often people express a feeling of "loss of identity," particularly if the result is different from the one they expected. Frequently people go through a period of regretting past decisions, which they might have made differently if they had known their status with regard to HD. This is particularly true if those decisions were permanent, for example, decisions about whether or not to have children, or career paths. Some other feelings specific to the test result may be as follows:

### *Positive or high risk test result in a person with no symptoms–*

Many people express a sense of isolation, feeling that there are few other people who can relate to their feelings. Participating with an HD support group or continued support from their HD testing center can help them feel they are not alone. Some people have difficulty with not knowing when they will first develop symptoms of HD. They, their friends and relatives may wonder if the occasional clumsiness, jerk or emotional outburst is the beginning of HD. An appointment at the HD testing center or with a neurologist may help to sort through some of these fears. Feelings such as depression, anger, loss of hope, despair, and severe stress can occur. If these feelings occur, treatment with a psychologist, psychiatrist, or counselor can be very helpful. The sense of "riding an emotional roller coaster" with good days and bad days is normal. Most people eventually come to terms with their results and use the information to help make plans for the future.

### *Positive or high risk test result in a person with symptoms–*

For some people, it is a relief to actually have an explanation for some of the problems they may have been experiencing. Sometimes this information can reduce stress in the work environment. The person with HD may be eligible for job reclassification or benefits. Stress in the family may also be reduced. As with the diagnosis of any chronic illness, the diagnosis of HD can bring feelings of shock, grief, anger, disbelief, depression and loss of control. Professional support and support from friends and family can help someone with HD continue to lead a productive and satisfying life.

### *Uncertain (reduced penetrance) result–*

This can be the most frustrating result since the at risk individual chose to be tested in order to have a clear answer.

### *Negative or normal result–*

Most people feel extreme joy and relief with a negative result but they may experience a low period following the testing. They may be disappointed that the "good news" did not bring as many positive changes in their life as anticipated. The problems that existed before the HD testing are most likely still there. Huntington disease is still very much a part of their life. Often there may be a feeling of increased responsibility for caring for affected family members. Often people who have lived their lives feeling they would not live a long life because they would someday develop HD have a hard time dealing with the concept of "having a future." They may feel a new pressure to "make something of

themselves." They may also feel guilty that they will not develop HD when other close family members will, particularly if they are the only family member who has "escaped."

### *Coping with results–*

Most people eventually adjust well to their test results. It is important to draw on the support of professionals, family and friends.

## TESTING CHILDREN

Testing is not offered to children under the age of legal consent (age 18). There is no medical reason to test a child without symptoms of HD. When children become adults, they may make their own choice about DNA testing. Children with possible symptoms of HD should be evaluated by a neurologist.

## FAMILY PLANNING

The decision whether to have children when you are at risk to develop HD is a difficult one. Some people chose to have children and others do not. For some people, knowing whether they have the HD gene alteration helps them with this decision.

It is possible to do DNA testing early in pregnancy to determine whether or not the fetus has the HD gene alteration. Amniocentesis involves removing some of the fluid (the amniotic fluid) from around the fetus through a needle inserted through the woman's belly and into her uterus. This procedure is done at 14-18 weeks in pregnancy. Another procedure, called chorionic villus sampling (CVS) involves inserting a thin catheter (a hollow tube) through the vagina and cervix. A small piece of the developing placenta (called the chorionic villi) is removed. Sometimes the chorionic villi are removed

in a manner similar to amniocentesis. Chorionic villus sampling is done at 10-12 weeks in pregnancy.

It is important to realize that testing in a pregnancy requires you to consider the possibility of termination of the pregnancy if the fetus is found to have the HD gene mutation. You should consider how you feel about pregnancy termination well in advance of a pregnancy. When the HD test in pregnancy shows the fetus has the HD mutation and the pregnancy is continued, there are many potential difficulties with knowing a child has been identified from birth as a person who will develop HD at some point in his or her lifetime.

There are alternative reproductive techniques to allow an individual with the HD gene to have a child. If the man has the HD gene alteration, donor sperm can be used to conceive a pregnancy with his partner. This is a relatively inexpensive and usually a successful way to have a child. If the woman has the HD gene alteration, donor eggs can be used to conceive a pregnancy with her partner. This is a more costly procedure with a lesser success rate in achieving a pregnancy.

A genetic counselor can help individuals and couples identify which options are most compatible with their personal belief systems and life goals. Ideally, you should meet with a genetic counselor prior to considering a pregnancy.

## WHAT IS THE FUTURE OF HUNTINGTON DISEASE RESEARCH?

The ability to directly test for the HD mutation has only been possible since 1993. As more people participate in testing for HD, our knowledge of the long-term psychological effects of this testing improves, so that we can better support people through this difficult process.

Each year brings important new insights into what goes wrong in the brain cells affected by HD. As our understanding about what causes HD increases, our ability to treat and manage this condition will improve. There is an international research effort involved in the campaign to find new treatments and ultimately a cure for HD.

Receiving the Huntington Disease Society of American newsletter is an excellent way to stay informed about new advances.

## RESOURCES

Huntington Disease Society of America (HDSA)
140 W. 22nd Street, 6th Floor
New York, NY 10011-2420
Phone: (212) 242-1968
http://www.HDSA.org

National Society of Genetic Counselors (NSGC)
233 Canterbury Drive
Wallingford, PA 19086-6617
Phone: (610) 872-7608
http://www.nsgc.org/

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