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Over half a million people in the UK are living with heart failure. There's no cure but drugs can improve quality of life. Extreme therapies include artificial hearts – and perhaps even regenerated hearts.

## What is heart failure?

In heart failure, the heart is unable to deliver enough blood to your organs because it's lost its pumping efficiency. It can be caused by damage to the heart muscle, such as after a heart attack, or by high blood pressure. Symptoms include breathlessness, swollen ankles and fatigue.

Tablets for heart failure can be divided into those which help the pump (the heart), those which act on the pipes (the blood vessels) and those which counter some of the problems associated with heart failure.

## Pills for the pump

Digoxin, derived from the foxglove plant, has been used for centuries as a treatment for heart failure since it strengthens the heartbeat.

It's falling out of favour, though, as it can trigger dangerous heart rhythms, and cause visual problems. Vincent van Gogh may well have taken digoxin: he painted his physician holding a foxglove plant, and the frequent use of the colour yellow, and the halos around the stars in his paintings, have been attributed to possible toxic effects of digoxin.

### Vincent van Gogh may well have taken digoxin.

## Pills for the pipes

Tablets such as nitrates [6], which relax and widen your blood vessels, help in heart failure since they make it easier for blood to flow to your organs; they also reduce blood pressure so lessen the strain on the heart. Caution is advised though, since the drop in blood pressure can cause dizziness and headache.

## Pills for the problems

Your body responds to heart failure by releasing hormones: *adrenaline* to strengthen the heartbeat and *renin* to boost your blood volume (by causing salt and water retention). Trouble is, they can actually worsen heart failure. Renin causes excessive fluid retention: the resulting increase in blood volume overstretching your heart so that it pumps even less efficiently (rather like an overstretched rubber band losing its elasticity). Renin also narrows blood vessels, further reducing blood supply to your organs.

Drugs known as ACE inhibitors [7] block the effects of renin; diuretics [8] (water tablets) counter the excessive fluid retention by making you pass more urine. Amazingly, your heart itself releases a natural diuretic during heart failure: scientists have recently launched a drug [9] to boost its levels in heart failure.

Adrenaline adds extra strain to the ailing heart; beta-blockers [10], or a newer drug called ivabradine [11], can lessen its effects.

## New hearts?

Heart bypass surgery [12] is commonly used to improve blood supply to the failing heart, helping it beat better; heart transplants [13] are used for end-stage heart failure, if a donor can be found.

But what about an ‘off-the-shelf’ solution? I was privileged to meet Peter Houghton, the man who lived with an artificial heart for nearly 8 years. His heart surgeon, Professor Stephen Westaby, described to me the titanium turbine, the size of a thumb, fitted inside the failing heart. It spins at 10,000 rpm, pumping 5 litres of blood around your body each minute (the same rate as a normal heart). Peter died from kidney failure; the artificial heart continues to pump in a laboratory.

The final frontier is probably stem cell therapy: using cells that have the ability to regenerate into any other type of cell in the body, to patch over damaged parts of the heart. It’s been tried on macaques in Japan [14], but dangerous heart rhythms resulted.

The British Heart Foundation have invested £27 million into stem cell research since 2010, so watch this space.

## Lifestyle

Smoking narrows your blood vessels and raises your blood pressure, making more work for the heart; excess salt in your diet causes your body to retain fluid, overstretching your heart so that it becomes less good at pumping. Quitting smoking and reducing the amount of salt in your diet can help you to live with heart failure; light exercise can strengthen your heart and reduce your stress.

Lifestyle changes can be hard, though, when you’re frightened, and ‘heart failure’ is an unnerving term conjuring up images of a heart that has stopped working. Helping you to better understand heart failure are cardiac rehabilitation nurses [15], offering education and tailored-exercise programmes. With heart failure, your heart is weakened but it is still working – and they will help you to get the best out of it.

*On 10th August, 2017, NHS England [16] announced that hundreds more people are now surviving heart failure thanks to improved treatments. Good news indeed.

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