

# Beta-Blockers

## Introduction

The first beta-blocker, propranolol was invented by the Scottish pharmacist Sir James Black in the late 1950s and contributed to his winning the Nobel Prize for Medicine in 1988. Since their development the roles of beta-blockers in medicine have been very wide ranging, treating problems from heart rhythm abnormalities to anxiety attacks.

Beta-blockers can be spotted in your medication list by their names ending in 'olol' such as in bisoprolol or atenolol.

## How do they work?

In the cells of various organs such as the heart, kidneys, lungs and the veins and arteries are receptors for the hormone adrenaline. When adrenaline is released in the body it will activate these receptors so that the organ becomes more active. The best example of this is when you are physically active, adrenaline is released to ensure that your heart rate increases to maintain your activity. These receptors are called beta adrenergic receptors and it is here that the beta-blocker has its effect.

From this we can see that beta-blockers have a minimal effect at rest, however during activity, when adrenaline is released, the medication will reduce its effect on the heart rate and force of contraction. They also have effects elsewhere that there are beta receptors such as the airways of the lung and the muscles of our arteries.

We can expect from this that they will have an effect on reducing the blood pressure and also the output of the heart, as they reduce both the heart rate and force of contraction.

## Clinical Use

**Anti-hypertensives (blood pressure tablets):** For a long period beta-blockers were seen as first line medications for blood pressure. However since 2006 they have shifted in position with the family of medications called ACE-I inhibitors (such as ramipril or captopril) being regarded as more effective.

**Anginal medications:** Since beta-blockers reduce the work of the heart during activity they are used to reduce problems of angina pain (heart pain felt as a tightness in the chest) and many people are regularly taking beta-blockers for this purpose. There is a great body of medical evidence and work that suggests that patients who have suffered a heart attack (myocardial infarction) have a better life expectancy if treated with beta-blockers and so most people who suffer a heart attack will find beta-blockers included in their discharge medications.

**Left ventricular failure (heart failure):** Although beta-blockers were once thought to potentially worsen the condition, studies in the late 1990s showed their positive effects on illness and prognosis in congestive heart failure. They are now specifically indicated to work alongside the standard therapy in congestive heart failure. Medical research has shown that the absolute risk of death from heart failure can be reduced by 4.5% over a 13 month period as well as reducing the number of hospital visits.

**Atrial fibrillation:** As beta-blockers reduce the effect of adrenaline on the heart rate they have a significant role to play in the management of persistent and permanent atrial fibrillation to maintain a steady heart rate. Many doctors would consider beta-blockers first in managing a patient with an uncontrolled heart rate in atrial fibrillation. Usually they are started at a low dose and their dose is slowly increased over time to



balance their beneficial effects with the possible side effects (see below).

In people with paroxysmal atrial fibrillation (atrial fibrillation that spontaneously comes and goes over time) or persistent atrial fibrillation (atrial fibrillation that is continuous but may possibly be returned to normal rhythm by an intervention such as cardioversion at some time) beta-blockers have the added advantage that they may assist in maintaining the normal rhythm or even assist in returning the heart to its normal rhythm.

### Side Effects and Problems

**Fatigue:** Approximately one patient in ten will report that beta-blocker treatment will make them feel tired and fatigued. They generally describe this as tiredness rather than a feeling of sleepiness. Unfortunately this side effect can present even after you have been taking the medication for some time.

**Breathlessness:** As beta-blockers also have an effect on the airways of the lungs they can make susceptible people feel breathless. Due to this problem beta-blockers are not used in patients with asthma. However, many people with chronic bronchitis are able to use them very successfully.

**Lightheadedness:** Due to their effect on blood pressure, some patients taking beta-blockers can feel faint and light headed.

**Raynaud's Phenomenon:** In some individuals beta-blockers can cause coldness of the fingers and toes. In particularly susceptible people this can cause a transient loss of circulation to the fingers and toes making them white and painful, this is called Raynaud's Phenomenon and is an indication to stop the beta-blocker.

### Caution!

Due to the many cardiac properties of beta-blockers they are commonly used in people suffering from many different types of cardiac disease. However having possible side effects they should not be suddenly stopped without advice from your doctor. Often, when a beta-blocker is being used at a high dose, most doctors would reduce the dose before withdrawing the beta-blocker rather than stopping it suddenly.

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**AF-A Australia Medical Advisory Committee:** Dr Michael Davis Professor Ben Freedman Dr Gerry Kaye  
**Founder & CEO:** Mrs Trudie Lobban MBE **Deputy CEO:** Mrs Jo Jerome

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