2018 PSBR 7th & 8th Grade Essay Contest
First Place

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In 1900, the human lifespan was approximately 47 years. Today, the average person can expect to live 79 years. Though some attribute this to an improvement in hygiene standards, it is also the byproduct of advancements in the field of biomedical research, which is dedicated to the combination of physiology, anatomy, the physical sciences, and medicine to understand the complexities of the human body. It is this type of research that has allowed monumental innovations in medicine, including everything from antibiotics to open-heart surgeries.

From a biological standpoint, life is extremely complicated, leaving scientists in the biomedical field with an amazingly large amount to investigate. Studies fall into three main categories; Basic, Applied, and Clinical research. Basic research is conducted to increase the knowledge of the chemical, physical, and functional processes of biological systems, like how the human senses change with age. Applied research is when existing knowledge, obtained through basic biomedical research, is applied to a specific medical problem with the hope of achieving a specific end, such as cure for cancer. Clinical research builds off of basic and applied research by using it to focus on the testing of treatment for a specific ailment. Clinical studies include things like determining the possible side effects of drugs.

Animals are crucial to the development of biomedical innovations. Small rodents, such as mice and rats, are the primary testing subjects in labs. Each animal is bred and sold directly to labs from suppliers to ensure quality and consistency. Although animals have an external appearance that is drastically different than humans, their internal function and genetic makeup are nearly homologous. Because of this, the effects that a drug or treatment has on an animal will be very similar to that of a human. This makes animal testing the most accurate way to simulate the effects that a treatment will have on a human without the risks that accompany total uncertainty in testing only in humans.

Experimentation with animals eliminates the risk of human harm; however, the risk of harming animals is still present. For this reason, all labs have 24-hour veterinary specialists to tend to all testing subjects. There are also laws to ensure the humane treatment of animals, such as the Animal Welfare Act, which requires that all animals used for research receive a specified standard of veterinary care and that any possibility of pain and distress be minimized.

Although animals do tend to be the best testing subjects for most research projects, there are other alternatives, including computer-generated models, in vitro testing, epidemiological studies, and human clinical trials. Computer-generated models use computer science and data on bodily processes and structure to model and simulate the function of biological systems. In vitro testing is the study of biological processes outside of the living organism. Epidemiological studies involve the use of data to study disease incidence and

distribution to work toward prevention strategies. Human clinical trials are studies conducted directly in humans, with strict rules in place to mitigate risk and ensure all testing practices are safe and ethical. The Food and Drug Administration requires that there be legitimate grounds for human trials, and that every step of each trial meets guidelines for the preservation of human dignity, and the minimization of pain and discomfort.

Recently, eight-year-old Bridget Kelley, my little cousin, walked out of Boston Children's Hospital with newfound assurance of her future. Thanks to the development of chemotherapy, radiation, and bone marrow treatment protocols, she beat leukemia. Every day, more and more people like Bridget are regaining their futures thanks to continued advancements in the field of biomedical research.

Sources:

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