

## 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 of 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 identified in a 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 adrenalin. When adrenalin is released in the body it will activate these receptors so that the organ becomes more active. The best example of this is when performing physical activity; adrenalin is released to ensure that the heart rate increases to support the activity. These receptors are called beta adrenergic receptors and it is here that the beta-blocker takes effect.

Beta-blockers have a minimal effect at rest, however during activity, when adrenalin is released, the medication will reduce the heart rate and the force of heart contraction. Beta-blockers also effect other sites where there are beta receptors such as the airways of the lung (potentially causing narrowing of the airways) and the muscles of the arteries (causing a decrease in the blood pressure).

### 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) which are regarded to be more effective.

**Anginal Medications:** Since beta-blockers reduce the work of the heart during activity they are used to reduce angina pain (heart pain felt as a tightness in the chest) and many people regularly take beta-blockers for this purpose. There is a large body of medical evidence which suggests that patients who have suffered a heart attack (myocardia infarction) have a longer life expectancy if treated with beta-blockers; 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 heart failure, studies in the late 1990s showed their positive effects on illness and prognosis in patients with congestive heart failure. Along with other medications they are now specifically indicated in the treatment of congestive heart failure. Medical research has shown that beta-blockers can reduce the absolute risk of death from heart failure by 4.5% over a 13 month period, and can reduce the number of hospital visits required for treatment of heart failure exacerbations.



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**Atrial Fibrillation:** Because beta-blockers reduce the effect of Adrenalin on the heart rate they can help to control the heart rate in patients with Persistent and Permanent Atrial Fibrillation. Many doctors would consider beta-blockers first in managing a patient with an uncontrolled heart rate in Atrial Fibrillation. In order to balance their beneficial effects with possible side effects (see below) beta-blockers are usually started at a low dose which is then slowly increased. 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) 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 complain that beta-blocker treatment makes them feel generally tired (rather than sleepy). Unfortunately this side effect can present even after 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.

**Light-headedness:** 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!

Beta-blockers should not be suddenly stopped without a doctor's consent. Most doctors slowly reduce the dose of beta-blockers rather than abruptly stopping them.

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