

# Electromagnetic Wave Health Issues

In this project, you are to research the debate over the health impact of electromagnetic radiation. Remember that different frequencies of light (and radiation in general) have different amounts of energy. Consider how damage to living tissue from electromagnetic radiation may correlate with or be caused by the energy of the radiation.

## Some topics you could research:

- Sunlight, sunburn, and melanomas. What are the negative impacts of “fun in the sun”? You can still see your skin when you apply sunscreen lotion, so it does not block visible light. What does sunscreen “screen” your skin from? What is the meaning of “SPF”?
- Suntan studios (aka tanning salons). Do artificial tans have a negative impact on human health?
- Cell phone signals. You could research any studies on the health risks from cell phones as they are used (in other words, when they are used close to a person’s head), or you could research electromagnetic radiation from cell phone towers. If there are journal articles or websites that arrive at different conclusions, assess the reliability of the sources.
- X-rays. X-rays are commonly used in medical offices, often with parts of the patient’s body shielded. Are there risks to this procedure? How many x-rays per year are “acceptable”? How do any health risks from a certain dosage of electromagnetic radiation in the x-ray spectrum compare to any risks from exposure to other types of electromagnetic radiation, such as the electromagnetic radiation (radio waves) used in Magnetic Resonance Imaging (MRI)?

## Some logical positions on the debate:

- There are known health risks.
- There is strong evidence but no proof that there are health risks.
- The health risks are present but very low.
- There are no known health risks.
- It is unclear (there is an active debate among qualified parties) whether there are health risks.

The ones listed above are some options, illustrating a range of positions, but you may reach your own conclusion about the research.

This assignment will challenge your ability to assess the accuracy/quality of the sources of information, especially if you use the Internet (Web) as your source. It is likely that any position mentioned above, and ones even more extreme, can be found on the Web.

**To accomplish your assignment, you need to find the most credible sources.**

To do this, ask questions like these:

- What is the source of the information? Is it a credible source (for instance, a study from a medical school)?
- Does the report cite data? How many subjects participated in the study? Were proper controls used?
- Were there any conflicts of interest between the researchers and what they were studying — that is, does the source have a stake in the outcome? For instance, if a study were funded by a cell phone company, that might cause you to question the credibility of a report, but not necessarily dismiss it. Would there be any professional consequences to this group's research being demonstrably wrong — i.e., is there any incentive or disincentive to falsifying or making up results?
- Were the studies reproduced by other independent groups of researchers?
- Do other reputable sources cite the information you are examining? For instance, does a credible source (say, *Scientific American*) cite the information?
- Does the information seem to be accurately stated with strong sources of data? Or does it consist of generalizations or opinions lacking much data?

### **Present your information:**

1. Form a logical train of steps. Make a series of assertions that support one another and reach a conclusion.
2. Support your assertions with data.
3. Present opposing points of view respectfully as they relate to your assertions, and explain why you do not favor them.
4. Present the information at the appropriate level for your audience – this is for a physics class, not medical school, so explain any anatomy/biology/physiology terms and concepts that are required.
5. Use the mathematics, physics, and reasoning skills you have developed in other courses and are developing in this one.
6. Use a mix of media relevant to your presentation: hands-on demonstrations, video, photographs, slides you create, and so on. Choose the presentation style that works best with the material you have. For example, if you can bring items to class, do so. For presenting data, consider graphs. For things that change over time, look for an animation or video. Keep the text on your slides relatively brief; no one wants to see a “wall of text” on a slide.
7. Make your presentation interactive.
  - a. Allow time for questions; practice and time your presentation.
  - b. Pause and ask for questions frequently.
  - c. Do more than ask for questions: Try to find times when you can ask audience members for their opinions, experiences, beliefs, and so on.