

## Cancers You Can Catch

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Freelance

Most people know that viruses can cause a host of unpleasant illnesses—skin rashes, stomach flu and the common cold, to name a few. But many of us may not realize these clever microorganisms play a key role in triggering a surprising number of cancers. In fact, one-fifth of cancers may be linked to viral pathogens. Every year, new discoveries seem to confirm this provocative relationship.

The question of why and how cancer begins to grow in previously healthy tissue has long perplexed scientists. But in the last 25 years, more and more evidence seems to point to a common culprit: Infectious microbes. The revolutionary discovery by Australian scientists that stomach ulcers are likely caused by *Helicobacter pylori*, or *H. pylori*, bacteria sparked new interest in the role that bacteria and viruses may play in disease development.

Today, we know that *H. pylori* also causes stomach cancer, and that infection with two strains of the human papilloma virus (HPV) lead to cervical cancer. In the case of the latter, the viral connection prompted a new cervical cancer vaccine targeted for preteen girls.

The potentially contagious cancers list goes on: The hepatitis B virus is related to liver cancer, certain retroviruses are linked to T-cell leukemia, and the Epstein-Barr virus plays a role in some carcinomas. Another virus, named XMRV, made headlines last year when researchers discovered that it may be related to prostate cancer.

"It seems clear that more and more viruses will be implicated in more cancers," says Dr. Robert Ferris, associate professor of immunology at the University of Pittsburgh Cancer Institute.

However, certain cancers in particular seem to be associated with parts of the body exposed to the "outside world," such as the mouth, throat and reproductive areas. That's because viruses enter the body through everyday activities like eating, breathing and sexual activity, notes Ferris.

So how do common viruses turn healthy cells into cancerous ones?

Once inside the body, the virus integrates its genetic material with the host cell's DNA. These genetically altered, "corrupted" cells begin to grow uncontrollably, eventually leading to cancer. In the case of cervical cancer, for example, the HPV virus hijacks cervical cells and turns them into malignant growths.

Not everyone who is infected by these viruses will develop cancer—and this is one of the fascinating, if not fear-reducing, mysteries of the virus-cancer connection. For example, while most\* women who develop cervical cancer have had a human papilloma virus (HPV) infection, not all women with HPV infection will develop cervical cancer. Studies have shown that 70 percent of new HPV infections resolve on their own within one year, and as many as 91 percent clear within two years. The same holds true for Epstein-Barr virus (EBV)—most people are infected with EBV, but very few will develop Hodgkin's lymphoma.

It's clear that the immune system plays a critical role in keeping these high-risk viruses in check. In most cases, the body's defenses clear the infectious agents without any signs or symptoms. That's because the immune system is constantly working behind the scenes, patrolling the body for foreign agents and destroying disease-causing microbes before they can tamper with the DNA of healthy cells.

In some cases, though, the immune system fails to perform these tasks and the virus seizes the opportunity. Old age, underlying disease or unhealthy habits may weaken the body's defenses, giving these viruses a leg up. "The immune system, like most parts of the body, gets rickety with age and less able to prevent cancer," Ferris says.

The key to preventing some of these cancers simply may be keeping the immune system working in tip-top shape. Eating well, exercising and avoiding alcohol and cigarettes are good ways to keep your body's natural defenses functioning at their best. "You don't want to give the virus an advantage by smoking or drinking," says Ferris. "These habits damage cells and give viruses an entrée into the weakened cells."

Viruses are everywhere and are contagious, but there is one significant upside to the virus-cancer link: we have tools which can prevent infection in the first place. For example, the new cervical cancer vaccine, a phenomenal breakthrough, can prevent women from becoming infected with the HPV virus and thereby eliminate the risk of cervical cancer.

Interestingly, the HPV vaccine may prevent some mouth, throat and larynx (voice box) cancers, which also appear to be linked to the HPV virus. The hepatitis B vaccine is another weapon in the fight against cancer. It effectively protects against the liver cancer-associated virus. And because these two viruses often are sexually transmitted, use of condoms during intercourse can prevent exposure to these disease-promoting bugs.

As the old adage goes, an ounce of prevention is worth a pound of cure. Or as Allen Lichter, CEO of the American Society for Clinical Oncology, recently said: "The easiest cancer to cure is the cancer we don't get because we prevented it."

Ironically, viruses may both cause and kill cancer. Viruses have evolved over millions of years to selectively target certain cells while leaving other tissue unharmed. For this reason they are, in some ways, the ideal anti-cancer weapon.

Researchers have shown that viruses, such as HIV and inactivated measles, can be used to carry a therapeutic gene to the precise location of the cancer. For example, studies have shown that a benign altered virus can trick the immune system into attacking pancreatic cancer cells, and the measles virus may effectively identify and neutralize ovarian cancer cell lines. This cutting edge of cancer research holds huge promise for the development of effective, non-toxic cancer treatments of the future. Puts viruses in a whole new and positive light, doesn't it?

**Correction, 2/23/2007:** *This article originally stated that "all women who develop cervical cancer have had a human papilloma virus (HPV) infection." According to the U.S. National Institutes of Health, HPV infection is the primary risk factor for cervical cancer, but other risk factors include a high number of full-term pregnancies, use of oral*