

X-RAYS

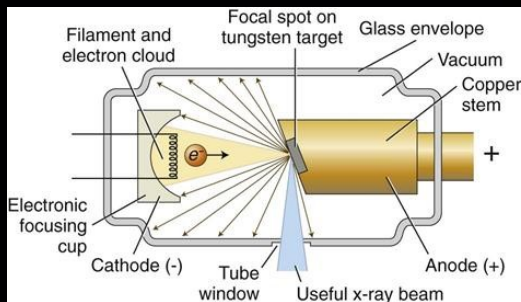
Shay Hasenboehler

X-radiation (X-Rays) are a type of electromagnetic radiation. Their wavelengths are shorter than UV rays and longer than gamma rays. Most x-ray wavelengths range from 0.01 to 10 nm and a frequency ranging from 3×10^{16} Hz to 3×10^{19} Hz. (C. Benjamin. 2014.)

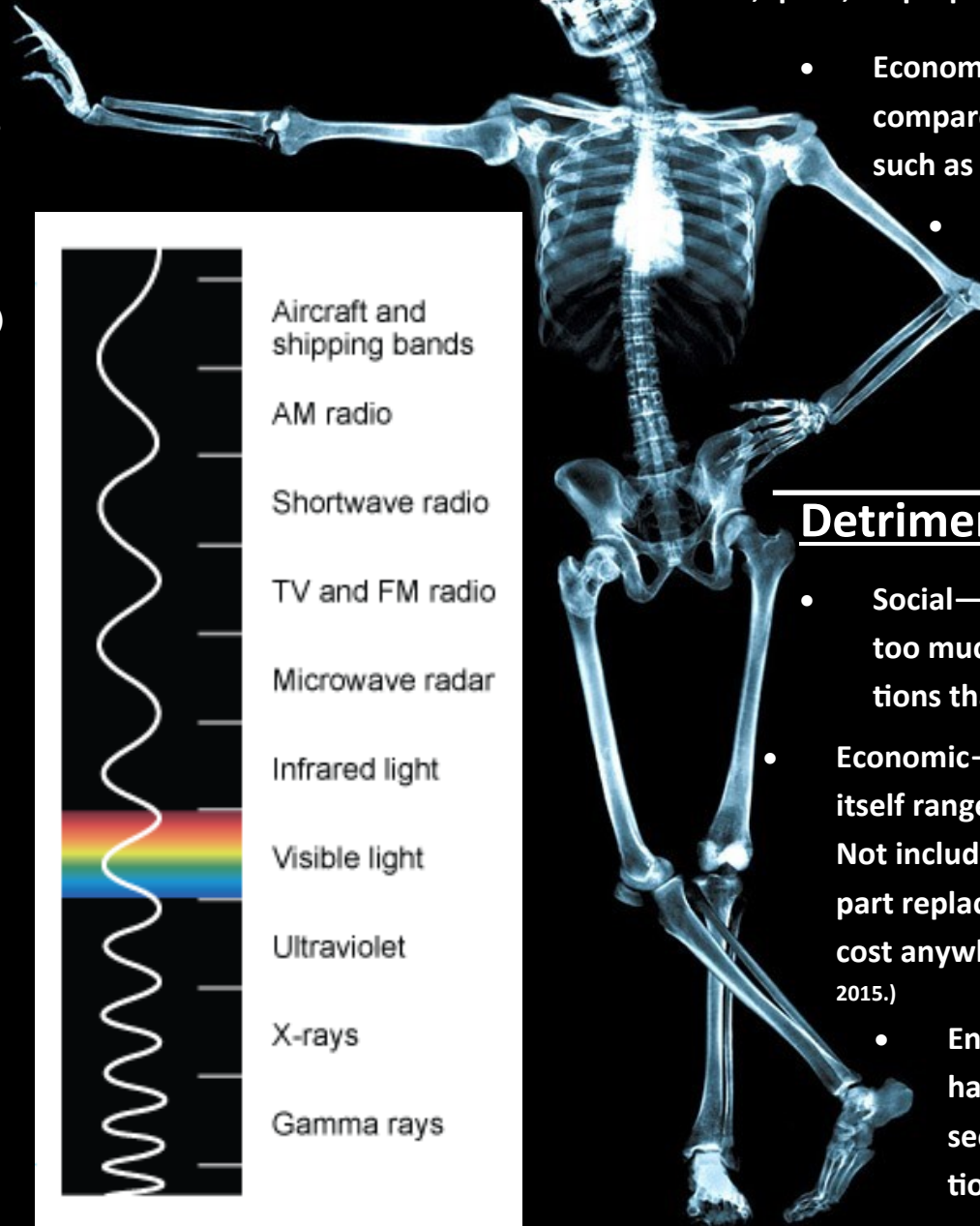
X-RAY Machines

X-ray machines are like a camera, but instead of visible light, x-rays are used to expose the film. They are so energetic that x-rays are able to penetrate different materials to varying degrees and expose the film, similar to how light would. Since muscles, fat, tumors, bones, and other masses all have a different density, they absorb x-rays at varying levels allowing one to see the distinct masses on the image.

(HowStuffWorks.2015.)



WORKINGS OF A X-RAY MACHINE



Benefits

- **Social**—Non invasive way to diagnose medical issues, such as broken bones and tumors. Not painful, quick, no preparation and no recovery .
- **Economic**—X-Rays are less costly when compared to other imaging machines such as MRI or CT. (NASA. 2015.)
- **Environmental** — There are no benefits from ionized radiation from X-rays but some natural radiation in the environment is necessary . (Livestrong. 2010.)

Detriments

- **Social**—X-rays are a form a radiation but too much exposure can cause cell mutations that may lead to cancer .
- **Economic**—The initial cost of the machine itself ranges from \$125 000 to \$200 000. Not including maintenance, cleaning, and part replacements. For individuals it can cost anywhere from \$20 - \$1000. (B. Lucas. 2015.)
- **Environmental** — Ionized radiation has been proven that it can weaken seeds from plant and cause mutations. (Radiation in the Environment. 2015.)