Primate Medical Testing

The debate about the use of primate/Non-Human Primate (NHPs) for medical research has been there for years. Just like many ethical issues revolving around the animals and their rights, this issue also has been remained the focus of attention for many years. Some of the researchers around the globe are in favor of medical experimentation done on Primate while some are not. They prefer the use of Non-Human Primates for experimentation that is unable to be tested on humans for various reasons. Among Non-Human Primates the most frequently used animal for the experimentations is monkeys. They are used in different clinical trials for the prevention of a disease, for drug development, toxicity studies, and safety testing for various medicines. They are currently used to find the cure for various fatal diseases e.g. Cancer, Hepatitis, HIV, various neurological diseases, etc. They have been given the drugs to check its effectiveness before applying it to human beings, because of their similar nature. In this essay, the pros, and cons of using non-human primates in medical testing will be discussed and analyzed in detail.

Advantages and disadvantages of using non-human primates as medical test subjects

There are two major types of monkeys: old world monkeys and the new world monkeys. The species that are mostly used for biological researches are rhesus monkeys (Macaca mulatta) and the long tail cynomolgus monkeys (Macaca fascicularis). Both these species are of the old world monkeys. Their genetic similarities to humans are about 93% (Bailey, 2014). Another advantage of using Non-Human Primates for medical researches is that their defence system or immunity system is similar to that of humans. Where there are several unethical principles attached to it, it is helpful to be used in medical testing.

A type of Brain cancer, glioblastoma is a very deadly cancer in which the tumor grows double times in size in only about 14 days. A recombinant form of poliovirus is made

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to cure this type of cancer. This research is being tested in monkeys based on immunotherapy; it is a form of treatment in which the body's own immune system is used to fight against cancer. This virus is inserted into the cancerous cells in the brain; the immune system recognizes this virus as a foreign body and starts attacking it which in turn kills the cancerous cells. Monkeys were important to be used in this research because it helped the researchers to map the pathway through which the virus could be inserted or taken up by the cancerous cells. This research is proven to be a success in animals and now is tested on humans.

Both the renowned institutes, National Institute of Health (NIH) and Food and Drug Administration (FDA) made it mandatory for researchers to first test it on monkeys to check whether the poliovirus would be harmful or cause any type of health risk in humans (Friedman et al., 2017). Along with the advantages, there are also some disadvantages. On conducting the research or experimentation on NHPs, the first point that comes to everybody's mind is the ethical tension. It is as if we are willing to perform experiments and manipulate the NHPs in a way that we are unable to do on humans. It gives rise to many Anti-animal rights movements causing tension in the community of biomedical research. The use of Non-human primates in medical research has some moral standing and is not supposed to be abused or mutilated. Many researchers have started shifting their experimentation of initial level from NHPs to rodents and the zebra fish because the use of NHPs is not only costly but is ethically wrong unless not necessary (Walker & King, 2011).

Scientific evidence to support primate medical testing

Scientific evidence is present that explains the importance of the use of NHPs for medical experimentation purposes. Philip and colleague (2014) have explained the importance of NHPs for research in their study by mentioning in their article, "The physiological similarity between humans and NHPs means there is greater validity of the data

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obtained from primate models than other animal models (e.g., reproduction and pregnancy, cognition, and cognitive aging). This physiological similarity also means that one can address questions using NHP models that cannot be addressed using other species (e.g., models of AIDS, lung disorders, and drug metabolism)" (Philips et al., 2014).

Non-Human primates have also been tested for immunotherapy against Brain Cancer. NHPs are being used for organ transplantation study because their immune system closely resembles humans. (Friedman et al., 2017) Their cognitive abilities, neuroanatomy, social complexity, reproduction, and physiology resembles a human that is why NHPs are being used for extensive research for Neuro AIDS, stress, Alzheimer's, and Parkinson's disease (Capitanio & Emborg, 2008). There is no cure for Alzheimer's and Parkinson's yet, but many drugs have been manufactured after the testing firstly on NHPs and then later on humans to dampen the effect of the disease which tends to progress with time. These animals are also being used for the production of various vaccines especially for hepatitis B and HIV/AIDS as no cure has been found yet for these two deadly diseases.

NHP testing

Some studies are being conducted in the making of a vaccine against HIV to protect babies. The infant monkeys are being used for the testing of the vaccine and the antibodies are reported to be found against HIV in their bodies which is ground-breaking research, along with that, NHPs are also being used for the testing of blood pressure drugs as high blood pressure is the leading cause of heart disease, stroke, kidney damage, and memory problem. (Friedman et al., 2017: Philips et al., 2014) With this much scientific evidence for the importance of NHPs medical testing, there is also some scientific evidence that shows the limitations.

Scientific evidence to condemn primate medical testing

According to Bailey (2014) NHPs have been reported to be essential for testing because of their genetic similarity but on studying in-depth, this similarity is not enough for

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NHPs to be considered as the excellent model organism. He mentioned in his article, "similarity figures appear to be high; it is becoming increasingly evident that those genetic differences translate to profound biological differences that make these species unsuitable and poorly relevant models for humans, and/or which explain a number of observed empirical differences." The similarities are found in the genetic sequences but there are a tremendous amount of differences in gene regulation and post-translational modifications which in term results in the production of a different protein.

The NHPs, especially monkeys as they are used more than any other Non-Human Primate, have different genetic sequences based on the regional differences. The genetic viability of the macaque monkey found in Cambodia is different from that found in the Philippines. Hence, when it will come to drug testing, the outcome will be different as well. Not only that, but the testing is done on NHPs for the renal, hepatic, and respiratory toxicity were false positive. A study done on the rodents reported that toxicity testing is more predictive than in the NHPs. There have been various clinical failures also recorded, the Non-steroid anti-inflammatory drug (NSAIDs) benoxaprofen, have shown to be found safer for the use in the rhesus monkey but then later after its production and marketing, various cases had been reported for the severe effects and many deaths due to the use of the drug, which impacted its implementation.

Discussion on Primate Medical Testing

The use of the Non-Human Primates in biomedical research or testing has both its advantages and limitations. I believe as science is advancing with each passing day, with the help of genetics, technology, and innovation we can find an alternative to that of NHPs for better researches. As many false-positive tests were reported and now that rodents have proven to be better model organisms making the research not only easy but also less costly. For some diseases, we can use the NHPs as a testing model but in my evaluation, we should

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not only rely on these species for our medical testing as they are the best model organisms in some cases but not all.

In case of the neurological researches, NHPs have found to be very complex therefore most of the times mouse or rats are used for the studies because Monkey is a higher animal and many synapses are being conducted by the NHPs brain in a single moment making it complex for the researcher to understand the mechanism of toxicity of the drug which results in different outcomes than are expected. NHPs have found to have the same emotions as that of humans, motherly love, and use of sign language, gestures, expressions, cognitive activity, intelligence, and social activity are similar to humans than other animals. But these similarities do not fit the NHPs in every medical testing category.

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