

**2016 PSBR 7<sup>th</sup> & 8<sup>th</sup> Grade Essay Contest**  
***First Place***

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Recently, my grandparents were going to a movie. Their plan was interrupted, however, when my Opa felt a pain in his chest. My Nanna took him to the hospital, he had tests, and was told that he had pneumonia. He was put on an antibiotic called Azithromycin to treat his pneumonia, and went home in five days. Azithromycin is an antibiotic discovered in the 1970's. It was a great past success because it is a very efficient treatment. All of these tests and treatments are results of the biomedical research process.

The first step in the biomedical research process is making a computer model. A computer model is a simulation of an organism that has an illness that needs to be cured. Many factors can be put into the simulations causing them to be very accurate. These models can help scientists hypothesize what could happen on a live organism.

The second step in the process is called *In Vitro* tests. *In Vitro* tests use cells or tissues from live organisms to see how they react with the new treatment. For example, if a section of cancer cells were removed from a human and the treatment kills the cancer cells without killing the good cells, then the treatment could work.

The next step is using animal models to test the treatment. Some of the species used in animal research are rats, mice, pigs, dogs, and even fish. The reason we use them is because we can be similar to them in complex ways like our cells structures, and in simple ways like how we eat, sleep, and breathe. Animal models also differ from humans. An example of this is how fish breathe through their gills and we breathe with our lungs. However, researchers in need of animals must obtain them from a legal breeder and must follow the 3R's: reduce, or keeping the number of animals used to a minimum; replace, or trying to use other tests instead; and refine, making sure that the animals are not suffering greatly from the testing.

These three steps of the process are examples of basic and applied research. Basic research is researching the topic to get greater knowledge on the topic. Applied research is using information that scientists already have to find solutions to specific problems. After these stages, human clinical trials would be performed. This is when a new treatment is tested on a person that signs up for it. Of course, when the person signs up, they have certain rights, that are referred to as the ethics of human experimentation. They can leave the test if they choose, and are not forced to obey their doctor giving the treatment. Epidemiological studies, or studies of groups of people, show patterns of these populations.

Even though our world today is very high-tech, we can still improve. There are many cancers and illnesses that do not have cures. Hopefully in the future there will be a day when there is a cure for every illness.

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