

Mobile Phones and Radiation

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Starting Point

You may have seen headlines in newspapers and stories on TV about the health dangers of mobile phones. Some people have said they may cause cancer and infertility. Do you have a mobile phone? Do you believe what you've heard but keep using your phone anyway? Should we worry about our mobile phones and masts? Or do you think they are completely safe?



Task 1

How does a mobile phone work? Do you have one, and if so were any possible dangers of them made clear to you when you got one? Do other people know of the dangers? Ask around to answer these questions, and do a short piece of writing with the answers.

The Electromagnetic Spectrum

To help you to do your own research into mobile phones and radiation, you need to know a bit about the electromagnetic spectrum.

Mobile phones use **radio waves** to transmit signals. Radio waves are just part of the **electromagnetic spectrum**. The spectrum includes names you may have heard of, such as X-rays, infra-red and ultra-violet.

The Electromagnetic Spectrum

Gamma Rays
Ionising



X-rays
Ionising



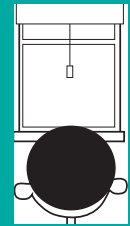
Ultra-violet Radiation
Non-ionising



Infra-red Radiation
Non-ionising



Light Waves
Non-ionising



Short wavelength
High frequency
High energy



The spectrum is divided into different groups. These groups are decided by the waves' **frequency**. Radio waves are **low frequency**, meaning that not many arrive every second. **Gamma rays** are **high frequency**, so you get loads arriving every second. This makes them **dangerous** - they have loads of energy! Frequency is measured in HERTZ. Light waves are in the middle.

Different Types of Radiation

All parts of the electromagnetic spectrum are described as **radiation**, but not all **radiation** is the same.

You may have noticed that on the picture, some types are **ionising radiation** and some types are non-ionising radiation. If radiation is ionising, it means even small amounts can *change the cells in your body*. That means the cells won't work properly, and could **mutate**. This is a cause of **cancer**.

Non-ionising radiation can't do this - but enough of it can kill cells, just as ionising radiation can.

Radio waves, such as in mobile phones, are at the **non-ionising end** of the spectrum. They have very low energies, and do not have the ability to change your cells.

Radio Waves

Radio waves given off by mobiles can heat up body tissue, which has damaging effects, but they are not powerful enough to cause heat damage to the body.

Magnetic fields created by mobile phones can affect the way that your body cells work, but the magnetic fields are incredibly small, and so unlikely to affect cells in our body.



Task 2

All of these are part of the electromagnetic spectrum: radio waves, microwaves, infra-red radiation, light waves, ultra-violet (UV) radiation, X-rays, gamma rays. Where might you find each type? It can be from a natural source, or a human one.

People who make long mobile phone calls sometimes complain of fatigue, headaches, and loss of concentration, but the same results have never been reported in laboratory conditions and may be due to other factors in modern lifestyles.

Mobile phone users are **2.5 times** more likely to develop cancer in areas of the brain adjacent to their phone ears, but researchers admit it's unclear this increase is linked to using mobiles.

The *International Agency for Research on Cancer* found a link between childhood cancer and power lines. Like mobile phones, power lines also give off radiation, but the radiation produced by power lines is a different kind of radiation, with much more energy than that coming from mobile phones.

Scientists also did some research on nematode worms, and found that radio waves like the ones that mobiles use did damage cells in the worms. But **nematode worms** are not human, so we can't be sure it would damage us too.

Microwaves Non-ionising



Radio Waves Non-ionising



Long wavelength
Low frequency
Low energy

Scientific Research

A lot of research has been done into mobile phone handsets. A few studies have claimed that some phones can cause higher rates of brain tumours, but these tend to have been focused on old style analogue phones, which use a much stronger signal than modern phones. Research which suggests that mobiles might damage health are actually rare.

Mobile Phones and Health - The Debate

Using mobile phones a lot is damaging people's health. It is associated with brain tumours, memory and concentration problems and early onset dementia (similar to Alzheimer's).

This is the view of **Powerwatch**. Powerwatch is an independent organisation with a central role in the UK Electromagnetic Field and Microwave Radiation health debate. They work closely with Government and business, and with other like-minded groups, promoting policies for a safer environment. They have been researching electromagnetic field effects on health for the last 20 years, and provide a range of information to help the general public understand this complex issue.

Task 3



Why do you think it is important for scientists to recreate results and patterns in their laboratories before deciding if there is a connection? Why can't they just take the results people have reported?

There was a report written in 2004 by the Advisory Group on Non-Ionising Radiation. Look for it on the Internet. What did this report say?



o p i n i o n

In this section are quotes from different people, on what they think or have found out.

Source 1

People who use their mobile phones a lot have reported the following symptoms which can be brief or which may last for some considerable time after the user has stopped the call; burning skin, warmth in the head, warmth in the ear, tingling or lightness, fatigue, headaches, dizziness, concentration problems and forgetfulness and memory loss.

- Swedish research has linked mobile phone use with brain tumours on the same side of the head that the phone is used.
- Other Scandinavian research has suggested that users in their teens and early 20s may develop early onset dementia.
- Spanish researchers believe that the natural electrical activity in a child's brain may be affected, leading to psychiatric and behaviour problems, especially increased aggression, a poor attention span, impaired memory and learning.
- The Department of Health has a leaflet recommending that children under 16 should use mobile phones in emergency situations only and should keep their call short.
- The parts of the body which are most vulnerable to microwave radiation are the eyes, the breasts and testicles. Other parts of the body which are sensitive are internal soft tissue organs such as kidneys, liver, ovaries, etc. Your phone should be kept away from these parts of the body.
Do not carry your phone on your belt.

From the Powerwatch website.

http://www.powerwatch.org.uk/phones_dt.asp

Source 2

Mobile phone use does not raise the risk of cancer, at least in the first 10 years of use, the largest investigation to date shows.

Some past studies had suggested an increased risk of acoustic neuroma - a tumour of the nerve connecting the ear and the brain, but others did not. The latest Institute of Cancer Research work includes data from five European countries and more than 4,000 people.

Data from the UK, Denmark, Finland, Norway and Sweden included 678 people with acoustic neuroma and 3,553 without this form of tumour. This revealed no relation between the risk of acoustic neuroma and the number of years for which the mobile phones had been used, the time since first use, total hours of use or total number of calls.

Nor was there any link with analogue or digital phones or whether or not a hands-free kit was used.

However, the researchers said there was evidence that radiation from mobile phones could potentially cause adverse health effects, and therefore a "precautionary approach" to their use should be adopted.

On balance, the evidence suggests there is no substantial risk of acoustic neuroma in the first decade of use, but the possibility of some effect after longer periods remains open, the researchers concluded.

Dr Michael Clark from the Health Protection Agency said: "This is good news but we still need to be a bit cautious."

Dr Julie Sharp, senior science information officer at Cancer Research UK, said: "This study provides further evidence that using mobile phones does not increase the risk of brain tumours. However, it is important that researchers continue to monitor phone users over the coming years as mobiles are still a relatively new invention."

From the BBC News website.

<http://news.bbc.co.uk/1/hi/health/4196762.stm>

Your Views

Do your own research, and then say what you think.

More Sources of Information

Try these places for more info:

Google key phrases:

Radiation and Mobile Phones,
Health Risks and Mobile Phones.

Main Task



Write an essay on **Radiation and Mobile Phones: Is Using A Mobile Safe?**

Do an Introduction, saying how mobile phone networks work, and whether you found that people knew about them and any dangers.

Look for the Stewart Report (May 2000). Say what it was and what it found.

Find out what the Government's advice is for young people with mobile phones.

Look for any new research being done now.

Do a Conclusion to finish the essay, saying what you think as a result of all the research you've done.



Mobile Phone Mast



Sim card

TASK 1

Do people know how mobiles work, and do they know of any possible dangers?

TASK 2

Where can the following types of electromagnetic radiation be found?

RADIO WAVES:

MICROWAVES:

INFRA-RED RADIATION:

LIGHT WAVES:

UV RADIATION:

X-RAYS:

GAMMA RAYS (hard!):

TASK 3

Why is it important for scientists to recreate results in their laboratory?

What did the 2004 report on non-ionising radiation tell you about radiation and mobile phones?