بسم الله الرحمن الرحيم

Effect of Electromagnetic Wave on Haman Health

BY

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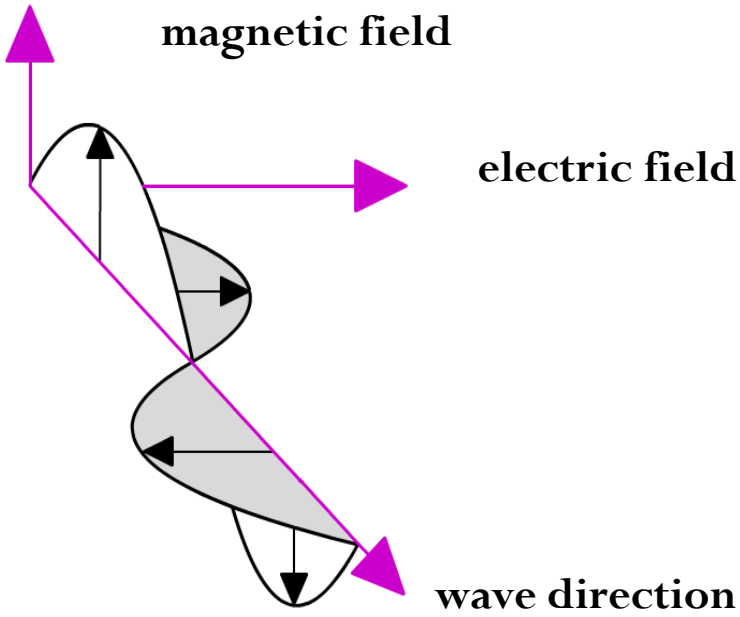
Introduction

Electromagnetic waves are produced by the motion of electrically charged particles. These waves are also called electromagnetic radiation because they radiate from the electrically charged particles. They travel through empty space as well as through air and other substances. Electromagnetic waves at low frequencies are referred to as electromagnetic fields and those at very high frequencies are called electromagnetic radiations (1,2).

electromagnetic waves

What's the connection between light, microwaves and X-rays?

They are all different types of electromagnetic radiation that travel as waves and transfer energy from one place to another.



Electromagnetic waves are transverse waves made up of electric and magnetic fields

In a vacuum (space), they travel at 300,000,000 m/s!

Characteristics of Electromagnetic Waves

Electromagnetic waves:

- They can travel in a vacuum (i.e. they do not require a medium).
- They travel at the speed of light in a vacuum ($c = 3.00 \times 10^8$ m/s)

- Gamma rays
- X rays
- UV waves
- Visible light
- Infrared waves
- Microwaves
- Radio waves

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Properties of EM Waves

1. Electromagnetic waves are propagated by oscillating electric fields and magnetic field oscillation at right angles to each other.
2. These waves travel with speed $3\times108ms{-}1$ in vacuum.
3. They are not deflected by electric or magnetic field.
4. They can show interference or diffraction.
5. They are transverse waves.
May be polarized.
6. Need no medium of propagation.
7. wavelength and frequency related as $c=v\lambda$.

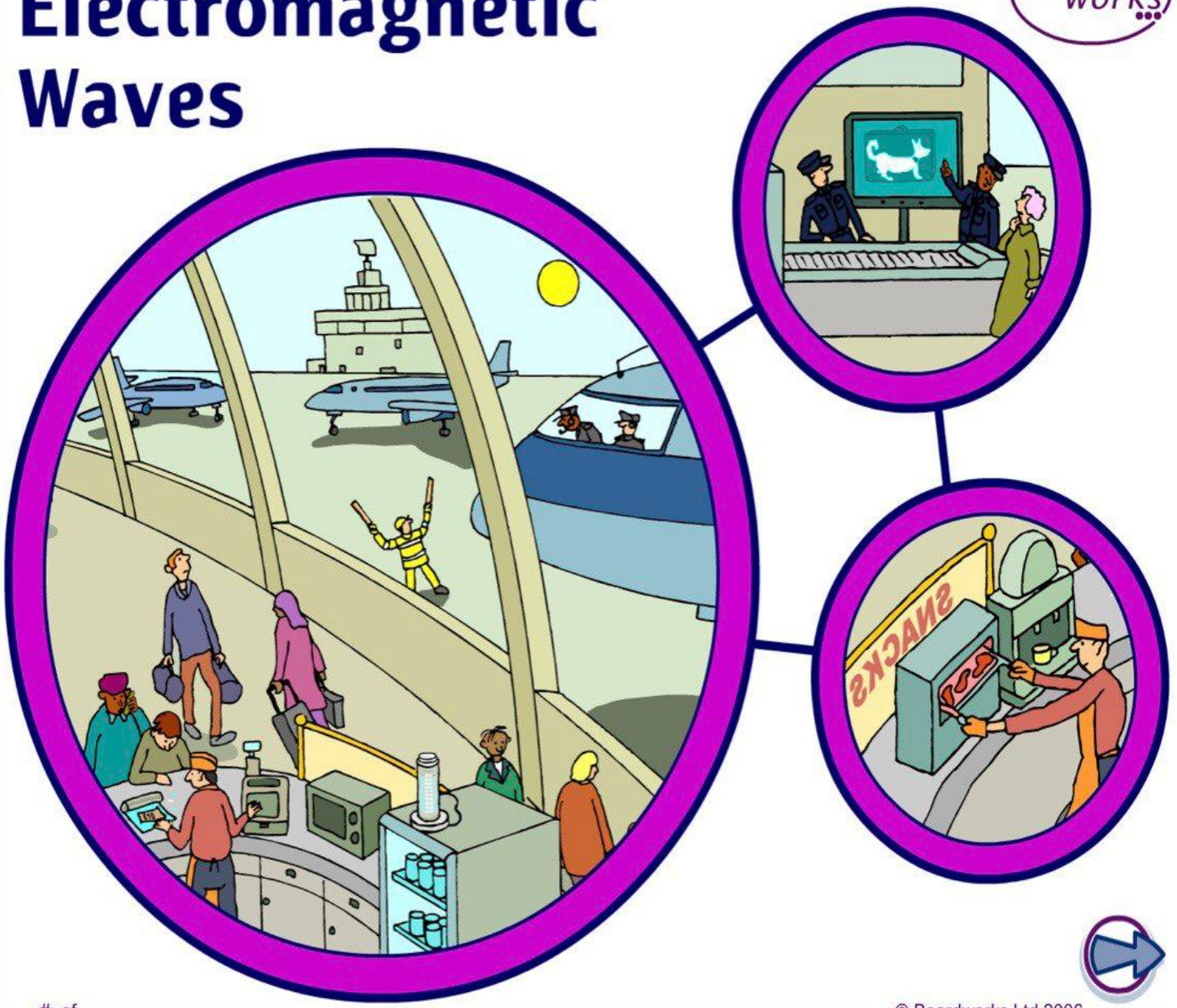
Effects of Electromagnetic on human health

Electromagnetic waves generated by many natural and human-made sources can travel for long distances and play a very important role in daily life. In particular, the electromagnetic fields in the Radiofrequency (RF) zone are used in communications, radio and television broadcasting, cellular networks and indoor wireless systems. Resulting from the technological innovations, the use of electromagnetic fields gradually increases and thus people are exposed to electromagnetic waves at levels much higher than those present in the nature (1,2,3)

Carcinogenesis and electromagnetic waves

Since the first observation by Wertheimer and Leeper in 1979, a lot of epidemiologic investigations done between magnetic fields exposure and cancer. Speculations that electromagnetic waves can be carcinogenic increased the number of relevant epidermiological and in vitro studies (4,5)

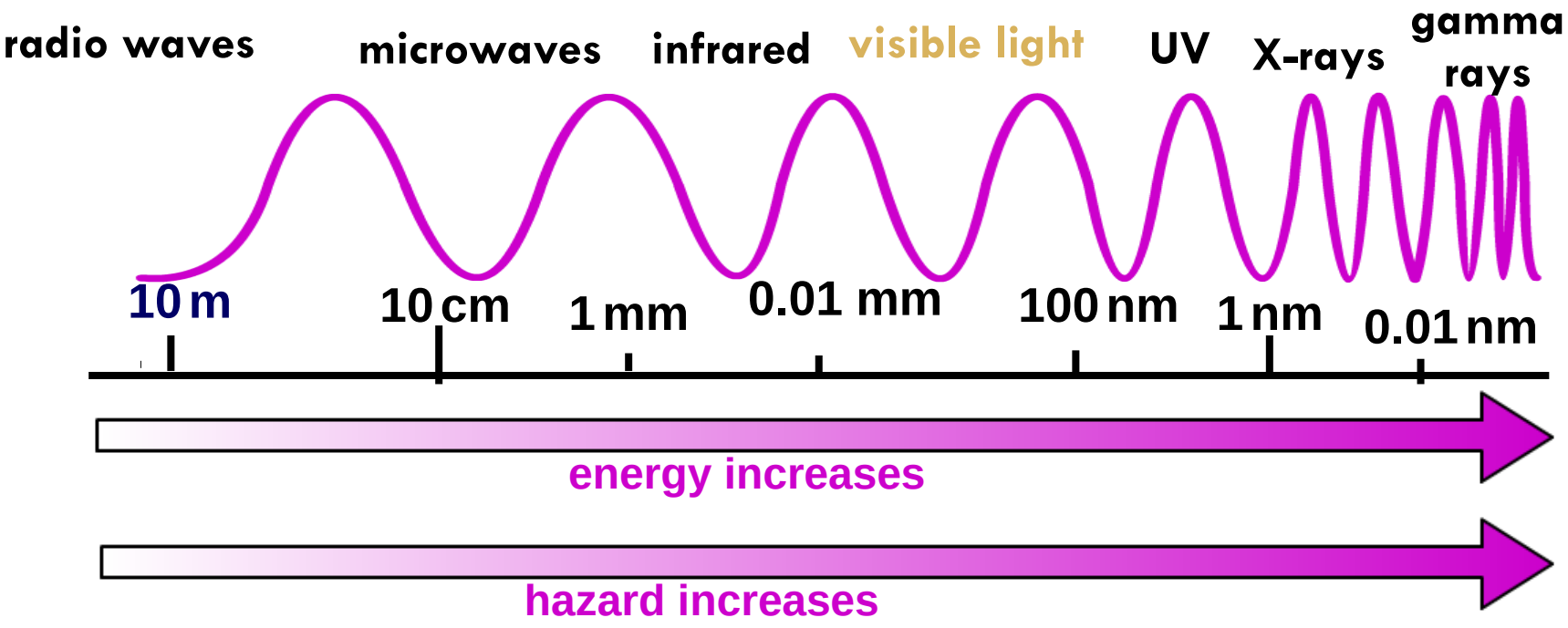
Electromagnetic Waves



GCSE Science

Electromagnetic waves
Dangerous

The shorter the wavelength (and higher the frequency) of electromagnetic waves, the more energy that they carry.



High-frequency electromagnetic waves, such as gamma rays, are potentially more harmful because they have more energy

Affect of radio waves on humans

Radio waves are the longest-wavelength electromagnetic waves and mostly pass through the body.

They are not strongly absorbed and are thought to have no effect on the health of living tissue.

Microwaves are radio waves with short wavelengths. They are very slightly absorbed by the body and can cause a minor heating effect.

However, the microwaves produced by mobile phones have not yet been proved to cause health problems.

What happens when waves hit a surface?

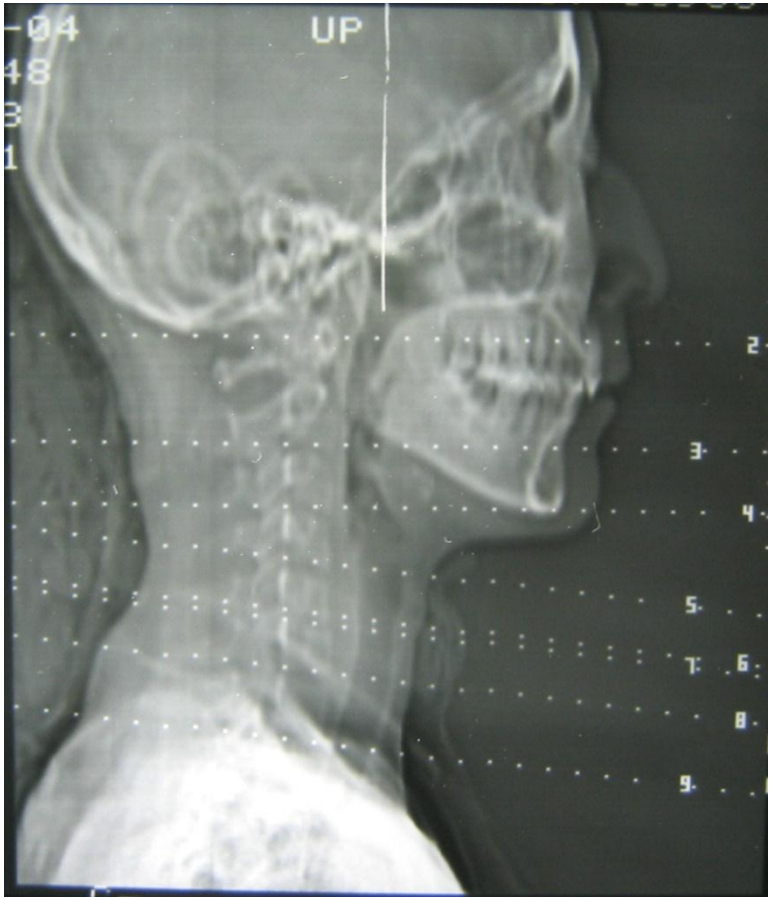
When electromagnetic waves hit a surface, they can be **reflected**, **absorbed** or **transmitted**.

For example, light waves are reflected by skin but X-rays pass straight through.

If electromagnetic waves are absorbed, some of their energy is absorbed by the material. This usually increases the temperature of the material.

X Rays and Gamma Rays

- EM waves with shortest wavelength & highest frequency
- High Energy- go through skin & muscle
- High level exposure causes cancer



Effect OF ionizing waves on humans

Ionizing waves have enough energy to ionize the atoms in materials. These waves can have a severe effect on living tissue by killing cells or damaging DNA.

- **Ultraviolet rays** are absorbed by the body. Skin tissues can be ionized and damaged by the shortest-wavelength ultraviolet radiation causing skin cancer.

- **X-rays** pass through soft body tissue, such as skin and muscle, without being absorbed. Denser tissue, such as bone, absorb some X-rays and can be ionized.

- **Gamma rays** pass through the body but very high energy waves can ionize atoms in living tissue.

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[4] Wertheimer N, Leeper E. (1979 Mar). Electrical wiring configurations and childhood cancer. Am J Epidemiol. 109(3):273-84.
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