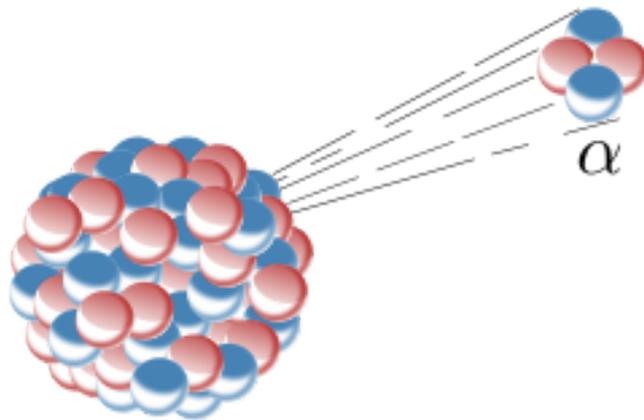


ALPHA PARTICLES AND CANCER



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Introduction

The discovery of Alpha, Beta, and Gamma rays are one of the historical monuments of human discoveries that has changed our technology and made us rethink the kind of power we possess as a race. These types of rays can be used to harm others by decaying living cells from human beings, or they can be used to cure or treat many well-known branches of one certain disease, Cancer. By having the technology and the knowledge, we are able to artificially decay any human cells by decaying elements of the earth, propelling the radiation into their bodies, and wiping out any diseased cells in the area. This may sound all good and well, but, the power of decay is not one to be toyed with. It does not just rid the receiver's disease cells. It will rid any sort of live cell and putting it through a decaying state, making it very fatal if used inappropriately.

How Alpha particles were first observed

Ernest Rutherford in 1899 studied the particles emitted by Uranium, however he was not correct at his first attempt. He stated: "The cause and origin of the radiation continuously emitted by uranium and its salts still remain a mystery. All the results that have been obtained point to the conclusion that uranium gives out types of radiation which, as regards their effects on gases, are similar to Röntgen rays and the secondary radiation emitted by metals when Röntgen rays fall upon them. If there is no polarization or refraction the similarity is complete." This was soon found incorrect as new technology came around.^[12]

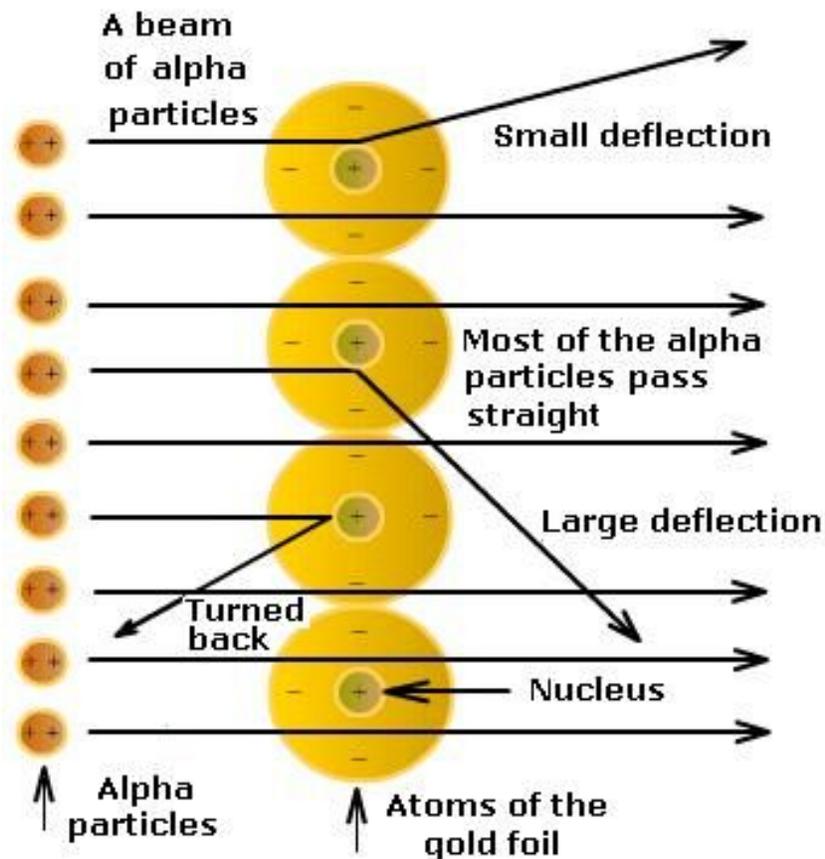


Exhibit 1: The Rutherford-Geiger-Marsden Experiment, otherwise known as the “Gold Foil” Experiment, Alpha particles (light) hit gold foil and bounce off into many different directions.

Rutherford then exposed both alpha and beta particles at the same time to a magnetic field. He found that the alpha particles did not bend, but the beta particles did. The alpha particles, as studied by Pierre Curie, could not penetrate deeper into a wall about 6.7 centimeters deep into the material. The particles also lost their charge, going from a +2

charge to zero charge. They picked up new electrons in the process and eventually turn into a complete helium atom floating around. His wife, Marie Curie, also discovered that the rays were not rays at all, but instead particles, and they were absorbed more frequently the further they traveled. ^[12]

Radiation Through Decay

Radiation from the elements occurs when an element is unstable, by gaining or losing a proton, resulting in a type of decay in the system of the nucleus. The first type of decay is called Alpha Decay, where the element emits two neutrons and two protons within their nucleus and moving down to the element less than two protons from it. ^[3]

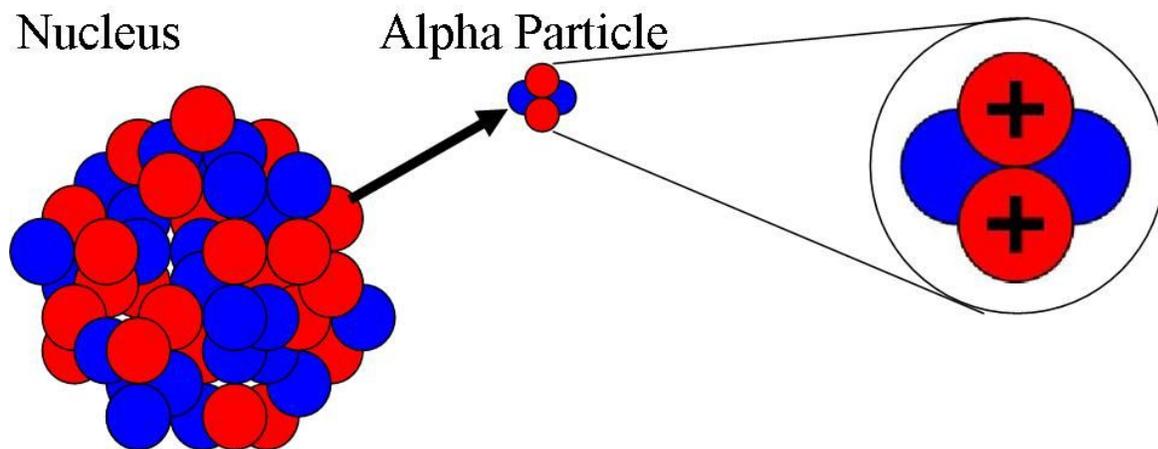


Exhibit 2: An example of a nucleus of an element processing through alpha decay.

You may have seen two protons and two neutrons somewhere else before. Alpha particles are relatable to Helium. ^[3] As a nucleus goes through alpha decay, it creates an

atom containing two protons and two neutrons, very close to the form of a helium atom, that atom is being shot out from the nucleus, leaving the daughter nucleus to become another element two protons before it, repeating the process to become stable. Commonly, an element will have to achieve an atomic number above 83 protons to be able to emit alpha radiation.^[2]

Although the Alpha particle is very closely related to helium, it has not become its own element. The alpha particle is classified with the character “ α ”, within a chemical equation, seeing that character explains that an element has undergone alpha decay.



Exhibit 3: The basic formal equation of Alpha decay, “X” is the element going through decay and “Y” is the daughter element.

Causes of Cancer

Cancer in humans is caused by mutations in cells as the cell is developing. In the creation of a cell, it is given “instructions on how to grow and what cell to be in the body. Very rarely, errors can occur, causing the cell to become cancerous and spread the disease

to other cells. The infection can spread from just one cell to almost every cell in your body, and as you know, can be fatal.^[13]

Alpha particles are actually the least likely to cause cancer and changes in your DNA within a cell. This is because an alpha particle is almost stable and may catch and bond with electrons when passing through the air or other surfaces. Our bodies aren't affected by most due to our epidermis protecting us, the outside layer of our skin is thick enough to stop alpha particles from entering our internal organs and decaying cells. In fact, even something as thin as paper can be a shield against alpha radiation.^[4]

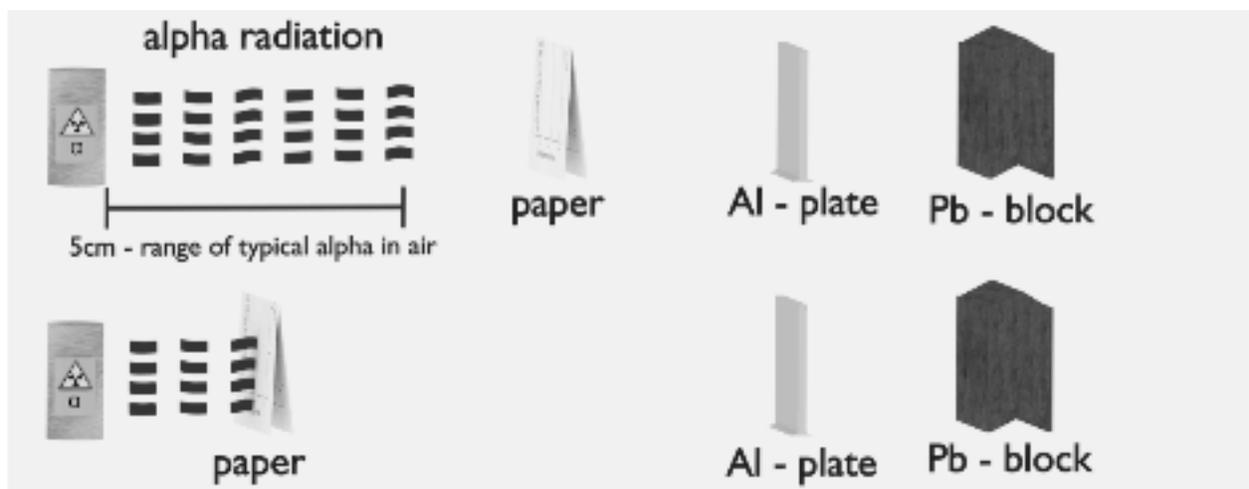


Exhibit 4: The penetration and range of alpha particles.

However, let's consider that one person was exposed to alpha radiation and eventually obtained cancer, this is because as the cells were being created, the particles decayed the DNA that was trying to be copied into the cell, it will then mutate into a higher

stage of cancer, and eventually take its toll. Although it may seem like much of the populous of cancerous patients could receive cancer from radiation, it is actually quite the opposite. A study from 2012 indicated that only about 2% of cancer patients achieved their state of decay due to radiation. Adding on, very few have experienced it through alpha rays, the more dangerous particles are Beta (β) and the highest calamitous of the three, Gamma (γ).

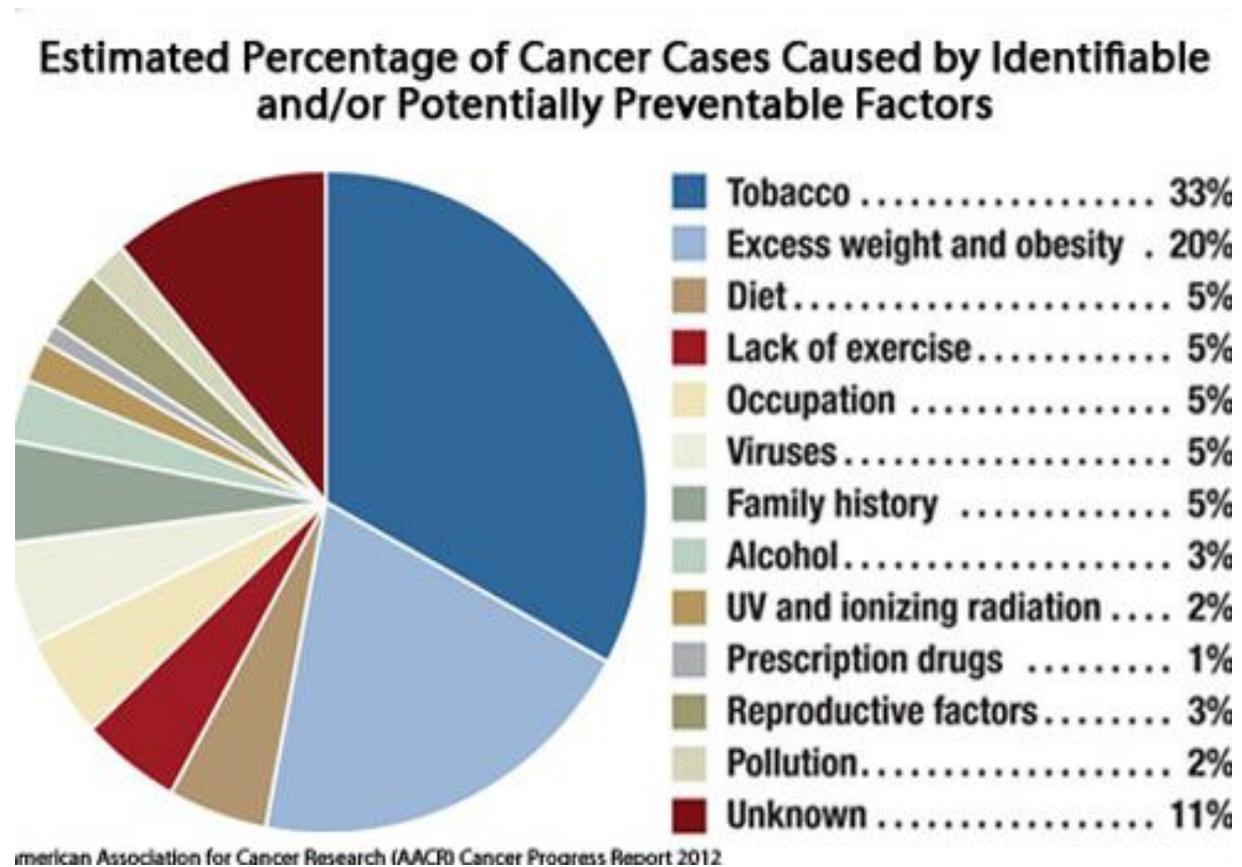


Exhibit 5: Chart comparing the different sources of cancer

Radiation through Smoking

If you took everyone in the world and split them into all people who did have cancer and those who did not, and split the ones who did into how they got cancer, using the chart above, people would see two large groups that stand out. The largest, taking a majority of the chart compared to the rest of the causes is smoking, and the second largest of the chart is excess weight and obesity. Smoking, broken down, is actually radiation from the tar and smoke entering your body, these chemicals contain “radionuclides” that build up on your internal organs, providing a sustainable source for decay.^[10]

A radionuclide is another method of addressing an unstable element. Tobacco already has stable elements within, but the radionuclides come into effect from another source, fertilizer. Fertilizer contains radium, an organic yet unstable substance, this decays to form radon particles that shoot out from the dirt, and eventually hit the sticky hairs on the bottom of tobacco leaves. However, radon isn't the only thing that you are inhaling. The particles shoot out at random times and decay the leaf itself. This causes the leaf to decay into lead-210 and polonium-210, other factors like rain or wind are too weak to overcome the molecular bond made through decay, rendering them immobilized. Once the leaves are harvested, they head straight to cigar and cigarette companies and transport them directly to your system, potentially poisoning you without your knowing about it. Although radiation plays a big role in causing cancer, it is not the main role, other factors that don't include radiation like nicotine and tar can also cause cancer, not just radiation.^[10]

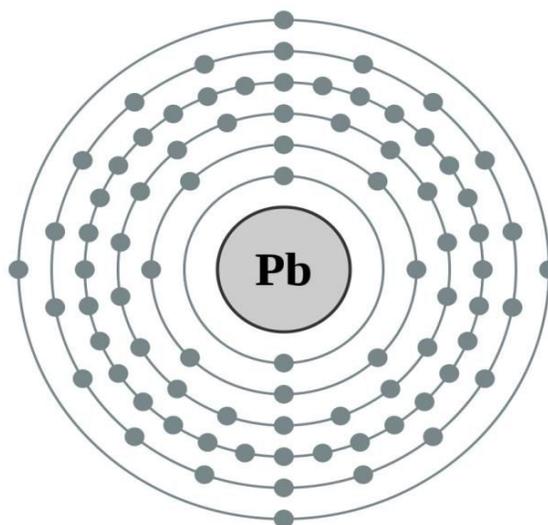
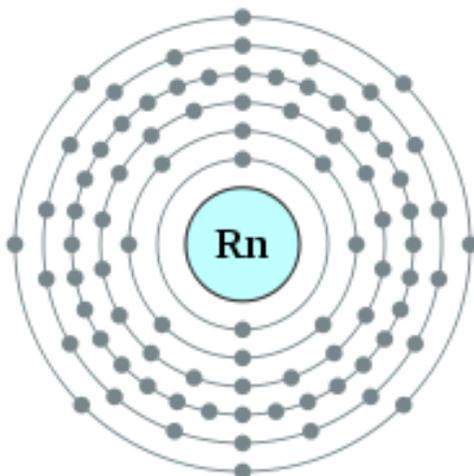
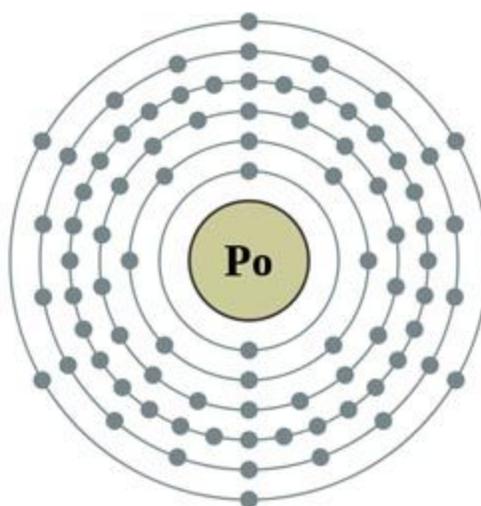
86: Radon**2,8,18,32,18,8****82: Lead****2,8,18,32,18,4****84: Polonium****2,8,18,32,18,6**

Exhibit 6: Radon, lead, and polonium, respectively, in their atomic image.

Radon, lead, and polonium also occur naturally in the soil and air which can seep in through any crack in foundation and you may breathe them in naturally, but they don't build up as much as smoking. While you may breathe these things in naturally, they pose a small risk to health and can be broken down naturally. Smoking leads to the ingestion of tons upon tons of radionuclides is much more worrisome to health. When you smoke, you aren't just hurting yourself, you are hurting everyone around you as well. The smoke can travel anywhere when you breathe out, and it may be absorbed by other life forms around you causing them to reach an increased likeliness to contract cancer, and you even greater than them.^[11]

Conclusion

Alpha particles do not contribute greatly in causing cancer, however, it is possible to get cancer from alpha particles. The chances of getting cancer from alpha particles is inferior to gamma and beta rays because they can be blocked by mere sheets of paper and/or your epidermis. Beta and Gamma particles contribute most and succeed greatly in developing cancer in most of the cancerous population. Ionizing rays give a very little amount in growing cancer cells, smoking gives most of the percentage. Although the corporations know the dangers of smoking, they are not encouraged to stop because of the profit being made off of the people who buy tobacco products. As for future generations, we may not know the outcome if the world may end up being a tobacco-free world. When the smoke clears, the visible solution to many of the people's cancer is from beta and gamma rays and must not be taken lightly.

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