

# VASODILATORS

Vasodilators are drugs that widen blood vessels. Their most obvious use is to reverse narrowing of blood vessels when this leads to reduced blood flow and, consequently, a lower oxygen supply to parts of the body. This problem occurs in angina, when narrowing of the coronary arteries reduces blood supply to the heart muscle. Vasodilators are often used to treat high blood pressure (hypertension).

## Why they are used

Vasodilators improve the blood flow and thus the oxygen supply to areas of the body where they are most needed. In angina, dilation of the blood vessels throughout the body reduces the force with which the heart needs to pump and thereby eases its workload (see also Anti-angina drugs, p.59). This also may be helpful in treating congestive heart failure when other treatments are not effective.

Because blood pressure is dependent partly on the diameter of blood vessels, vasodilators are often helpful in treating hypertension (see p.60).

In peripheral vascular disease, narrowed blood vessels in the legs cannot supply sufficient blood to the extremities, often leading to pain in the legs during exercise. Unfortunately, because the vessels are narrowed by atherosclerosis, vasodilators have little effect.

## How they work

Vasodilators widen the blood vessels by relaxing the muscles surrounding them, either by affecting the action of the muscles directly (nitrates, hydralazine, and calcium channel blockers), or by interfering with the nerve signals that govern contraction of the blood vessels (alpha blockers). ACE (angiotensin-converting enzyme) inhibitors block the activity of an enzyme in the blood that is responsible for

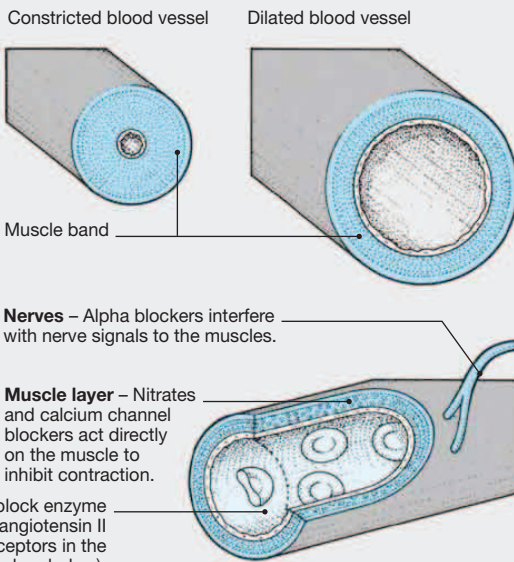
## ACTION OF VASODILATORS

The diameter of blood vessels is governed by the contraction of the surrounding muscle. The muscle contracts in response to signals from the sympathetic nervous system (p.35). Vasodilators encourage the muscles to relax, thus increasing the size of blood vessels.

### Where they act

Each type of vasodilator acts on a different part of the mechanism controlling blood vessel size in order to prevent contraction of the surrounding layer of muscles.

**Blood** – ACE inhibitors block enzyme activity in the blood; angiotensin II blockers block receptors in the vessels (see box below).



producing angiotensin II, a powerful vasoconstrictor. Angiotensin II blockers prevent angiotensin II from constricting the blood vessels by blocking its receptors within the vessels.

## How they affect you

As well as relieving the symptoms of the disorders for which they are taken, vasodilators can have many minor side effects related to their action on the circulation. Flushing and headaches are common at the start of treatment. Dizziness and fainting may also occur as a result of lowered blood pressure, which is often worse on standing. Dilation

of the blood vessels can also cause fluid build-up, leading to swelling, particularly of the ankles.

## Risks and special precautions

The major risk is of blood pressure falling too low; vasodilators are used with caution in people with unstable blood pressure. It is also advisable to sit or lie down after taking the first dose of a vasodilator.

## COMMON DRUGS

### ACE inhibitors

- Captopril \*
- Cilazapril
- Enalapril \*
- Fosinopril
- Lisinopril \*
- Perindopril \*
- Quinapril
- Ramipril \*
- Trandolapril

### Angiotensin II blockers

- Candesartan \*
- Irbesartan \*
- Losartan \*
- Telmisartan
- Valsartan \*

### Alpha blockers

- Doxazosin \*
- Indoramin
- Prazosin
- Terazosin

### Potassium channel activators

- Nicorandil \*

### Nitrates

- Glyceryl trinitrate \*
- Isosorbide dinitrate/mononitrate \*

### Calcium channel blockers

- Amlodipine \*
- Diltiazem \*
- Felodipine \*
- Lacidipine
- Lercanidipine
- Nicardipine
- Nifedipine \*
- Verapamil \*

### Other drugs

- Hydralazine
- Minoxidil \*

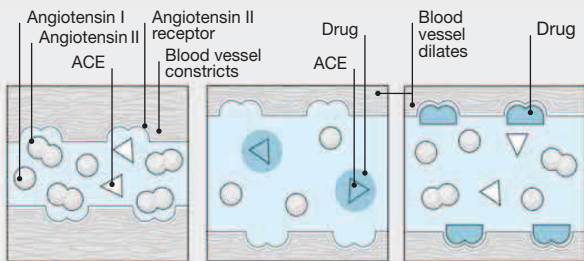
### Peripheral vasodilators

- Cilastazol
- Naftidrofuryl \*
- Pentoxifylline

\* See Part 3

## ACE INHIBITORS AND ANGIOTENSIN II BLOCKERS

ACE inhibitors block the action of ACE (an enzyme in the blood that is responsible for converting the chemical angiotensin I into angiotensin II). Angiotensin II encourages the blood vessels to constrict; its absence permits them to dilate. Angiotensin II blockers do not prevent angiotensin II from being produced, but they block its receptors, preventing it from acting on the blood vessels to constrict them.



**Before drugs**  
Angiotensin I is converted by the enzyme into angiotensin II. The blood vessel constricts.

**ACE inhibitor action**  
ACE inhibitors block enzyme activity, thereby preventing the formation of angiotensin II. The blood vessel dilates.

**Angiotensin II action**  
Angiotensin II blockers block the receptor, preventing angiotensin II from acting on the blood vessel. The blood vessel dilates.