

The evolution of cancer research

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The illness that comes in all shapes, colors and sizes kills 7.4 million people of all ethnicities, nationalities and races annually. It is probable that dying from cancer is something everyone has pictured, because people who have suffered through this are all around. Still, while there is no doubt that finding the cure has progressed throughout the years, scientists are still searching.

Cancer being a "group of more than 100 distinct diseases characterized by the uncontrolled growth of abnormal cells in the body" (Costa, Jose) has been the priority for doctors for a long time now, since its first case during the Renaissance. Medical technologies however, have helped find solutions and advance the way scientists tackle this disease in many ways. They have found faster ways to diagnose, treat, and recover from it during the years.

Research for this is done every day, in hope of creating the best cure. The question now might be why it is so hard to cure and the general answer is that there is more than a 100 types of cancer and it would be so complicated to find something that would help all of them without minding where they are located in the human body.

Medical student Erika Garza she mentions, "cancer is a particularly interesting disease because it has many different faces and forms that cannot be placed into a single category" (Garza, Erika). Now in the 21st century, new technologies are saving millions of lives and we owe this to bioengineers, the ones understanding the body and the machine at the same time. The cure, something people question frequently, is it possible that it exists? Solutions such as the iKnife, CAR-T therapy and the iChip are some treatments that doctors and engineers together have been working on in order to treat cancer carefully and rapidly. For is it probable we fear cancer,
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a word, for us and a life sentence for others because we know the chances are of getting better are close to none. The roots of this illness come from long time ago, the very first cases presented during the renaissance.

for example in 1761, Giovanni Morgagni did the very first autopsy to find any relationship between the patient's illness to pathologic findings after death (American Cancer Society). Later on, Scottish surgeon John Hunter suggested that cancer could be cured with surgery and decided which types should be removed with different procedures. To add on, in a normal healthy body people have cells grow and make the body function properly. Cells in a body know when to stop growing and when their life should be terminated, being replaced by new cells who take their place. Cancer, on the other hand, is exactly the opposite, having cells start grow out of control without stopping. They eventually invade healthy cells and crowd them out, consequently affecting the part of the body where these cells first started growing.

It is popularly believed that tumors are where cancer cells are located and that is correct for the most part. However, not all cancer types form tumors and not all tumors are malignant. In order for a proper diagnosis, doctors normally cut a tiny piece of the tumor during the surgery and send it to be studied. Here is where they find out if the tumor is formed from cancer cells and if treatment is needed. This disease is diagnosed in four stages and normally doctors tell you that between the first two stages, the cancer has not spreaded entirely and between stages three and four cancer has spread much more, although this doesnot mean it is terminal (American Cancer Society). There are 3 major ways of treatment that are effective, strong and common: surgery, chemotherapy and radiation.

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In surgery, doctors would remove the tumor from the body before the cells spread while being anaesthetised. There is also chemotherapy which consists of drugs that not only tackle tumor cells but also normal ones, and so it is not always favorable but it is an effective solution. Lastly radiation is when they use high potential rays for treatment. Cancer has advanced a long way since medical engineers have worked hard to understand the different types and attempted to tackle them. Population wouldn't have come this far in terms of finding a cure if it was not for bio engineers and their work to understand how the body and machines could work together.

In a recent interview with Erika Garza, a student on her 8th semester studying bioengineering in the Tecnológico De Monterrey, she said that, "doctors and biomedical engineers should work together to find solutions because without the help of today's technological innovations, we won't get very far from where we are now ". From this, it is clear that these two professions need each other in order to reach their maximum potential. The advancements in general regarding Cancer consist firstly on how it is diagnosed. Now with bigger machines that capture a more extensive view that is clearer, doctors are able to diagnose it since before it develops and are ready to treat it when medicine is most effective. As also going into the OR scenario, the instruments used to vanish it have changed to being minimal invasive and used in robotic surgery.

A new PET scan has also been under construction, this one will give more in depth information about the patient and he's/hers tissue throughout the whole body while reducing the amount of radioactivity that a normal PET

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scan would use (LUHS). What people back in the day thought was that when cancer had spread there was nothing they could do. Then, Glen started only operating on breast cancer when they could take the whole tumor out. “Surgery then was very primitive with many complications, including blood loss. It wasn’t until the 19th and early 20th centuries that major advances were made in general surgery and cancer surgery” (Cancer in the Sixteenth to Eighteenth Centuries). Since then medicine and technology have come a long way working together in order to find the best solution and it was not until 1940 when chemotherapy started becoming a type of treatment that could cure cancer; and it was before that, in 1896, that radiation was discovered by a medical student who didn’t quite understand why these energy rays killed tumors and spreading cells.

Today it is known that it works by breaking the DNA that is found in every cell and managing the process of uncontrollable cell division. From this they have advanced what people might say humankind never thought possible, still we are way ahead now with new solutions that will tackle the disease. It is hard to believe patients will survive when there is no solution and that their days are counted. It’s like needing to complete a math problem without having the equation to do so, you can use many other equations but you will never have the precise one to complete the task. Some may believe there is no hope for them when they are diagnosed with cancer, and so they do not get attended and live the few months they have left in peace and with the fear of when they will not wake up.

There are different ways to cure cancer such as mentioned before: radiation, chemotherapy and surgery. Some of the new technologies this engineers

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have been working on consist of the iknife, antigen labeled nanoparticles, and ichip. The first technology mentioned consist of cutting the tumor and from the vaporized smoke detecting real-time if it is malignant tissue or not. A bio engineer fromHarvardMedical School, David Monner, is currently coming up with antigen labelled nanoparticles, something “ that can be injected into the body and, after self-assembly into a matrix, recruit host dendritic cells that generate a potent response that in turn targets breast cancer in animal models”(Mamaghani, Shadi). Still there are approaches such as making the body immune to cancer cells again so that the immune system can fight back.

There are also projects that are making cancer diagnosis faster and efficient. Mehmet Toner, from Harvard Medical School, is currently developing the iChip technology consisting of analyzing CTS from a patient’s blood, things that are extremely rare to find before the tumor is even visible. With this analysis they can detect and track constant mutation. These few projects that have been mentioned are all in the process of being made but there are people working on them on a daily basis. What the world has become with technology is something unrecognizable.

Still, human health will always be the priority, due to the uncertainty of what happens in the afterlife. Bio engineers have completed the task of giving hope to those who were dying, a task nobody thought possible. As they always say, a human is the greatest technology there is. But what happens when communities become one with technology is something spectacular. Cancer has evolved to every color, to every body part and to a great majority

of people. Being the uncontrollable growth of cells, there is nothing to say than to state that a team will always be greater than one.

For this scientists have come a long way, from radiation, chemotherapy and surgery humanity is now in the most advanced technologies ever seen.

Doctors are getting further, some may think they are in no way close to the goal but how do they know if scientists are not sure of how this goal looks like. People think that it is likely that at one point in our lives everyone will develop cancer, and die from it since rates are still pretty high still. But what cancer has provoked is empathy between people. Doctors and engineers are working together to save other people, so people might believe that cancer may kill the human race but they way I see it, it has united humankind.