



2017 PSBR 7th & 8th Grade Essay Contest
Second Place

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Biomedical research is undertaken to investigate human health concerns and test medications and procedures. The biomedical research process provides crucial information on diseases which affect human and animal health and their potential cures, ensuring that both humans and animals live healthy lives.

Basic research, the first type of biomedical research, increases basic knowledge of the body's systems and their development. With this knowledge, scientists can proceed to applied research, in which diseases and their potential treatments are explored more closely with a specific biomedical issue in mind. Finally, clinical research involving human volunteers determines if a particular treatment is effective and safe for use by the public. During the three phases of clinical research, the drug or treatment is tested on progressively larger numbers of people, both healthy and affected by the disease.

Before clinical trials, it is not ethical to experiment on humans for both moral and practical reasons. For example, animals used in biomedical research are bred specifically to have certain traits related to the research and are guaranteed to have no unexpected medical conditions, whereas anomalies in humans could complicate the research. Additionally, animals are easier to care for throughout the research process.

Though humans and animals may not look or think similarly, our bodies and immune systems work in the same basic ways, meaning that animals can be used to study and find cures for human diseases, known as *in vivo* research. The animals most commonly used in biomedical research, mice and rats, are very similar genetically to humans. Other animals used include non-human primates, pigs, rabbits, fish, dogs, and cats. The species of animal is chosen based on the diseases they model best, and the animals are purpose-bred by licensed dealers.

When animals are used, federal law requires that researchers provide appropriate living conditions for animals and avoid subjecting them to unnecessary pain. Not only is the proper care of animals a moral issue, but it ensures accurate and consistent data. The three R's of biomedical research help to promote the use of alternative research methods by requiring researchers to reduce the number of animals used in research, refine the animals' welfare while research is taking place, and replace the use of animals with other models and research methods whenever possible.

Using cell and tissue cultures, known as *in vitro* research, allows scientists to cultivate certain cells in a petri dish and test how diseases affect them. Computer models of animal or human bodies can also be used to research the spread of disease through an entire body. However, these models cannot always predict how a living body would function when infected by a disease or treated for it. Epidemiological studies, another replacement for animals, use real data about the spread of diseases to determine how a disease or treatment will affect a wider population. Chemical and statistical analysis is also used in place of animal research.

One of the most important advancements biomedical research has made is in the area of vaccines. An effective way to prevent disease, vaccines have contributed to a higher human life expectancy and nearly eradicated several diseases from the world. Vaccines that I receive annually keep me relatively healthy and free from the fear of disease, an impossible feat without biomedical research. My family and I would likely have succumbed to disease if not for the advancements of vaccines and treatments.

As our world changes, we continue to be faced with new diseases and health issues. Biomedical research will always be needed to combat these new dangers and to keep both humans and animals healthy and happy.

Works Cited

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