

# HIV/AIDS and neurologic diseases

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**WHAT DID THE AUTHORS REPORT?** In their article, “Neurologic disease burden in treated HIV/AIDS predicts survival: A population-based study,” Dr. Vivithanaporn and colleagues<sup>1</sup> carefully studied a group of people living in Alberta, Canada. They specifically looked for neurologic illnesses: problems due to HIV infection of the brain, spinal cord, or nerves. “Modern” treatment of HIV started after 1996, when many of the highly effective antiviral medications were developed. Since modern treatments have been used, no one has looked at how often people with HIV or AIDS develop neurologic illnesses. For this reason, Vivithanaporn et al. examined a group of people between 1998 and 2008. The group was taking the highly effective antiviral medication (also called combination antiretroviral therapy or cART). What they wanted to know was this: What effect has cART had on the development of neurologic illness in people with HIV and AIDS?

Between 1998 and 2008, they identified 1,651 people who had HIV. Dr. Vivithanaporn wanted to include people who had been followed over a period of time. Anyone who had been seen only once was excluded for this reason. The average time that people were followed in the clinic (the Southern Alberta Clinic) was 7.6 years. Within this group (1,651 people), 424 had been diagnosed with AIDS.

In the group, there were 404 people who had at least 1 neurologic illness. In keeping with prior studies, the authors found that neurologic diseases were more likely to develop late in the course of HIV. On average, people with a neurologic illness had been HIV-positive for 5.5 years. Further, they found that neurologic diseases were more likely to happen if the person had very low CD4 cell counts, or if the number of viruses in the blood was very high.

**WHAT DID THE AUTHORS FIND?** Dr. Vivithanaporn and colleagues identified several kinds of neurologic illnesses. The most common problem was a distal sensory neuropathy. This is a problem that affects the nerves in the hands and feet. It causes pain and numbness in the hands and feet. It is due to an

attack on the nerves by the HIV virus, but can also occur due to the medications that are sometimes used for treating HIV. About 10% of people with neurologic illness had a neuropathy. The next most common neurologic illness was HIV-associated neurocognitive disorder (HAND). HAND causes a person to have problems with thinking and memory. Though the cause is very different from that of Alzheimer disease, a person with HAND has some of the same problems that a person with Alzheimer disease might have. A total of 6.2% of people had HAND. Seizures, headaches, and infections of the nervous system also occurred, but were less common.

Not everyone came to the clinic immediately after they were infected with HIV. In fact, some people did not have symptoms of being sick until they developed AIDS. AIDS usually occurs after a person has been infected with HIV for several years (see below). When a person develops AIDS, it is a sign that the HIV has seriously affected the immune system. In the study, having AIDS correlated with having a nervous system disease. A total of 41% of people with AIDS had a neurologic illness, compared to 19% who were HIV-positive but did not have AIDS.

Dr. Vivithanaporn and colleagues discovered that having a neurologic illness also meant a higher mortality. In other words, if a person with HIV/AIDS developed a neurologic disease, there was a much higher chance that he or she would die from the illness. For those with a neurologic disease, the mortality rate was 17.6%. If the person did not have a neurologic illness, mortality was 8.0%.

The authors compared the rate of neurologic illnesses before and after cART. The incidence of these illnesses was lower after cART. Further, when they looked at 1998–2003 and compared the rates to the interval between 2003 and 2008, it looked like the numbers of people who had some type of neurologic disease were going down. This suggests that cART decreases the rates of neurologic illness.

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# About HIV and AIDS

**WHAT IS HIV?** HIV stands for human immunodeficiency virus. The virus is transmitted from one person to another through sexual contact or through the transfer of blood or body fluids that are infected with HIV. The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have been carefully monitoring HIV since the first cases were reported 30 years ago (in 1981). It is estimated that 0.5% of the world's population is infected with HIV. This means that HIV (and the disease it causes, called acquired immunodeficiency syndrome or AIDS) has killed more than 25 million people in the past 30 years. In places like Africa, where medications may be difficult to obtain, the rates of AIDS and death are very high.

The first cases of what we now recognize as AIDS were first recognized in the late 1970s and early 1980s. At first, the reports focused on the infections that occurred as a result of the weakened immune system. However, doctors and scientists quickly realized that there must be some sort of infection that was the cause. Later, the virus was identified as HIV.

Before effective treatments were developed, the CDC reported that about one-half (47.6%) of people with AIDS would die. It was estimated that 80% died within 2 years of diagnosis. By 3 years after diagnosis, this number was almost 100%.<sup>2</sup> With current treatments, a person can live with HIV for many years.

**WHAT IS AIDS?** AIDS is the illness that the virus, HIV, causes. HIV can affect the body in several ways, but its main target is the immune system. As the immune system becomes weaker, the body is at risk of developing infections and certain kinds of tumors.<sup>3</sup> For instance, a person with AIDS is more likely to have problems due to certain fungi like yeast. Yeast is very common, and nearly everyone has yeast in their mouths. The immune system keeps the yeast from growing to the point where a problem could occur. However, when the immune system is very weak, the yeast begins to grow out of control. It causes oral candidiasis, which then needs to be treated with medication.

AIDS is a syndrome. What this means is that it is diagnosed by recognizing a combination of symptoms (what a person reports) or signs (what the doctor sees). In other words, AIDS is the term that is applied to an HIV-infected person when he or she begins having certain kinds of infections. Usually, this does not occur until a certain kind of immune system cell, called CD4, falls to a critically low level. The cutoff seems to be around 200 CD4 cells/ $\mu$ L (1 one-millionth of a liter) of blood. In other words, once the CD4 count falls below 200, the chance of developing AIDS is much higher. From the time of infection with HIV, it usually takes about 10 years before a person has AIDS.

HIV attacks more than just the immune system. For many years, doctors and scientists have known that HIV also infects the nervous system. HIV causes problems in the brain, spinal cord, and in the nerves that go to the arms and legs. In some people, HIV also attacks the muscles, called a myopathy, which results in weakness. In most people, neurologic problems occur after other body systems have been affected. However, in a small number of people, the neurologic disease is the first sign of the HIV infection. Usually, neurologic illnesses occur late in the course of HIV or AIDS.

HIV causes several kinds of nervous system illnesses. When it infects the brain, a person can develop dementia, which causes problems with thinking and memory. It is similar to having Alzheimer disease, another kind of dementia. When HIV affects the spinal cord, a person can have problems like weakness or difficulty walking. When the nerves in the arms and legs are affected, weakness and pain can occur.

## WHAT IS THE TREATMENT FOR HIV OR AIDS?

The treatment for HIV changed in 1996. It was at this time that improved antiviral medications were developed. Usually, a combination of antiviral medications are used, commonly called a "cocktail" of medication. Typically, 3 medications are given in combination. These combinations have been referred to as highly active antiretroviral therapy (HAART) or combination antiretroviral therapy (cART).

When a person takes HAART, the number of viruses in the blood decreases. In fact, the number can become so low that it is no longer detectable by routine blood testing. Although the number of viruses is no longer detectable, this does not mean that the person is cured. Instead, the medication is helping to keep the virus at the lowest possible levels.

By reducing the number of viruses, people can live much longer, and healthier, with HIV. For instance, without treatment, the time from infection with HIV to the appearance of AIDS is about 10 years. HAART increases the time it takes to develop AIDS. Before treatment, AIDS caused death in less than a year. With HAART, a person can live with AIDS for many years.

## FOR MORE INFORMATION

AIDS.gov

<http://aids.gov/>

NINDS

[http://www.ninds.nih.gov/disorders/aids/detail\\_aids.htm](http://www.ninds.nih.gov/disorders/aids/detail_aids.htm)

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