c. They are also vasodilators reducing afterload

4. Phosphodiesterase inhibitors
   a. Milrinone inhibits phosphodiesterase type 3 which breaks down cAMP
   b. Increased intracellular cAMP increases Ca2+ and so increases contractility
   c. Also a vasodilator

b. Non-Pharmacological
   i. Revascularisation
      1. Coronary artery disease is the most common cause of heart failure
      2. Angioplasty and stenting can improve abnormalities in wall motion
   ii. Cardiac resynchronisation therapy
      1. Patients with heart failure often have left BBB and so the ventricles do not contract uniformly
      2. New pacemakers can stimulate both the left and right ventricle simultaneously
      3. Indicated for patients with left ventricular systolic dysfunction who have moderate or severe symptoms of heart failure and a widened QRS on ECG
      4. Aims to improve co-ordination of the atria and both ventricles
   iii. Implantable cardioverter-defibrillator
      1. Indicated for patients with left ventricular ejection fraction <30% on optimal medical therapy
      2. Sudden death from ventricular arrhythmia's is reduced
      3. ICD's deliver a small impulse when an arrhythmia arises
   iv. Cardiac transplantation
      1. Treatment of choice for younger patients with severe intractable cardiac failue
      2. But requires lifelong immunosuppression

Acute Heart Failure

1. Medical emergency
2. Presents as
   a. Acute decompensation of chronic heart failure
   b. Hypertensive heart failure
      i. High BP, preserved left ventricular function, pulmonary oedema on CXR
   c. Acute pulmonary oedema
      i. SOB, tachycardia, sweating (sympathetic over activity), wheeze and crackles throughout chest, hypoxia and pulmonary oedema on CXR
   d. Cardiogenic shock
      i. Hypotension, tachycardia, oliguria, cold extremities
   e. High output cardiac failure
      i. E.g septic shock
      ii. Warm peripheries, pulmonary congestion, hypotension
   f. Right heart failure
3. Initial investigations are the same as those for chronic heart failure