

From *A Practical Guide to a Healthy Body for People Living with HIV*

## Brain Health

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Growing older in good health includes maintaining a healthy brain. Since effective antiretroviral therapy became widely available, HIV-related dementia—the serious deterioration in mental function that was once common among people living with HIV—is now rarely diagnosed. However, milder forms of cognitive impairment remain common among people with HIV. Through ongoing research, we are learning more and more about ways to minimize the effects of HIV on the brain.

HIV-associated neurocognitive disorders (HAND) is an umbrella term that covers a range of problems:

- **asymptomatic neurocognitive impairment** – Many people with HAND perform below expected levels on formal neuropsychological testing but experience no noticeable symptoms and their day-to-day lives do not seem to be affected.
- **mild neurocognitive impairment** – Some people with HAND experience mild or moderate problems in their thinking, memory, mood and/or physical coordination and function. Symptoms can include not being able to remember things that you were told or that you read or saw recently, struggling to remember incidents from the past or facts you once knew, difficulty problem-solving and learning new things, confusion, depression or anxiety, problems with your attention span, reduced reflexes, and a feeling of “brain fog” or fuzzy-headedness.
- **HIV-associated dementia** – This is the rarest and most severe form of HAND. People with HIV-associated dementia experience a decline in brain function that interferes significantly with their daily activities and quality of life.

Exactly how many people with HIV in Canada have HAND is not clear—estimates range from 15 to 50 percent. The vast majority of people with this condition have either asymptomatic or mild neurocognitive impairment.

## Risk factors for HAND

HAND is not fully understood but it is thought to result from a combination of brain cell injury due to chronic inflammation and a weakened immune system that leaves these nerve cells unprotected. In addition to HIV-related effects on the brain, many other factors can cause or contribute to neurocognitive impairment, including:

- aging
- depression
- a concussion
- alcohol consumption
- cardiovascular disease, hepatitis C, diabetes or thyroid disease
- vitamin B<sub>1</sub> and B<sub>12</sub> deficiencies
- the use of recreational drugs, such as cocaine, crystal meth, heroin, ecstasy, LSD and inhalants
- neurological conditions, such as epilepsy and multiple sclerosis
- learning disabilities

## Diagnosing HAND

The diagnosis of HAND can pose a number of challenges. Many of the tests for HAND are time-consuming and your doctor may not have the resources required to perform them. But thanks to an increased focus on this disease by researchers and healthcare professionals, a number of more easily administered screening tests have been developed. These include the five-question HIV Dementia Scale, which can be used to detect both severe and milder forms of impairment; the Montreal Cognitive Assessment (MoCA), designed to help detect mild cognitive impairment; and the International HIV Dementia Scale, which has been validated for use with populations of different cultural backgrounds but not to screen for milder forms of HAND.

If you're living with HIV and are concerned about mental changes you're experiencing, the first step is to see your doctor to rule out other conditions that can produce symptoms sometimes mistaken for HAND. These include depression, anxiety, hepatitis B or C, substance use, cardiovascular disease, prediabetes and diabetes, vitamin B<sub>12</sub> deficiency and hypothyroidism as well as side effects from prescription drugs, including some antiretrovirals, such as efavirenz (sold as Sustiva, also in the combination drug Atripla), and narcotics. Ruling out these other possible causes can help to establish the likelihood of HAND and the need for diagnostic testing. If one or more of these other factors is causing mental changes, addressing them could reduce or even eliminate the problem.

If you're concerned about problems with your memory or thinking, you might want to keep a record of these problems and how often you notice them so that you can discuss them with your doctor. If your family, friends or other people around you point out symptoms that they have observed, you might want to make a note of these, too. The more information you can provide your doctor with, the better you will be able to address the issue together.

## Lowering the risk and reversing symptoms

Fortunately, there are things you can do to help prevent symptoms of HAND or, if you already have symptoms, to minimize them or prevent them from worsening.

### Take your HIV meds

Antiretroviral therapy (ART) hugely diminishes the risk of the more severe forms of HAND. Since potent ART became widely available, the rates of HIV-associated dementia have plummeted in Canada and other high-income countries. People who have an undetectable viral load are much less likely to develop HIV-associated dementia; if they already have symptoms, those symptoms are much less likely to worsen. It appears that taking at least one antiretroviral drug that penetrates the blood-brain barrier as part of your antiretroviral therapy may help to protect the brain. (In the chart above, HIV drugs are ranked according to their ability to penetrate the blood-brain barrier.)

### Penetration of HIV drugs through the blood-brain barrier

	<b>Best</b>	<b>Moderately good</b>	<b>Moderately poor</b>	<b>Poor</b>
<b>Nukes (NRTIs)</b>	AZT	abacavir emtricitabine	ddl 3TC d4T	tenofovir zalcitabine
<b>Non-nukes (NNRTIs)</b>	nevirapine	etravirine delavirdine efavirenz	rilpivirine	
<b>Protease inhibitors (PIs)</b>	boosted indinavir	boosted lopinavir boosted darunavir boosted fosamprenavir indinavir	boosted atazanavir atazanavir fosamprenavir	nelfinavir ritonavir saquinavir boosted saquinavir boosted tipranavir
<b>Integrase inhibitors</b>	dolutegravir	raltegravir	elvitegravir	
<b>Entry/fusion inhibitors</b>		maraviroc		T-20

*Personal communication, Scott Letendre, M.D., University of California at San Diego, 2016.*

## Reduce inflammation

Because [inflammation](#) in the brain may be a major underlying cause of HAND, countering it is important.

Chronic hepatitis B or C can also cause inflammation in the brain. Effective therapies for hepatitis B are now available, so long-term suppression of the virus is possible. New treatments for hepatitis C, which can cure the virus, are also available. So hep C can also be effectively treated and likely eliminated as a cause of inflammation. If you have hepatitis B or C, be sure to talk to your doctor about treatment.

Cardiovascular disease and chronic kidney disease can also result in increased inflammation in the brain, so these conditions need to be managed as effectively as possible.

## Boost your B<sub>12</sub>

[Vitamin B<sub>12</sub>](#) is important for keeping your brain in good working order. Severe long-term B<sub>12</sub> deficiency can result in memory loss, confusion, paranoia, sadness, depression, shaking, unstable gait, a tendency to fall and even an inability to communicate properly. (Many of these symptoms are also seen in people with HIV-associated dementia.)

At the early stage of B<sub>12</sub> deficiency, the problem is almost always fully reversible. Vitamin B<sub>12</sub> supplementation can often improve the mental function of people living with HIV. But research has shown that some of the damage caused by a lack of vitamin B<sub>12</sub> may become irreversible if B<sub>12</sub> therapy is not initiated in time. So, if you're noticing unusual memory loss or other aspects of diminishing mental function, talk to your doctor or a dietitian about ways to ensure that you're getting enough vitamin B<sub>12</sub> and, if necessary, to begin B<sub>12</sub> supplementation.

## Maintain healthy levels of thyroid hormones

An underactive thyroid (hypothyroidism) can cause a feeling of “brain fog” that is very similar to what many people with HIV who experience neurocognitive symptoms report. So it is important to get tested to determine if hypothyroidism might be contributing to your neurocognitive symptoms. Your doctor should regularly check your levels of TSH (thyroid-stimulating hormone, an indirect indicator of thyroid function) and thyroid hormones (especially free T3 and free T4), if indicated. If your test results reveal that your levels are low, thyroid replacement therapy can help restore your mental energy and function and lift that feeling of brain fog.

## Take care of your emotional well-being

People who are depressed or anxious can experience mental fatigue and impaired mental function, so addressing depression and anxiety can sometimes improve neurocognitive symptoms. In addition, chronic depression and anxiety are associated with increased inflammation in the brain, which is thought to be one of the underlying causes of HAND. So addressing depression and other mental health issues may also help reduce inflammation.

A supportive healthcare provider should be able to work with you to identify the problem, determine what’s behind it and figure out ways you can deal with it. Depression in people with HIV—especially in men—can be caused by low levels of testosterone.

[Vitamin D](#) deficiency, which is common among people with HIV, can contribute to depression, especially in the winter. The seasonal affective disorder (SAD) that affects many people during the winter may be the result of a vitamin D deficiency. Talk to your doctor about having your vitamin D level tested and, if necessary, use supplements to boost it. With proper supplementation, depression and other problems associated with vitamin D deficiency can usually be reversed.

## Adopt a healthy lifestyle

A [healthy lifestyle](#) can help protect the brain in many ways:

- **Eating a nutritious diet** can provide you with the nutrients needed to optimize your brain health. These include B vitamins, omega-3 fatty acids, zinc and other minerals.
- **Exercising regularly** helps keep your brain fit by boosting oxygen flow to the brain and helping maintain healthy neurons.
- **Maintaining a healthy weight and not smoking** can help minimize the risk of developing vascular disease.
- **Limiting your consumption of alcohol and recreational drugs** can help minimize or prevent neurocognitive problems.
- **Stimulating your brain**—for example, by learning a new language or musical instrument, doing crossword puzzles or memory games—can help protect it.
- **Staying socially connected** can help, too! Take time to do things with your friends, volunteer for a non-profit organization or a political campaign, find a group you can work out or hike with, check to see if a local HIV or community health organization has a support group.... Interacting with others can help you maintain your mental health.

To read long-term survivor Maggie Atkinson's first-hand account of cognitive challenges she experienced and what she learned about protecting her brain, check out “[A Mind of Her Own](#)” in the Winter 2010 issue of *The Positive Side*.

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Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV- and hepatitis C-related illness and the treatments in question.

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