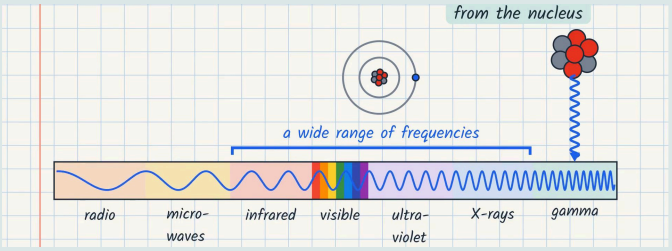
EM wave dangers

Where they come from, and the harm they can do

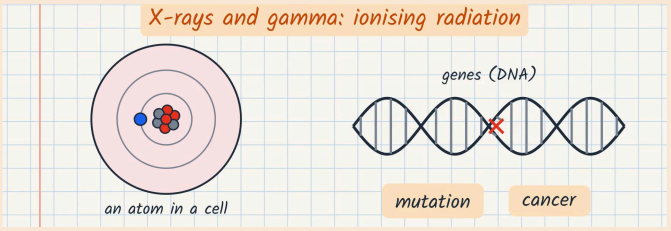
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Summary sheet

1 Where they come from



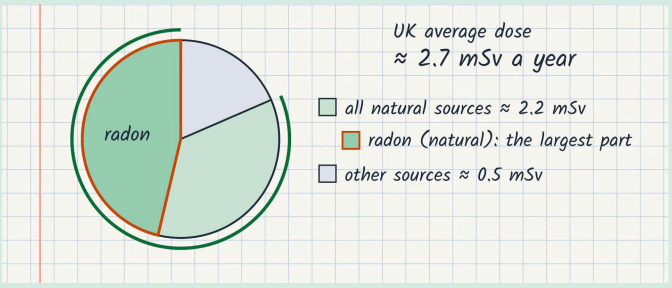
- When electrons in an atom **change energy level**, the atom can **give out** or **absorb** an EM wave.
- Changes in atoms make EM waves over a wide range of frequencies. **Gamma rays** come from changes in the **nucleus**.

2 Which can harm us



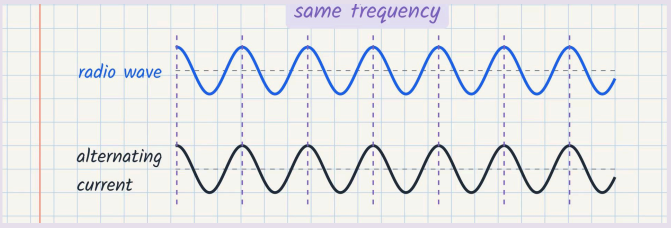
- **Ultraviolet**, **X-rays** and **gamma rays** can damage cells; radio to visible light don't cause this damage.
- UV: **premature skin ageing**, higher risk of **skin cancer**. X-rays and gamma are **ionising**: they can cause **mutations** of genes and **cancer**.

3 Measuring the dose



- Harm depends on the **type** of radiation and the **dose**. **Radiation dose** is a measure of the risk of harm, in **sieverts (Sv)**.
- 1000 mSv = 1 Sv (given in the exam). UK average ≈ 2.7 mSv a year, ≈ 2.2 natural; **radon** gas is the largest part. In data questions, compare doses, then say what that means for risk.

4 Higher: radio and circuits



- Radio waves are made by **electrons oscillating** in an electrical circuit.
- Absorbed radio waves make electrons in a receiver oscillate, creating an **alternating current** with the **same frequency** as the radio wave.

1000 mSv = 1 Sv

dose in sieverts measures the risk of harm

Exam tip

Data question? Compare the numbers, then say what they mean for risk: "The dose is higher, so the risk of harm is higher."

Check yourself

- 1 Name two harmful effects of ultraviolet.
- 2 How many millisieverts are in 0.5 Sv?

Answers: 1. Premature skin ageing; higher risk of skin cancer 2. 500 mSv