

# CARDIOVASCULAR PATHOLOGY

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Cardiovascular disease is a term used to describe a variety of conditions affecting the heart and blood vessels. Coronary Heart Disease (CHD) and Hypertension (HBP) remain major causes of morbidity and mortality in the UK and especially Scotland, despite various health education campaigns. The good news though is that there has been an improvement in the death rates from cardiovascular disease in the last ten years.

## Cardiovascular Diseases

- Coronary heart disease
- Cardiac failure
- Hypertension
- Cerebrovascular accidents (strokes)
- Peripheral vascular disease

## Deaths in Scotland from Ischaemic Heart Disease 1998

BOTH SEXES 1998	All Ages	Ages													
		20+	25+	30+	35+	40+	45+	50+	55+	60+	65+	70+	75+	80+	85+
	13419	2	7	13	41	101	196	359	545	1016	1534	2087	2478	2103	2937

Source: GRO (Scotland) – 1998 Annual Report – Section 6

In England the picture isn't much better:

- 1.4 million suffer from angina
- 300,000 have heart attacks every year
- 110,000 die of heart problems every year

(Source: Alan Millburn, SOS for Health – National Service Framework – Coronary Heart Disease)

## CHD Risk Factors

### Non-modifiable:

- **Age** – incidence increases with age
- **Gender** – incidence is greater in men than in women, as women have some degree of protection until after the menopause after which the incidence increases
- **Family History** – some people have a genetic predisposition to certain types of CHD. However, it is difficult to pinpoint how far genes are responsible and how much is due to lifestyle factors – members of the same family have similar lifestyles.

### Modifiable:

- **Smoking** – the single biggest avoidable risk factor (x4 risk)  
Why?
  - causes coronary vasoconstriction
  - increases blood viscosity
  - reduces oxygen carrying capacity of the haemoglobin of the red blood cells (smokers have carbon monoxide combined with their Hg)
- **Hypertension**  
*Definition – systolic pressure above 140mmHg and or diastolic above 85mmHg (80mmHg in diabetics)*  
Hypertension is a silent killer. A high pressure in the arterial system means the left ventricle has to work harder to eject blood. This results in the ventricle getting bigger over time and requiring more oxygen in order to effectively pump. If this increased demand cannot be met by increased supply then the myocardium become *ischaemic*. HBP has been accepted as one of the most important risk factors for myocardial infarction, stroke, congestive cardiac failure and peripheral vascular disease. It has been estimated that around 16% of adults in the UK are sufficiently hypertensive to increase their risk of cardiovascular disease. The risks increase with the severity of hypertension and are multiplied when other factors such as smoking and elevated cholesterol are present. If lifestyle modification does not control or prevent hypertension, then drug therapy is necessary. Control of other risk factors that interact with blood pressure is also important. Smoking, high cholesterol, and diabetes accelerate the damage by high blood pressure on the heart and blood vessels. Therefore, it is important to manage and control all of these factors.
- **Diet**
  - a diet high in saturated fat can contribute to elevated serum cholesterol levels
  - poor diet contributes to obesity (greater cardiovascular workload)
  - can play a role in the development/prevention of HBP
  - plenty of anti-oxidants (fresh fruit and vegetables) help protect against heart disease (and cancer)
- **Activity Levels** – a sedentary lifestyle increases risk. Exercise is essential for a healthy heart.

## Coronary Heart Disease – pathophysiology

The coronary arteries supply the heart muscle with oxygenated blood. If these arteries are narrowed due to fatty deposits (atheroma) at times of increased demand for oxygen (e.g. during exertion) the myocardium becomes deprived of sufficient oxygen (i.e. ischaemic) and the person experiences chest pain known as *angina pectoris*. Normally if the person stops the activity the pain will subside, or they may take a vasodilating drug such as glycerol trinitrate (GTN) – available in spray (nitrocline) or sublingual tablet form.

### Signs and Symptoms of CHD:

- Angina - gripping pain in chest, may spread to left arm, neck, jaw  
- may have pain or tingling in left hand
- shortness of breath
- weakness

### What can you do?

The aim is to reduce the demand on the heart

- help to sitting position and support
- rest
- reassurance
- loosen tight clothing
- give medications required and prescribed – e.g. nitroglycerine spray, and repeat as necessary
- assess effectiveness of medication
- if no pain relief call ambulance

### Myocardial infarction (heart attack)

This occurs when the fatty plaque (atheroma) fissures, clots then form (coronary thrombosis) resulting in a complete blockage of the affected coronary artery. The area of myocardium served by that artery first becomes ischaemic, if the ischaemia is prolonged the cells start to die. Dead tissue is said to be necrotic. If the necrosed area is large then the heart can no longer pump effectively (cardiac failure) and the person may die or may become a “cardiac cripple”. Get medical help immediately if medication doesn’t relieve the pain – prompt treatment can reduce the myocardial damage – i.e. limit the size of the infarct with thrombolytic agents.

### Signs and Symptoms:

- History of chest pain – crushing, vice-like, often radiating to arms and jaw, doesn’t subside with rest or GTN
- Dyspnoea
- Nausea/vomiting
- Sweating
- Weakness
- Pale, ashen skin
- Feeling of impending death

### What can you do?

- Call ambulance
- Sitting position
- Check pulse
- Observe colour
- Reassure – calm atmosphere
- Aspirin

### Cardiac Failure

The heart’s pumping ability is severely impaired, and it can’t meet the body’s demands. Remember the heart acts as two pumps – the right side pumping blood to the pulmonary circulation and left side to the systemic circulation. Failure of either side can occur independently, although if left untreated would eventually result in failure of both sides (congestive cardiac failure or biventricular failure) due to the Frank-Starling Law of the heart.

Cardiac failure is caused by CHD, hypertension, valve disease, chronic respiratory disease.

**Types:** left sided failure, right sided failure, bi-ventricular failure or congestive cardiac failure

**Symptoms:** breathlessness, fatigue, frothy sputum, rapid pulse, swollen ankles

**Treatment:** is mainly symptomatic – diuretics, digoxin

Some useful websites:

[www.heartpoint.com/gallery.html](http://www.heartpoint.com/gallery.html) - lots of animations to explain cardiovascular pathology

[www.healthnet.org.uk](http://www.healthnet.org.uk) - this is the Coronary Prevention Group’s website, where you can download factsheets on lots of CHD-related topics

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