



Fueling technology

Basic science fuels advances in technology, and technological innovations affect our lives in many ways everyday. Because of science, we have complex devices like cars, X-ray machines, computers, and phones. But the technologies that science has inspired include more than just hi-tech machines. The notion of technology includes any sort of designed innovation. Whether a flu vaccine, the technique and tools to perform open heart surgery, or a new system of crop rotation, it's all technology. Even simple things that one might easily take for granted are, in fact, science-based technologies: the plastic that makes up a sandwich bag, the genetically-modified canola oil in which your fries were cooked, the ink in your ballpoint pen, a tablet of ibuprofen—it's all here because of science.

While images of big, complex innovation, might be the first to spring to mind when you think of technology ...



... it can also be the smaller, simpler, science-based innovations that we take for granted.



Though the impact of technology on our lives is often clearly positive (e.g., it's hard to argue with the benefits of being able to effectively mend a broken bone), in some cases the payoffs are less clear-cut. It's important to remember that science builds knowledge about the world, but that people decide how that knowledge should be used. For example, science helped us understand that much of an atom's mass is in its dense nucleus, which stores enormous amounts of energy that can be released by breaking up the nucleus. That knowledge itself is neutral, but people have chosen to apply it in many different ways:

- **Energy.** Our understanding of this basic atomic structure has been used as the basis of nuclear power plants, which themselves have many societal benefits (e.g., nuclear power does not rely on non-renewable, polluting fossil fuels) and costs (e.g., nuclear power produces radioactive waste, which must be carefully stored for long periods of time).
- **Medicine.** That understanding has also been used in many modern medical applications (e.g., in radiation therapy for cancer and in medical imaging, which can trace the damage caused by a heart attack or Alzheimer's disease).
- **Defense.** During World War II, that knowledge also clued scientists and politicians in to the fact that atomic energy could be used to make weapons. Once a political decision was made to pursue atomic weapons, scientists worked to develop other scientific knowledge that would enable this technology to be built.

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Knowledge of the atomic nucleus has been applied in many different ways:



So scientific knowledge allows new technologies to be built, and those technologies, in turn, impact society at many levels. For example, the advent of atomic weapons has influenced the way that World War II ended, its aftermath, and the power plays between nations right up until today.