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2022 PSBR High School Essay Contest *Grand Essayist*

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How have scientists and doctors been able to prolong the life of those with a deadly, incurable cancer? Glioblastoma is a stage 4 brain tumor with only a 10.3% 3-year survival rate, as of 2010. This survival rate was actually a significant improvement from that of ten years prior, 4.4%. There is currently no cure for glioblastoma, but treatments such as surgery, chemotherapy, and radiation can elongate the survival of a glioblastoma patient. These treatments and advancements to these treatments have all been made possible as a result of biomedical research. Biomedical research on glioblastoma, especially that done on animals, has greatly impacted the life of my grandfather, and therefore my own life, as it has enabled him to live longer.

Biomedical research has led to improvements in glioblastoma treatment, allowing those diagnosed with this aggressive cancer to live longer. For example, a phase III trial done by the European Organisation for Research Treatment of Cancer and National Cancer Institute of Canada Clinical Trials group in 2004 tested the effects of radiotherapy when adjuvant temozolomide (TMZ) was added to the treatment. The results showed a 2-year survival rate of 10.9% for radiotherapy alone, with an astonishing rate of 27.2% with the added TMZ. Additionally, the results showed a 5-year survival rate of only 1.9% for radiotherapy alone and a survival rate of 9.8% with the added TMZ. This was a huge advancement in brain-cancer treatment that changed and prolonged the lives of many, including my own grandfather. He has been receiving radiotherapy and TMZ for the past several months, and it has kept him alive. Without this biomedical research, he would quite literally be dead right now. The radiation that he has received only works as well as it does because of the trials and studies that have been done to create and improve it. Yes, at this point he is going to die within a matter of weeks. Without biomedical research, however, he would not have even made it this far. Biomedical research has directly added on time to my grandfather's life, and to me that is everything. Biomedical research is not only done on human clinical trials like this one, but also on animals.

Animals play a crucial role in biomedical research. In fact, research needs to be done on animals, such as dogs and mice, before scientists can even begin testing on humans. Preclinical animal models are necessary in order to discover information about the tumors and how possible treatments will affect them. Dogs are a great model because "The canine genome provides evidence of strong similarities with humans, particularly with respect to the gene families associated with cancer." (J. Hicks, Canine brain tumours: a model for the human disease? , 18 May 2015, <https://onlinelibrary.wiley.com/doi/10.1111/vco.12152>). Additionally, dogs are likely to have spontaneous brain tumors, just like humans, making them ideal for pre-clinical research. For instance, a Phase I clinical trial that took place at the Texas A&M College of

Veterinary Medicine & Biomedical Sciences Veterinary Medical Teaching hospital showed advances in a possible glioblastoma treatment. The drug used in this treatment is known as STING (STimulator of Interferon Genes). This trial was done on dogs rather than humans. It will have only been made possible for STING to be tested on humans in the future because of the animals it was initially tested on. This shows how biomedical research on animals has affected my life. The preliminary research done on animals makes it possible for scientists and doctors to create successful treatment for humans. If it weren't for animals like dogs, my grandfather may not have been able to live with his cancer for as long as he has.

No, I've never been a part of biomedical research, nor have I known much about it until recently. Yes, it has affected me in a personal way. Studies that have been done on the effects of TMZ when added to radiotherapy treatment have given my grandfather as well as many other cancer patients access to a longer life. Animals are also a huge part of biomedical research. Preliminary studies done on animals are what make it possible for further biomedical research and clinical trials to be done on humans. More and more discoveries are being made every day through biomedical research. Though there is currently no cure to glioblastoma, it is very possible that biomedical research will continue to lead to revolutionary advancements and treatments.

Citations

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