INVISIBLE LIGHT

<table>
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<tr>
<th>radio</th>
<th>microwave</th>
<th>infrared</th>
<th>visible</th>
<th>ultraviolet</th>
<th>x-rays</th>
<th>gamma rays</th>
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higher frequency & lower wavelength & more energy

**Infrared**

Anything not at absolute zero emits this radiation (hotter things are more blue, then white, then red)

Tungsten light bulbs emit lots of IR (so do CFLs)

Heat lamps

Spying/special mission operations [x-ray backscatter also used to find illegal immigrants in trucks]

Trees and clouds (sleeping under them)

Earth surface temperatures

Weather satellites

Stinger missiles

Pit vipers & mosquitoes

Remote controls

To keep houses cool you can use infrared cool roofs

Infrared astronomy and firefighting (particles of smoke is smaller than the infrared)

**Ultraviolet**

Black lights emit UV to help see things that fluoresce

Detergents - absorbing UV and emitting it as visible light (fluorescence)

Sunburn / Windburn (same thing)

Disinfection via UV because it causes mutations in DNA

Cancer from mutations of DNA

Ozone created by UV light. O2 broken into O & O which then recombine with O2 to make O3 – ozone

Ozone Hole – over the South Pole

Created by CFCs and Freon… very good at turning ozone into O2

This problem is currently stable and not really related to global warming

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<tr>
<th>medical technology</th>
<th>type of wave</th>
<th>what it senses</th>
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<tbody>
<tr>
<td>x-rays</td>
<td>x-rays</td>
<td>bones – emit x-rays when the stop</td>
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<td>CAT (computer aided tomography)</td>
<td>x-rays</td>
<td>heavy elements (bones)</td>
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<tr>
<td>PET (positron emission tomography)</td>
<td>gamma rays</td>
<td>drink a positron emitter, positron hits an electron and emits a gamma ray and the particles are annihilated, region that doesn’t work is blank, hyperactive will be bright</td>
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<tr>
<td>thermography</td>
<td>infrared</td>
<td>new technique – breast cancer</td>
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<td>MRI (magnetic resonance imaging)</td>
<td>magnets detect wobble in the hydrogen nuclei</td>
<td>soft tissue (lots of hydrogen)</td>
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<tr>
<td>ultrasound</td>
<td>high frequency sound waves</td>
<td>unborn fetuses</td>
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Ultrasound also use to clean things, and for sonar (bats & submarines)