

ANTIVIRAL DRUGS

Viruses are simpler and smaller organisms than bacteria and are less able to sustain themselves. These organisms can survive and multiply only by penetrating body cells (see Action of antiviral drugs, right). Because viruses perform few functions independently, medicines that disrupt or halt their life cycle without harming human cells have been difficult to develop.

There are many different types of virus; and viral infections cause illnesses with various symptoms and degrees of severity. Common viral illnesses include the cold, influenza and flu-like illnesses, cold sores, and childhood diseases such as chickenpox, mumps, and measles. Throat infections, pneumonia, acute bronchitis, gastroenteritis, and meningitis are often, but not always, caused by a virus.

Fortunately, the natural defences of the body are usually strong enough to overcome infections such as these, with drugs given to ease pain and lower fever. However, the more serious viral diseases, such as pneumonia and meningitis, need close medical supervision.

Another difficulty with viral infections is the speed with which the virus multiplies. By the time symptoms appear, the viruses are so numerous that antiviral drugs have little effect. Antiviral agents must be given early in the course of a viral infection or they may be used prophylactically (as a preventative). Some viral infections can be prevented by vaccination (see p.92).

Why they are used

Antiviral drugs are helpful in the treatment of various conditions caused by the herpes virus: cold sores, encephalitis, genital herpes, chickenpox, and shingles.

Aciclovir and penciclovir are applied topically to treat outbreaks of cold sores, herpes eye infections, and genital herpes. They can reduce the severity and duration of an outbreak but do not eliminate the infection permanently. Aciclovir, famciclovir, and valaciclovir are given by mouth or, under exceptional circumstances by injection, to prevent chickenpox or severe, recurrent attacks of the herpes virus infections in those people who are already weakened by other conditions.

Influenza may sometimes be prevented or treated using oseltamivir or zanamivir. Oseltamivir may also be used to treat the symptoms of influenza in at-risk people, such as those over 65 or with respiratory diseases such as COPD (chronic obstructive pulmonary disease) or asthma, cardiovascular disease, kidney disease, immunosuppression, or diabetes mellitus.

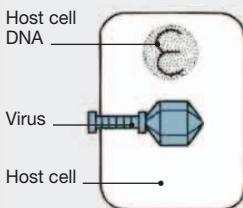
The interferons are proteins produced by the body and involved in the immune response and cell function. Interferon alpha and beta are effective in reducing the activity of hepatitis B and hepatitis C. Lamivudine is also used to treat hepatitis B, and ribavirin for hepatitis C.

ACTION OF ANTIVIRAL DRUGS

In order to reproduce, a virus requires a living cell. The invaded cell eventually dies and the new viruses are released, spreading and infecting other cells. Most antiviral drugs act

to prevent the virus from using the host cell's genetic material, DNA, to multiply. Unable to divide, the virus dies and the spread of infection is halted.

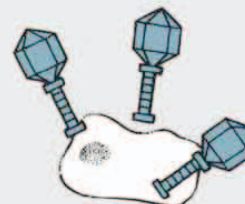
Before drug



Virus enters body cell.

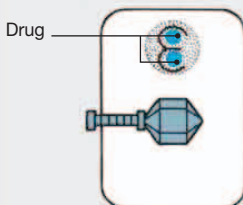


Virus uses host cell's DNA to reproduce.



Host cell dies and new viruses are released.

After drug



Virus enters cell that has absorbed an antiviral drug.



Cell DNA is altered by drug action and virus cannot use it.



Virus dies and spread of infection is thereby halted.

Ganciclovir is sometimes used for cytomegalovirus (CMV). Respiratory syncytial virus (RSV) has been treated with ribavirin, and prevented by palivizumab. Drug treatment for AIDS is discussed on p.116.

How they work

Some antivirals act by altering the building blocks for the cells' genetic material (DNA), so that the virus cannot multiply. Others stop viruses multiplying by blocking enzyme activity within the host cell. Halting multiplication prevents the virus from spreading to uninfected cells and improves symptoms rapidly. However, in herpes infections, it does not eradicate the virus from the body. Infection may therefore flare up on another occasion.

How they affect you

Topical antiviral drugs usually start to act immediately. Providing that the treatment is applied early enough, an outbreak of herpes can be cut short. Symptoms usually clear up within two to four days.

Antiviral ointments may cause irritation and redness. Antiviral drugs given by mouth or injection can occasionally cause nausea and dizziness.

Risks and special precautions

Because some of these drugs may affect the kidneys adversely, they are prescribed with caution for people with reduced kidney function. Some antiviral drugs can adversely affect the activity of normal body cells, particularly those in the bone marrow. Idoxuridine is, for this reason, available only for topical application.

COMMON DRUGS

Aciclovir *	Osetamivir *
Amantadine	Palivizumab
Cidofovir	Penciclovir
Famciclovir	Ribavirin
Foscarnet	Valaciclovir
Ganciclovir	Valganciclovir
Inosine pranobex	Zanamivir
Zidovudine/	
Lamivudine *	

* See Part 3

See also Drugs for HIV, p.116