Radiation, Dentistry and Healthcare

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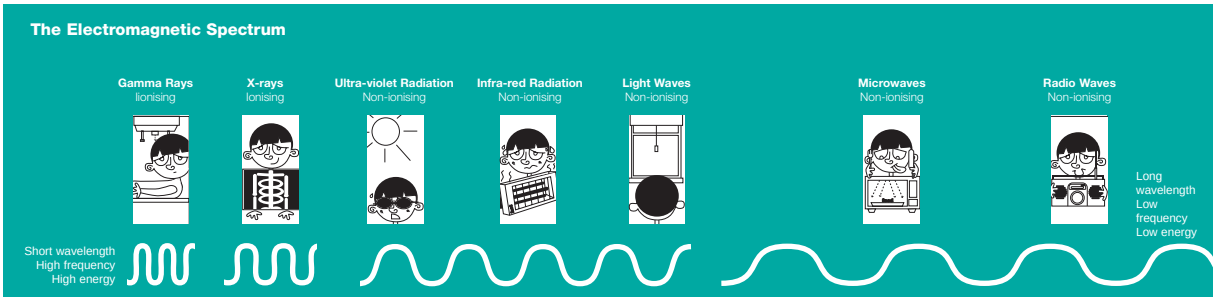
Starting Point

Getting an X-Ray when you go to the dentist is quite common these days. The X-Ray helps your dentist get a clear picture of the whole of your mouth. This isn't very easy otherwise!

X-Rays are high energy waves. They are part of the **Electromagnetic Spectrum,** which includes Radio Waves, Microwaves, Infra-Red Waves, **visible light**, Ultra-Violet Rays and Gamma Rays.

This means that X-Rays are the same kind of thing as light. We can't see them, though - our eyes are only designed to pick up light, so X-Rays (along with Gamma Rays, Ultra-Violet, Infra-Red Waves, Microwaves and Radio Waves) are invisible to us without special cameras to 'see' them!



Task 1

THINK: If it is safe for you to have an X-Ray at the dentist, why do the staff have to go behind a protective screen or into another room?

If you have a mouth X-Ray at the dentist, the dentist and nurse will leave the room or go behind a protective screen when it's being carried out.It's the same at the hospital if you ever go in for an X-Ray. The X-Rays have lots of energy in them, and too many will be very bad for you.

Hospitals and dental clinics are careful to keep track of the size of the **radiation dose** from X-Rays. They measure the dose in **millirems**, and they know how many millirems of radiation is too much. There is a number of millirems that the government say is the maximum amount you can receive in one year to be safe. If you haven't answered it already, use this information to help you answer Task 1.

Is X-Ray Radiation like Nuclear Radiation?

No. The radiation people worry about from nuclear power stations is radioactive radiation. Of all the sorts in the Electromagnetic Spectrum, only Gamma Rays are radioactive. X-Rays don't have enough energy to be radioactive. They can still cause harm if you get too much though. X-Rays are ionising, like Gamma Rays. It is this that makes them potentially very dangerous. "Ionising" means they have enough energy to change atoms that they hit. If the cells in your body get too much, their atoms might change and the cells might stop working properly.

"THE DEBATE"

Do people get too much radiation from their trip to the dentist? Are there any dangers linked with getting an X-Ray of your mouth? How many X-Rays can you have before it becomes dangerous for you?

These are all questions that have been discussed by many people. What do you think?

Task 2

Find out how big the radiation dose is from getting one mouth X-Ray. Do people think this amount is dangerous or not?

Task 3

Go to your local dental clinic and ask for any leaflets about dental X-Rays. What do they say about X-Rays and their dangers? List the ones you pick up, saying when they are published and who by, and write down any quotes you think are useful from them on your worksheet. This is a list of sources called a Bibliography. You can then use this information for your Main Task.

(Optional) If you can, get in touch with a dentist or dental nurse. What do they think about the dangers of X-Rays?

opinion

Below are 3 sources that tell you about the issues in this Report, or give you different opinions on those issues. They may help you in your own summary.

Source 1

'Just the mention of the word "radiation" conjures up an unpleasant image for most people. We associate it with bombs, cancer, and all manner of other bad things. But do you know that there are many beneficial uses of radiation? One type of radiation, x-rays, are used extensively in the medical and dental professions to diagnose and treat a wide variety of conditions.

Just how much radiation do you get from a dental x-ray and how harmful is it? First, let's talk about what an x-ray is. X-rays are energy in the form of waves, identical to visible light. In fact, the only difference between light and x-rays is that light doesn't have enough energy to go through your body and x-rays do. Both can make an image on photographic film, so both types of energy are used to make pictures; light makes photographs of the "outside" of objects, x-rays make pictures of the "inside" of objects, including your body.

A unit called a "rem" is used to measure radiation. A rem is a large unit, much like a mile is a large unit of length, so we usually use a millirem (mrem) instead, much as you would measure in inches instead of miles for most purposes. (It takes 1000 mrem to equal one rem.)

Advances in x-ray equipment, especially film technology, allow your dentist to get a good x-ray image using much less radiation than was previously required. A typical dental x-ray image exposes you to only about 2 or 3 mrem. The National Council on Radiation Protection (NCRP) says that the average resident of the U.S. receives about 360 mrem every year from background sources. This comes from outer space, radioactive materials in the earth, and small amounts of radioactive material in most foods we consume.'

By Steve D. Rima, CHP; from the website of the Physics Department of Idaho State University, USA.
http://www.physics.isu.edu/radinf/dental.htm

Source 2

'Dental radiographs are one of the most frequently undertaken radiological exposures in the UK. Although the dose delivered to individual patients is small, the collective dose is significant because of the large numbers of radiographs taken…

In deciding to take a radiograph, you should take account of:
- previous radiographs
- the reason for taking the radiograph
- diagnostic benefit to the patient
- the radiation risk
- alternative techniques that might achieve the same purpose…

Every decision to take a radiograph should be recorded in the patient's notes. It should be clear who carried out the clinical examination and who authorised the radiograph…

Female patients of child-bearing age

It is not usually necessary to ask a patient if she is pregnant before you take a dental radiograph because the pelvic area is not usually irradiated and the dose involved is very small. You should explain that the risks to the foetus are negligible and give the patient the option of delaying the radiograph.

Extracts from the Radiation in Dentistry Advice Sheet, published by the British Dental Association.
http://www.bda.org/advice/docs/A11%20Radiation.pdf

opinion

Source 3
'Biological effects of radiation from dental radiography. Council on Dental Materials, Instruments, and Equipment
Clearly, there is ample evidence of adverse effects of radiation in sufficient doses. There is at present no proof of such effects from doses commonly employed in dental practice; however, it has not been possible to prove the absence of such effects. Most experts now agree that there may be a small, difficult to quantify risk of cancer or genetic mutation from diagnostic exposure in patients and in personnel exposed during work. Prudence dictates acceptance of this position until proof to the contrary is available.'

By S J Gibbs, from the Journal of the American Dental Association.
J Am Dent Assoc, Vol 105, No 2, 275-281.

http://jada.ada.org/cgi/content/abstract/105/2/275?ck=nck

Main Task

Write an essay on Radiation, Dentistry and Healthcare. Split it into several parts:

Do an Introduction. This should say what X-Rays are and why you get them at the dentist.

Next, say why X-Rays could be dangerous. Mention the Dose you get from them (Task 2), and why the staff who carry out the X-Rays need to be protected (Task 1).

Then say what you found out from the leaflets available to the public. You can also use what you found in the sources that are with this pack and from your own sources if you have found any more information. Remember to record where you got what from!

Lastly, finish off with a Conclusion. Is it dangerous? Is it worth getting the dose so the dentist can have a good image of your mouth? What have you found out, and what do you think?

After the end, put in a Bibliography. You already have this for the leaflets on your worksheet (Task 3). Continue it for any other sources used (including the ones quoted here!).

More Sources of Information
These are only three of the articles out there. Can you find more information about dentistry and radiation?

Google key phrases:
Radiation and dentistry, Dangers of X-Rays

http://www.hpa.org.uk/radiation/services/dxps/guidance.htm

TASK 1
Why is it safe for you to have an X-Ray at the dentist's, but the staff need protection?

TASK 2
How much radiation do you get from one mouth X-Ray? Do people think this amount is dangerous? Remember to say where you got your information from.

TASK 3
Bibliography: Your list of leaflets you found

Leaflet Title	Date and Publisher	Quotes chosen from it

Did you manage to speak to any dentists or nurses? If so, and if they give you permission, write their comments in below.

Name (optional)	Date	Comment