

Silent Suffering in the Lab



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I believe I am not interested to know whether vivisection produces results that are profitable to the human race or doesn't. To know that the results are profitable to the race would not remove my hostility to it. The pains which it inflicts upon unconsenting animals is the basis of my enmity towards it, and it is to me sufficient justification of the enmity without looking further.

Mark Twain

Each year, hundreds of thousands of animals are killed, blinded, and poisoned as part of procedures testing cosmetics, medicines and household chemical products. Mice and rats breathe in toxic vapors, dogs are fed food containing insecticides, and rabbits have chemicals rubbed into their eyes and skin. Such experiments only minimally contribute to ensuring that medicines, other therapeutics, and animal food are indeed safe. So are they strictly necessary? How might they be replaced?

Numbers

The use of animals in research is, the argument goes, justified by our need to learn more about the biological systems (health, disorders, behavior) of humans and animals, and the need to test the activity and side effects of various compounds, drugs, cosmetics and xenobiotics, as well as chemical and nuclear weapons. In 2010, in the US alone there were 1.28 million animals covered by the US Animal Welfare Act (which does not apply to lab mice, lab rats, birds, farm animals, or cold-blooded animals) used for experimentation, plus around a hundred million lab mice and lab rats. In 2009 in Canada, 3.38 million animals were

used, with almost 150,000 undergoing painful procedures while fully conscious. In 2012, the UK conducted 4.11 million animal experiments, including 2.95 million without pain relief (source: People for Ethical Treatment of Animals - PETA). The same year in Poland, 233,561 animals were used, including 161,846 in basic research and 30,155 to test products and devices in medicine, dentistry, and veterinary sciences. Of the 70,633 animals used in research into diseases, only 2528 were used in studies of animal disorders (source: National Ethics Committee, Ministry of Science and Higher Education). Animal research in Poland is regulated by the Act of 21 January 2005, covering animal experimentation.

Facts? Myths?

Researchers are encouraged to be kind and thoughtful when they handle lab animals through the 3R rule: replacement, reduction, and refinement. Replacement involves using alternative methods whenever they bring a comparable scientific result, reduction means using fewer animals in order to obtain the same information, or extrapolating more data from the same research, while refinement strives to eliminate or at least reduce pain, suffering, and distress, as well as ensuring the wellbeing of animals used in experiments. Unfortunately, many researchers do not follow the advice set out in the 3Rs.

Proponents of animal testing claim that all progress in medicine has been achieved through the use of such tests, adding that were they to be abandoned, people suffering from illness or injury would not receive necessary care and die. And yet the myth that the results of animal testing offer a close approximation of the functioning of the human body has already been debunked, marking a major breakthrough in contemporary medicine. Quality biomedical journals are increasingly stating that the fundamental differences between species mean that the results of experiments conducted on animals are not a reliable predictor of response in humans. Many significant medical disco-



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veries - such as the link between cholesterol levels and heart disease, or smoking and the incidence of cancer - were made through research on humans without any animal experiments.

Another myth perpetrated by radical supporters of animal testing claims that moving away from such experiments would mean shifting all testing onto humans. And yet such testing already happens anyway: regardless how many animal tests are conducted, for a drug to be approved for marketing, there is always a first person to take it. According to data published by the Food and Drug Administration (FDA), 92% of medicines shown to be safe and effective in animals have since been found to be dangerous or ineffective in humans. Additionally, around half of all drugs on the market have side effects which were not observed during animal testing, and many have been withdrawn since.

Further support for animal testing stems from the belief that the complex reactions occurring in cells, tissues and organs should be observed in a living organism. However, this is also questionable. Artificially infecting a healthy animal with an illness that the species would be unlikely to contract in its own environment, and keeping it in unnatural and stressful conditions, means that extrapolating its responses to humans is dubious to say the least. Physiological responses to drugs vary greatly between species: for example, penicillin is lethal in guinea pigs and ineffective in rabbits, while aspirin is lethal in cats and causes birth defects in rats, mice, guinea pigs, dogs and monkeys.

Alternatives

For the reasons outlined above, growing numbers of researchers are shifting away from using animals and instead are develo-

ping, testing and implementing alternative methods of studying diseases and testing various compounds, thus sparing animal lives. Non-animal methods generally take less time, involve fewer researchers and are less expensive than animal studies, as well as not running the risk of being hindered by inter-species differences. Such non-animal methods include sophisticated genomic methods, computer modeling, tests conducted on patients and healthy volunteers, and screening across the wider population.

The CeeTox lab conducts human cell-based in vitro toxicity screening of drugs, cosmetics and food products. The biotech company Hurel has created an artificial 3D liver from living human cells, and uses it to study metabolism of chemical compounds in the human body. VaxDesign has developed the Modular IMMune In vitro Construct (MIMIC) system, which uses human cells as an analogue to the immune system for testing the effectiveness of HIV/AIDS vaccines. Scientists from the Wyss Institute at Harvard have designed organs-on-a-chip, including a “breathing” lung-on-a-chip and a gut-on-a-chip. These minuscule devices contain human cells, arranged in 3D and mimicking human organs, used for researching a variety of diseases, testing drugs and toxic compounds. The in vitro 3D human skin tissue equivalent made by MatTek from human epithelial cells is an excellent model for studying burn healing, the effects of exposure to radiation and chemical weapons, and testing various dermatological treatments. The microdosing technique provides information on the safety of drugs by administering them at tiny doses at concentrations far lower than could be expected to have any pharmacological activity. State-of-the-art microscopy and imaging techniques provide insight into the activity of the human brain, right down to the level of individual neurons. These methods are frequently faster and less expensive than animal testing, and – most importantly – they are a viable alternative to cruel and often irrelevant research on animals.

Fundamental question

So far, I have examined the practical and scientific aspects of using animals in

biomedical research, but the moral angle must also not be overlooked. Do we have a right to make animals suffer, to imprison them, to isolate them from their mothers or offspring, to submit them to painful procedures?

The only legal document regulating the use of animals in laboratories in the US is the previously mentioned Animal Welfare Act. Animals not covered by it – rats, mice, birds, reptiles and amphibians – can be subjected to burns, shock, poisons, isolation, brain damage, starvation, and addictive substances. It also does not stipulate the use of pain relief, and as a result as recently as five years ago analgesia was only used in around 20% of rats and mice used in invasive, painful procedures. Regardless of legal requirements, the entire laboratory environment is stressful for animals – they need to be caught, transported, kept in highly unnatural conditions, isolated, and separated from their kin. The most difficult situation is faced by primates; in their natural environment, they live in groups and spend their time eating and sleeping together, grooming, playing, and developing complex hierarchies. In labs, they are frequently isolated, resulting in severe symptoms of depression, stress and deprivation which may persist for many years after the end of the research.

The question we should be asking is not, then, “Do animals think or speak?” but “Do animals suffer?” This was already being deliberated at the turn of the 19th century by Jeremy Bentham, an English liberal thinker, lawyer, philosopher, economist, and reformer of legal and social institutions. Many scholars of science and the arts have long been striving to mobilize public opinion by discussing ethical aspects of animal research and eradicating our perceived right to cause them suffering. ■

Further reading:

- Garret J. R. (ed.) (2012). *The Ethics of Animal Research: Exploring the Controversy*. MIT Press.
- Mepham B. (2008). *Bioethics*. Oxford University Press.
- Westoll A. (2013). *The Chimps of Fauna Sanctuary*. Houghton Mifflin Harcourt.
- Żylińska J. (2013). *Bioetyka w epoce nowych mediów [Bioethics in the New Media Epoch]*. Wydawnictwo IBL.