

2021 PSBR 7th & 8th Grade Essay Contest
Second Place

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My Grammy, who I was able to hug for the first time in over a year this past weekend, owes her life to biomedical research. Before I was born, she fell into an abyss that disconnected her from her family and friends and took away her will to live. She suffers from depression, which before treatment, was what she would describe as "debilitating". Ironically, my Papa - her husband - spent his career as a biomedical researcher who helped develop therapeutics targeted at the central nervous system. One of the very drugs, an antidepressant, that he helped to develop ended up saving my Grammy. This truth, and being raised by two parents who met in the lab doing research, has instilled in me an appreciation for the power of biomedical research to transform lives. My respect for this research has only been reinforced by the recent development of Covid-19 vaccines this past year. But what is biomedical research?

Biomedical research is the exploration of ways to prevent illnesses and death among animals and humans. But at what cost? Biologists and chemists use many various subjects when testing out the effects of certain cures, diseases, etc. One way they test is by using animal models. Researchers use animals because their bodies are complex and have similar reactions to illnesses, diseases, and more concerning humans. Because testing on people can result in serious damage to their health, it is thought of as unethical to use them as test subjects which make animal testing the next best option. Many rodents, specifically mice and rats, are used in experiments due to their similar genes and physiology to humans. Using animals in experiments is necessary for biomedical research. However, researchers can decrease the number of animals used by employing a method called 'the three Rs' to reduce, refine, and replace animals in testing when possible.

Following strict protocols that govern the use of animals in research, scientists can use reduction so animals are only used when necessary, refinement to ensure animals are treated humanely, and replacement to use non-animal models when possible. The Public Health Service and Congress have created laws to ensure the refinement of animals remains humane. Other methods can be used to replace animals in testing. Research could be conducted using technology and in vitro experiments which are tests completed in laboratories on cells, bacteria, tissue, and organ cultures. Epidemiological studies, which are studies on what groups of people are affected by certain diseases, and human clinical trials can also help further biomedical research.

Biomedical researchers use the biomedical process - experimentation, development, and evaluation (for effectiveness and safety) - when researching. Basic, applied, and clinical research are three ways they can do so. Basic research focuses on incrementing our

understanding of life processes and universal scientific principles, and applied research utilizes known information and expands on it to work towards a certain discovery. Clinical research uses human volunteers to measure the safety of certain medicines, drugs, devices, and more in a clinical environment. However, clinical research can only ensue after being regulated and having the object being tested studied profusely.

There have been many successes in the biomedical research field. From treatments like chemotherapy to simple antibiotics, many people have witnessed how this research can save and help not only humans but animals as well. As we move forward into 2021, more innovative vaccines, treatments, and inventions continue to be explored. Some recently shared data from Eli Lilly shows promise in the fight against Alzheimer's disease, a horrific disease that took the life of my great aunt for whom I was named. Still, there is much more research to be done, such as finding cures for various cancers and better medication to combat substance addiction. There will always be more work to be completed, but every day offers promise as biomedical researchers continue to discover breakthroughs that help us get closer to achieving a brighter future. For them to do so, we need to give them support and endorsement. Most importantly, as my mom always tells me, we need to "trust the scientists".

Sources

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