Non-Hodgkin's Lymphoma

Biomedical Breakthroughs and My Life

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Lymphoma is a deadly blood cancer which kills thousands every year. Thanks to modern medicine and research, my uncle was not one of these people. In January 2003, my uncle Steve was diagnosed with non-Hodgkin's Lymphoma, or NHL for short. An abdominal CT scan showed that my uncle was already in stage IV, the worst and most deadly stage. This stage is defined by at least one organ being invaded by the disease, although fortunately it was only in his spine, instead of a critical organ. Many years ago my uncle would have most likely died shortly after his diagnosis, but modern biomedical research has revealed a variety of life-saving treatments and research techniques. Thanks to these treatments, people with Lymphoma can finally expect a brighter future.

Lymphoma is a blood cancer in which a type of white blood cell (T-cell or B-cell), which help prevent disease, mutate. These mutated cells multiply and spread throughout the body and, upon reaching a certain concentration in one area of the body, form a tumor. Although non-Hodgkin's Lymphoma usually occurs in ages 55-85, in rarer cases younger people (like my uncle, who was diagnosed at 41) can have Lymphoma as well. Early Lymphoma research occurred in the late 1920's to the early 1930's, although radiation treatment, a critical part of most lymphoma treatments today, was discovered in the late 1800's. Radiation treatment is used to kill mutated or cancerous cells and shrink tumors using x-rays or gamma rays. Radiation treatment was first discovered in 1895 by Wilhelm Conrad Rontgen who discovered the x-ray during his research. Early trials of radiation treatment mainly consisted of bombarding animals with radioactive gamma rays, which although often nonlethal, was still usually considered absurd or irresponsible testing by scientists and researchers at the time. The first human test, in 1936, proved successful, and new research has continued since then.

Another part of most modern lymphoma treatment is chemotherapy. Chemotherapy is the administration of drugs or medications to stop the spread of cancer cells. Practical chemotherapy was first invented by Paul Ehrlich. When experimenting with chemical dyes on animal tissue, Ehrlich

discovered that some cells would absorb a certain type of dye, while other cells did not. This led to the premise of a "magic bullet" or a drug that could target certain cells. Since cancer is only caused by certain mutated cells, this proved to be an effective technique. However, there are a variety of side effects that can be caused by chemotherapy, ranging from hair loss to a potentially fatal problem in which the drug attacks healthy white blood cells.

Animal research has played a large part in the development of new treatments. For example, in 2001, researchers began mapping out the genome of the Zebrafish, which is similar enough to the human genome that accurate testing can occur. The goal of the experiment was to test how Leukemia (a blood cancer similar to Lymphoma) would develop and mutate in a wide base of subjects. Fish were given a combination of *MYC* genes, which cause cancer in humans when mutated, and Zebrafish genes that cause the MYC genes to affect only the lymphoid cells, which are the cells affected by Leukemia. These fish were used in testing new methods for treating the cancer, as well as showing new mutations of the disease not occurring in humans. Zebrafish are not the only animals being used to research blood cancers. An ongoing study is mapping the dog genome, in which natural cancers such as lymphoma are common

After a treatments of radiation therapy, chemotherapy, and other supplementary drugs, my uncle was released from the hospital. Fifty years ago, he probably would have died within months of the initial diagnosis. Biomedical research has done more than improve our understanding of the human body, or improve our knowledge of plants and animals. It has given millions of people a second chance at life.

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Reflective Paragraph:

I knew practically nothing about the treatments, or even the symptoms and causes, of cancers such as Lymphoma before this essay. I never really understood how important biomedical research is in the modern world. In less than 50 years, lymphoma survival ratings have gone up by more than a third, and that difference just keeps increasing as new research happens and new medicines are created. These diseases, seemingly indomitable a century ago, are now curable and also understood by the entire medical community. We have the knowledge and the resources to eradicate diseases that had previously devastated entire regions or countries. Without this knowledge, my uncle, and many thousands of others, would not be alive today. Overall, I found this a great opportunity to learn and an insight into the world of modern medicine