

## HDBuzz Special Feature: Huntington's disease and sleep



Why do many Huntington's disease patients have trouble sleeping, and what can be done about it?

By Prof Jenny Morton on February 06, 2013

Edited by Dr Ed Wild

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*Many Huntington's disease patients have problems with sleep and in the control of daily or 'circadian' rhythms. These problems may actually be part of the range of symptoms in HD, and managing or treating them directly may be beneficial. In this special HDBuzz feature, sleep expert Prof Jenny Morton looks at the science behind sleep problems and solutions in Huntington's disease. Coming soon, part 2: Prof Morton's 'Simple Rules for a Good Night's Sleep'.*

After a long day, many of us look forward to the bliss that comes with a good night's sleep. But not everyone who is tired is guaranteed a peaceful night's sleep. For those to whom sleep does not come, the night can seem a lonely and sometimes anguished exile. And more often than not, those who live with the sleepless share the burden. Unfortunately for the person with a neurological disease like Huntington's, the consequences of sleep disturbance may not only be distressing and disruptive, but may also contribute significantly to their symptoms.

### We all need sleep

There is no doubt that sleep is an essential and beneficial part of a daily pattern of life. Short-term sleep deprivation causes no lasting damage, but unquestionably impacts mood. Without adequate sleep, people become irritable and unable to sustain attention. They also become unreasonable and short-tempered.

Most people can bounce back after a couple of good night's sleep. But what if you have Huntington's disease?

Evidence is emerging that HD patients frequently suffer from abnormalities in both sleep and in the control of daily or 'circadian' rhythms. It is possible that sleep and circadian dysfunction may actually be part of the range of symptoms in HD. If this is the case, it is important that it is recognized, because sleep and circadian disturbances have negative impact on people's daily lives, even in people without a neurological problem. So, sleep and circadian disturbance in HD patients are likely to contribute to HD symptoms that are worsened by sleep deprivation, such as irritability and anxiety.



Sleep problems are common in the general population. People with Huntington's disease may have extra reasons to have sleeping difficulties, too.

Chances are, if you have Huntington's disease and sleep poorly, it will not be solely due to your disease. A significant percentage of the general population suffers sleep disruption due to personal habits, lifestyle or environment. We stay up too late - we get up too early. We take drugs that interfere with sleep, we over-stimulate ourselves with late-night activities such as work or television. HD patients are no exception to this. The difference is that HD patients may not have the reserves that allow a neurologically healthy person to cope with sleep deprivation.

Chronic sleep deprivation is damaging to health in normal people, so it's possible that chronic sleep-wake deficits could actually contribute to mental decline in HD. If this is the case, then treating sleep deficits might delay cognitive and emotional decline in HD.

## Is there a difference between sleep and circadian rhythms?

Circadian rhythms and sleep are two different processes, although the terms are often used interchangeably. Circadian rhythms are biological processes that change roughly every 24 hours. They are orchestrated by a small part of the brain known as the **suprachiasmatic nucleus** or **SCN**. The SCN is known as the body's 'master clock'. It regulates all your daily activities, including when you wake up and when you want to go to bed.

Sleep is a very obvious 'circadian behavior', because the onset of sleep typically happens once a day. But it is just one of many circadian behaviors that are controlled by the master clock. Others include heart rate, hormone secretion, blood pressure and body temperature.

So, sleep is a circadian behavior that is **influenced** by the SCN, but it is not **generated** there. Sleep is a very complex thing, and the process of going to sleep, maintaining sleep and waking up are all controlled by different parts of the brain.

There are multiple stages of sleep that can be identified by looking at the brain's electrical activity. The mechanisms that generate sleep and control movement between these different sleep stages are not fully understood. It is not even known **why** we sleep, although there is growing evidence that sleep is important for learning and forming lasting memories. We may even do some 'brain housework' while we sleep - by reviewing experiences that have occurred during the day.

## Neurological disease causes sleep problems

Sleep abnormalities and disorders of circadian rhythm are already recognized as symptoms in a number of other neurodegenerative diseases, particularly Parkinson's disease and Alzheimer's disease. In fact, sleep disruption in Alzheimer's patients is reportedly the main reason for their institutionalization. This is probably because when an Alzheimer's patient has disrupted sleep, this becomes a problem not only for the patient, but also for their carer.



Improving sleep might have a beneficial effect on cognitive and emotional problems in people with Huntington's disease

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More research is needed before we will know if sleep or circadian rhythm disruption is part of the complex repertoire of Huntington's disease symptoms, or if it is just a 'knock-on' effect of having HD. But whatever the cause, we should recognize that even mild sleep abnormalities could worsen neurological symptoms in HD patients. Knock-on effects of sleep abnormalities in HD may be critical for determining the care-plan of patients. And, if they worsen thinking and mood disturbances, they may also end up having a greater impact on quality of life than other symptoms like involuntary movements.

## **Circadian abnormalities in Huntington's disease**

The first clue that sleep or circadian rhythms might be abnormal in HD patients came from a study showing subtle changes in circadian activity profiles, measured by wrist-mounted movement monitors.

Circadian rhythms are difficult to measure accurately in humans, because the rhythm can be masked by other activities such as work and social life. But they are easy to measure in mice, and direct measurement of circadian rhythms in one HD mouse model showed clear abnormalities in circadian behavior.

These mice showed a progressive disintegration of the normal rhythm of rest and activity. That disturbance was mirrored in the HD patients wearing the activity monitors. In the HD mice, there was also disruption in activity levels of genes that controlled the circadian clock in the SCN. These circadian abnormalities in HD mice have now been confirmed by three different laboratories.

Importantly, the breakdown in circadian rhythms in the mice were linked to their decline in thinking function - and restoring good circadian rhythms delayed the thinking decline.

This suggests that some of the thinking problems in the mice were caused by the disruption of sleep and circadian rhythm. If the same thing happens in humans, then improving sleep and circadian function might have a beneficial effect on cognitive and emotional problems in people with Huntington's disease.

## **What causes sleep disturbance in Huntington's disease?**

The most common causes of sleep disturbance in healthy people are depression, stimulant drugs like caffeine and nicotine, and disruptive lifestyles like going to bed late, getting up late and taking naps during the day. So, it is likely that these same culprits are responsible for some sleep disturbance in Huntington's disease patients.

But it's also possible that sleep and circadian abnormalities are direct symptoms of HD, in the same way that chorea is a symptom. There is evidence for sleep disturbance in early symptomatic HD patients who are not taking any medication and not depressed.

So, we don't know yet if there are sleep and circadian abnormalities that are caused directly by the HD mutation, or if it is simply that some patients have disrupted sleep and circadian

behavior because they have symptoms of HD.

More research is needed to address this question. But it is interesting that many of the subtle symptoms of early HD are similar to those experienced by normal individuals after sleep deprivation.

## Can we treat sleep or circadian disturbances in HD?

If you have Huntington's disease, you don't want to add the consequences of sleep deprivation to your symptomatic burden. But there is good news: there are already well-established treatments for sleep disturbance.

If disrupted sleep is interfering with your daily life, you should **talk to your doctor**. He or she may be able to prescribe a drug treatment that will help you. This does not have to be a long-term treatment - sometimes a short period of treatment is enough to help you re-establish good sleeping patterns.

If you think you might be **depressed**, you should also talk to your doctor about depression and sleep problems. Depression is the enemy of sleep, but effective treatments are available.

Remember, too, that many **medications** that can cause sleeplessness as a side effect. Ask your doctor or pharmacist if the medication you are taking can lead to sleeplessness. Don't stop taking the medication, even if you think it might be interfering with your sleep. Always seek the advice of your physician and other healthcare professionals before changing your medications.

## Simple Rules For a Good Night's Sleep

As well as drug treatments, there are recognized, scientifically sound self-help strategies for improving sleep. Whether you are a carer or a patient, improving your **sleep hygiene** can only be beneficial.

**Prof Morton's 'Simple Rules For a Good Night's Sleep', were recently published in the journal Experimental Neurology. In the next installment of this special feature on sleep in Huntington's disease, we'll bring you her 'Simple Rules' in full.**

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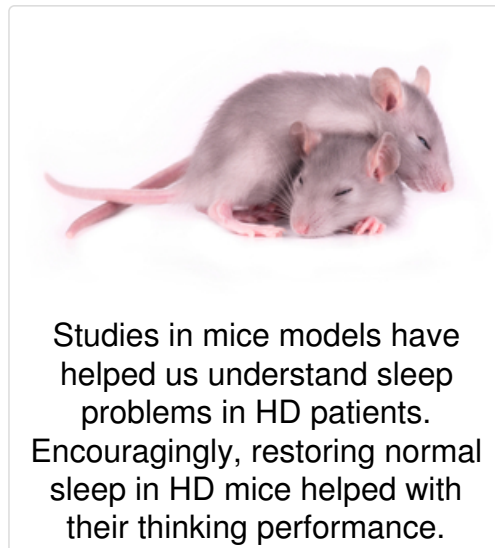
*This article is based on a recent peer-reviewed review article by Prof Morton in Experimental Neurology, which looked at all published research on sleep in HD, including that of her own group. For more information about our disclosure policy see our FAQ...*

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## Glossary

**suprachiasmatic nucleus** the part of the brain that controls daily or 'circadian' rhythms

**Parkinson's Disease** A neurodegenerative disease that, like HD, involves motor



coordination problems

**neurodegenerative** A disease caused by progressive malfunctioning and death of brain cells (neurons)

**circadian** a circadian rhythm is something that repeats every day, like the body's sleep-wake cycle

**caffeine** stimulant chemical found in tea, coffee and soft drinks like cola

**hormone** Chemical messengers, produced by glands and released into the blood, that alter how other parts of the body behave

**chorea** Involuntary, irregular 'fidgety' movements that are common in HD

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