**Physiol-MAKEUP** Describe the cardiovascular changes with morbid obesity

**Definition of obesity**

Excessive fat accumulation in adipose tissue to the extent that health may be impaired

WHO classification of obesity is based on BMI (weight in kg/ height in m squared)
- Normal 18.5 ~ 25
- Overweight 25 ~ 30
- Obese (class 1) 30 ~ 35
- Morbid obesity (class 2) 35 ~ 40
- Class 3 ≥ 40

**Changes in cardiovascular system**

CVS changes depend on **extent** and **duration** of obesity

Extra adipose tissue needs ↑cardiac output
One source quote increase of 30 ~ 50 mL/min per 100g tissue! *(Anaesthesia 2006, 61, 36)*

This is achieved through both ↑↑heart rate and ↑stroke volume
Increased SNS activity through potentiation by hormones (leptin, insulin, etc)
↑SNS → ↑RAAS → sodium retention → ↑blood volume → ↑MAP

↑SNS → ↑HR → ↓diastolic filling → ↓myocardial perfusion

↑MAP → **LV hypertrophy** → LV dilatation → LV failure

Obesity → OSA → **pulmonary hypertension** → cor pulmonale (RV failure)
Obesity → OSA → **polycythaemia** → ↑viscosity → ↑hydraulic resistance

Compression of abdominal and leg vessels → ↓**venous return** → supine hypotension and ↑risk of DVTs

Insulin resistance + hyperlipidaemia → inflammatory mediator upregulation (CRP, IL-6, TNF-a, etc) → disrupt endothelial function → **ischaemic heart disease + cerebrovascular disease + peripheral vascular disease**

Direct deposition of fat in myocardium → **conduction disease** and cardiomyopathy

**CVS diseases associated with obesity** *(from Kam Anaesthesia; 2005, 60, p1009)*

Associated with hypertension, cardiac failure, ischaemic heart disease, cardiomyopathy, sudden cardiac death, cardiac arrhythmias, peripheral vascular disease, DVT, cerebrovascular disease

Hypertension – for every 10 kg weight gain, SBP ↑3~5 mmHg, DBP ↑2 mmHg
Heart failure – for every increment of BMI by 1 → HF risk ↑ 5% XY, ↑ 7% XX