

Behavioral Symptoms

The Behavioral Changes Associated with Huntington's disease

Huntington's Disease (HD), an inherited [neurodegenerative](#) disease, damages specific areas of the brain, resulting in movement difficulties as well as cognitive and behavioral changes. Behavioral changes are a characteristic feature of HD and are often the most distressing aspect of the condition for individuals and families dealing with HD. Although there is a great deal of variation in behavioral symptoms among individuals with HD, HD damages specific parts of the brain, resulting in specific and predictable behavioral changes. However, it is important to look at what may be triggering the behaviors in order to provide an environment that minimizes difficult behaviors, behaviors that disrupt the ability of the individual or caretaker to function effectively in a safe environment.

- [What are some of the behavioral changes that occur in people with HD?](#)
- [What causes the changes in behavior?](#)
- [How do behavior changes vary throughout the course of HD?](#)
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Behavioral Symptoms Part 1

The Behavioral Changes Associated with Huntington's disease

What are some of the behavior changes that occur in people with HD?

- [Aggression](#)
- [Altered sexuality](#)
- [Anxiety](#)
- [Apathy](#)
- [Delusions](#)
- [Denial](#)
- [Depression](#)
- [Disinhibition](#)

- [Frustration](#)
- [Hallucinations](#)
- [Irritability](#)
- [Mania](#)
- [Repetition](#)
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Note: This section addresses some possible causes of specific HD behaviors. For a more complete description of the possible causes of general behavioral changes associated with HD, read [Part 2](#) of this chapter.

Apathy

Characterized by indifference or lethargy, apathy is one of the most common behavioral symptoms of Huntington’s Disease. An apathetic individual may seem to have a diminished concern for things he or she used to care about. The individual may seem uninterested in his or her surroundings and lose enthusiasm as well as spontaneity. A lack of motivation and loss of the ability to initiate conversation or activities also tends to occur in individuals suffering from apathy.

Coping with apathy can be very difficult for caregivers as well as for the affected family member. Families may feel that he or she is no longer the same person they knew because of the loss of interest in activities that were previously enjoyed. Apathy can also be a frustrating symptom of HD because a caregiver may feel that the person with HD is capable of performing an activity but “won’t.”

Although the inability to initiate conversation or activity can occur independently, it tends to accompany apathy. The ability to initiate is a very complex brain function. Apathy appears to be caused by changes in the brain due to HD. The middle and bottom sections of the [frontal lobes](#) are connected to the [limbic system](#), a part of the brain that is associated with emotions. HD leads to damage of a structure called the [caudate nucleus](#), which may serve as a relay station for some of the messages being sent from the limbic system to the frontal lobes. As HD progresses, some of the connections from the caudate to the frontal lobes and limbic system are destroyed, potentially causing the frontal lobes to be disconnected from the “emotions” of the brain. As a result, the ability to self-initiate an activity is compromised, but the ability to perform the activity is retained.

Although aspects of apathy resemble depression, there are important distinctions. (see [depression](#) below) Many patients suffering from apathy deny being sad. Once the initiative is provided, the person is usually capable and willing to be involved in a particular activity. To read an article about techniques for motivating individuals with HD, click [here](#).

Depression

Depression is often dismissed as an understandable reaction to being diagnosed with Huntington's Disease. While a saddened mood is an understandable response to the life changes and loss of abilities resulting from HD, research and clinical experience show that many HD patients do not suffer from clinical depression. However, when depression does occur in HD, it often appears to be the direct result of changes in the brain caused by the disease. Brain changes due to HD can alter neurotransmitters, the chemicals that regulate moods. Thus, depression in HD is partly biological and partly situational, as an affected individual becomes aware of the life changes that may result from HD.

One of the challenges in managing depression for a person with HD is the diagnosis. Unfortunately, many of the symptoms of HD, such as memory loss, weight loss and apathy, resemble the symptoms of depression, thus making it potentially difficult to diagnose depression in an individual who has HD. Because patients with HD often have difficulty describing their emotional state, a specific complaint of a depressed mood is usually not necessary to diagnose depression. Following is a list of possible signs and symptoms of depression:

- Lack of interest in usual activities
- Sleeping most of the day or rarely sleeping
- Depressed mood most of the day, nearly every day
- Weight loss
- Slower movements or speech
- Feelings of worthlessness
- Social withdrawal
- Inability to concentrate
- Recurrent suicidal thoughts
- Loss of sex drive

The suicide rate for persons suffering from HD is seven times the national average. If a person with HD may be depressed, it is recommended to contact his or her physician. For a list of risk factors for suicide and suicide prevention tips, click [here](#).

Depression is very treatable. Generally, physicians recommend aggressive treatment of depression in persons with HD. Treatment of depression can greatly improve one's quality of life and significantly reduce the risk of suicide. Depression may precede the onset of other symptoms, and treatment may improve other problem behaviors. For more treatment information, click [here](#).

Frustration, Irritability & Aggression

Although some people suffering from HD may remain even tempered, others may lose the ability to control their emotions. Emotional volatility may be evident in increased irritability or episodes of explosiveness. A study on mice with the HD [allele](#) of the [Huntington gene](#) found that mice portrayed abnormal social behavior, particularly chronic aggressive behavior. For others, rigidity of thinking causes the individual to focus on one particular request. This individual may become irritable, frustrated or aggressive if

demands are not met. To read more about the study on mice with the HD allele, click [here](#).

When the caudate nucleus has deteriorated, emotions are improperly regulated, causing an increase in feelings of frustration and irritability. These feelings are often legitimate and triggered by something in the environment. The brain, however, cannot control the intensity of the emotion. Several factors may contribute to the feelings of intense frustration, etc:

- Hunger
- Pain
- Inability to communicate
- Changes in routine
- Loss of ability to perform certain tasks

HD causes changes in the brain that often make it difficult for a person with HD to see another's point of view. As a result, the individual may become easily frustrated or irritated if his or her views or ideas are challenged. A person with HD can rapidly escalate into severe anger; however, he or she can also calm down very quickly. If you would like to read about one woman's personal experience of dealing with a husband suffering from these behavioral symptoms, click [here](#).

Disinhibition

Disinhibition is the inability to control a sudden desire to do or say something. When these desired actions or words are potentially hurtful, repetitious or socially inappropriate, disinhibition may be considered a problem behavior. Making a comment to a co-worker about the supervisor's horrible hair-do while she is within earshot is an example of a disinhibited behavior. Generally, these behaviors are unintentional. The damage to the [caudate nucleus](#) may cause this difficulty in controlling emotions and impulses. Damage to the caudate may also result in the inability to experience intense feelings of embarrassment, guilt or shame.

In certain circumstances, a repetitious behavior or an impulsive behavior, such as a temper tantrum, may be an inappropriate response to something in the environment or a change in routine that needs to be addressed. An unreliable routine can contribute to disinhibition, such that mild feelings of confusion or annoyance are expressed as intense feelings of anger or fear. For more information on frustration, irritability and aggression, click [here](#).

Repetition

Following damage to the [basal ganglia](#) and the [caudate nucleus](#), individuals with HD may become "stuck" on one idea or activity. Inflexible thoughts and behavior may also make it difficult for an individual to change from one activity or idea to another or to deal with changes in routines. These behaviors are often associated with [Obsessive-Compulsive](#)

[Disorder](#) (OCD). True OCD, however, is uncommon in HD patients. Another possible cause of repetitive behavior is that legitimate needs of the individual are not being met. He or she may repeat a request in hopes of being understood.

Anxiety

While it is common for an individual with HD to experience anxiety about the future, sometimes excess worry occurs over seemingly trivial matters. Anxiety, a behavioral symptom of HD, is characterized by:

- Nervousness
- Restlessness
- Fidgeting
- Shallow breathing
- Sweating
- Fear
- Panic
- Rapid heart-rate
- Repetitive thoughts about bothersome topics

For individuals with HD, continual life changes as HD progresses can be a source of anxiety. Some individuals become anxious about social engagements because they are embarrassed about visible symptoms, such as [chorea](#). However, physical brain changes caused by the disease itself may also cause excessive anxiety. As thought processes become less flexible, changes in routine can exacerbate anxious behavior. Often, a *calm, predictable environment* can effectively minimize some behavioral symptoms.

Unawareness & Denial

The term "denial" is most commonly used to describe the inability to accept the reality of a distressing circumstance. HD sufferers may deny having HD or may be unable to recognize their disabilities. However, such denial is not under the individual's control, so "unawareness" may be a more accurate term for people with HD.

As a result of the HD mutation, circuits connecting the [caudate nucleus](#), [frontal](#) and [parietal lobes](#) may incur damage, resulting in a lack of self-awareness. People with HD may be unable to recognize disabilities or evaluate their own behavior. The inability to evaluate one's own performance may cause individuals to be unaware of mistakes that are evident to others. (see figure – info and mismatched socks) Damage to these [neural connections](#) may also impair the ability to experience a range of subtle emotions and see another's point of view, making social and personal relationships more difficult.

A lack of awareness often plays a role in seemingly irrational behaviors. For example, a person may become upset if he or she is not allowed to go back to work or live independently, because of the unawareness of failing capabilities. However, a person may be willing to talk about his or her capabilities, but unable to acknowledge that failing

capabilities are the result of HD. Unawareness, a cognitive as well as a behavioral symptom, is currently accepted as an untreatable component of HD.

Hallucinations, Delusions & Mania

Hallucinations, delusions and mania are very rare behavioral symptoms of HD. Hallucinations involve *seeing, hearing or experiencing* things that are not real, such as feeling bugs crawling on you, hearing voices, etc. Thinking that someone is out to get you or that someone is watching you are examples of delusions. Delusions are defined as *thoughts* about unreal situations.

Many hallucinations or delusions are benign, meaning that they are not bothersome or harmful to the person experiencing them. If an individual is staring out into space and laughing at something that appears to be in front of them, this is a non-bothersome hallucination. However, this is not to suggest that the hallucination or delusion is non-bothersome to a caregiver. Occasionally, more severe hallucinations or delusions occur and may cause extreme fear or paranoia. In these cases, medical treatment can be sought.

Mania is also a very rare symptom of HD. Characterized by an irritable mood, overactivity, decreased need for sleep and impulsiveness, mania can drastically upset one's daily routine. Sometimes a period of mania is followed by a period of depression (see [depression](#) above), referred to as [Bipolar Disorder](#). Mania and Bipolar Disorder can be treated with medication. For more information on the medical treatment of any one of these three behavioral symptoms, a psychiatrist can be consulted.

Altered Sexuality

A very common behavioral symptom of HD is altered sexuality. One possible cause of this symptom is that HD damages the brain's ability to regulate the amount of sex drive a person has. Another possible cause is that the delicate balance of hormones in the brain is disrupted by the progression of HD, causing changes in behaviors regulated by hormone levels. Most commonly, people with HD suffer from a decreased sex drive. Increased sex drive and inappropriate sexual behavior are less common alterations of sexuality resulting from HD.

While altered sexuality can be due to the progression of HD, a decreased sex drive may also be caused by depression or apathy, other behavioral symptoms of HD. Inappropriate sexual behavior can be secondary to disinhibition. However, the inheritance of HD does not cause an end to one's sexuality. For more information regarding altered sexual behaviors associated with HD and an account of personal experiences with this behavioral symptom, click [here](#).

Behavioral Symptoms

Part 2

The Behavioral Changes Associated with Huntington's disease

What causes the changes in behavior?

The behavioral changes that occur in people with HD are the result of one or more of the following factors: [changes in the brain](#), [events in the living environment](#), [the psychological and social impact of HD](#), and other [health-related issues](#).

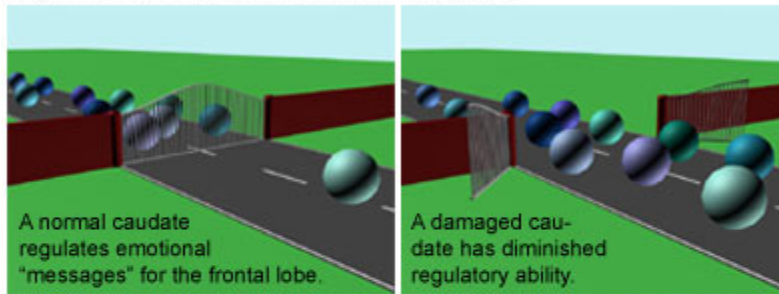
Changes in the brain

The brain has many parts and each part has a primary function. Just as certain areas of the brain are responsible for movement and regulating body temperature, certain areas of the brain are responsible for certain behaviors. The [frontal lobes](#) are responsible for many important tasks, some of which are:

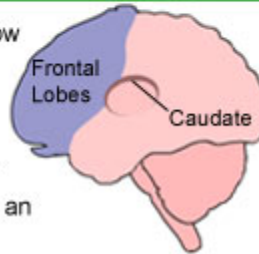
- Organizing
- Prioritizing
- Controlling impulses
- Self-awareness
- Initiating and ending activities

While the [caudate nucleus](#) connects with many parts of the brain, it has the most connections with the frontal lobes. The caudate nucleus, located within the [basal ganglia](#), incurs the greatest number of destroyed neurons as a result of HD. To read more about how the basal ganglia is affected by HD, click [here](#). The connections between the brain's cells or [neurons](#) provide the means by which information travels in the brain. The function of the caudate nucleus is to regulate, organize and filter information. Thus, the many connections between the caudate and the frontal lobes play a large role in determining our behaviors. To learn more about neurons and connections within the brain, click [here](#).

Figure W-1: Emotion & The Caudate

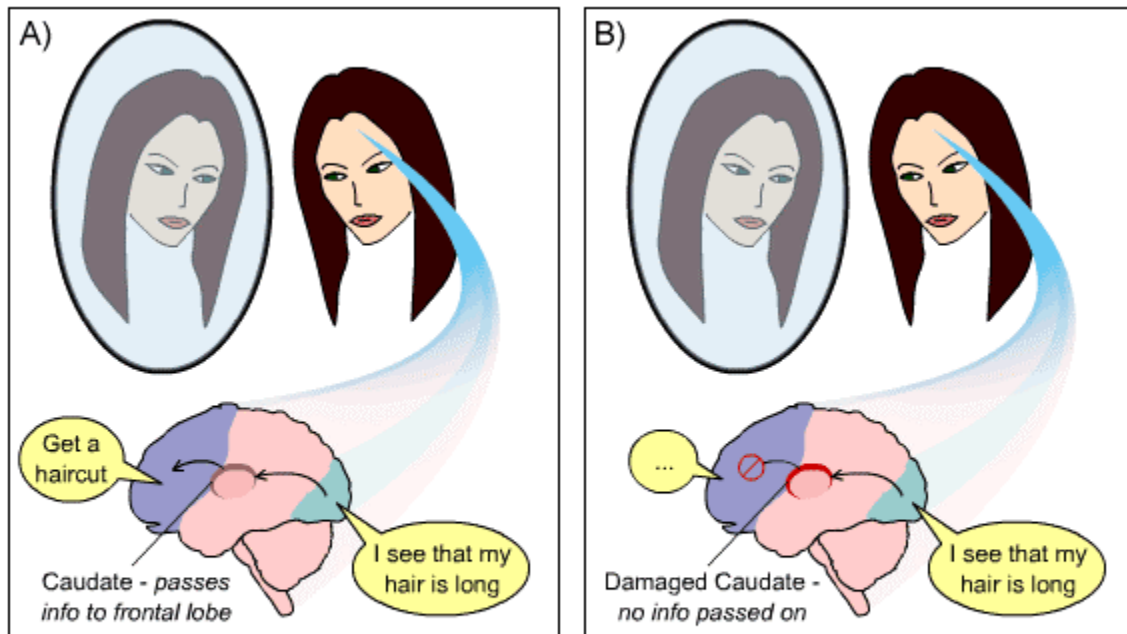


When functioning properly, the caudate may allow only a little bit of "frustration" to travel to the frontal lobes as a reaction to an upsetting situation, such as lima beans for dinner. However, a damaged caudate may leave the "gate" open for too long, allowing a great deal of "frustration" to travel to the frontal lobes, which may result in an extremely intense emotional response.



As the caudate deteriorates, the connections to the frontal lobes fail to work properly so that the person with HD is unable to control feelings, thoughts or movements. Also, the functions of the frontal lobes (listed above) may not be carried out efficiently. Neural messages may not reach the frontal lobes, or the improper amount of messages may be sent as a result of damage to the caudate and its connections. Imagine, for example, that lima beans are served to an individual who does not like lima beans. An undamaged caudate would lead to a little bit of frustration or irritation. In the case of a damaged caudate, however, too much of the "anger signal" is sent and the individual may have a temper tantrum.

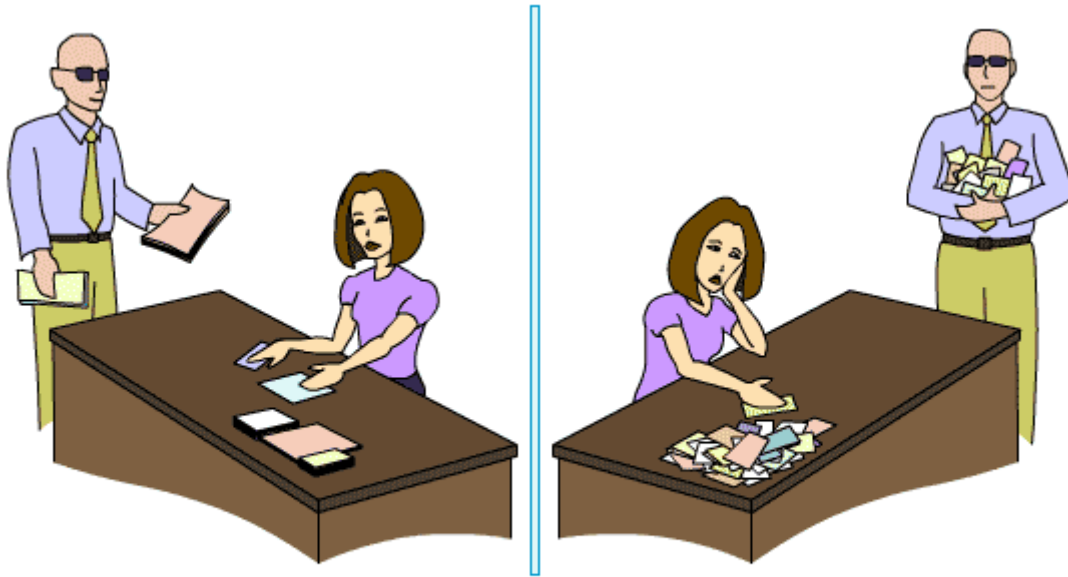
Figure W-2: The Caudate Relays Information To The Frontal Lobes



(A) An **undamaged caudate** regulates and organizes information received from other areas of the brain, such as the **occipital lobe** (responsible for vision), and transmits the information to the **frontal lobes**. The **frontal lobes** then instruct another area of the brain to carry out a particular task, based on the transmitted information. (B) A **damaged caudate**, on the other hand, may not properly deliver the information to the **frontal lobes**. The result, "unawareness", may mean that particular task, such as getting a haircut, is not carried out.

As an organizer, the caudate assists the frontal lobes in prioritizing the transfer of information to other parts of the brain. Messages from several parts of the brain may be sent to the frontal lobes at the same time with a request. If the caudate and its connections with the frontal lobes are damaged, the brain can't transfer information as easily or effectively. This makes it difficult for people with HD to prioritize tasks and organize their day as well as handle a number of stimuli simultaneously.

Figure W-3: The Caudate As A Secretary



The caudate may work much like a secretary, in that it is responsible for regulating and organizing messages or information for the "boss." If the secretary gives the boss a stack of unorganized mail and telephone messages, he or she may be unable to manage the incoming messages efficiently and become overwhelmed. Whereas a damaged caudate can lead to slowed thought processing, undamaged caudate enables the frontal lobes to perform quickly and efficiently.

Environmental factors

For individuals with caudate damage, organizing daily activities and multi-tasking may be very challenging. Dealing with unexpected events or a number of distractions can be particularly frustrating and may trigger emotional outbursts because the caudate is unable to regulate emotions. Usually a problem behavior such as excessive anger or aggression is triggered by something in the environment but exaggerated by HD. Fatigue can also increase behavior problems, as people with HD require more energy to accomplish daily activities, making it especially important for them to get an adequate amount of sleep. A dependable daily routine may minimize some behavioral symptoms of HD. For suggestions on how to provide a safe and comfortable living environment for a person with HD, click [here](#).

The Psychological and Social Impact of HD

For an individual newly diagnosed with Huntington's Disease, the realization that life changes are occurring or are likely to occur in the future can be very upsetting. Frustration, irritability, depression, and feelings of helplessness are understandable reactions to changing capabilities and responsibilities. In addition, HD often results in communication difficulties that can be very isolating and frustrating. For suggestions of methods for improving communication skills, click [here](#).

As a result of the movement symptoms or communication difficulties, individuals with HD may suffer from a loss of self-confidence. This loss of self-confidence may be

responsible for the apparent lack of interest in social engagements or activities that an individual enjoyed previously. For example, a specific activity may have previously defined the individual's role in the family or may have contributed to his/her sense of self-esteem. A person may, for instance, take pride in her musical ability. If she is no longer able to play her saxophone because of HD, she may lose her sense of identity. Caregivers may want to take steps to help an individual with HD maintain their sense of identity and personality.

Health-Related Factors

Sometimes behavior changes in a person with HD may not be related to HD at all. Unfortunately, side effects such as drowsiness, apathy, nausea, and depression can accompany medications for certain HD symptoms. Also, as the disease progresses, physical discomfort may increase, which in turn may lead to behavioral and emotional changes. The natural aging process (including menopause) or other illnesses may also contribute to changes in behavior. For example, HD sufferers often have undetected hearing or vision impairments, which if left untreated may result in frustration-induced behavior problems.

Behavioral Symptoms

Part 3

The Behavioral Changes Associated with Huntington's disease

How do these changes in behavior vary throughout the course of HD?

Typically, the progression of HD is divided into five stages. Each stage marks a change in situation or loss of the ability to perform a particular task. As HD progresses, an individual as well as his/her family are continually challenged to adjust to the loss of ability that generally occurs at each stage. As HD damages more neurons in the brain, behavior changes occur as well as changes in cognitive and motor ability. To read about how changes in the brain affect the motor symptoms of HD, click [here](#).

Table W-1: Common Progression of Behavioral Stages in HD		
Stage #	Years after onset of illness	Common symptoms
Stage 1	0-8 yrs.	<ul style="list-style-type: none"> • marginal engagement in occupation • independence in all "basic functions" <li style="text-align: center;">- OR - • maintains engagement in occupation • requires slight assistance in one "basic function"
Stage 2	3-13 yrs.	<ul style="list-style-type: none"> • unable to work • requires only slight assistance in all "basic functions" <li style="text-align: center;">- OR - • unable to work • requires major assistance in one "basic function" with only slight assistance in one other "basic function"
Stage 3	5-16 yrs.	<ul style="list-style-type: none"> • unable to work • requires major assistance with most "basic functions"
Stage 4	9-21 yrs.	<ul style="list-style-type: none"> • requires major assistance with "basic functions" • may be able to perform some "daily living activities" • care may be provided at home or at a care facility
Stage 5	11-26 yrs.	<ul style="list-style-type: none"> • requires major assistance with "basic functions" • full-time nursing is usually necessary
<p>* It is important to note that these are general stages and symptoms. There is a great deal of variety amongst individuals with HD.</p> <p>** "Basic functions" include: financial management, domestic responsibilities, & daily living activities (bathing, eating, dressing, etc.)</p>		

During the early stages of HD, irritability, depression, anxiety and aggression are common behavior symptoms. In the later stages, individuals tend to be less irritable and aggressive, as apathy and a lack of concern become more pronounced. Disinhibition, often a problem while the person with HD is still active, also tends to diminish as apathy sets in. During the late stages of HD, there appears to be some loss of self-awareness, and individuals tend to be less aware of other's feelings as well. An analysis of the data obtained in the largest and most comprehensive study on the behavioral symptoms of HD revealed that depression tends to occur sporadically and can occur at any time throughout the course of the disease. In this study, depression occurred with almost equal frequency at all stages of HD. The data also indicate that irritability, inflexibility, preoccupations and verbal and physical aggression occur most frequently in patients 6-11 years after the onset of HD.

It is important to note that the occurrence of certain behavioral symptoms during certain stages is just a general trend and by no means absolute. Also, there is no association

between duration of HD and severity of the behavior. However, the data obtained in the aforementioned study suggest that there may be one exception to this rule. Apathy, which is characterized primarily by lack of initiative, increased in severity with duration of illness. Thus, it is possible that apathy may provide a useful behavioral marker of the progressive neurodegeneration of HD.

Behavioral Symptoms Part 4

The Behavioral Changes Associated with Huntington's disease

Will the same behavioral changes occur in every person with HD?

Behavioral changes vary significantly among individuals with HD. For some, the behavioral symptoms are mild and have little impact on social functioning. For others, the behaviors severely disrupt family life as well as social relationships and may play a role in the decision of whether or not to place the person with HD in a care facility. Behavioral changes are a major aspect of HD; however, they have received little attention from scientists and researchers. This may be partially due to the variability of type and severity of behavioral symptoms.

In the largest and most comprehensive study to date on the behavioral symptoms of HD, Crauford, Thompson and Snowden (2001) confirmed that behavioral symptoms are common among patients with HD. The data indicated that the most common behavioral change that occurs as a result of HD is apathy. 70% of participants reported apathetic behaviors such as loss of energy and initiative as well as poor quality of work. Impaired judgment, poor self-care and a blunting of emotions were reported only slightly less than apathy and were placed into the category of “apathy” during further analysis of the data. Reported by 50% of the participants, depression, anxiety and irritability were less common behavioral symptoms. Less than 5% of the participants reported hallucinations or delusions.

The data obtained in this study also indicate that HD may result to some extent in altered sexuality. For 62% of participants, reduced or absent sexual desire was a reported behavioral change. Just 5% and 6% of participants reported disinhibited and inappropriate sexual behaviors, respectively. For more information regarding altered sexuality as a result of HD and links to other useful resources, click [here](#).

Behavioral Symptoms Part 5

Do behavior changes represent the onset of HD in an at-risk individual?

Behavioral changes do not necessarily represent the onset of HD. Behavioral symptoms tend to precede movement problems, and during the early stages of HD, they may be dismissed as being due to stress, lack of sleep or depression. However, other individuals with HD may suffer first from movement symptoms or have very few behavioral symptoms. In some instances, changes in behavior may not be related to HD at all. For example, depression often precedes the onset of other symptoms. Yet, depression is also common in the general population, so it is difficult to determine whether depression really represents the onset of HD in an at-risk individual.

Although changes in behavior should not be used to diagnose HD, one study found apathy to be highly **correlated** with duration of illness, suggesting that this behavior may be a way of marking the progression or onset of HD. Genetic testing is available for those who have HD in their family and would like to know whether or not they are at risk for inheriting HD. The only sure way to diagnose HD is to have a neurological examination. To learn about the inheritance of HD, click [here](#). If you are interested in more information on genetic testing or neurological examinations, click [here](#).

Behavioral Symptoms

Part 6

Are Behavior Changes Treatable?

Currently, there is no way to repair the damage to the brain that leads to the behavioral symptoms of Huntington's Disease. Behavioral changes are often primarily due to the damage of [neurons](#) and [neuronal connections](#) in the brain, which at this time are considered irreversible. However, scientists and researchers continue to investigate the brain's ability to produce new neurons as well as its ability to form new connections between neurons. For more information on the brain's natural ability to repair itself, click [here](#). Fortunately, there are drugs available for the management of behavioral symptoms, and there are strategies for minimizing the frequency of difficult behaviors.

The maintenance of an individual's personality is critical to coping with the losses that occur in the context of HD. Such maintenance can ward off depression, frustration and irritability. Treatments for behavioral problems can be as simple as social contact with others and activities outside the home. Given the apathy often associated with HD, however, a caretaker may need to suggest an activity and provide the initiative. Engagement in an activity that the individual has always enjoyed can be especially therapeutic, even if the activity must be modified to some extent. A calm, predictable environment can reduce the frustration and irritability caused by information overload and may therefore help minimize problem behaviors. To read about how the environment can cause or exaggerate behavioral symptoms, click [here](#).

A variety of drugs are available for the treatment of behavioral symptoms. While caffeine can act as an anti-depressant, anti-depressant medication is generally used successfully for the treatment of depression in HD patients. In the rare cases of [Obsessive-Compulsive Disorder](#), [Bipolar Disorder](#), hallucinations or delusions, a psychiatrist can be consulted and may prescribe antipsychotic medication. Apathy, the most common behavioral symptom of HD may be treated with [psychostimulants](#), such as Ritalin. Anxiety is usually treated with Selective Serotonin Reuptake Inhibitors (SSRIs) which increase levels of serotonin, a brain chemical known to regulate mood, emotion, sleep and appetite.

Most medications used to treat the symptoms of HD have side effects. Given the potential for such side effects, it may sometimes be difficult to tell whether a particular symptom such as apathy is a sign of the disease or a reaction to medication. Seeing a physician with knowledge about HD may be important in the treatment of motor, cognitive and behavioral symptoms. For hints on how to find an HD-knowledgeable doctor, click [here](#).

Patients with HD are often underdiagnosed and undertreated for the behavioral aspects of the disease. For some, the behavioral symptoms can be the most distressing aspect of HD. Fortunately, scientists researching new treatments for HD recognize the importance of treating behavioral symptoms as well as movement symptoms and continue to explore new ways to effectively treat behavioral symptoms.

Overall, treatments for HD can be divided into two categories: treatments that improve symptoms, and treatments that slow down the progression of the disease. Currently, there are no treatments available that slow down the progression of HD. However, as research continues, there are growing hopes that science will discover the means by which to not only treat, but also cure HD. For more information on potential treatments for HD, click [here](#).

-K.Hammond 1-01-03

For further reading:

1. Crauford, D., Thompson, J., & Snowden, J. "Behavioral Changes in Huntington's Disease". *Neuropsychiatry, Neuropsychology, and Behavioral Neurology*. Vol. 14, No. 4, p. 219-226. Philadelphia: Lippincott Williams & Wilkins, Inc., 2001. *The largest and most comprehensive study on the behavioral symptoms of HD. This published article contains information on the procedure, results and analysis of the data obtained in this study.*
2. Huntington Study Group. Huntington's Disease Overview. <http://www.huntington-study-group.org/HUNTINGTON%27S%20DISEASE%20OVERVIEW.html>
A fairly basic overview of HD and its three main aspects: the movement disorder, the cognitive disorder and the psychiatric disorder.
3. Huntington's Disease Association. Fact Sheet 10. Behavioral Problems in Huntington's Disease. <http://www.hda.org.uk/charity/download.html>
This clearly-written Fact Sheet is just one of the many informative and helpful Fact Sheets available at this site.
4. Kansas University Medical Center. Department of Neurology. Behavioral Problems in Huntington's Disease. <http://www.kumc.edu/hospital/huntingtons/behavior.html>
A helpful guide for coping with and caring for individuals experiencing the behavioral symptoms of HD.
5. Paulsen, J. "Understanding Behavior in Huntington's Disease" (2nd ed.). Huntington's Disease Society of America, Inc., 1999.
This is an easy to read and extremely informative resource with the purpose of providing practical and helpful information about the behavioral symptoms of HD.
6. Rosenblatt, A., Ranen, G., Nance, M. & Paulsen, J. "A Physician's Guide to the Management of Huntington's Disease" (2nd ed.). Huntington's Disease Society of America, Inc., 1999.
This is a guide specifically for physicians. It explains the symptoms of Huntington's Disease and methods for providing optimal management of the symptoms.