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Finalist

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The most essential and influential roles are often behind-the-scenes, not on stage. Behind every medication and procedure, is a biomedical scientist. The significant role of animal testing in this research is often overlooked as well, but the world depends on it. The regulated systems of biomedical and animal research merge to impact countless lives through the provision of leading medical practices and equipment.

Since disease is an irrevocable aspect of life, biomedical and animal research are a necessity. Diabetics especially, owe much gratitude to biomedical research. Over twenty million Americans (7%) suffer from diabetes. A diabetic friend of mine requires a restricted diet, incessant worry from friends and family, and meticulous monitoring of his blood sugar. Eventually, patients experience kidney failure, blindness, circulatory complications, nerve damage and premature death. The treatments available, and the continued search for a cure, are due to biomedical scientists, with an animal at their side. While illness persists, biomedical and animal research will play a significant role in the lives of countless individuals.

Biomedical researchers utilize regulated protocols to develop new products. Biomedicine encompasses a broad area of science: the investigation of the relationships between biological processes and disease. In biomedical research, animal testing was always widespread, but the Food, Drug and Cosmetic Act, passed in 1938, made it mandatory prior to human trials for drugs, medical devices, and procedures. Today, the Food and Drug Administration oversees biomedical research. When a product is developed, if alternatives are inapplicable, preclinical trials commence, in which animal models test the product before conducting clinical trials with informed human volunteers. Advancing to the next testing stage relies on the product's benefits outweighing the risks. After a successful clinical trial, the Food and Drug Administration must approve the product before it goes on the market. Therefore, the journey of many medical products, which will eventually impact countless individuals, involves animal research.

Highly regulated animal testing is interwoven within biomedical research. Unlike computer models and cell or tissue cultures, animal testing takes the entire body system into account, and because animals are biologically similar to humans, provides results readily applicable to people. Also, when compared to humans, the shorter life cycles of animals offer quicker studies spanning entire lives or several generations, and the control of an animal's environment, such as diet, lighting and ventilation, limits extraneous variables. Finally, it is illegal and unethical to test products on humans in early developmental stages. Therefore, in preclinical trials, research animals are selected meticulously to enhance conclusive results. For example, the similar skin and cardiovascular systems in swine and cows compared to humans have helped develop organ transplants, Computer Assisted Tomography (CAT) scans, and skin grafts for burn victims. Meanwhile, sharks rarely develop cancer, and amphibians regrow lost limbs. Animal research opens doors for biomedical researchers, but not without protection. The Animal Welfare Act (AWA) and Public Health Service (PHS) Policy install regulatory laws

regarding animal testing, and mandate that all research institutions must install an Institutional Animal Care and Use Committee (IACUC) to uphold welfare laws. With strict regulations, animal research is effective and humane. It is impossible to deny its significance in the past, and the potential it holds for the future.

Through past and future progress in biomedical and animal research, biomedicine impacts innumerable individuals. I have been directly influenced by biomedical research through antibiotics, many of which, including penicillin, were developed using mice and other rodents, and vaccines, such as my protection from Polio. One of the greatest biomedical achievements occurred in 1921, when Frederick Banting was the first to isolate insulin from the islets of Langerhans in the pancreas of a dog. Injecting insulin into diabetic dogs proved to lower their exorbitantly high blood sugar and subdue the disease's symptoms. My friend and diabetics around the world owe their lives to his pioneering work. Since then, biomedicine has provided needle-free insulin injections and lightweight external insulin pumps for diabetics. The future may hold insulin patches, implantable insulin pumps, and diabetes-associated stem cell opportunities. Islet cell transplants have already cured diabetic rats. Many people have enjoyed and continue to look forward to medical products developed through biomedical and animal research.

The new medications and procedures established through biomedical and humane animal research have impacted the countless lives of the ill and their families. Although the scientist and animal may be forgotten, their legacies live on in the health of individuals around the world. It is crucial to recognize and support the roles behind-the-scenes because they run the show.

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