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Animal Experimentation

- a necessary evil?

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Introduction

We are becoming increasingly aware of the many ways in which animals are exploited in today's society. Never before have we used animals in such vast numbers nor exposed them to such confinement and cruel practices than we do today.

Many people would agree that such exploitation cannot be justified. There are healthier and more humane alternatives. However, there is a form of animal exploitation that gets little attention and one that is harder to oppose on ethical grounds.

Every year, hundreds of millions of animals are used around the world in experiments. They are injected with diseases, driven insane, electric shocked, blinded, burned, drowned, mechanically raped and dismembered – all in the name of human health and well-being.

It's not an issue that many people like to think about let alone address. We can argue that it's cruel, that it's unethical and that we should respect animals and afford them rights, but when we are involved in debate with researchers, or with parents of children born with genetic defects or who have terminal cancer, every ethical argument is cast aside.

Humans are considered more important and we are dismissed as caring more for animals than for people. Animal experiments are thus considered a 'necessary evil' and are kept hidden behind closed doors. Animals continue to suffer in silence.

Humane Research Australia Inc. is strongly opposed to the use of animals in research on both ethical and scientific grounds. We maintain that animal experimentation is NOT a 'necessary evil', and that instead it is unreliable science.

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Types of research

Are animal experiments still conducted today?

In Australia, around six million animals are used in research every year.[1] The procedures these animals are subjected to vary from simple observational studies to painful and invasive operations.

Animal are exploited by drug and chemical companies, universities, hospitals and other non-commercial bodies for a wide variety of purposes:

1) Basic Research:

Basic research is that performed, not to find any specific cure, but instead to increase knowledge in a general sense.

Case Study:
A classic example of 'basic research' is an experiment that occurred in Victoria. It involved eighteen marmoset monkeys who were anaesthetised and had their heads mounted in a stereotaxic (restraining) head device. Their skulls were sawn open so that brain recordings could be made while the eyes of the marmosets received visual signals. Typical recording sessions lasted 72 hours, during which the animals received intravenous fluids as well as a muscle paralysing drug. At the end of the recording session all the animals were killed with an overdose of barbiturates.[2]

A scientific consultant critiqued this research. He concluded ***"the authors do not present any clear-cut conclusion at the end of the paper. Instead, they present a long discussion, which raises more questions than it answers."***

The experiment does not appear to be applicable to human or animal health and could certainly not be considered life-saving research."[3]

1 2011 national figures collated by Humane Research Australia Inc.
2 *Spatial coding and* response *redundancy in parallel visual pathways of the marmoset 'Callithrix jacchus' Forte et al.* "Visual Neuroscience" 2005
3 Dr Andre Menache, Scientific Consultant, Animal Aid UK, 22 June 2006. (Personal correspondence)

2) Toxicity tests:

There are many types of toxicity tests - conducted to determine the level of toxicity of a substance or product.

The **Draize test** is the most traditional method of determining a product's level of irritation. It involves application of a product to the eyes of restrained rabbits. Rabbits are used because they have large eyes and few tear ducts so are unable to wash the product away with tears. The rabbits' eyes are examined for swelling, discharge and ulceration to determine the level of irritation of the product.

The **LD50 (Lethal dose 50%) test** involves the force-feeding (or sometimes injection) of a substance to animals to determine the dose that will kill 50%. Prior to death, animals often suffer from abdominal pain, convulsions, diarrhea and paralysis.

Skin irritancy tests involve the shaving and abrading of an animals' skin before applying a product.

Other forms of toxicity testing are used for environmental reasons (the mouse bioassay to determine the toxicity caused by algal blooms in water) and medical reasons (for carcinogenicity, mutagenicity and teratogenicity - the latter being to determine whether a substance causes malformations in the embryo.)

> ***"The best guess for the correlation of adverse reactions in man and animal Toxicity data is somewhere between five and 25 per cent."***
>
> - Animal Experiments: Bad Ethics Bad Science, quoting Heywood R, 1989.
> Animal Toxicity Studies: their relevance for man. Eds C E Lumley and S R Walker.

3) Genetic engineering:

Genetic modification is the process of transferring (transgenesis) or removing (knockout) one or more genes in order to produce a particular trait in the recipient species. The recipient animal should then be able to successfully reproduce offspring that carry the trait. An animal that has undergone this process is said to have been 'genetically modified.' In the case of mammals, the process usually involves direct injection of foreign DNA into the nucleus of a cell during its early embryonic stage. Its first 'success' was in 1985.[4]

4 Cunningham, E.P. (1999) The application of biotechnologies to enhance animal production in different farming systems, Livestock Production Science 58, 1-24.

There are several reasons for this type of research:

- To improve productivity of agricultural animals e.g. enhanced wool production in sheep and increased growth of animals used for food.
- To counter obstacles in animal research, such as removal of a protein that causes rejection if a part of that animal is transplanted to another animal (xenotransplantation), or to create animals with a pre-disposition to disease, which will allow them to be used as 'models' for such conditions as cystic fibrosis, multiple sclerosis, and other diseases.
- For the production of therapeutic products, such as pharmaceuticals in milk or human insulin which can be produced by transgenic bacteria.

The procedures that genetically modified animals must endure are above and beyond that of other experimental animals, as they are subjected to both the modification process (and resultant effects) as well as the actual procedures relevant to the research to which they have been assigned.

While genetic modification occurs naturally and is indeed the basis for natural selection and evolution, the intervention of humans in the process comes at great cost.

The following concerns have been cited by Christiansen and Sando[5]:

- Reproductive techniques such as superovulation, insemination and embryo transfer can cause stress.
- Production of large offspring causing difficult births.
- Increased incidence of genetic anomalies.
- Clones are often behaviourally retarded and experience joint problems.
- Insertion of foreign DNA can lead to unpredictable responses from totally unrelated genes.
- Manipulation of genes may prevent the expression of stress responses.
- Engineering a loss of genetic diversity may make animals less resistant to newer diseases.

5 Christiansen, S.B. , & Sando, P. (2000). Bioethics:limits to the interference with life. *Animal Reproduction Science*, 60-61. 15-29.

4) Xenotransplantation:

Xenotransplantation is the transplantation of cells, tissue or organs from one species to another and is one of the reasons that transgenesis is performed. The main reason given for this type of research is the shortage of human organs and tissues available for transplants.

One of the biggest obstacles to the “successful” transplantation of foreign organs, tissue or cells into another species is the need to overcome rejection. The introduced cells/tissue/organ is recognized by the recipient as being foreign and is therefore attacked by the recipient’s immune system. Sometimes the strong response cannot be controlled by merely suppressing the immune system and is then referred to as hyperacute rejection.

In order to overcome the hyperacute rejection, source animals are genetically modified by inserting human genes so that the human recipient’s immune system is tricked into not recognizing it as being foreign. Alternatively, the source animal may have a gene removed. The most likely source animal for human transplants is the pig. 'GAL-knockout' genetically modified pigs have been modified to remove a galactose sugar which triggers an immunological response in humans.

Another major danger with xenotransplantation is the possibility of a virus crossing the species barrier. The virus may be harmless in its original host species but can mutate and cause great harm to its new host and may lead to the emergence of a new epidemic. These diseases are referred to as zoonoses. Examples of diseases believed to have originated from another species include BSE, Avian Bird Flu and HIV/AIDS.

5) Psychological research:

This type of research is not always physically invasive but can cause extensive psychological and emotional stress, such as through inflicting fear or loneliness.

Case Study:

A well-known and particularly controversial historical example was performed by American psychologist Harry Harlow who conducted maternal deprivation and isolation experiments on monkeys. His work involved raising infant rhesus monkeys in isolation chambers where they had no contact with other monkeys or humans. After being isolated this way for up to 24 months the severely disturbed monkeys demonstrated the importance of care giving and companionship in the early development of primates.[6]

6) Agricultural research:

One of the main uses of genetically modified and cloned animals is to increase the productivity of farm animals.

The genetic modification of animals is even more unjustified when it is for this purpose. The animals currently used for food and fibre already produce to their capacity, and current intensive housing facilities fall very short of fulfilling adequate welfare standards. The manipulation of these animals to produce an even higher yield is merely a further assault on their already exploited bodies.

6 "Monkey Love", Four Corners, ABC TV 12/6/06

7) Observational Studies:

Whilst considered the least invasive of all animal research, observational studies may still cause distress to the test animals. Even studied in their natural environment, animals are sometimes trapped and restrained to be fitted with electronic tagging devices and again to have them removed at the end of the experiment.

The trapping and anaesthetising of the animals may leave them vulnerable to predators, particularly if they are still disorientated or relocated to unfamiliar territory. In some cases the tagging devices cannot be retrieved and they can remain on the animal throughout the remainder of their life. This can cause problems when the animal grows, for example collars can restrict breathing or small antennae may catch on foliage and cause an animal to be trapped.

Ethics

Who's more important – your child or your dog?

In almost every situation, a parent would choose to save the life of their child over that of another. This does not imply that their child is more important than another child, but rather it is a basic and instinctual reaction. As with any other species, humans have an intrinsic urge to protect their own offspring in an attempt to further enhance their species.

Unfortunately the "dog or your child" argument is frequently used by proponents of animal experimentation to convince people of the necessity to use animals to save lives. The truth is however, that using a different species on which to conduct research and obtain data is misleading and can cause suffering to both the child and the dog. We therefore owe it to our family and friends to promote human-specific medical research.

As there is much evidence that data extrapolated from animal experiments can prove misleading or even fatal when applied to humans it is unethical to continue with methods that exhaust precious research funding, waste valuable time, and delay progress toward genuine human cures.

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Legislation and Protection

Aren't animals protected through welfare legislation?

Prevention of Cruelty to Animals (POCTA) Act and Codes of Practice

Animal welfare legislation exists to protect animals from unnecessary suffering being inflicted upon them either through intentional cruelty or through neglect. However the Act is very general and cannot be specific to all species and all circumstances. The welfare needs of dogs in boarding kennels for example, would be very different from the needs of a layer hen in a battery cage. Codes of Practice therefore exist to address issues that relate specifically to the welfare concerns of animals covered in the relevant Code and provide guidelines on what is necessary to ensure that the welfare needs of such animals are met.

Codes of Practice often work against the animals' best interests however, as some acts of cruelty are exempt within the Act as they are in accordance with the Code of Practice. Without Codes exempting certain actions many research institutions would be unable to operate as the confinement and treatment of animals would otherwise constitute cruelty.

Codes therefore serve a dual purpose – to address specific needs of animals through providing guidelines for their treatment, and to allow animal industries to continue certain procedures and practices without breaking the law.

Ethics Committees

Before any research involving animals is conducted in Australia, it must first be approved by an Animal Ethics Committee (AEC).

They consist of the following people:

Chairperson
Category A - Veterinarian
Category B - Scientist/Researcher
Category C - Animal welfare representative
Category D - Layperson.

The role of this committee is to ensure that the research adheres to any guidelines, that the number of animals used and the level of suffering is kept to a minimum, that non-animal alternatives are used wherever possible and that the use of animals in the research is ethically justified. It is impossible to know how effective these committees are however, as all information on protocols and decisions made remain confidential. It is also unlikely that the category C and D people have sufficient scientific knowledge to challenge the research.

The 3 Rs

William Russell and Rex Burch proposed the three R's – replacement, reduction and refinement -in their manuscript *The principles of humane experimental technique*, published in 1959. The recommendations, which have been universally accepted, were intended to reduce the overall amount of suffering caused to animals during research.

Unfortunately, reduction and refinement do not address the fact that results from animal experiments can be dangerously misleading when applied to human health. It is therefore pointless to use fewer animals or refine the procedure when it is the wrong procedure to follow. Replacement is therefore the only one of the R's that remains a credible objective.

The major problem with legislation, codes of practice, ethics committees and the 3R's principle is that they serve to endorse the belief that animal experiments are necessary, rather than challenge its validity.

Species Differences

Don't we need to test on animals before people?

Extrapolation from animals to humans can and often does result in dangerously misleading outcomes. The reason is due to “species differences.” Different species have a different genetic make-up and it is on the genetic and molecular level that variances occur.

Results can differ between different sexes of the same species, different strains, and even due to different housing conditions or levels of stress within the same species. So if such differences can occur within the same species then it’s negligent to extrapolate from say a rat to a human – two totally different species with a totally different genetic make-up.

> ***“The Pharmaceutical Research and Manufacturers of America (PhRMA) estimate that for every 1,000 drugs that are tested on animals, only one reaches human clinical trials… Of the drugs that make it to these human trials, only one in five are eventually approved by the FDA. That’s a staggering failure rate of roughly 99.9 percent!”***
>
> - Letter to the editor, MRMC Update January 27,2007

Even when we consider the species with who we share a large percentage of genes, another fundamental difference is the way in which these same genes are regulated (or “turned off” and “turned on”).

For example, humans and mice share 99% of the same genes. Both humans and mice have the genes that enable us to grow a tail. In humans that gene is “turned off” but in mice it is “turned on,” so despite us both sharing these common genes they are regulated in different ways and result in mice, and not humans, having tails.

Researchers often claim that animals are used because they need to test in an entire living system rather than on isolated cells or tissue, however an entire living system (of the wrong species) creates exponentially more variables that can further affect the outcome of any results. Already, non-animal methodologies exist that can mimic the human living system. These include micro dosing and microfluidic chips.

> ***“Using animal ‘models’ is often an easy way to manipulate an almost infinite number of variables and generate data that in themselves can be totally worthless.”***
>
> - Marjorie Cramer, M.D., MRMC Report Vol.4 No.3 July 1991.

Another problem in using animals is that quite often a disease that is being researched does not appear in its natural state but instead is artificially induced in the research animal. This can result in the same symptoms being expressed but the underlying illness is not the same as in its human form. Treatments then try to cure the symptoms of the falsified illness but is not addressing nor curing the real problem, which may have been caused, or further affected, by social and environmental factors rather than biological factors alone.

'Every species has its own metabolic pattern, and no two species are likely to metabolise a drug identically.'

- Dr Miles Weatherall, vivisector and former director of Welcome Research Laboratories.[7]

Some examples of 'species differences' are:

Morphine sedates man but stimulates cats

Aspirin causes birth defects in rats, mice and monkeys but not in humans;

Penicillin is highly toxic to guinea pigs and hamsters, yet safe in mice and rats; and

The common industrial chemical benzene causes leukemia in man but not in mice.

To further illustrate the existence of species differences, think about why doctors treat humans and veterinary surgeons treat animals, and why there cannot be any interchange. Why don't we give panadol or aspirin to our companion animals, and why don't we use Excelpet's worming tablets to treat intestinal worms in our children?

7 *Nature*, April 1982, pp.387-390

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A futile waste of resources

Examples of why animal models don't work

Cancer

Millions of rats and mice are used each year in an attempt to find a cure for cancer, yet humans and rodents do not develop the same kind of cancers. Rodent cancers are generally sarcomas (arising in the bone, connective tissue or muscle) while most human cancers are carcinomas (arising in covering or lining membrane).[8]

Cancer that is induced artificially in a laboratory animal must develop quickly and cannot adequately mimic a naturally-occurring cancer, which may take a long time to develop.

Over the last two decades, researchers around the world have been breeding mutant mice with faulty oncogenes that readily grow tumors… But the result has been hundreds of drugs that cure cancer in mutant mice – and don't do much for human cancer victims. Meanwhile, cancer is still killing about 7 million people worldwide every year…. And that's despite the fact that in the United States alone, some $6 billion a year is sunk into cancer research."

- 'Chasing Cancer' The Bulletin, 19 September 2006.

AIDS/HIV

HIV is a retrovirus that infects and damages the immune system leaving the patient susceptible to a range of other diseases (which are the cause of death). Despite the continued focus on using primates to find a cure for this disease, the condition is only found in humans, hence the term; Human-Immunodeficiency virus.

Chimpanzees exhibit only a flu-like illness when injected with the HIV virus, and vaccines tested on chimpanzees have been unsuccessful, as they do not show the antibody or cell-mediated response to HIV that humans do.[9]

8 "Exploding a Myth. Questions and Answers on Vivisection", AAHR, 1988
9 "Expressions 5", National Anti Vivisection Society, 2002

"..no single animal model perfectly reproduces the symptoms of HIV-1 infection and development of the disease in the diverse human population. The primate models that are currently available have inherent limitations. Despite the fact that chimpanzees are naturally infected with the SIVcpz, which is the most likely forebear of HIV-1 in humans, they are resistant to AIDS."

- The ethics of research involving animals, Nuffield Council on Bioethics, 2005, p.116

Parkinson's Disease

Parkinson's disease is caused by the degeneration of a specific part of the brain and as animals are unable to contract the disease, researchers can only replicate some of the symptoms (called Parkinsonism). This is done by applying MPTP (a by-product of synthetic heroin) to the brains of animals. The neurotoxic damage caused by this drug (usually to marmoset monkeys) is reversible and the monkey recovers gradually – unlike the real disease in humans. Furthermore, the illness is induced quickly – unlike the slow degeneration in humans – and animals cannot communicate the difficulties they encounter such as symptoms, emotions and difficulties in motor functions.

Human studies have revealed that the specific area affected by Parkinson's disease is a part found in the basal ganglia. Animals do not have a comparable basal ganglion![10]

10 "Parkinson's – The Truth" www.speakcampaigns.org/

Delays and disasters caused by our reliance on animal research

Researchers cite a number of examples of which they consider the use of animals to be integral. However they do not provide any measure of how the perceived 'successes' compare with the number of delays and disasters animal use has caused throughout history. For example:

- 85% of drugs that reach clinical trial fail to attain general distribution (which certainly questions the efficacy of animal tests).[11]

- the development of the Polio vaccine, often cited by researchers as an example of the necessity of animal experiments, was long delayed due to misleading results from primate experiments. This was stated under oath by Dr Sabin (pioneer of the polio vaccine).[12]

- Penicillin was delayed for 15 years and blood transfusions for more than a century.

We are constantly reading news headlines that breakthroughs have been made in the cure against cancer yet today it remains one of the greatest killers in the Western world. What we don't hear are the many drugs that are recalled on a daily basis – drugs that have been "successfully" tested on animals and have later proven to be dangerous to human health.

> ***"Currently, nine out of ten experimental drugs fail in clinical studies because we cannot accurately predict how they will behave in people based on laboratory and animal studies," said Health and Human Services Secretary Mike Leavitt.***
>
> - FDA Issues Advice to Make Earliest Stages Of Clinical Drug Development More Efficient. Press release / FDA 12 Jan 2006

The use of the following drugs/procedures were delayed for many years due to the misleading conclusions from animal-based research:

Penicillin

Discovered by Fleming in 1928 who found that bacteria would not grow on a culture medium accidentally contaminated by a mould. Even before this discovery however, mould on damp cheeses were used to make a plaster for infected wounds. Fleming lost interest in his discovery when a sample was injected into rabbits and became deactivated by blood. Many years later, the drug was resurrected by Oxford scientists Florey and Chain. Fleming wished to inject penicillin into the spine of a dangerously ill patient but the results of the administration were unknown. Florey tried the experiment on a cat, but due to a shortage of time it was also administered to the patient before the results of the cat test were available. The cat died, however the patient's health improved.

11 Dr Robert Coleman of Pharmagene PLC, giving evidence at the House of Lords Select Committee on Animals in Scientific Procedures (April 2002) UK.
12 Dr Ray Greek MD, Proof of Evidence supplied to University of Cambridge in response to their planning appeal for a proposed primate research facility.

Blood transfusions

Following the discovery of blood circulation in 1666, Richard Lower transferred blood from one dog to another. A year later, French physician Jean Denis transfused lambs blood into a boy. After a number of patients died following the procedure, and a lawsuit brought against the professor, no further attempts were made for more than a century. It wasn't until the early part of the nineteenth century that it was realised that transfusions could only be sourced from human donors, and the method only became safe after the discovery of the main blood groups by Karl Landsteiner in 1900. The discovery was made by mixing human blood in test tubes and not through the use of animals.[13]

Digitalis

The beneficial effects of digitalis for the treatment of heart conditions were known for many years however its widespread use was delayed because animal experiments indicated a dangerous rise in blood pressure.[14]

Iron Sorbitol

Used as a treatment for iron deficiency anaemia. It was originally injected into the muscles of rats and rabbits and found to cause sarcomas at the site of injection. 20 years after the initial research on rats it revealed no real hazard during clinical experience.[15]

13 R. McGrew, *Encyclopaedia of Medical History*, MacMillan Press, 1985
14 M.Beddow Bayly, *The Futility of Experiments on Living Animals,* NAVS, 1962
15 M. Weatherall, *Nature,* 387-390, 1 April 1982

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Some examples of where animal research has gone wrong. The following drugs were 'successfully' tested on animals:

Drug	Purpose	Result
Thalidomide*	A sedative and to treat morning sickness in pregnant women.	Found to cause damage to the human fetus, resulting in 10,000 children born crippled and deformed with missing limbs.
Opren	Arthritis drug.	Found to be highly toxic in humans, with 3,500 reports of harmful effects including 61 British deaths, mainly through liver damage in the elderly.
Clioquinol	Ingredient in anti-diarrhoea drugs	At least 10,000 people, and possibly up to 30,000, fell victim to SMON (subacute myelo-optic neuropathy), a disease that causes numbness, weakness in the legs, paralysis, eye problems including blindness, all due to nerve damage.
Diethylstillbestrol (DES)	A synthetic estrogen prescribed to pregnant women to prevent miscarriage	Increased spontaneous abortions, premature births and neonatal deaths. Increased risk of vaginal cancer in daughters and granddaughters of users.
Vioxx	Painkiller for rheumatoid and osteoarthritis	Increased risk of cardiovascular events despite being shown to be cardio-protective in mice.
Ritalin and Dexamphetamine	Treatment of ADHD, especially in children.	Children as young as 5 suffered strokes, heart attacks, hallucinations and convulsions, shortness of breath, heart palpitations, hair loss, muscle spasms, severe abdominal pain, tremors, insomnia, severe weight loss, depression and paranoia.
TGN1412 **	Treatment of inflammatory conditions (especially rheumatism) and leukemia	Volunteers in a clinical trial suffered poor breathing, heavy swelling of neck and head, organ failure

These are only a small number of examples in which literally millions of lives may not have been lost had we not relied on the dangerously misleading results from animal experiments. Had we instead looked more closely at human conditions, then we can only wonder how much further we may have progressed by now.

**** Thalidomide Tragedy***

The thalidomide tragedy is probably the most well-known example of how animal experiments have been misleading. This drug, that was intended to prevent morning sickness, resulted in tens of thousands of children born with severe deformities such as missing limbs.

It has been claimed that had it been tested on pregnant animals we would have seen malformations, however after thousands of malformed babies were born researchers started conducting teratogenicity tests and failed to produce similar malformations in numerable other species.

Finally, the White New Zealand rabbit also gave birth to deformed offspring, but only at a dose between 25 to 300 times that given to humans. It also eventually occurred in monkeys, but only at ten times the normal dose. The bottom line is that more animal testing would not have found the side effects, and even if they had tested on the White New Zealand rabbit, Thalidomide would still have gone to market since the vast majority of species showed no ill effect. It is only possible to produce specific deformities in specific species, and chances are the right species would never have been used.[16]

***** TGN1412 Tragedy***

> ***"Preclinical trials in monkeys had shown no such adverse reaction, despite the fact that they share an almost identical receptor for the antibody." [Referring to TGN1412 trials]***
>
> - "The Elephant in the room" Nature, Vol 444, Issue no.7121, 14 December 2006

The outcome of the UK drug trial of TGN1412 in 2006 was unfortunate, but is indicative of how "species differences" make animal experiments a dangerous mode of research. Six healthy volunteers become seriously ill after participating in a clinical trial of a new drug in the UK. This is despite the fact that the drug, coded TGN 1412 had completed pre-clinical trials (animal tests) which did not indicate there was likely to be any serious side effects in humans.

The drug is a genetically engineered "humanised" protein which was being developed by German pharmaceutical company TeGenero AG. It was intended to treat inflammatory conditions, rheumatism and leukemia. The six men reportedly reacted immediately when administered the drug, by experiencing excessive swelling of the head and neck followed by organ failure.

16 Specious Science, Drs Ray Greek and Jean Swingle Greek. p.108

Regardless of whatever results are taken from animal experiments, ultimately it is humans that are the real guinea pigs. It is essential that we accept that species differences will always mean that humans metabolise and will react to drugs differently than other species.

> ***"…following the 'successful' completion of all the animal tests, more than 80% of new drugs fail when administered to healthy human volunteers during Phase 1 clinical trials."***
>
> – BM Bolton and T DeGregario, Nature Reviews Drug Discovery (2002) 1 (5): 335-336, quoted by Animal Aid in 'Monkeying around with human health.'

Another thing worth considering is the number of drugs and treatments that were abandoned because they ***didn't*** work in animals. We may easily have inadvertently discarded a potential cure for cancer!

It is becoming more and more apparent that reliance on animal-based research is nothing more than a quantum leap of faith and cannot continue as traditional research practice.

The irrelevance of animal models

The British NHS (National Health Scheme) funded six studies to quantify the relevance to humans of testing treatments on animals. The studies compared systematic reviews of human clinical trials with corresponding animal experiments and found that in four out of six interventions, the animal studies did not clearly predict the human outcome.[17]

The report showed that:

- Animal researchers don't talk to hospital doctors about their work
- Clinical trials with human patients get underway even before the animal research is completed
- Drugs that fail in animals are used in humans anyway
- A drug that increased overall mortality in animals was, nonetheless, used in people
- Most of the animal research that was analysed was poorly conducted and gave conflicting results.

> ***"Crucial genetic, molecular, immunologic and cellular differences between humans and other animals have prevented animal models from serving as effective means by which to seek a cancer cure."***
>
> - A Critical Look at Animal Experimentation, Medical Research Modernisation Committee.

The study by Peral et al, which was titled "Comparison of treatment effects between animal experiments and clinical trials: systematic review" concluded that animal experiments often fail to predict outcomes in humans.[18]

Clearly, the discordance is being recognized by health care professionals. Patients advocacy group Europeans for Medical Advancement conducted a survey of British general practitioners in 2004. 500 GPs were asked their opinions on animal testing and its relevance to their work. 82% were concerned about animal data. 51% would have more confidence in human-based tests.[19]

This is further illustrated by the emergence of such groups as Physicians Committee for Responsible Medicine (PCRM), Doctors and Lawyers for Responsible Medicine (DLRM), Americans for Medical Advancement (AFMA) and Europeans for Medical Progress (EMP) – all consisting of scientists and health care professionals who oppose the use of animals in medical research.

17 Animal Aid media release 7/6/06
18 BMJ, 15/12/06, bmj.com
19 Alternative News 85, spring 2005, p13 and 'Good Medicine', PCRM, Winter 2005, p5

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Real Medical Progress (without animals!)

Where would we today if it wasn't for research using animals?

The following advances in medical progress have all been achieved without the use of non-human animals:

Sanitation

In the mid to late 19th Century, death rates fell dramatically due to the decline in infectious diseases, including TB, bronchitis, pneumonia, influenza, whooping cough, measles, scarlet fever, diptheria, smallpox, cholera, typhoid, diarrhoea and dysentry. However the mortality for each of these infections was declining long before the introduction of antibiotics and immunization. Instead they have been linked to public health measures and social legislation that have improved the living standards of working people, and to better understanding and availability of nutritional requirements.

Surgery

Surgery, particularly for wounds of the heart and chest during the Second World War became a common procedure, providing opportunity for many fundamental skills of heart surgery to be developed.[20]
Lawson Tait has been recognised as one of the most brilliant surgeons in history and pioneered many of our present day surgical techniques. He was also a fierce critic of vivisection. He was the first to successfully perform a cholecystectomy (gall bladder operation), removal of the appendix, operation on a case of ruptured ectopic pregnancy, and many abdominal operations. He was also a strong proponent of cleanliness during surgery, which during his time was not a common practice.[21]

Anaesthesia

Before the discovery of anaesthetics, the best surgeons were those who could perform painful operations in the shortest possible time. The introduction of anaesthesia was therefore considered to be a huge medical advance.
In the 1840's, laughing gas parties and 'ether frolics' were popular entertainments amongst medical students. It was the recreational inhalation of ether that prompted Dr Crawford Long to suggest its use for surgical procedures. Further 'partying' led to the discovery of the properties of chloroform and others.

X-rays

Discovered by accident in 1895 by physics professor Wilhelm Rontgen. He was passing electrical discharges through a partially evacuated glass tube when he discovered that highly penetrative but invisible rays were emitted from the tube. By putting his own hand in the path of the rays he learned that flesh but not bones was transparent to the rays.

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20 *The Wellcome Museum of the History of Medicine (Science Museum, London, 1986*
21 Lawson Tait, *Transactions of the Birmingham Philosophical Society*, 20 April 1882

When animal research DOES work

What about all the medical advances that HAVE been made through research on animals?

Many researchers acknowledge the arguments against animal experiments, but they insist that using animals HAS made some advances. However these could have been made through other means. Additionally, many discoveries were made by non-animal methods, and later experiments on animals only further verified these breakthroughs as being correct.

William Harvey for example, has been credited as being the first to provide an accurate description of the blood's circulation in 1628 through using animals (although it has been reported that the Chinese understood the blood's action as early as 2,650 B.C.). However Dr Lawson Tait (one of the most famous surgeons of the nineteenth century responded:

"That he [Harvey] made any contribution to the facts of the [blood circulation] case by vivisection is conclusively disproved… It is, moreover, perfectly clear that were it incumbent on anyone to prove the circulation of the blood as a new theme, it could not be done by any vivisectional process but could, at once, be satisfactorily established by a dead body and an injecting syringe."[22]

Ovarian function was demonstrated by physician Dr. Robert.T. Morris in 1895 in surgical procedures on women, yet history credits the discovery to Emil Knauer who one year later reproduced the procedure in rabbits in 1896.[23]

Banting and Best are often cited as having discovered insulin through animal experiments in 1922. However further investigation of the history of diabetes reveals that this is not quite the case. The connection between diabetic symptoms and the pancreas dates back to 1788 when an English physician, Thomas Cawley, performed an autopsy on a diabetic. Unfortunately subsequent research on animals delayed the acceptance of his hypothesis. Despite the existence of this knowledge, it was evidence obtained from Banting and Best's dog experiments that was the convincing factor for scientists.

"***Historically, vivisection has been much like a slot machine. If researchers pull the experimentation lever often enough, eventually some benefits will result by pure chance***."

- Dr John McArdle, Animals Agenda, March 1988.

22 Tait, L. (1882) Transactions of the Birmingham Medical Society, quoted by Greek, R and Swingle Greek, Jean, (2002) Specious Science
23 Greek R. and Swingle Greek, Jean (2002) Sacred Cows and Golden Geese.

Such logic however, does NOT constitute good science.

It seems that all too often researchers insist on animal experiments in an attempt to verify any discovery, however the use of animals to further work does not change the fact that a technique or discovery was made without animals.

“Today, science is studying diseases and drug responses on a very different level than in the 1800s and early 1900s. In the past, science was looking at traits and functions that were largely shared among species thus animals were used as surrogate humans. Science is currently studying disease and drug response at the level where the differences between individual humans are of critical significance.”

- http://afma-curedisease.org/historical-breakthroughs.html

Why it continues

So if using animals is unethical and scientifically unreliable why does it still go on?

There are many reasons that animal-based research still occurs. Primarily it is due to the many vested interests attached to its continuation. There are many businesses that thrive from breeding laboratory animals with specific traits, manufacturing housing systems, and of course the pharmaceutical companies that want quick results - despite these results often providing misleading information that has led to drug recalls.

Another reason is for academic recognition. Using animals can be a quick and easy way to get scientific papers published, and of course the greater 'credibility' (through producing papers) the more chance of receiving government and public grants to continue more animal research.

Some countries' legislation actually requires animal testing. There is no legislative requirement in Australia to use animals, however drug developers seek an international market, so they need to adhere to the overseas requirements.

Unfortunately researchers who use animals are seldom questioned about their methodology and the public are denied access to knowing what happens to animals nor how inaccurate the results can be when extrapolated to humans. They therefore continue their practices as the public (incorrectly) believes it to be a 'necessary evil' for medical progress.

Alternatives

If we don't experiment on animals what else can we do?

With animal-based research so entrenched in our scientific community, one may wonder how medical progress could ever occur without the use of animals – to test new drugs, to determine biological, neurological and pathological processes etc. Animal-based research, however, is only one method of research. There are many others.

A different approach

The move away from animal use is not simply a matter of replacing such procedures with non-animal methods, but rather, there is a need to re-evaluate the entire process of how we approach medical research.

Far more emphasis needs to be placed on prevention, epidemiology, and clinical research and autopsies so that we can address the real disease rather than a replica in a model of another species.

Prevention is clearly the best option when it comes to human health. The large majority of illness and deaths in our society today are attributable to lifestyle choices rather than to genetic disorders and disease. Heart attack and stroke (atherosclerosis), many cancers, obesity and motor accidents are largely preventable. By placing greater emphasis on diet and lifestyle education our society would enjoy a much higher level of health and longevity.

Epidemiology is the study of human populations and the direct observation of disease progression so that preventative measures can be taken. These population studies have led to a vast knowledge in regards to the causes of many cancers – including the link to smoking, the effect of diet on atherosclerosis, the benefits of a diet rich in fruit and vegetables and reduced salt intake.

The analysis of data obtained through epidemiology can also factor in environmental and lifestyle aspects that impact on the disease and recovery.

Autopsies Back in the 18th century autopsies provided a vast amount of knowledge about the human body, and disproved much that was learned previously through animal experiments.[24] They are a credible way of determining the cause of illness, revealing undiagnosed findings and making valuable discoveries, however they are no longer routinely performed.

In vitro literally means “in glass” and is an alternative to using live animals in experiments. The advantages of using tissue and cell cultures are that they can be derived from humans (often after death) and so there is no inter-species variation, the cells are the same and so can be compared with other laboratories, and the experiments are quicker, cheaper and more humane.

Examples of these methods include the Ames test, which uses bacteria to test for mutagenicity (which usually correlates to carcinogenicity); growth of human skin cells to test toxicity; and the use of human placentas.[25]

Computer Modeling is used to screen thousands of chemicals by building on the knowledge that we have already obtained about their structure and predicting their likely reaction with living cells. Computers are now able to simulate parts of the human body as mathematical equations. They can also create three-dimensional graphical models of molecules, which will allow the study of their shape and structure. The use of computer modeling means that information can be obtained through comprehensive medical databases rather than having to repeat experiments conducted previously.

24 Greek, C. Ray & Swingle Greek, Jean, (2000) Sacred Cows and Golden Geese.
25 Animal Experimentation, Resource Material for Students (1991) Animal Liberation SA.

New technologies: Despite claims by some researchers that alternative methods are not yet sophisticated enough to replace animal tests, they are certainly more dependable and produce more accurate results than tests on species who differ from humans in their metabolism of toxins, rates of detoxification and protein binding, absorption of chemicals, mechanisms of DNA repair and lifespan – all factors that would have a profound effect on the efficacy of drugs. The following list provides just a snapshot of some of the emerging technologies that will replace outdated and unreliable animal tests.

Genomics: The study of nucleotide sequences, structural genes, regulatory sequences and DNA within the chromosomes of an organism.

Proteomics: Analysis of the expression, functions and interactions of proteins expressed by the genetic material.

Nanotechnology: The science of assembling materials one atom at a time by combining molecular biology, chemistry, physics, engineering, computer science and electronics. It enables scientists to see atoms they are working with and piece them together in different ways.

Pharmacogenomics: Using cell-based assays, computer modeling and innovative technology, it identifies complex patterns of gene variations and enables scientists to classify patient populations according to their own individual response to a drug.

Phage Display: A method of quickly evaluating a huge range of potentially useful antibodies, and then producing large quantities of the selected ones. It is the interaction between a virus and a bacterium to produce antibodies, which can be produced in a much shorter time than traditional animal methods.

Microdosing: a sophisticated new method of predicting human reactions to new drugs. It involves giving research participants miniscule doses of an experimental drug – doses far too small to have any health effects – then tracking the drug's movement through the body by radio labeling. Its distribution and metabolism in bodily fluids is measured and enables researchers to quantify its concentrations in blood, urine, saliva and white blood cells.[26]

The Hurel cell: a new microchip system consisting of a network of interconnected reservoirs mimicking the organ systems of a living being. Researchers can place lung, liver, fat, gastric or heart cells inside the reservoirs, add a particular drug and quickly evaluate how the chemical is absorbed, distributed, metabolized and excreted. It also enables scientists to see how a specific drug may affect multiple organs simultaneously in a human.[27]

Non-invasive imaging techniques: Technologies such as Magnetic Resonance Imaging (MRI), Positron emission tomography (PET) and ultrasounds allow us to visualize internal structures of the human body.

26 Good Medicine, PCRM, Winter 2006/Vol.XV, No.1. p.4
27 Ibid.

Conclusion

The use of animals in medical research is unjustified. This is based on both ethical and scientific grounds. There has been too much damage caused by the inaccurate extrapolation of information from non-human animals to humans, and with 21st century technology we should be moving away from such archaic research methods and looking toward more humane and scientifically-valid methodologies.

Researchers may fear that without using animals there would be no medical progress, but that is certainly not the case. If one road is blocked then we must take another route – and in this case a much better route. Medical progress WILL continue and researchers WILL find other better ways, for that is what science is all about.

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Humane Research Australia Inc. is a non-profit organisation that challenges the use of animals in research and promotes the use of more ethical and scientifically valid non-animal methodologies. For further information, please visit our website at **www.humaneresearch.org.au** or via the following contact details:

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