

2023 New Jersey Middle School Essay Contest
3rd Place

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Back in the times when the pyramids were new, the colosseum was being built, and people set sail to discover new worlds, sickness raged across the land. Treatments and medicinal options were scarce, and people even began to rely on magic or the supernatural itself to heal their friends and families.

Today, in the presence of a single cough, people have options. Advil and tylenol are always at the ready. Tums are over the counter drugs for an upset stomach. Pneumonia is easily diagnosed and treated in hospitals. Hospitals filled with people looking for help with a variety of different afflictions. But, the one thing that all of the different sicknesses, broken bones, brain injuries have in common is: they are being treated with the results of centuries of biomedical research.

Biomedical research has always been an important part of my life. Growing up, there was always a need for flu treatments, strep throat medicine, broken limb splints. Even recently, when I had a concussion and needed to be put into the hospital after a fainting episode, the doctors never deigned to set me up to IVs, blood pressure machines, and prescribe me medicines for different symptoms. My family as well has been affected by biomedical research as well, from my mother being treated for Celiac disease, to my uncle's ALS.

With all of these things, it begs the question: What is biomedical research? How is it done?

Research methods begin with the basic research stage, in which scientists gain basic and fundamental knowledge on the field that they are going to be exploring. This includes basic information on how an organism lives and develops. The next stage would be the applied research. Taking this knowledge gained previously and aiming it towards a specific goal like developing a drug, treatment, etc. After testing in this stage, the next step would be to test the work created. Most presume that scientists and researchers would develop a chemical or medicine and then immediately proceed to find a human test subject. But, you may be surprised to discover that the first "test subject" is none other than a furry animal. Most commonly a mouse.

Why mice? Well, mice are actually very genetically similar to humans, and are very inexpensive when you crunch the numbers. As well as this, most animals can be genetically modified with human diseases or conditions, making them the subjects of what is known as pre-clinical trials. Scientists primarily learn everything they need to know on each subject by utilizing the three R's: Replacement, Reduction, and Refinement. While each of these words may seem complicated, understanding each concept is simple.

Reduction is the act of using fewer animals to produce a result during a research study and or experiment. Having fewer animal subjects allows for more comparable results in the experiment. Researchers are able to better understand their findings with less subjects to account for. Next, Refinement is the process of promoting animal welfare by eliminating any distress or pain that a test might potentially cause. It is known amongst scientists that if animals are kept in better conditions, better experimental results will be produced in the end. Finally, the last R, replacement. The thing about replacement is that it doesn't even involve the use of animals. It's known as the process of replacing animal test subjects with other non-animal methods that include computer models and cell culture. Even though animals make suitable test subjects for research, considering the similar genetics to humans, replacement allows for other methods to be tried so that live animals don't have to be used, and results across the board can be evaluated.

If a test is run successfully throughout different animals, testing methods, and other various factors, then it is ready to move into the clinical trials. Testing on humans. Human volunteers will be the new test subjects for the biomedical product and make sure that it is suitable to be released into the market.

With the help of the three R's, and animals themselves, biomedical scientists are able to put forth a variety of different drugs for human use, but not just human use. Animal research produces vaccines and medicines. Using the thorough research methods and extensive tests, biomedical scientists have been able to develop ways to help humanity throughout time, now, and in the future to come.

Works Cited

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