Obesity

Characterised by **excess body fat**: lean body tissue (muscle).

Causes

1. **high fat diets**
2. **decrease** in physical **activity.**

Body Mass Index (BMI)

BMI ≥ 30 indicates obesity.

$$BMI = \frac{\text{body mass (kg)}}{\text{height}^2 \text{ (m)}}$$

Problem with BMI Measurement

Individuals with **low body fat** but a large bone mass or muscle bulk can be **wrongly identified** as obese. *e.g. - body builders/rugby players.*

Obesity & Health

Obesity may **impair health** as major **risk factor** for **CVD/ type 2 diabetes.**

Treatment

1. **Diet (energy intake)**

- Limit fats as they a high calorific value per gram
- Limit free sugars as no metabolic energy expended in their digestion.

2. **Exercise**

- Preserve lean muscle tissue
- increases energy expenditure

Exercise lowers risk of CVD by

1. keeping weight under control
2. minimising stress
3. reducing hypertension
4. increasing HDL: LDL ratio

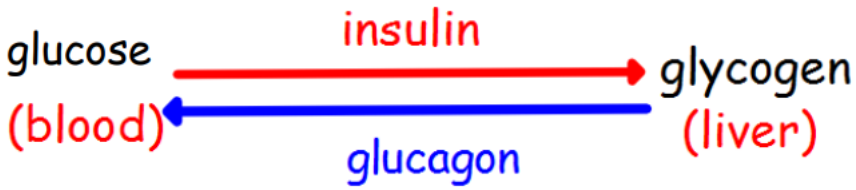
Blood Glucose

A **constant supply of glucose** is needed by ALL cells for **respiration.**

However **chronic high levels of glucose** can **damage** blood vessels

It is important that the concentration of glucose in the blood is maintained at a constant level via two hormones released by pancreas

Blood Glucose too High	Blood Glucose too Low
Detected by pancreatic receptors	Detected by pancreatic receptors
Insulin produced	Glucagon produced
Converts glucose into glycogen in liver	Converts glycogen in liver back into glucose
Lowers blood glucose	Lowers blood glucose



In cases of fight/flight/exercise

The body needs additional supplies of glucose to provide energy quickly.

The **adrenal glands** secrete **Adrenaline** into the bloodstream.

Chronic Elevation of glucose

Leads to the endothelium cells **taking in more glucose** than normal, damaging the blood vessels.

Atherosclerosis may develop leading to

1. cardiovascular disease
2. Stroke
3. peripheral vascular disease.

Small blood vessels damaged by elevated glucose levels may ALSO result in micro vascular disease

1. haemorrhage of blood vessels in the retina
2. renal failure
3. peripheral nerve dysfunction

Types of Diabetes

Type 1 Diabetes

Unable to produce insulin which usually begins in **childhood**

Treatment: regular insulin injections/tablets

Type 2 Diabetes

Cells are **less sensitive/resistant to insulin** due to a **decrease** in the number of insulin receptors at the liver which tends to **develops later in life.**

Obesity is a risk factor for type 2 diabetes.

Diabetes Testing

1. **Urine test**

   Glucose present in urine often indicates diabetes. Further testing needed.

   The kidneys remove some of the excess blood glucose that normally is stored as glycogen in the liver by insulin production.

   This removal by kidneys results in glucose appearing in the urine of diabetics

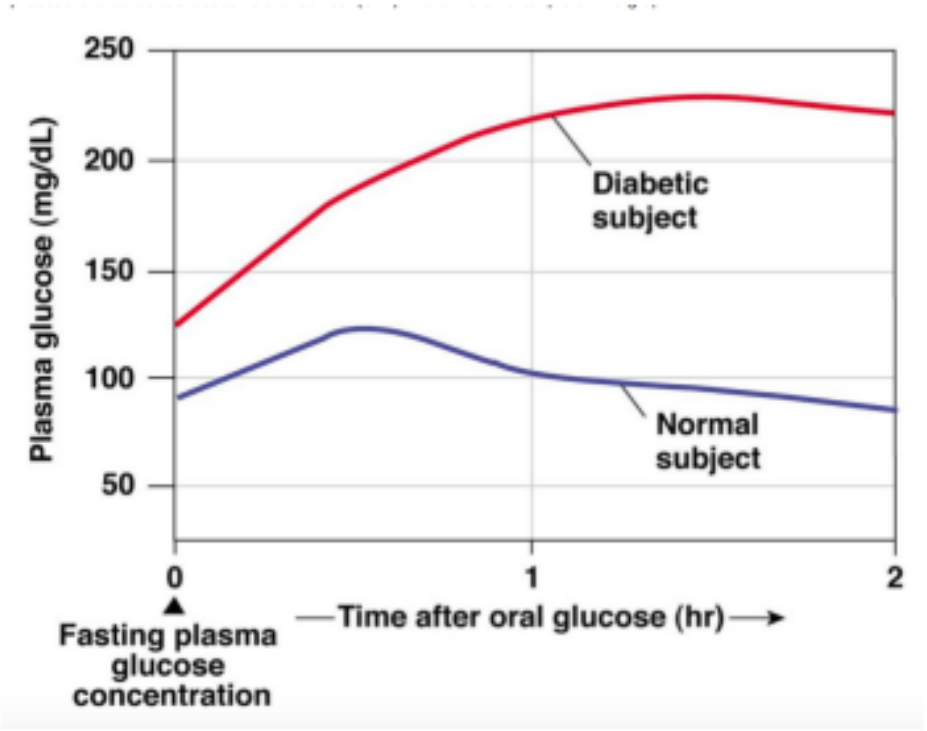
Blood Glucose

2. **Glucose Tolerance Test**

   This test formally diagnoses diabetes

Stage

1. Initial blood glucose concentrations measured after **fasting.**
2. The individual drinks a glucose solution
3. Changes in blood glucose concentration are measured for **≥ 2 hours**



The glucose concentration of the diabetic person:

1. Starts at a higher concentration
2. Rises more quickly
3. Reaches a higher maximum level.