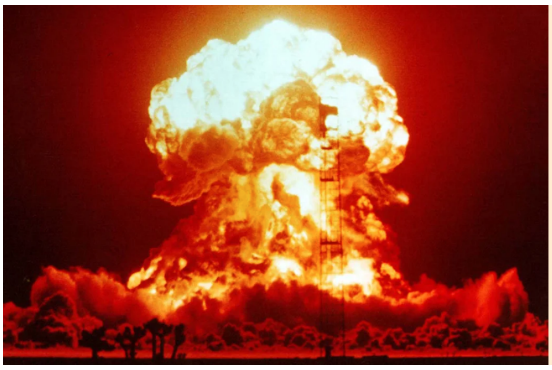


Explore the Nuclear Age
A Timeline from Creation to Global Impact

BY TURNING POINT

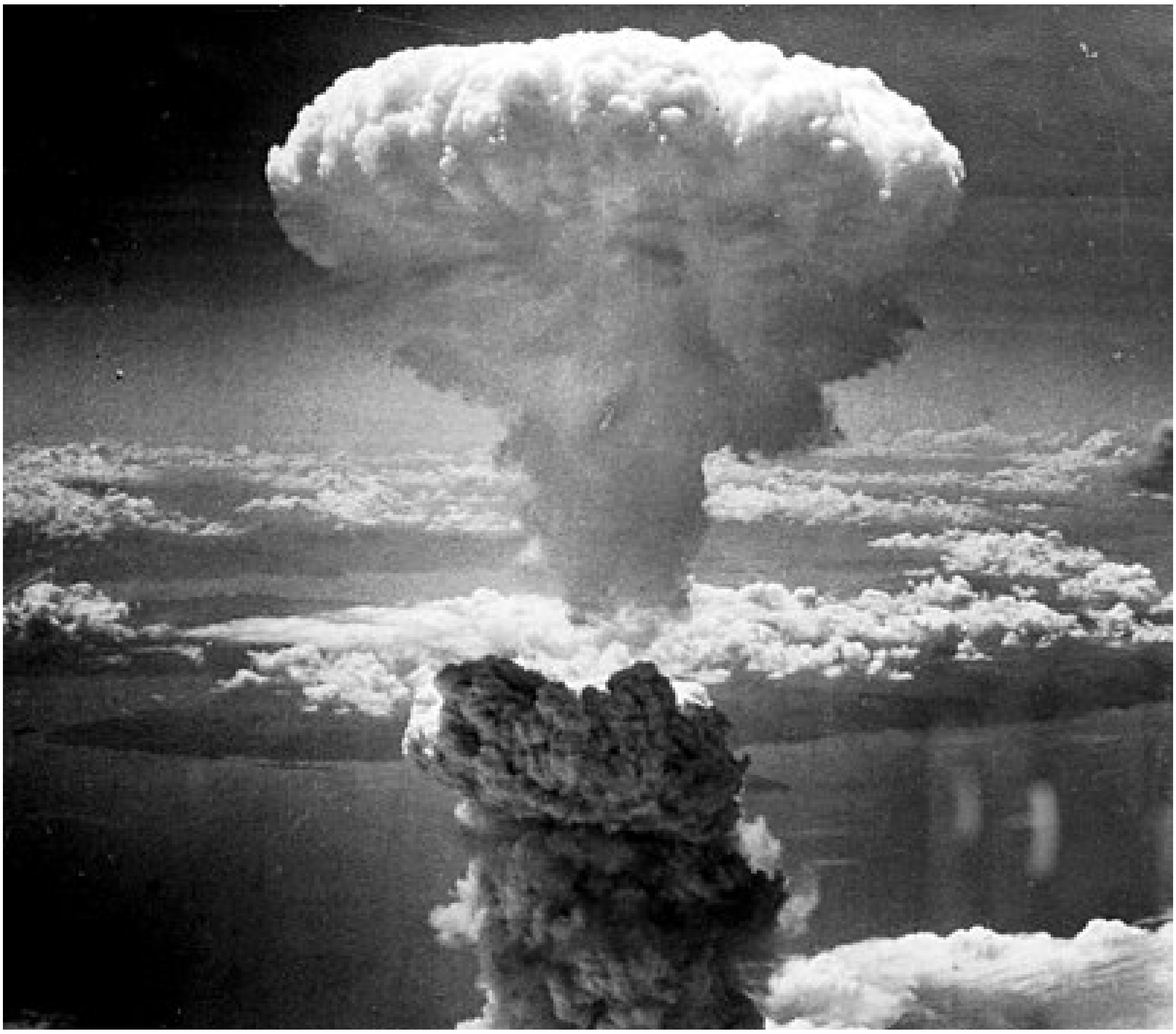


Image source: Atomic Cloud Rises Over Nagasaki, Japan. Photo by Lieutenant Charles Levy, 1945, via Wikimedia Commons.

Table of contents

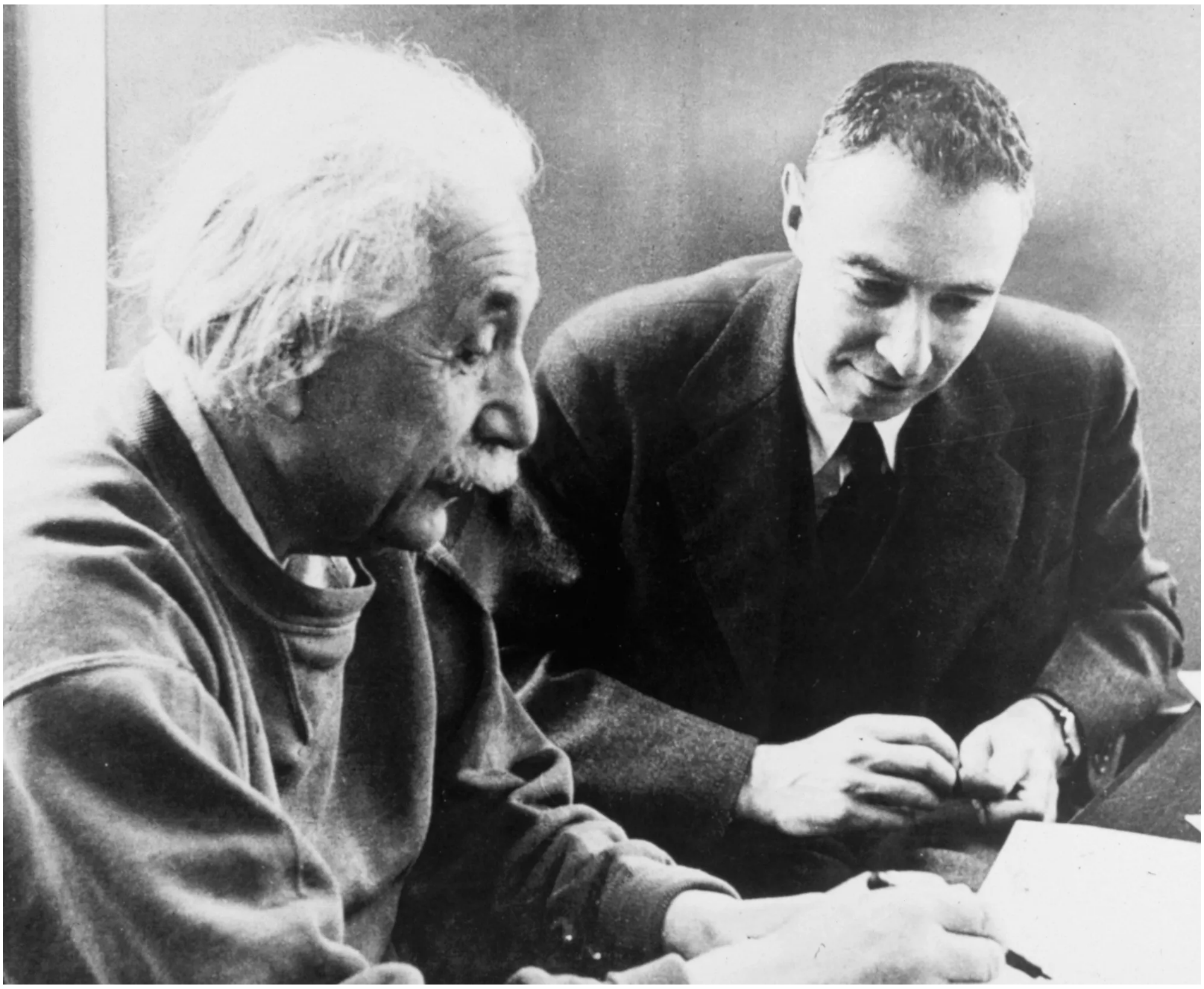


Image source:
https://www.vanityfair.com/hollywood/2023/07/oppenheimer-einstein-movie-real-life

Image source: https://warisboring.com/crimean-tom-rocket-cats-and-the-felines-of-war/

Abstract

This journal embarks on a comprehensive journey through the annals of history, unravelling the intricate tapestry of the nuclear age. This report meticulously traces the timeline from the inception of nuclear technology to its far-reaching global consequences. Delving into the scientific breakthroughs, geopolitical dynamics, and ethical quandaries that define this era, our exploration aims to provide a nuanced understanding of the transformative impact that nuclear advancements have had on the world stage. Join us as we navigate through this chronological narrative, examining the milestones that have shaped the course of human history and international relations.

Image source: https://futureoflife.org/cause-area/nuclear/

Why was the Nuclear Bomb Created?

– By Bella Abdullah and Calysta Lim

On August 6, 1945, the U.S. dropped the first of their newly developed models of nuclear bombs on Japan. Uranium “Little Boy” fell on Hiroshima, wiping out 90 percent of the city and killing 80,000 people. Three days later, the U.S. killed another 40,000 in Nagasaki with plutonium “Fat Man” (“Little Boy and Fat Man - Nuclear Museum”), and Japanese surrender was announced the following week, ending the Pacific War, the final episode of the devastating World War 2.

A month before, Allied Forces met together at Potsdam to negotiate the actions they would take on the fate of Japan. It was there President Truman casually mentioned USA’s development of a “new weapon of unusual destructive force” (“Manhattan Project: Potsdam and the Final Decision to Use the Bomb, July 1945”) to Stalin and probably to his surprise, the Soviet leader showed little interest. To Truman’s oblivion, Soviet intelligence had infiltrated the Manhattan Project since its launch, and had already been receiving information about the program from then on. This signalled the beginnings of USA-Soviet tensions that caused the Cold War in the following decade, and more enduringly, the significance of nuclear weapons in the modern world up to the present.

When World War II started, some countries, especially the United States, were worried that their enemies might build these bombs first. So, American scientists worked really hard and built the first atomic bombs. The reason for this to happen is because of the Japanese bombing of Pearl Harbor on 7th of December, 1941, which accelerated the development of an atomic bomb in the United States. Then on 28 December 1942, President Franklin D. Roosevelt authorised the formation of the Manhattan Project to bring together various scientists and military officials working on nuclear research. (“Atomic Bomb: Nuclear Bomb, Hiroshima & Nagasaki - HISTORY”) Much of the Manhattan project was performed in Los Alamos under theoretical physicist J. Robert Oppenheimer who was named director of the Los Alamos Laboratory in northern New Mexico 1st January 1943. Later on 16th July 1945, a plutonium bomb which is known as ‘The Trinity Test’ was launched on a remote desert located near Alamogordo, New Mexico which escalated to the nuclear bomb being made. After the war, Oppenheimer decided to begin working with the U.S Atomic Energy

Commission to control the use of nuclear weapons so that it will help the future. ("Atomic Bomb: Nuclear Bomb, Hiroshima & Nagasaki - HISTORY")

By the end of 1945, the survivors sadly would face leukaemia, cancer, or other terrible side effects from the radiation. The uranium bomb in Hiroshima had an explosive yield equal to 15,000 tonnes of TNT. It led to buildings being razed and burnt and caused an estimated 140,000 deaths. The ground temperature reached a temperature of 4,000°C and even rain came. The damages of the bomb in Hiroshima and Nagasaki made it almost impossible to provide aid to all the victims. The reason for this is because about 90% of nurses were killed or injured and about 42 of 45 hospitals were not functional from the huge impact of the bombs. Also some people who came after the bombing to help out victims also died from the radiation. Pregnant women had higher rates of miscarriage and deaths among their infants; their children were more likely to have intellectual disabilities, impaired growth and an increased risk of developing cancer. Then finally in 2017, the Treaty on the Prohibition of Nuclear Weapons was adopted from Japan.

In conclusion, J. Robert Oppenheimer caused a long term catastrophe to everyone in Japan in 1945. As it led to a loss of many medical facilities, medical professionals and even a huge impact on the global and welfare relations. Furthermore, the atomic bomb's legacy underscores the critical need for responsible handling of technology and emphasises the enduring pursuit of peace to safeguard humanity from the horrors of nuclear warfare.

Image source:

1. https://www.nationalgeographic.com/history/article/how-advent-nuclear-weapons-changed-history, PHOTOGRAPH BY BETTMANN, GETTY

Citations:

1. https://www.history.com/topics/world-war-ii/atomic-bomb-history
2. https://ahf.nuclearmuseum.org/ahf/history/little-boy-and-fat-man/
3. https://www.osti.gov/opennet/manhattan-project-history/Events/1945/potsdam_decision.htm

Hydrogen Bomb v.s. Atomic Bomb

– By Doris Zhao

August 6,1945, after the Japanese attacked on Pearl Harbor, America strikes back. Atomic bomb, “Little Boy” , was released from America to Hiroshima - the first nuclear weapon used in warfare, killed 66,000 people, injured at least 69,000 more, according to estimates the U.S. Army made in 1946.

Three days after “Little Boy” in Hiroshima, the second atomic bomb was dropped on Nagasaki: a 21-kiloton plutonium device,which is a radioactive element that is used to make nuclear energy and nuclear weapons, known as “Fat Man”. The bombings killed between 129,000 and 226,000 people, bringing a huge blow to Japan, which directly resulted in the Japanese government signing the instrument of surrender on 2 September, ending 4 years of war.

Atomic bomb, also known as nuclear fission weapon, is the first nuclear weapon human ever made. It releases large quantities of energy from relatively small amounts of materials based on the principles of nuclear fission and nuclear chain reaction. As it requires small amounts of energy but has huge destructive power, its manufacturing is extremely complicated. Not until 16 July 1945, the US invented and detonated the world’s first nuclear bomb.

According to EIA, in nuclear fission, atoms are split apart, which releases energy. All nuclear power plants use nuclear fission, and most nuclear power plants use uranium atoms. During nuclear fission, a neutron collides with a uranium atom and splits it, releasing a large amount of energy in the form of heat and radiation. More neutrons are also released when a uranium atom splits. These neutrons continue to collide with other uranium atoms, and the process repeats itself over and over again. This process is called a nuclear chain reaction. This reaction is controlled in nuclear power plant reactors to produce the desired amount of heat.

Now let’s talk about nuclear fusion. Which is used in Hydrogen bombs, also known as thermonuclear weapons. Hydrogen bombs are the second-generation nuclear weapon, they are weapons with enormous explosive power resulting from an uncontrolled self-sustaining chain reaction. They have greater sophistication, vastly greater destructive power than first-generation nuclear bombs, a compact size, a less massive or a combination of them all. The first full-scale thermonuclear test was carried out by the United States in 1952, imitated by other nuclear powers after that.

Nuclear fusion is when two light atomic nuclei combine to form a single heavier nucleus. Under normal circumstances atomic nuclei carry positive electrical charges that act to strongly repel other nuclei and prevent them from getting close to one another. Only under extremely high temperatures of millions of degrees can they change their charge of nuclei to positively gain sufficient kinetic energy, or speed, to overcome their mutual electric repulsion and approach close enough to each other to combine under the attraction of the short-range nuclear force. Therefore more energy is released during the fusion process than fission process, which causes a bigger blast. The reaction also powered the Sun along with other stars.

Over all the century, nuclear weapons are the most dangerous, destructive, and powerful weapons humans have ever created. A single nuclear weapon can destroy a city and kill most of its people. A hydrogen bomb even has the potential to be 1,000 times more powerful than an atomic bomb. That’s one of the reasons it’s been strictly prohibited by the TPNW (Treaty on the Prohibition of Nuclear Weapons). Its ultimate goal is to comprehensively prohibit nuclear weapons. Which strictly limits the development of nuclear weapons.

Citations:

1. https://www.jstor.org/stable/1894674
2. https://en.wikipedia.org/wiki/Thermonuclear_weapon
3. https://en.wikipedia.org/wiki/Nuclear_weapon
4. https://en.wikipedia.org/wiki/Atomic_bombings_of_Hiroshima_and_Nagasaki
5. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/fission-weapon
6. https://www.newscientist.com/definition/invention-nuclear-bomb/
7. https://www.iaea.org/newscenter/news/what-is-nuclear-fusion
8. https://www.icanw.org/catastrophic_harm

Image source:

1. https://www.nation.com.pk/22-Sep-2017/nukes-on-earth-atomic-and-hydrogen-bombs-explained

J. Robert Oppenheimer and the Manhattan Project: Father of the Atomic Era

– *Mina Kim*

The Manhattan Project, a covert scientific venture during World War II, stands as a monumental achievement in human history. Spearheaded by the United States, this ambitious project aimed to develop the atomic bomb, a revolutionary weapon with unprecedented destructive capabilities. Leading this historic undertaking was J. Robert Oppenheimer, a brilliant physicist who assumed the role of the scientific director for the Manhattan Project. This essay delves into Oppenheimer's pivotal role in the atomic bomb project, analysing his leadership style, and exploring the ethical dilemmas associated with the bomb's development, drawing insights from the book I recently read, "American Prometheus."

Oppenheimer's Background:

Born on April 22, 1904, J. Robert Oppenheimer exhibited exceptional intellectual prowess from a young age. His early passion for science and outstanding academic achievements in theoretical physics at the University of Göttingen in Germany quickly established him as a rising star in the scientific community.

The Manhattan Project:

Amid escalating World War II tensions, the United States recognized the strategic potential of harnessing atomic energy. In 1942, the Manhattan Project was initiated, assembling top-tier scientists in physics, chemistry, and engineering to unravel the mysteries of the atom. Oppenheimer, appointed as the scientific director, was entrusted with coordinating the collaborative efforts of the diverse team.

Leadership Style:

Oppenheimer's leadership approach was characterised by a unique blend of intellect, charisma, and an unwavering commitment to the project's success. Despite facing numerous challenges such as scientific uncertainties and logistical obstacles, Oppenheimer fostered a collaborative and innovative environment. Encouraging open dialogue among scientists resulted in groundbreaking discoveries and advancements in nuclear physics.

Scientific Achievements:

Under Oppenheimer's guidance, the Manhattan Project achieved remarkable scientific milestones. The December 1942 development of the first controlled nuclear reaction, known as the Chicago Pile-1, marked a pivotal moment. This breakthrough laid the foundation for subsequent atomic bomb design and construction. Oppenheimer's expertise in theoretical physics played a pivotal role in shaping the scientific trajectory of the project.

The Trinity Test:

On July 16, 1945, the culmination of the Manhattan Project unfolded with the successful detonation of the first atomic bomb at the Trinity test site in New Mexico. Oppenheimer's profound quote from the Bhagavad Gita, "Now I am become Death, the destroyer of worlds," encapsulated the gravity of the moment and the profound implications of harnessing nuclear power.

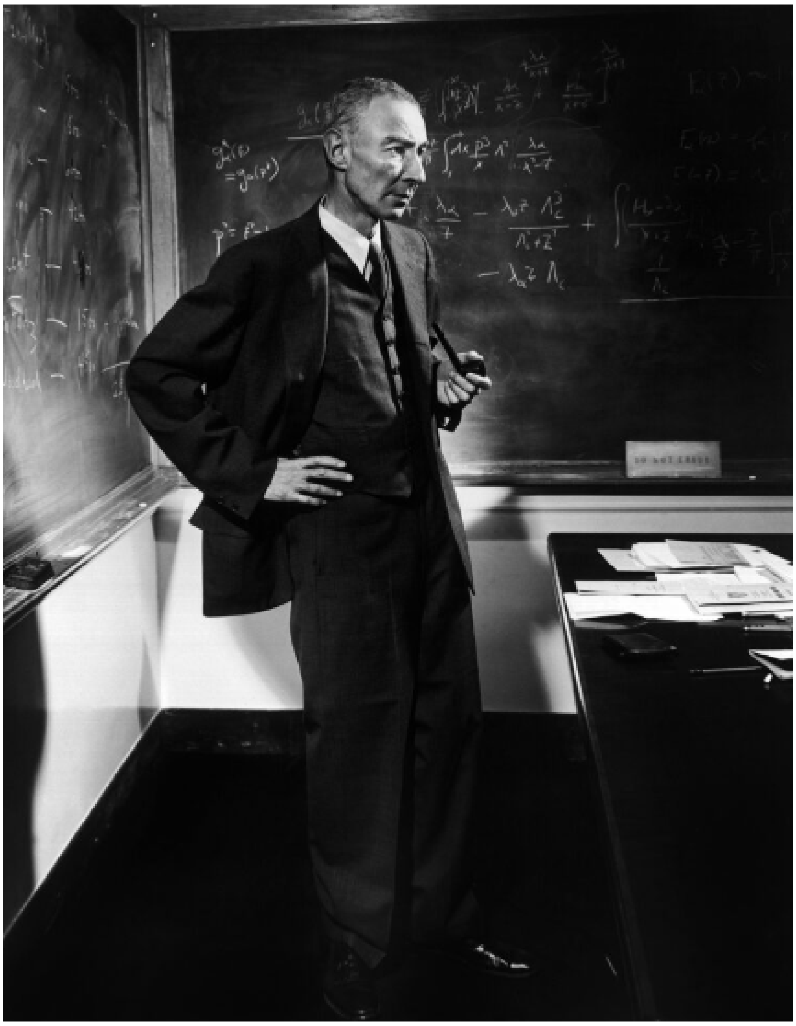
Moral Dilemmas:

The success of the Manhattan Project raised profound ethical questions. The use of atomic bombs on Hiroshima and Nagasaki in August 1945 resulted in unprecedented human suffering, sparking enduring moral debates. Oppenheimer, grappling with the consequences of his scientific achievements, advocated for international atomic energy control and opposed the development of the hydrogen bomb.

Legacy and Later Years:

Post-war, Oppenheimer's contributions earned him acclaim, but his opposition to the hydrogen bomb led to the revocation of his security clearance in 1954 due to suspected communist ties, tarnishing his reputation. Despite setbacks, Oppenheimer continued to contribute to academia, remaining a prominent scientific figure until his death in 1967.

Overall, J. Robert Oppenheimer's role in the Manhattan Project stands as a multifaceted aspect of his legacy. While instrumental in unlocking atomic power, ethical scrutiny of his work persists. Oppenheimer's leadership, scientific prowess, and moral introspection exemplify the intricate relationship between science, morality, and knowledge pursuit amidst unprecedented challenges. The Manhattan Project, under Oppenheimer's guidance, serves as both a testament to human ingenuity and a reminder of the responsibilities accompanying scientific breakthroughs.



Citations:

1. https://www.atomicarchive.com/media/videos/oppenheimer.html
2. https://en.wikipedia.org/wiki/J._Robert_Oppenheimer
3. https://en.wikipedia.org/wiki/Chicago_Pile-1
4. https://pubs.aip.org/physicstoday/online/42547/Oppenheimer-s-science-beyond-the-Manhattan-Project?searchresult=1
5. https://www.atomicarchive.com/resources/documents/manhattan-project/oppenheimer-farewell.html

Image source:

1. https://vocal.media/history/j-robert-oppenheimer-father-of-the-atomic-bomb-and-key-figure-in-wwii
2. https://karsh.org/robert-oppenheimer-father-of-the-atomic-bomb/

Biological Impact of Nuclear Weapons

– Rain Cheng

Nuclear weapons have significant biological impacts due to the release of intense heat, blast waves, and ionising radiation. These effects can cause immediate casualties and long-term health consequences for survivors. Here are some key points regarding the biological impact of nuclear weapons

CASUALTIES AT HIROSHIMA AND NAGASAKI

Zone	Population	Density (per square mile)	Killed	Injured
Hiroshima				
0 to 0.6 mile	31,200	25,800	26,700	3,000
0.6 to 1.6 miles	144,800	22,700	39,600	53,000
1.6 to 3.1 miles	80,300	3,500	1,700	20,000
Totals	256,300	8,500	68,000	76,000
Standardized Casualty Rate: 261,000 (Vulnerable area 9.36 square miles).				
Nagasaki				
0 to 0.6 mile	30,900	25,500	27,300	1,900
0.6 to 1.6 miles	27,700	4,400	9,500	8,100
1.6 to 3.1 miles	115,200	5,100	1,300	11,000
Totals	173,800	5,800	38,000	21,000
Standardized Casualty Rate: 195,000 (Vulnerable area 7.01 square miles).				

1. Immediate Effects:

Blast Wave: The blast wave generated by a nuclear explosion can cause severe injuries, including trauma, burns, and internal injuries.

Thermal Radiation: The intense heat released by a nuclear explosion can cause extensive burns and start fires, leading to further casualties and destruction.

Prompt Ionising Radiation: The initial burst of ionising radiation can cause acute radiation sickness, which can be fatal.

(Burn injury due to impact of the nuclear explosion)[1]

DISTRIBUTION OF TYPES OF INJURY AMONG SURVIVORS

Injury	Percent of Survivors
Blast (mechanical)	70
Burns (flash and flame)	65
Nuclear radiation (initial)	30

2. Long-Term Effects:

Radiation Exposure: Survivors of a nuclear explosion may experience long-term health effects due to exposure to ionising radiation. These effects can include an increased risk of cancer, genetic mutations, and other radiation-related illnesses.

Environmental Contamination: Nuclear explosions can release radioactive materials into the environment, leading to long-term contamination of air, water, and soil. This contamination can have adverse effects on ecosystems and food chains, posing risks to human and animal health .

Psychological Impact: The psychological impact of a nuclear explosion, including fear, anxiety, and post-traumatic stress disorder (PTSD), can have long-lasting effects on individuals and communities.

Environmental Consequences: Nuclear weapons tests and detonations have also had significant environmental consequences. For example, between 1945 and 2006, a total of 2,053 nuclear tests were conducted worldwide, which had wide-ranging effects on the environment, including contamination of soil, water, and air.

(Microcephaly due to in-utero exposure(right), normal child(left))[2]

3. Humanitarian Concerns:

The humanitarian consequences of nuclear weapons have been a subject of global concern. International efforts have been made to regulate, restrict, and eliminate nuclear weapons through multilateral treaties and instruments .

The United Nations and other organisations have highlighted the catastrophic humanitarian consequences of any use of nuclear weapons and emphasised the need for compliance with international humanitarian law .

It is important to note that the use of nuclear weapons is widely condemned, and efforts towards disarmament and non-proliferation continue to be pursued by the international community.

(The nuclear destruction of Hiroshima)[3]

Citations:

1. https://www.un.org/en/global-issues/disarmament
2. https://disarmament.unoda.org/wmd/nuclear/tpnw/
3. https://www.nato.int/cps/en/natohq/topics_50325.htm
4. https://www.atomicarchive.com/resources/documents/effects/glasstone-dolan/chapter12.html

Image source:

https://www.atomicarchive.com/resources/documents/effects/glasstone-dolan/chapter12.html
https://www.aasc.ucla.edu/cab/200708230012.html
https://www.nti.org/atomic-pulse/depicting-nuclear-risk-accurately-the-likely-global-effects-of-nuclear-weapons-in-the-21st-century/

Economics Before and After the Nuclear Bomb

– By Ishika Chakraborty

The Japanese government also produced a report on war damage. Between 1935 and 1945, Japan lost the following percentages of physical assets (most loss was incurred toward the end of the war).

Total capital stock	25%
Military planes and ships	100%
Commercial ships	81%
Industrial machines	34%
Urban housing	33%
Buildings and structure	25%
Telegraph, telephone, water supply	16%
Electricity and gas supply	11%
Railroad and other land transportation	10%

Judging off the table, it is safe to say the majority of the stock was still present but many of the railways and factories were inefficient as nobody was in the right state of mind to pick up from where they left off. The psychological damage was prevalent. The lack of inputs was the main reason why Japan's economy plummeted to 20% of what it was during the wartime peak and a 30% reduction of what it was in pre-war time. This shows the linkage between the productivity of an economy and the efficiency of labour (primarily due to the trauma) within that time period. This goes on to prove for an economy to be within the curve of the PPC, all factors of production should be used to full efficiency. Also many capital was not in best shape such as railways and roads which prevented labour to be geographically mobile. In order for the production output to be lying on the PPC (as mentioned previously).

The economic infrastructure which is left intact after the attack would play a key role in determining the length of time during which such life-threatening conditions might persist. The survivors would face the critical task of rebuilding a viable economy capable of rapidly reallocating undamaged capital and distributing uncontaminated foodstuffs. The few studies which have dealt with the issue of economic recovery are sobering. Potential Vulnerability Affecting National Survival (PVANS), a study prepared in 1970 for the Office of Civil Defense by the Stanford Research Institute (SRI), estimated the fewest number of nuclear detonations required to "prevent economic recovery." The attack which SRI found to be most effective in achieving this end combined the destruction of the industrial capacity located in 71 of the nation's largest standard metropolitan statistical areas, 5 and SRI concluded that a crippling blow could be delivered by a combination of 500 1-Mt and 200 to 300 additional 100-kiloton weapons. This number is only 10 percent of that posed by the formulators of the FEMA(Federal Emergency Management Agency) CRP-2B scenario. The direct effects of the PVANS attack, in terms of health care delivery, would not differ significantly from the projections sketched above. However, the economic dislocations resulting from the attack may create a whole new set of health issues.

Summary:

Let's take a closer look at how Japan's economy improved finally after the war as Japan's exporting was on a rise, allowing Japan's economy to boom. Japan's aggressive export trade policy effectively caused a sturdy recovery from WW2. In addition, Japan's low cost of its import technology allowed industrial growth to increase by a great margin. The productive capacity of the economy increased greatly due to technological advances which produced an outward shift of the PPC (displaying economic growth).

Citations: https://www.ncbi.nlm.nih.gov/books/NBK219185/

Image source: https://daily.jstor.org/hiding-the-radiation-of-the-atomic-bombs/

The use of Nuclear Technology in treating cancers resulting from Atomic Bomb Exposure

– By Dora Qian

Cancer, often known as 'The Emperor of All Maladies' (A1), claiming the lives of thousands each year, ravaging both individuals and their families, leaving a trail of profound regret and loss. The white war against this relentless disease seems impossible to reach its shore; however, the nuclear power is like a beacon of light, giving hope to the whole human nation. “We’re waiting for that miracle”, said Susan Curry, distinguished professor in the College of Public Health at the University of Iowa, and immediate past chair of the U.S. Preventive Services Task Force. (C1)

- Cancer’s relationship with the Atomic Bomb

  Cancer's insidious journey begins at the cellular level, it initiates when a single mutated cell begins to proliferate abnormally. Rather than responding appropriately to the signals that control normal cell behaviour, cancer cells grow and divide in an uncontrolled manner, invading normal tissues and organs and eventually spreading throughout the body. (C2)

  Atomic bomb, with its disastrous radiation, highly increases the rate of one’s cancer risk, making those lucky survivors unable to escape suffering. In theory, ionising radiation can deposit molecular-bond-breaking energy, which can damage DNA, thus altering genes, increasing mutation’s possibilities. Statistics have shown that for the average radiation exposure of survivors within 2,500 metres, the increase is about 10% above normal age-specific rates. For a dose of 1250 metres, the corresponding cancer excess is about 50%.(C3)

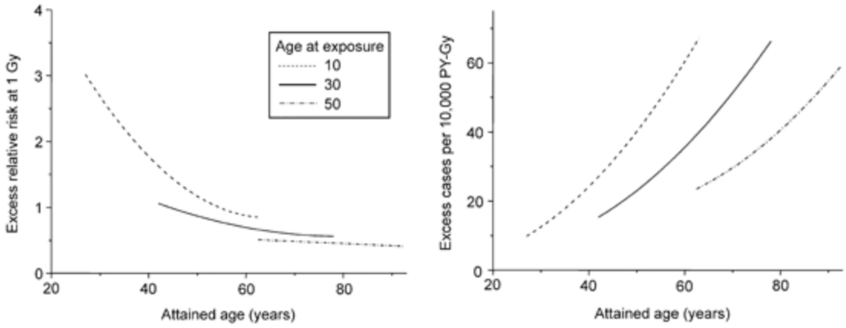


Figure 2. Effects of age at exposure and attained age on the excess risk of solid cancer (incidence) following exposure to 1 Gy. The left panel represents excess relative risk (ERR) and the right panel excess absolute risk (EAR).

P1: (Shown how the rate will increase with a 1 Gy dose influence)

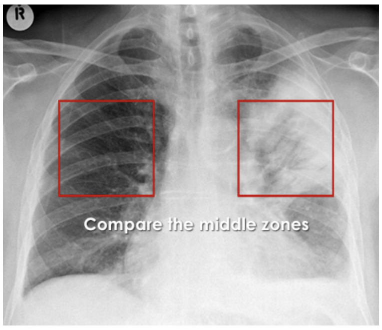
However, the rescue of countless lives from the dangers of nuclear power stems from the inherent strength within nuclear energy itself. It has proven its use through every step of cancer treatment.

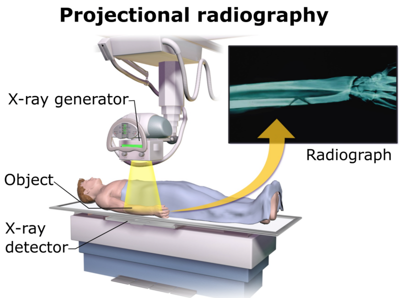
- Diagnostic Imaging: The most prominent action nuclear power did was on diagnostic imaging. This technique allows for earlier diagnosis of medical conditions, reduces the need for needless invasive exploratory processes and creates better patient outcomes. (C4) Moreover, it can also be used to monitor the whole process.

➔ Type 1: Structural image
➔ If the patient needs the help of a structural image to check if they have cancer, X-ray Imaging & Computed Tomography (CT) enable us to do so.

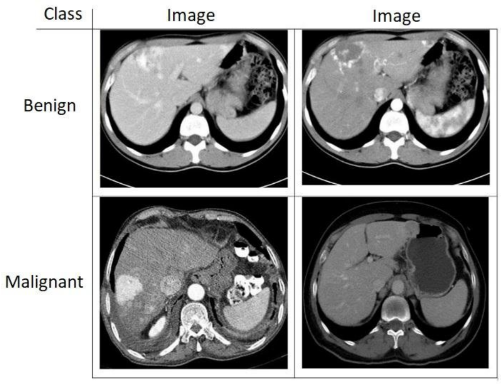
In X-rays, the machine situates the X-ray tube on one side and the detector on the opposite side, producing a 2D image. On the image, bones appear white, soft tissues in grey, and cancer areas are lighter grey. X ray is commonly used for bond cancer and digestive system cancer.

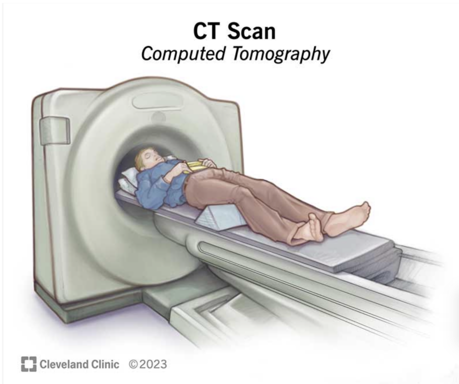
On the other hand, CT scans involve the machine rotating around the patient, emitting X-rays from various angles. The computer processes this data to create a 3D structure. CT is more valuable in head and neck Cancer and abdominal Cancers, in which they are able to show more detailed three-dimensional images.





(P3: CT image for lung cancer, P4: CT scanner)

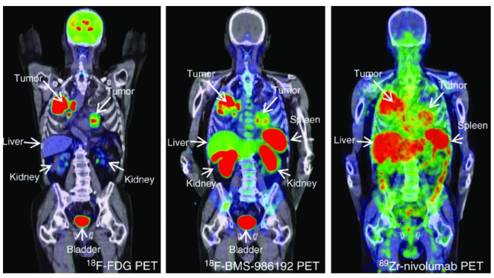


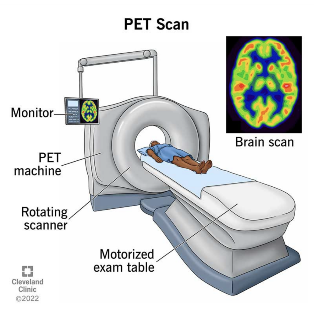


(P4: CT image, P5: CT scanner)

➔ Type 2: Functional Imaging

➔ If the patient needs to see the activity of brain cells during a period of time to check their healthiness, we can commonly use Positron Emission Tomography (PET). The patients are given a small amount of a radioactive substance, usually a sugar called FDG, before their PET scan. This substance gives off tiny particles called positrons. The PET machine then detects these positrons, and creates detailed pictures showing where your body is using a lot of this sugar, showing where the cancer is. The tracer is administered as an intravenous injection usually labelled with oxygen-15, fluorine-18, carbon-11, or nitrogen-13. (C5)





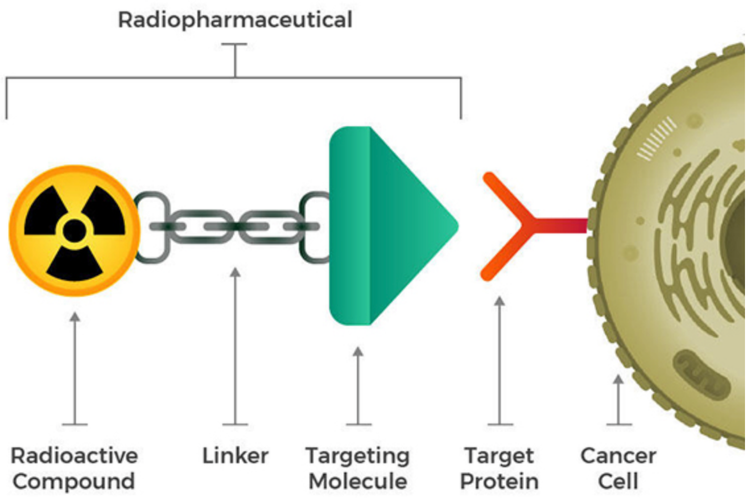
(P6: PET image, P7:PET Scan)

- Nuclear medicine therapy:
  Nuclear medicine is also helpful to treat and destroy cancer after the cancer is detected. Nuclear medicine combines the precision of targeted therapy with the power of radiation therapy. It uses radioactive drugs called radiopharmaceuticals.

Nuclear medicine uses radioactive drugs to target cancer cells but not healthy cells. The drug has three parts: a head, a body and a tail. Once it enters the bloodstream, the head seeks out cancer cells the way a bumblebee seeks flowers.

Then the tail delivers the sting: a radioactive atom that bombards the cancer cell with radiation, causing it to stop growing or die.

The drug hits the cancer cells with radiation for many days before slowly wearing off. After that, the drug breaks down and is flushed from the body. These drugs home in on cancer cells and bombard them with radiation, causing them to stop growing or die. (C6) They help the patients to relieve much of the pain they experience.



(P6: diagram of how the nuclear medicine therapy work)

- Starting from ancient Greek, thousands of years before, people have already started their cancer learning. However, failure occurs more than success, unfortunately. “They recommended an unbelievable variety of potions, and plant extracts, and combinations to see if they couldn’t kill the cancer in other places,” Olson said. “None of those worked.” (C7) However, with the help of nuclear power, it will be possible to save 12.5 % of cancer patients, or 9.55 million lives. (C8)

- Nuclear power isn't inherently good or bad—it depends on how we use it. Yes, there are dangers, like atomic and electronic bombs, but nuclear energy can also be a positive force. It produces electricity without pumping out a lot of greenhouse gases, helping to fight against climate change. Moreover, it's crucial in medicine for diagnoses and treatments, for example, in treating cancers resulting from nuclear exposure. The key is using nuclear tech wisely and making sure rules are in place to keep us safe.

Annotations:

1. “The Emperor of All Maladies”: The title of a biography written by Siddhartha Mukherjee

Citations:

1. https://www.hsph.harvard.edu/magazine/magazine_article/the-cancer-miracle-isnt-a-cure-its-prevention/
2. https://www.ncbi.nlm.nih.gov/books/NBK9963/
3. https://www.rerf.or.jp/en/programs/roadmap_e/health_effects-en/late-en/cancrisk/
4. https://www.healthimages.com/what-is-diagnostic-imaging/
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1126321/
6. https://www.ohsu.edu/knight-cancer-institute/nuclear-medicine-treat-cancer
7. https://edition.cnn.com/2016/11/13/health/ancient-world-cancer/index.html

Image source:

1. https://www.rerf.or.jp/en/programs/roadmap_e/health_effects-en/late-en/cancrisk/
2. https://www.radiologymasterclass.co.uk/tutorials/chest/chest_pathology/chest_pathology_page3
3. https://en.wikipedia.org/wiki/X-ray_detector
4. https://www.researchgate.net/figure/Computed-tomography-CT-images-of-liver-tumors_fig4_332732470
5. https://my.clevelandclinic.org/health/diagnostics/4808-ct-computed-tomography-scan
6. https://www.researchgate.net/figure/PET-imaging-of-a-patient-with-non-small-cell-lung-cancer-18-Left-Image-showing-the_fig2_361327417
7. https://my.clevelandclinic.org/health/diagnostics/10123-pet-scan
8. https://www.ohsu.edu/knight-cancer-institute/nuclear-medicine-treat-cancer

Education on Sensitive Topics: Nuclear Bomb

– By Sierra Goonoo

The education of History is a matter of resounding importance, but what happens when students are unable to differentiate between the truth and blatant bias within their classrooms? Students exposed to biassed curriculums are clouded by the perception of false truths and are unable to grasp or form a well balanced understanding and opinion on whatever the subject is- standing as a prominent problem as it runs the risk of birthing unnecessary stigmas. Unfortunately however, bias when retelling historic events is extremely common. Within this text, let's explore the differing ways that subtle bias from a student's education can impact their opinions and how it's done so in powerful countries- particularly, revolving around that of the Hiroshima bombing in 1945.

<u>Japanese education of the Hiroshima bomb.</u>

Hiroshima, the city that was targeted for the bombing duringWorldWar 2, tends to detail graphically and in-depth on the matter. Often introduced to students during middle school, Hiroshima teaches most of its students the science behind the bomb, the effects of radiation, and the thought process behind dropping it. Schools in Hiroshima even have special allocated classes exclusively for discussing the event. With memorials being dotted across the city, students from a young age have an unfiltered exposure to the horrors of the bombing and learn about it vividly. However, such exclusive classes aren't nationwide and are only common in Hiroshima. Japan as a country still does discuss the Hiroshima bombing however in much less detail. In Japan, it is not a contentious topic to discuss, and is usually done so with unanimous sentiments revolving around it. A part of why people share such galvanised opinions on the matter, (with 29% of Japanese people saying the bombing was justified but with a further 64% saying it was unwarranted) is due to the way it's approached in schools. It's done so in ways where the aftermath is deeply discussed and the reasoning behind the bomb dropping is done so in similar ways across the country, meaning that there isn't much room to make any assumptions further than the information that's presented to students. This means that most Japanese people don't hold animosity towards the events and are able to reflect on the situation.

American Education of The Hiroshima bombing

The manufacturers of the bombs, The United States of America, have a very detailed and thorough segment for teaching world war 2 within their classes, including the bombings. Having ample literature and media coverage on the topic, many young students are able to learn about the events independently, meaning that by the time it’s discussed in class they’re decently familiar with it. However, when it’s properly discussed, usually in high school, the content differs greatly depending on the state and even the prerogatives of teachers themselves. America is highly divided on the stances its citizens take, (a normal dilemma as the country is diverse and there's bound to be a clashing of opinions) but as misinformation and a lack of understanding runs rapid, harmful conclusions often swelter into a slew of ambiguous and disorganised opinions. This can be attributed to the different ways the topic is taught leading to widely different conclusions on the matter. For example, within America, some textbooks state the bomb dropping is a “necessary evil” and in others, it could have been “avoided all together”. However, in the best case scenario in America it’s proposed to students as a question, should the bombs have been used? Was it justified? From this, the students are able to form an opinion themselves. Despite the fact that American education isn't strictly biassed, the inconsistent way it's taught leads to several opinions being drawn, which inherently is beneficial but it runs the risk of misguided and unnecessary hostility.

Citations:

1. https://www.washingtonpost.com/news/worldviews/wp/2015/08/06/how-the-hiroshima-bombing-is-taught-around-the-world/https://www.washingtonpost.com/news/worldviews/wp/2015/08/06/how-the-hiroshima-bombing-is-taught-around-the-world
2. https://www.google.com.my/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjuveLrquiCAxX44jgGHTN8DUwQFnoECBoQAQ&url=https%3A%2F%2Fwww.quora.com%2FHow-is-the-annihilation-of-Hiroshima-and-Nagasaki-by-nuclear-attack-taught-in-Japanese-schools&usg=AOvVaw2FWyZEnBQQRECNcoSthWCw&opi=89978449
3. https://www.google.com.my/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjuveLrquiCAxX44jgGHTN8DUwQFnoECCoQAQ&url=https%3A%2F%2Fwww.reddit.com%2Fr%2Fhistory%2Fcomments%2Fmz7odc%2Fhow_is_the_hiroshimanagasaki_atomic_bomb_taught%2F&usg=AOvVaw1dNqGexYuq-q8iUSehpc7_&opi=89978449

Image source:

1. https://www.livescience.com/nuclear-bomb-wwii-shadows.html
2. https://news.sky.com/story/uks-education-system-is-failing-on-every-measure-with-shocking-regional-disparities-uncovered-12634175

Acknowledgements

Special thanks to Ms.Ling (ling.chingching@gardenschool.edu.my) for the support of our student lead club!

Thank you to everyone in Turning Point for this amazing report!

Turning Point Leaders:
Mina KIM 206189@gardenschool.edu.my
Rain Cheng 204556@gardenschool.edu.my
Please contact us if you have any concerns!

Email of Turning Point: tpjournall@gmail.com
Our Instagram: turning_point_club
Please email us for collaboration, more ideas or anything else about Turning Point :)