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Homework #5

Medical Imaging is an extremely important part of our healthcare system. Being able to take an image of the inside or outside of someone's body and then reviewing it for long periods of time afterwards allows doctors to draw conclusions that would otherwise be unable to do. The most common form of medical imaging comes with X-Ray scanners, which use X-rays to view objects. For example, Arthrograpy is the use of X-rays to examine a joint, and "special form of x-ray called fluoroscopy and a contrast material containing iodine" (http://radiologyinfo.org/en/info.cfm?pg=arthrog). This allows doctors to get a good view of a patient's joints, even while in motion. For joint injuries, like the knee, this is incredibly useful. Another type of medical imaging is X-ray Computed Tomography, or CT. A CT scan "provides a 3-dimensional view inside the body useful for diagnosing illness such as stroke, internal bleeding, bone fractures, and gastrointestinal problems like diverticulitis and appendicitis." (http://ctsim.org/). CT scans differ from normal X-ray scans in that it is possible to create a 3D rendering of the scan, giving even more depth and information to the doctor that is trying to diagnose the patient. This is extremely helpful, because in some situations a 2D image of an injury will not show the actual point of injury, and the doctor may not be able to diagnose the patient correctly unless a 3D image is present. The third and final type of medical imaging device is the MRI. MRIs specialize in "soft tissue – organs, ligaments, the circulatory system and (as you know) the spinal column and cord. They help physicians identify multiple sclerosis, tumors, tendonitis, strokes and many other conditions." (http://www.magnet.fsu.edu/education/tutorials/magnetacademy/mri/). This means the MRIs are the scanner of choice when looking at conditions in the human brain. Other scanners just can't get the same level of detail that an MRI can, because of the ways they scan patients. MRIs are incredibly useful, and although we are not too sure whether they are completely safe or not, they provide such large amounts of useful data that the small risk is worth the possibly life saving reward.

Reverse Engineering is also a very useful tool in the field of Biomedical Engineering. One example of this is the video that was shown in lecture. If a murder victim has had part of their skull removed, scientists can now use different scanning technologies to create a 3d representation of the skull. From there, they can try to reverse engineer how the skull originally looked, and model that on the computer. The computer can then generate a bunch of different possible skulls from that one scan, and by using rapid prototyping, scientists can have multiple visual models of skulls that could have been the victims. They can then work with police to match identification records and try to find the victim's identity.

Right now, MRIs are still in their infant stages. In the coming years, the technology will grow to become more stable and in-depth. Future MRI machines might also reduce the chances of side effects, or maybe reduce the radiation you receive when you go through one.