

ANTIFUNGAL DRUGS

We are continually exposed to fungi – in the air we breathe, the food we eat, and the water we drink. Fortunately, most of them cannot live in the body, and few are harmful. But some can grow in the mouth, skin, hair, or nails, causing irritating or unsightly changes, and a few can cause serious and possibly fatal disease. The most common fungal infections are caused by the tinea group. These include tinea pedis (athlete's foot), tinea cruris (jock itch), tinea corporis (ringworm), and tinea capitis (scalp ringworm). Caused by a variety of organisms, they are spread by direct or indirect contact with infected humans or animals. Infection is encouraged by warm, moist conditions.

Problems may also result from the proliferation of a fungus normally present in the body; the most common example is excessive growth of *Candida*, a yeast that causes thrush infection of the mouth, vagina, and bowel. It can also infect other organs if it spreads through the body via the bloodstream. Overgrowth of *Candida* may occur in people taking antibiotics (p.86) or oral contraceptives (p.121), in pregnant women, or in those with diabetes or immune system disorders such as HIV.

Superficial fungal infections (those that attack only the outer layer of the skin and mucous membranes) are relatively common and, although irritating, do not usually present a threat to general health. Internal fungal infections (for example, of the lungs, heart, or other organs) are very rare, but may be serious and prolonged.

As antibiotics and other antibacterial drugs have no effect on fungi and yeasts, a different type of drug is needed. Drugs for fungal infections are either applied topically to treat minor infections of the

skin, nails, and mucous membranes, or they are given by mouth or injection to eliminate serious fungal infections of the internal organs and nails.

Why they are used

Drug treatment is necessary for most fungal infections since they rarely improve alone. Measures such as careful washing and drying of affected areas may help but are not a substitute for antifungal drugs. The use of over-the-counter preparations to increase the acidity of the vagina is not usually effective except when accompanied by drug treatment.

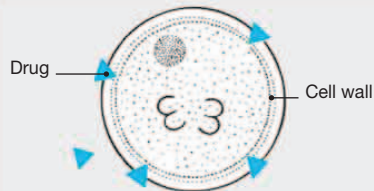
Fungal infections of the skin and scalp are usually treated with a cream or shampoo. Drugs for vaginal thrush are most commonly applied in the form of vaginal pessaries or cream applied with a special applicator. For very severe or persistent vaginal infections, fluconazole or itraconazole may be given as a short course by mouth. Mouth infections are usually eliminated by lozenges dissolved in the mouth or an antifungal solution or gel applied to the affected areas. For severe or persistent nail infections, either griseofulvin or terbinafine are given by mouth until the infected nails have grown out.

In the rare cases of fungal infections of internal organs, such as the blood, the heart, or the brain, potent drugs such as fluconazole and itraconazole are given by mouth, or amphotericin and flucytosine are given by injection. These drugs pass into the bloodstream to fight the fungi.

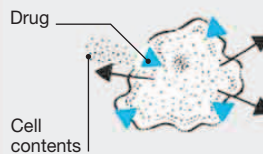
How they work

Most antifungals alter the permeability of the fungal cell's walls. Chemicals needed for cell life leak out and the fungal cell dies.

ACTIONS OF ANTIFUNGAL DRUGS



Stage one
The drug acts on the wall of the fungal cell.



Stage two
The drug damages the cell wall and the cell contents leak out. The cell dies.

How they affect you

The speed with which antifungal drugs provide benefit varies with the type of infection. Most fungal or yeast infections of the skin, mouth, and vagina improve within a week. The condition of nails affected by fungal infections improves only when new nail growth occurs, which takes months. Systemic infections of the internal organs can take weeks to cure.

Antifungal drugs applied topically rarely cause side effects, although they may irritate the skin. However, treatment by mouth or injection for systemic and nail infections may produce more serious side effects. Amphotericin, injected in cases of life-threatening systemic infections, can cause potentially dangerous effects, including kidney damage.

COMMON DRUGS

Amorolfine	Flucytosine
Amphotericin B *	Griseofulvin
Caspofungin	Itraconazole
Clotrimazole *	Ketoconazole *
Econazole	Miconazole *
Fluconazole *	Nystatin *
	Terbinafine *
	Tioconazole
	Voriconazole

* See Part 3

CHOICE OF ANTIFUNGAL DRUG

The table below shows the range of uses for some antifungal drugs. The particular drug chosen in each case depends on the precise

nature and site of the infection. The usual route of administration for each drug is also indicated.

Drug	Infection										Administration	
	Oesophageal thrush	Cryptococcal meningitis	Skin ringworm	Scalp ringworm	Nail infection	Mouth thrush	Vaginal thrush	Candida of the skin	Systemic candida	Topical	Injection	Oral
Amphotericin B	●	●				●			●		●	●
Caspofungin	●							●			●	
Clotrimazole			●	●		●	●			●		
Fluconazole	●	●					●	●			●	●
Flucytosine	●	●						●			●	●
Griseofulvin			●	●	●							●
Ketoconazole	●		●	●	●		●	●		●		
Miconazole			●			●	●	●		●		●
Nystatin	●					●	●	●		●		●
Terbinafine			●	●	●							●
Voriconazole	●					●		●			●	●