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Does Radiation Make Superheroes?

Introduction – Does Radiation Make Superheroes?

From the classical heroes of Greek mythology, to the pages of contemporary comic books, superheroes have been ''saving the day'' for centuries, using their superpowers to fight evil. Although the powers they possess may be in the realm of science-fiction, humanity has been able to replicate some of their abilities in the real world, using radiation. X-ray screening and imaging grants humanity access of Superman's X-ray vision, allowing objects to be ''seen'' behind a barrier. Additionally, through the use of radiation, modern medical devices are able to diagnose and treat diseases, giving humans miraculous healing powers like Wolverine. Powering these machines and devices, Nuclear energy, based off the principle of nuclear fission, brings energy which connects and innovates the world. Through the careful use of radiation, humanity is able to gain superpowers, using them to follow in the footsteps of classic superheroes, doing good for the world.

Background Information – Radiation

Radiation is the emission or transmission of energy in the form of particles and waves through space or a material medium (Weinstein, 2007). The three types of radiation include alpha particles, beta particles and gamma rays. Typically, alpha particles are very low in energy and is unable to penetrate skin or a piece of paper and beta particles are higher in energy but cannot penetrate a sheet of aluminium. Gamma rays have the smallest wavelengths and the most energy of any wave in the electromagnetic spectrum, the other waves being radio, microwave, infrared, visible, ultraviolet and x-ray (Crockett, 2019)

Screening and Imaging – Protecting Against Harm

The use of x-ray technology powered by electromagnetic waves provides a screening and imaging technique for contents concealed behind an opaque barrier. This technology is used in various medical and industrial devices such as computed tomography (CT) scans and x-ray systems which are often used in airports and country borders to detect illicit or dangerous substances/personnel (What is a CT Scan? Procedure, Risks, and Results, 2020) (Radiation and Airport Security Scanning US EPA, 2020).

CT scans use computers and rotating x-ray machines to map a cross-sectional image of the body. These images provide 3D visualisations of soft tissues, bones, and blood vessels and is able to be moved in space, allowing doctors to accurately observe where an abnormality is. Unlike a conventional x-ray which uses a fixed x-ray tube, a CT scanner uses a motorized x-ray source that rotates around the circular opening of a donut-shaped structure called a gantry allowing images to be taken from different angles (What is a CT Scan? Procedure, Risks, and Results, 2020). A narrow beam of electromagnetic waves is aimed at the patient and quickly rotated, producing signals that are processed by the machine's computer to generate cross-sectional images—or "slices" of the body. This method of imaging can be used to diagnose or track the progression of a disease (Computed Tomography (CT), 2020). Over 80,000 CT scans are performed on Australian children under the age of 20 annually, many being diagnosed with injury or illness quickly and effectively, allowing for treatment to be quickly implemented (CT scan, 2020).

From an industrial perspective, WI-VI, a device developed by MIT researchers, allows objects to be ''seen'' and tracked between walls. The device repurposes Wi-Fi in a similar manner to sonar or radar, pinging out radio waves and then tracking how they're bounced back. The scanning technology could be used by law enforcement and emergency services personnel, to identify hiding suspects, potential hazards, and people trapped in wreckage or rubble. It could also have a role in smart homes, being used to track movement and activity to control lighting, heating, and other environmental features (Davies, 2013)

Medical Devices – Killing and Looking Out for Enemies

As well as keeping civilians safe, radiation plays a vital role in saving lives. Implemented into machinery, it has the ability to kill off cancer cells through a treatment commonly known as radiotherapy. It uses a machine called a linear accelerator to fire beams of radiation with electricity, targeting the cancer and the bordering tissue. The radiation damages the genetic information (DNA) within the cell, inhibiting its ability to repair itself or replicate. It does this by altering the sequence of nucleotides and sometimes has the capacity to unwind the DNA double

helix structure. These beams of high-intensity energy are fired precisely allowing the safest and most effective outcome for the patient. In 2020, Australia is estimated to have 145,483 new cancer cases with around 50% of those receiving radiotherapy treatment (Cancer in Australia statistics | Cancer Australia, 2020). Worldwide, around 14 million new cancer cases are diagnosed each year and it is estimated by *The National Centre for Biotechnology, U.S.* that over 3.5 million will be cured through the use of radiotherapy (Jaffray, 2015).

Nuclear Radiation – Powering on the World

Not only does radiation protect and save lives, it gives humanity power and energy to run on. Nuclear energy, fuelled by the fission of Uranium-235 atoms, provides clean and renewable energy without using or polluting other precious resources like most other methods of generating energy. Nuclear power plants (reactors) use the heat generated from the split Uranium atom to power a turbine which generates electricity (Physics for Kids: Nuclear Energy and Fission, 2020). Nuclear reactors are also a reliable method of generating electricity, capable of running for 24 hours a day for years, without interruption, despite the weather. Additionally, most nuclear reactors can operate for very long periods of time – over 60 years in many cases. In 2019, units 3&4 at the Turkey Point plant in Florida were the first reactors in the world to be licensed for 80 years of operation (Statistics, 2020). Currently around 20% of global electricity is fuelled by nuclear radiation, with hope that percentage will continue to increase from 2020 and beyond.

Conclusion – Radiation; a Superhero in Itself

Through the use of ever-developing radiation technology, superheroes, helping mankind in all sorts of ways, are made. Whether it is the Superman style x-ray vision, Wolverine like healing powers, or the ability to fuel the world, powering on development. Radiation, although often thought as a component of a flashy ''superhero'' machine used to ''save the day'', is actually the key principle as to why humanity is able to achieve such superpowers. Radiation is like humanities own personal superhero, allowing us to develop machines that possess these abilities to help the good and fight the evil in the world; doing the great classical superheroes proud.

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