

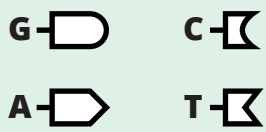
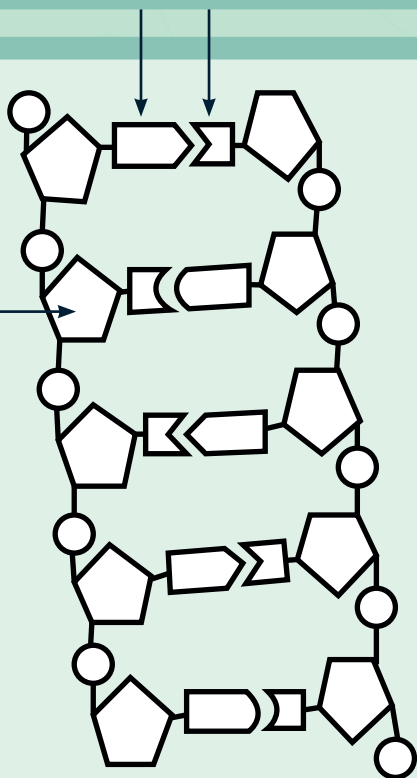
# Unit 2: GCSE Applied Science

## 2.3.1 Factors Affecting Human Health

### DNA structure

**4 types of base** connect the chains. The bases show **complementary** base pairing. **Guanine** (G) only pairs with **Cytosine** (C) and **Adenine** (A) only pairs with **Thymine** (T). There are weak bonds between complementary base pairs.

DNA is constructed from **2 long chains of alternating sugar and phosphate**.



**Genetic crosses** - Genes code for a characteristic. Genes can have different versions called **alleles**. These alleles are inherited one from each parent, so they occur in **pairs**.

We can use the **Punnet square** to the right to estimate the outcome of genetic crosses. In this example the **gametes** (sex cells) are shown at the top and side. The yellow boxes represent that alleles found in the sperm. As each sperm only contains 1 of a pair of alleles it contains either B or b. The green boxes represent the alleles in the egg cell, either B or b.

Alleles can be represented by letters; this is the **Genotype**. A dominant allele is represented by a capital letter, this allele is shown in the **phenotype** (how the organism looks) whenever present.

The **recessive** allele is represented by a lower-case letter. This allele must be in a **homozygous** pair (both alleles are the same i.e. bb) to be shown in the phenotype.

	B	b
B	BB	Bb
b	Bb	bb

These parents were **heterozygous**. This means that they have 2 different alleles of the same gene.

The punnet square shows us that:

- 3:1 ratio of dominant to recessives traits shown in the phenotype of the offspring in this cross
- 1:2:1 ratio of homozygous dominant to heterozygous to homozygous recessive genotypes in this cross.

### DNA is a code

Every three bases will code for a particular **amino acid**.

Chains of amino acids form **proteins**. This is how DNA codes for the structure of different proteins.

### Mutations

Changes in DNA result in mutations that may be harmless, beneficial or harmful and may be passed on from parents to offspring.

Conditions caused by changes in alleles include Huntington's and Cystic Fibrosis.

Down's syndrome is a condition where an extra chromosome is inherited.

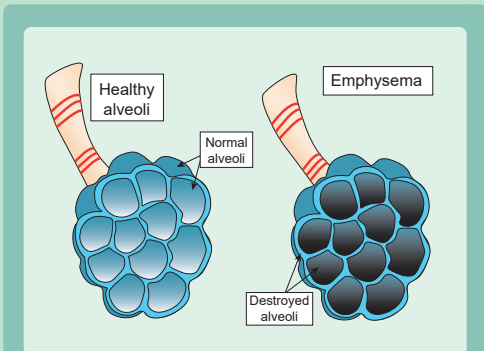
### Smoking

Chemical in cigarette smoke	Effect on the body
Tar	Contains <b>carcinogens</b> that <b>cause lung cancer</b>
Nicotine	Addictive

Smoking destroys lung tissue leading to:

#### • Emphysema

This disease is caused by the alveolar walls breaking down, reducing the surface area for gas exchange. A patient would struggle to get enough oxygen for normal activities.



### Alcohol

Alcohol has several effects on the body:



#### Short-term effects:

- depressant
- sleepiness
- reduced reaction times and impaired judgment
- impaired balance and muscle control
- reddening of the skin
- poor sleep.

#### Long-term effects:

- damage to the liver
- circulatory and heart diseases
- damage to the brain
- addiction.

**Guideline Daily Amount (GDA) or Recommended Daily Allowance (RDA)** values tell us how much an average person of a healthy weight and level of activity should eat.

These are shown on food packs.

Each 1/2 pack serving contains

<b>MED</b>	<b>LOW</b>	<b>MED</b>	<b>HIGH</b>	<b>MED</b>
Calories	Sugar	Fat	Sat Fat	Salt
<b>353</b>	<b>0.9g</b>	<b>20.3g</b>	<b>10.8g</b>	<b>1.1g</b>
<b>18%</b>	<b>1%</b>	<b>29%</b>	<b>54%</b>	<b>18%</b>

of your guideline daily amount

Source: Food Standards Agency

### Obesity

A person is considered obese if they are very overweight with a high degree of body fat.

Obesity can have a number of affects of health including:

- diabetes
- heart disease
- high blood pressure
- some cancers (e.g. breast and prostate cancers)
- stress, anxiety, and depression.

Eating too little is also bad for us. This can lead to deficiency diseases or illnesses such as anorexia.

**BMI** (Body Mass Index) is a way to categorise people according to tissue mass.

$$BMI = \frac{mass}{height^2}$$

BMI shouldn't be used to assess children or athletes as it doesn't distinguish between fat and muscle and doesn't account for whether a person is still growing.

### Salt

Too much salt in the diet is linked with high blood pressure and stroke.

Too little salt in the diet can cause muscle cramps, dizziness and electrolyte imbalance.

### Homeostasis

**Homeostasis** is the **maintenance** of a **constant internal** environment.

#### Regulating Glucose

The amount of glucose in your blood is controlled by **hormones (chemical messengers)** that **travel in blood** from the gland where they are produced, in this case the **pancreas** to the target organ, in this case the **liver**.

Eating increases glucose in blood	Exercising decreases glucose in the blood
Pancreas detects increase and releases the hormone insulin into the blood	Pancreas detects the decreases and releases the hormone glucagon into the blood
Insulin travels to liver and liver turns glucose into insoluble glycogen for storage	Glucagon tells the liver to turn stored glycogen into glucose and release into the blood
Glucose level decreases to normal levels	Glucose levels in blood increases to normal levels.

### Diabetes

Diabetes is a condition where you are unable to control your own blood glucose levels. In **Type I diabetes** the body does not release insulin. In **type II diabetes** the body cells do not respond to the chemical signal from insulin.

#### Symptoms:

Glucose in urine detected by a Benedict's test.

#### Treatments:

- Injecting insulin
- pancreas transplants
- low sugar/carbohydrates diet.

**Atmospheric pollution** can also harm health. Lead poisoning can lead to anaemia, loss of appetite and memory loss. Air pollution can lead to many problems including irritation of the lungs and reduced oxygen being supplied to the tissues.