CARDIAC ARREST

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PREFACE

The purpose of this booklet is to address the pro-animal research information sheets being distributed by the American Heart Association.

According to the American Heart Association, 22% of their funds are spent on animal research. In order to justify these expenditures to the public, the AHA has printed some pro-vivisection information to send to any would-be supporters who might wonder just how animal research has helped heart patients. At first glance, the list of "advances that depended on animal research" seems impressive - 42 of them. However, medical history shows that not one of the 42 named advances depended on animal research. Furthermore, general statements made by AHA in support of animal research are lacking in logic and truth.

Undoubtedly, 22% of AHA's income is a large sum of money. Imagine how many heart attacks could be prevented if those same funds were used to educate the public about prevention. Why the false claims about animal research? Why does it continue? Where are the cures? Think about who is profiting from animal research. Vivisectors know that money that could be used to help human heart patients is purposely thrown away on inapplicable animal experiments, ensuring that the problem is not solved and the profits keep rolling in. A river of gold continues flowing into a mammoth establishment, the lush survival of which depends on a state of no cure.

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INTRODUCTION

This booklet adds to the already extensive body of evidence disproving the claims that humans benefit from experimental research conducted upon non-humans. The American Heart Association (AHA), amongst its literature, distributes the three pieces this booklet specifically refutes: "Position of the American Heart Association on Research Animal Use"; "Assurances of Responsible Use of Animals"; "The Heart Transplant and Other Cardiology Advances That Depended on Animal Research: A Chronology". The latter piece makes 42 claims. Most of this booklet is devoted to disproving each of those claims, one by one.

The purpose of this booklet is not to assess, evaluate or question the intentions, motives or character of the AHA, but simply to show that the claims made by the AHA are incorrect.

This booklet uses the terms 'vivisection', 'animal research', and 'animal experimentation' synonymously. Although humans are animals, this booklet uses the word 'animal', as do most people, to mean 'non-human animal'.

The contributors to this booklet readily concede all of the more cogent ethical, moral and philosophical arguments against vivisection. Vivisection is cruel, causes pain, suffering and torment, and is a self-evident atrocity. These forms of antivivisectionist arguments have existed and have been used since the first animal experiment was conducted. Not only have they not stopped vivisection, vivisection has steadily increased despite them. The only practical conclusion to draw is that they have not been effective antivivisection arguments. This booklet is not predicated upon why they are ineffective. It merely acknowledges and accepts that this is so, and consequently addresses the AHA's vivisectionist claims from a scientific point of view.

The contributors to this booklet also maintain that vivisection is an inherently flawed method. A correct method of inquiry is one that is known, prior to the commencement of actual research, to yield results applicable to the purpose of the enquiry. Vivisection represents a totally erroneous methodology because it lacks this inherently essential quality. Vivisection has no reliable predictive features. Only after enquiries are made of human subjects can the results culled from animal experiments be evaluated accurately. This makes vivisection superfluous at best. The medical dangers of vivisection emerge from the false predictive value vivisectors assume. This explains why vivisection is responsible for one medical disaster after another: the controlling medical community relies, preponderantly and often exclusively, upon the grossly unreliable. Both the collective human and animal communities pay dearly and tragically for this literally senseless, thoroughly unscientific behavior.

Jack Tanis

Position of the American Heart Association on Research Animal Use

A Statement for Health Professionals by a Task Force
Appointed by the Board of Directors of the American Heart Association

American Heart Association

Rationale Millions of Americans today are healthy, and other millions are alive, because of advances in the prevention and treatment of heart disease. Death rates from the major forms of heart disease have declined steadily since about mid-century, and the decline is continuing. Most recently, between 1972 and 1982, the death toll from cardiovascular disease declined 28 percent. The decline is largely related to changes in life style and development of methods of treatment, many of which are based upon animal experimentation. These events encourage medical scientists to believe that most heart attacks, strokes, and hypertension can ultimately be prevented or their onset can be deferred so that they do not cripple or kill people prematurely.

Effective prevention and treatment of disease depends on accurate knowledge about the causes of disease, on information about how disease affects the body, on drugs that combat disease, on devices that work, and on operations that cure. The knowledge, material, and skills on which prevention and treatment are based have come from a wide variety of sources—basic scientific disciplines such as chemistry, biology, physics, engineering, mathematics, and many others; observation of naturally occurring disease in human and animal populations; and experimentation on human subjects and animals.

Great benefits have resulted from applications of this knowledge, including the heart-lung machine, repair of congenital heart defects, heart valve replacement, cardiopulmonary resuscitation and the use of drugs to combat hypertension and prevent stroke. Continued progress in the prevention and treatment of heart disease depends on maintaining access to all these sources of knowledge.

Animal experimentation has been challenged as unjustified on both scientific and ethical grounds. Scientifically, there is, as yet, no way to model the extraordinary complexity of the cardiovascular system, which nourishes and interacts with every organ in the body. Generation of new knowledge, testing of new drugs, and the refinement of new devices and operations that affect the cardiovascular system, therefore, require animal experimentation.

Ethically, the main choice is between improvements to human and animal health through animal research versus restrictions on animal research use that cancel our hope for life-saving progress. Confronted with such a choice, we have usually decided that experiments on animals should precede the extending of experiments to human beings.

Despite progress in conquering heart disease, that disease remains the number one killer in America. The American Heart Association, dedicated to improving human welfare by fighting cardiovascular disease, invests funds contributed by the American public in basic research on heart disease. That research, of necessity, involves the use of animals.

RESPONSE TO AHA POSITION SHEET

The "Position of the American Heart Association on Research and Animal Use" contains numerous fallacies and many outright untruths. The opening of the rationale for using animals in research states that any decline in heart disease is largely due to changes in lifestyle and that most heart attacks, strokes and hypertension can be ultimately prevented or their onset deferred. The importance of those statements cannot be overestimated, yet they have nothing to do with vivisection. Money that is currently being wasted on animal experimentation could be used to teach prevention. Moneim A. Fadali, M.D., F.A.C.S., Cardiovascular and Thoracic Surgeon, University of California at Los Angeles, stated in 1986: "I agree that for the benefit of medical science, vivisection or animal experimentation has to be stopped. There are lots of reasons for that. The most important is that it's simply misleading, and both the past and the present testify to that."[1] Because heart disease is largely preventable through dietary changes[2], money spent on educating people about proper diet could greatly reduce the incidence of heart disease in the first place.

Claims that humans benefit from therapies and drugs tested on animals are unscientific. The organic, anatomical, biological, metabolic, genetic and psychological differences between man and animal are so substantial that knowledge obtained from animals is not only worthless but misleading when applied to humans. In fact, there isn't one important therapeutic discovery that can be indisputably attributed to animal research, whereas books can be and have been filled with cases where animal experimentation has spelled disaster for humans, and has misled or retarded clinical research. Some examples of drug disasters due to reliance on animal research are methaqualone, orabilex, isoproteronal, paracetamol, preludin, pronap, phenacetin, amydropyrine, marzine, reserpine, methotrexate, mitotane, and cyclophosphamide.

Specifically, the American Heart Association talks about the use of drugs to combat hypertension and stroke. The effect these drugs have on animals does not apply to humans. Because animals don't suffer from hypertension naturally, vivisectors cannot even duplicate the disease in question! The only animal that comes close to developing hypertension is the Spontaneously Hypertensive Rat (SHR), which is a genetically altered animal, "made" in Japan. Even this model, however, does not mirror the human version of hypertension. While hypertension in SHRs is somewhat similar to human hypertension in that both are to an extent influenced by heredity, there are "no data available that would permit the definition of the genetic deviations responsible for the human disease".[3] In addition, SHRs do not develop atherosclerotic complications (one of the two major causes of damage to the body in human hypertensive patients) when fed a high-lipid diet. Instead such diets are more apt to cause an accumulation of lipid deposits in their livers.

World-renowned hypertension researcher Dr. Franz Gross, criticizing the World Health Organization for requiring that drug reactions first seen in patients be duplicated in animals before marketing the drug, states: "The beneficial effect of phentolamine, of prazosin, or of hydralazine in the treatment of heart failure (a typical complication of hypertension) is hardly demonstrable in experimental animals."[4] Additionally, propanolol, a medicine used to lower blood pressure in hypertensive patients was discovered by Dr. B. Pritchard, a British clinician, who, by clinical observation (not animal research) noticed that this drug, which was used for angina, lowers blood pressure.[5]

Basic physiology tells us there is no suitable animal model for strokes because, unlike humans, animals have a collateral vascular system in their brains which allows blood to bypass clots; therefore they do not have strokes in the way humans do, nor are the effects from stroke the same. In addition, many domestic animals have a *rete mirabile*, a system of blood vessels which effectively filters out blood clots and other substances that might otherwise flow to the brain.[6]

The way researchers "simulate" a stroke in an animal is by the application of microsurgical spring clips to an artery. The clipping itself affects blood vessels in ways totally artificial and never seen in the blood vessels of human stroke patients.[7]

In its third paragraph, the American Heart Association states: "Scientifically, there is, as yet, no way to model the extraordinary complexity of the cardiovascular system, which nourishes and interacts with every organ in the body." How then can it justify using animals who have their own unique complex cardiovascular systems, which are not the same as that in humans? There is no justification. Drs. Kenneth L. Melmon and Howard F. Morelli, two of the most respected clinical pharmacologists in the world, support this point: "Atherosclerotic coronary artery disease remains an unknown, perhaps because it develops slowly in man, and because animal models do not provide good mirrors of human disease ... Most of the information helpful in management of coronary artery disease comes from epidemiologic studies."[8]

The caged ball valve killed research dogs, one after another, and was almost completely discarded by Starr and Edwards until it became obvious that it needed to be changed; yet the original caged ball that killed so many dogs seems to be working quite well in humans.[9]

The American Heart Association takes the position that the responsible use of animals is essential and necessary to biomedical research and education in the prevention, reduction, and treatment of diseases of the heart and blood vessels.

Assurances of Responsible Use of Animals

The American Heart Association requires assurances of the responsible use of animals in research by requiring the following:

1. AHA grantee institutions must meet standards equivalent to those of the U.S. Public Health Service, including the following categories that pertain to the care and use of animals:

   Personnel

   Care and use of animals is carried out by qualified individuals.

   Supervision is carried out by a veterinarian trained in laboratory animal medicine.

   Research

   Should use alternative methods to live animals when appropriate.

   Should be designed to yield needed information.

   Must use anesthesia for surgical intervention.

   Post-procedural care must minimize or relieve discomfort.

   Should avoid all unnecessary suffering, and must terminate if continuation would result in unnecessary pain or fear.

   Animals must be killed by currently acceptable methods.

   Facilities and Transportation

   Must be in compliance with current federal, state, and local requirements and guidelines.

2. Grant applications submitted to the AHA or its Affiliates, which propose to use animals, must be reviewed and approved by an institutional Animal Care and Use Committee prior to review by an AHA Research Review Committee. It is recommended that the Animal Care and Use Committee include a non-scientist and a member of the public.

   Accreditation by the American Association for Accreditation of Laboratory Animal Care (AAALAC) and/or other verifiable assurances must be provided to be certain that the animal facilities, including staffing, meet appropriate standards. The institutional and American Heart Association Research Committees are responsible for determining that the proposed research is necessary, meets ethical considerations, and can be conducted effectively. The principal investigator has the ultimate responsibility for the conduct of research, including the appropriate care and management of the animals throughout the course of the experiments.

3. The "Instructions to Authors" section of all AHA journals should include the following statements. For experimental animals, state the species, strain, number used and other pertinent descriptive characteristics. For human subjects or patients, describe their characteristics. When describing surgical procedures on animals, identify the preanesthetic and anesthetic agents used, and state the amount or concentration and the route and frequency of administration for each. The use of paralytic agents, such as curare or succinylcholine, is not an acceptable substitute for anesthetics. For other invasive procedures on animals, report the analgesic or tranquilizing drugs used; if none were used, provide justification for such exclusion. When reporting studies on unanesthetized animals or on humans, indicate that the procedures followed were in accordance with institutional guidelines.

RESPONSE TO ASSURANCES OF RESPONSIBLE USE OF ANIMALS

The AHA's "Assurances of Responsible Use of Animals" is as vague as it is ludicrous. It is pointless to discuss lab conditions and treatment of "lab animals" because the entire concept of animal models is deeply flawed. Animals have no relevant place in labs. Between 1981 and 1984, USDA inspectors found 174 laboratories guilty of serious and/or chronic violations of the Animal Welfare Act; only 37 laboratories were in compliance.

Numerous other wretched conditions in animal laboratories have been exposed to the public by the Animal Liberation Front (ALF). Examples include:

1) The Genarelli Head Injury Clinic, University of Pennsylvania. Closed down by the N.I.H. because of pressure from animal rights groups, this lab would still be wasting $1 million a year bashing in the heads of baboons were it not for the ALF. Review of the records of this clinic shows that after thirteen years, there had been no information gained that was useful to the human condition.

2) City of Hope, Duarte, California. Records obtained by the ALF indicate up to a 50% mortality rate due to neglect before experiments even began!

3) University of California at Riverside. Britches, a 5 week old monkey who was the subject of a cruel and useless sight deprivation experiment, is described, after his rescue, by Ned Buyukmichi, D.V.M.: "I must conclude that the monkey was not receiving adequate veterinary care while on experiment ... a violation of the N.I.H. Guide and the Animal Welfare Act". Copies of lab notes removed from this University include, "baby torn apart, parts missing, head, neck, hand, half of back and chest, most of the inside organs; outside temperature very cold and windy, infant kept in dark and died". One could fill volumes with examples of unspeakable cruelties to animals that occur on a regular basis in "accredited" animal research laboratories.

The Heart Transplant and Other Cardiology Advances That Depended on Animal Research: A Chronology

WORK INITIATED OR CULMINATED DURING		CARDIOLOGY ADVANCE	SPECIES STUDIED
Pre-1900:	1.	Management of Heart Failure	
	2.	Asepsis	dogs
	3.	Blood pressure, heart rate	many species
	4.	Fluid & electrolytes, acid-base balance	many species
	5.	Surgical instruments & materials	dogs
	6.	Relief of Pain	many species
	7	Wound healing	many species
Early 1900's:	8.	Electrocardiography	dogs
	9.	Cardiac catheterization	dogs, rabbits, cats
	10.	Components of blood & plasma	monkeys, dogs, rabbits, rodents
	11.	Nutrition	many species
	12.	Surgical techniques	dogs
1920's:	13.	Intravenous feeding	dogs, rabbits, rodents
	14.	Ventilation of open thorax	dogs
1930's:	15.	Transfusion, blood groups & typing	many species
	16.	Monitoring EEG	many species
	17.	Modern anesthesia & neuro-muscular blocking agents	rats, mice, rabbits dogs, monkeys
	18.	Anticoagulants	cats
	19.	Pump oxygenator	cats, dogs
1940's:	20.	Antibiotics	many species
1950's:	21.	Blood preservation	many species
	22.	Blood O2, CO2, pH	many species
	23.	Chemotherapy	many species
	24.	Cardiac pacemaker	dogs
	25.	Floating cardiac catheter	dogs
	26.	Open heart surgery	dogs
1960's:	27.	Selective coronary angio-graphy, ventriculography	dogs
	28.	Assessment of cardiac, pulmonary, renal, hepatic, brain function	many species
	29.	Hypothermia & survival of ischemic organs	dogs
	30.	Defibrillation	dogs
	31.	Coronary collateral circulation	dogs, pigs, primates
	32.	Coronary bypass	dogs
	33.	Modern CPR	dogs
1970's:	34.	Elective cardiac arrest	dogs
	35.	Vascular anastamosis	dogs
	36.	Principles of intensive care	dogs
	37.	Measurement of coronary blood flow in humans	dogs
	38.	Myocardial preservation techniques	dogs
	39.	Beneficial effects of exercise on heart (cardiac rehabilitation)	dogs
	40.	Heart transplant	dogs
1980's:	41.	Cyclosporin & anti-rejection drugs	monkeys
	42.	Artificial heart	dogs, porpoise

Buffalo Physician (Sept. '84 Vol. 18 No. 3) "Some Thoughts on the Value of Life" by John A. Krasney Ph.D., State University of New York at Buffalo

RESPONSE TO AHA'S ADVANCES THAT DEPENDED ON ANIMAL RESEARCH:

We now refute "The Heart Transplant and Other Cardiology Advances That Depended on Animal Research: A Chronology".

1. **MANAGEMENT OF HEART FAILURE.** In England in the 1700s, Dr. William Withering extracted digitalis from the foxglove plant and used it in a primitive controlled clinical trial for "dropsy" patients, whom we now know as people suffering from heart failure. Thus, the discovery of digitalis and its effectiveness against heart failure are exclusive triumphs of the clinical approach. Digitalis and related substances, which lower blood pressure in humans, remain the mainstay of modern treatment for heart failure,[10] although digitalis raises the blood pressure in dogs to dangerous levels.

2. **ASEPSIS.** Clearly a case of animal research retarding what was obvious from clinical observation. As early as the 1840s, Dr. Ignaz Semmelweis in the Vienna General Hospital studied puerperal (child-birth) fever and concluded that this disease was a septicemia, due to de-composed animal organic matter that entered the body during delivery. The simple way to prevent this disease was for obstetricians to wash their hands with a solution of chlorinated lime water before attending each patient. While the results of this clinical observation were abso-lutely conclusive, the "experts" denied the importance of hand washing and continued to kill untold numbers of women. It was not until the 1860s that Louis Pasteur's animal experiments "confirmed" what Semmelweis already knew, and asepsis was then taken seriously.[11]

Lawson Tait, known as the father of modern surgery, and also a fierce anti-vivisectionist, was described by his colleague John Harvey Kellogg as being the "father of surgical asepsis".[12]

3. **BLOOD PRESSURE, HEART RATE.** These phenomena are easily observed in a non-invasive manner in most species, notably humans. The vivisectors assert advances in techniques involving blood pressure and heart rate in animals so they can make great claims about animal research, but there is no productive data on blood pressure and heart rate that could not have been obtained more accurately from human subjects. Also, the *discovery* of the circulation of the blood, blood pressure, and heart rate can be credited to William Harvey's work on the corpse of a hanged man. There is no evidence that animal experiments contributed to Harvey's revolutionary discovery.[13]

4. **FLUID AND ELECTROLYTES, ACID-BASE BALANCE.** All of these can be studied easily in human patients by drawing a blood sample. Using human blood to analyze human processes makes the only sense.

5. **SURGICAL INSTRUMENTS AND MATERIALS.** As with most other discoveries, surgical instruments and materials for human use were derived from observations and work with humans and were subsequently "duplicated" in animals. Whenever findings or techniques happen to concur, the vivisectors attribute these discoveries to animal experimentation.

6. **RELIEF OF PAIN.** Few claims are as blatantly false as the contention that anesthesia is the result of animal experimentation. Ether was discovered from its effects on humans. It became popular in America in a rather bizarre way. Medical students used ether for its exhilarating and hilarious effects at parties, which became known as "ether frolics". Crawford W. Long, a surgeon in Jefferson, Georgia, noted at one of these bashes that several of the participants seemed to be numb to pain. He then decided to try ether as an anesthetic for surgery. Ether and closely related substances remain the mainstay of modern surgical anesthesia. Thus, anesthetics were exclusively a result of clinical observation and application.[14] Fluroxene, a form of ether, has produced no untoward results in humans, yet when used on dogs, cats, and rabbits it produces ataxia, hypotension and seizures.[15] That chloroform excites dogs delayed its use in humans for many years.

7. **WOUND HEALING.** Surgeons have long argued that using animals to develop surgical techniques can be entirely misleading because of the basic biological differences between humans and animals.[16] Furthermore, doctors at The Royal Victoria Hospital in Belfast, who have to deal with the real victims of a continuous war, believe that animal experiments are of no value to them in treating human wound patients.[17] During the Second World War, surgery for wounds of the chest and heart, and practically all the procedures for reconstructive surgery, became relatively routine procedures and many of the fundamental skills of heart surgery were developed.[18]

8. **ELECTROCARDIOGRAPHY.** In his book *Clinical Medical Discoveries,* Dr. Beddow Bayly lists electrocardiography as one of the medical advances achieved entirely through clinical work rather than animal experimentation.[19]

9. **CARDIAC CATHETERIZATION.** This was developed by Dr. Forssmann in Germany using his own forearm. Again, no thanks to animal research.[20]

10. **COMPONENTS OF BLOOD AND PLASMA.** Human samples are easily obtained for the relevant study of blood and plasma products.

11. **NUTRITION.** In a contest for absolute absurdity, this one takes the cake! The exact diet that is perfect for a dog (meat based) is the diet that contributes to heart disease in humans. Dr. M. G. Marmot at the University of California, Berkeley, found that there is almost an exact statistical correlation for all groups between consumption of saturated fats and cholesterol, and deaths due to coronary heart disease.[21] Using dogs as subjects to study human nutrition only confuses the issue.

12. **SURGERY.** Practice surgery using animals is another farce. The British already know this; they banned the use of animals for surgical training in 1876. To quote Dr. Lawson Tait, "I had to unlearn everything I 'learned' on dogs and start over studying human anatomy. It delayed my progress by twelve years."[22] Dr. Tait also mentions, "The fact is that diseases of animals are so different from those of men, wounds of animals behave so differently from those of humans, that the conclusions of vivisection are absolutely worthless. They have done far more harm than good in surgery. In fact, the late Sir William Fergusson, Sergeant-Surgeon to the Queen, declared in his evidence that vivisection had done nothing at all for surgery, and I think his authority on the subject almost beyond appeal."[23]

13. **INTRAVENOUS FEEDING.** The knowledge necessary to develop intravenous feeding was not obtained through animal research.

We go back to Galen, who was known as the founder of experimental physiology. He vivisected many animals and, because he unhesitantly transferred his results to humans, he made many mistakes.[24] One of these concerned blood circulation and its function in the body. His ideas prevented doctors from having an accurate insight into circulation until the 17th century.[25] In 1628, William Harvey finally and accurately explained the circulatory system. His findings were from clinical observations, not animal research.[26] Nutrients appropriate for human intravenous feeding could be developed only through chemical analysis of human blood and careful clinical trials.

14. **VENTILATION OF OPEN THORAX.** It was not until World War I that the problem of open thorax was finally solved from extensive experience with war casualties. Two anesthesiologists, Ivan Magill and E.S. Rowbotham, were working at Sir Harold Gillie's plastic surgery hospital in Sidcup, where work was being done on facial wounds. They delivered anesthetic gas through a single endotracheal tube under positive pressure when the patient breathed in. This technique is essentially the same as modern Inhalation Anesthesia.[27] The development of this technique grew out of clinical investigations and not animal studies.

15. **TRANSFUSION, BLOOD GROUPS AND TYPING.** According to the Report of the Royal Commission on Vivisection (1912): "The first human blood-transfusion was made by Andre Libavius in 1594 when, for a large reward, the blood of a young man was passed into the veins of an older man. Modern technique depends upon a careful matching of blood-types, and no animal experiments have, or could have, helped in this essential particular."[28] The French physician, Jean Denis, transfused lambs' blood into numerous patients who all died. Not recognizing the basic differences between animals and humans, Denis did not realize why his technique failed. Yet, because of the failure of this animal experiment, no further attempts were made for more than a century.[29] Thus, we see again how animal research retarded clinical research by giving misleading results.

The identification of the various blood groups by Karl Landsteiner, an Austrian emigrant who was awarded a Nobel Prize for this achievement, which permitted safe blood transfusions, was a result of direct observation of humans.[30] Even the discovery of the other important blood factor - the rh factor - first came through clinical observation. The name was added when Landsteiner subsequently found the same factor in rhesus monkeys.[31] When test tube and clinical studies showed that sodium citrate could prevent clotting,[32] the two main problems in the development of safe blood transfusions had been overcome.

16. **MONITORING EEG.** The electroencephalograph itself is not a result of animal experimentation,[33] and because the monitoring of EEG activity in humans is not invasive, human studies would be far more meaningful and accurate than monitoring EEG activity in animals.

17. **MODERN ANESTHESIA AND NEUROMUSCULAR BLOCKING AGENTS.** Curare, now used as an important muscle relaxant in modern surgery, is derived from the wourli root, which was first used by South American Indians as a paralyzing poison placed on

arrows.[34] The modern way of administering anesthetics during operations - Inhalation Endotracheal Anesthesia - grew out of clinical trials and practice. Once again, animal experiments slowed the progress and development of effective ways of administering anesthesia. Delivering anesthesia through a tube passed down the trachea actually began in 1880 when William MacEwan, of Glasgow, was asked to remove a malignant tumor situated at the base of the patient's tongue. After a bit of practice on a human corpse, not an animal, MacEwan passed a tube down the trachea and into the lungs.[35]

18. **ANTICOAGULANTS.** There have been four main anticoagulants used for human medicine. None of these four were discovered through animal experiments. Two, hirudin and citrate, grew out of direct patient study. Hirudin is an anticoagulant secreted by leeches that allows them to suck blood out of animals. The observation was made that since the patient continued to bleed after a leech was removed from a site, it must have deposited the anticoagulant in the wound before removing the blood. This proved correct, for in 1884 the anticoagulant was extracted from glands near the leeches' suckers.[36]

The use of citrates stemmed from the observation of sailors treated for scurvy in the 1700s. Physicians noted that sailors often suffered spontaneous hemorrhages from lemon and lime juices, notably high in citrates.[37] The use of the anticoagulant dicumoral was developed from the observation made by veterinarians that cattle who ate the toxic plant "sweet clover" (which contains dicumoral), suffered the same spontaneous hemorrhages as the sailors. By coincidence, this particular agent had the same effect on humans.[38] The last anticoagulant, heparin, was discovered when Jay McLeon tested various chemicals on blood in a test tube.[39]

19. **PUMP OXYGENATOR.** This item stands out as one of the "advances" that are, in most cases, a last ditch effort to save a patient whose condition has deteriorated through his own neglect. The money spent developing the pump oxygenator could have been used to save many more patients through education in prevention.

Vivisectors had long attempted to take over the function of the lungs by putting air bubbles in the blood outside of the body and recirculating the oxygenated blood back into an animal's body. The animals usually died because the bubbles caused widespread organ damage. There were no substances known in the early part of this century, however, that could remove bubbles, until Dr. Richard Lillihei

of the University of Minnesota thought of using Corning Antifoam, a substance used in dairies to dissipate foam on milk. The use of Antifoam in milk production was the first proof that this substance was safe for human use. The prior animal studies were useless in the development of the bubble, or pump oxygenator.[40]

20. **ANTIBIOTICS.** Penicillin, in all probability, would have been discarded had it been tested on guinea pigs (a species commonly used in infection research) because it kills them. Fleming's discovery of penicillin in 1928 did not use animals, but a culture dish. Fleming noted that bacteria would not grow on a culture medium accidentally contaminated by a mold, which had come into the lab through an open window.[41] Later, in an attempt to save a gravely ill patient, Fleming injected him with penicillin, and the patient lived.[42] An example of human disaster caused by reliance on animal experiments is the antibiotic chloramphenicol. Extensive experiments on dogs failed to bring to light any injury to these animals, but chloramphenicol caused fatal aplastic anemia in humans.[43] On the other hand, potential new antibiotics are being identified in vitro by their ability to kill test organisms in culture tubes. Researchers at the University of Leeds have developed a new in vitro test by using human serum and white blood cells. These tests have a direct relation to the behavior of drugs and bacteria within the human host.[44]

21. **BLOOD PRESERVATION.** Vivisection had nothing to do with the development of blood preservation techniques. Trial and error using chemical analysis of human blood is the only accurate way to assess techniques of blood preservation.

22. **BLOOD O_2, CO_2, pH.** As with blood preservation, laboratory studies using human blood are the only way to accurately study blood components in humans.

23. **CHEMOTHERAPY.** Reliance on animal safety-tested drugs has been disastrous. Quoting one of the world's best-known toxicologists, Professor Gerhardt Zbinden from Zurich's Institute of Toxicology: "Most adverse reactions that occur in man cannot be demonstrated, anticipated, or avoided by the routine subacute and chronic toxicity experiment".[45] Specifically relating to heart disease, animal-tested clorfibrate did indeed reduce the number of mild, non-fatal heart attacks; yet, in clinical trials by the World Health Organization, the overall death rate turned out to be 37% higher for those taking the drug than for those not taking it.[46] Eraldin, marketed in the 1970s for the

treatment of heart conditions, was found to cause serious eye damage, including blindness, and/or death.[47] Eraldin was thoroughly tested, yet animal experiments gave no hint of the tragedy to come.[48] Even after the drug was withdrawn in 1976, no one could reproduce the harmful effects in laboratory animals.[49] Atromid S, another animal-tested drug used to lower cholesterol, caused cancer and diseases of the liver, gall bladder, and intestines. None of these symptoms were apparent in animal models.[50] Reserpine, used to treat heart patients, is another disaster of animal research. Adverse reactions not detected through animal studies include breast cancer and cancers of the brain, pancreas, uterus, ovaries and skin. Reserpine is also known to cause nightmares and depression.[51] Animal studies again failed to predict adverse reactions in humans caused by the heart medicine Kananycin, which include damage to the auditory nerves and kidney insufficiency.[52] Digitalis, not discovered through animal experiments, is an important drug for heart patients, yet it dangerously raises blood pressure in dogs.[53] Cholestyramine, another drug not discovered through animal research, but in vitro, has been shown to help prevent second heart attacks.[54] The list can be lengthened at will, yet the point is already clear. Animal tests for drugs cannot be reliably extrapolated to humans.

24. **PACEMAKER.** The pacemaker is a result of direct patient studies, not animal models. It can be credited to the work of Dr. Walton Lillihei at the University of Minnesota and his work with ventricular septal defect in children.[55] Thus, the pacemaker was perfected on humans, too.

25. **FLOATING CARDIAC CATHETER.** Cardiac catheterization was developed by Dr. Forssmann using his own forearm (see item 9). The successful refinements of this technique were possible only through clinical trials with human patients.[56]

26. **OPEN HEART SURGERY.** One of the most critical developments in the evolution of open heart surgery was the heart-lung machine, or cardiopulmonary bypass. The basic function of the heart-lung machine is to take over the function of a patient's heart and lungs during the open heart operation. John H. Gibbon of Philadelphia, who first developed a heart-lung machine on animals, could not come up with a machine that was safe for humans. After his second human fatality, he gave up the whole idea of the heart-lung machine.[57] Nonetheless, Dr. John W. Kirklin and his colleagues at the Mayo Clinic, using prior surgical knowledge and careful clinical trials, made the heart-lung machine safe for patients, something Gibbon's machine, based on animal

studies, failed to do.[58]

27. **SELECTIVE CORONARY ANGIOGRAPHY, VENTRICULOGRAPHY.** These are both techniques involving X-ray, which in no way can be credited to vivisection. In 1895, physics professor Wilhelm Roentgen accidently discovered X-rays. In his laboratory, Roentgen was busy passing electrical discharges through a partially evacuated tube when he found, quite by chance, that highly penetrating but invisible rays were being emitted from the tube. Roentgen called them X-rays and found that wood, glass, sheet metal and human flesh, but not bone, were all transparent to the rays.[59] The toxicity of dyes and other substances used in the more sophisticated techniques of coronary angiography and ventriculography could only be accurately assessed through use on human patients.

28. **ASSESSMENT OF CARDIAC, PULMONARY, RENAL, HEPATIC, BRAIN FUNCTION.** These items are extremely vague and general in nature. It is difficult to counter any of these without further clarification or specific examples of the alleged "advances that depended on animal research", except to reiterate the unreliability of extrapolating animal studies to the human condition. "Assessment of renal function" was discredited by the vivisectors themselves. Duncan and Alfred Blalock attempted to create "experimental shock" in dogs by various crushing injuries. Renal failure, usually the cause of death in man, did not occur at all in the dogs.[60]

29. **HYPOTHERMIA AND SURVIVAL OF ISCHEMIC ORGANS.** The main stimulus for using hypothermia came from direct observations of humans accidently exposed to extreme cold. One of the major clinical observations was made as far back as 1757. It appeared in a publication of the Swedish Academy of Sciences. The case was of a Swede who was nearly buried alive. He was assumed frozen to death, after having fallen asleep drunk in the snow. Even though the man's heart and breathing had stopped, Dr. Sven Naucler realized that he was still alive and managed to revive him. In 1798, James Currie, a Liverpool surgeon, persuaded people to take prolonged baths in cold water and noted their temperature and pulse. As their bodies lost heat, Currie found the heart rate also slowed.[61] Such observations led cardiac surgeons to combine low-flow heart-lung machines with hypothermia, leading to the major early successes of open heart surgery. Hypothermia is occasionally used today.

30. **DEFIBRILLATION.** Fibrillation of the ventricles is life-threatening because these large muscular chambers are necessary to pump blood throughout the circulatory system. Thus, one of the primary goals of coronary care specialists had long been to find an effective way to stop ventricular fibrillation. The earliest clues came from clinical observations. As early as the eighteenth century the Reverend John Wesley successfully used electrotherapy to stop fibrillation in human patients.[62] In 1774, Charles Kite published an essay, "On the Recovery of the Apparently Dead". He wrote: "A Mr. Squires successfully tried the effects of electricity to the heart on a child who had fallen from a window and been taken up for dead".[63] From his clinical observations, Kite noted that electricity was capable of reproducing the motion of the heart, and by that means could renew circulation.[64] Not until 1899, more than a century later, did Presost and Batteli "reprove" what was already known by using electric shock to reverse ventricular fibrillation in dogs.[65] William B. Kouwenhoven of Johns Hopkins University is often credited by pro-vivisectionists for developing a useful closed-chest defibrillator for dogs and then for human use in 1957. But, clinician Dr. Paul Zoll had already used closed-chest resuscitation on patients in 1956.[66] Again, Kouwenhoven was repeating what Zoll already knew through work with human patients and falsely crediting animal research for the advance.

31. **CORONARY COLLATERAL CIRCULATION.** By the 1960s, heart surgery on human patients had already revealed the nature of coronary circulation. Vivisecting animals added nothing to this knowledge to benefit human patients.

32. **CORONARY BYPASS.** As for bypass surgery, animal research actually retarded this therapy for humans. Because a dog's clotting characteristics and coronary valves are so different from ours, the initial human patients died. The first success was Dr. Kunlin's work in France. Dr. Kunlin's work was clinical and had nothing to do with animal research.[67]

33. **CPR.** CPR is another technique that owes nothing to animal research. Kouwenhoven, Jude and Knickerbocker knew that animal studies could not lead to an effective technique of cardiopulmonary resuscitation, so they began working on cadavers in the morgue. After months of experimenting on corpses within 45 minutes of death, they tried out their technique on human patients and it worked again. Today, combined with mouth-to-mouth resuscitation, their technique is the standard form of cardiopulmonary resuscitation (CPR) used by the American Red Cross.[68]

34. **ELECTIVE CARDIAC ARREST.** The effects of disrupting the function of the heart are discussed in items 26, 29, and 38. As for "restarting" the heart, again animal research gave misleading results. One of the most common procedures was to attach electrodes directly to the patient's skin and then to apply electric current through the chest wall from the outside. But, though this technique had been shown "effective" in animals, it was discarded for use in humans because of "many problems, consisting of pain, burns, and inability to keep up continuous stimulation for a prolonged period".[69]

35. **VASCULAR ANASTOMOSIS.** In Cleveland in 1935, Dr. Claude S. Beck pioneered the surgical technique to increase the blood supply to the heart muscle when it failed to receive blood because of blockage of the coronary arteries. Beck's first operation was based on clinical observations indicating that, under certain conditions, new blood vessels could be induced (anastomoses) to grow inward from surrounding tissues to the surface of the heart muscle itself. Beck also had an experience during an operation of cutting a band of adhesions that were connected to the surface of the heart, and "found that each end of the transected adhesion bled briskly."[70] He concluded: "This is the first observation that such bands of adhesions can, and actually do, transport blood to the human pulsating heart."[71] Beck himself conducted thousands of animal experiments, but his only useful knowledge was gained from his original clinical observations.[72] The various Beck-type operations that were performed on roughly 2,000 patients carried a death rate of about 15%. Beck's operations persisted in one form or another for almost a quarter of a century and were eventually abandoned because of the clinical development of new operations, an unacceptably high death rate from the procedures, and other complications. Thus, despite thousands of animal experiments, the various Beck operations proved to be utter failures.[73]

36. **PRINCIPLES OF INTENSIVE CARE.** One of the most important principles of intensive care for heart patients was the clinical observation that major life-threatening arrhythmias were invariably preceded by lesser, nonlethal "warning" arrhythmias. When clinicians showed that it might be possible to control these lesser arrhythmias with appropriate drugs (e.g., lidocaine, the effects of which "were not discovered except by serendipity after its clinical introduction for other purposes"[74]), emphasis of coronary care units switched abruptly from resuscitation to prevention of lethal arrhythmias. On the basis of this and other clinical data, aggressive drug treatment of minor arrhythmias became the new cornerstone of coronary care and resuscitation was relegated to a lesser role.[75]

37. **MEASUREMENT OF CORONARY BLOOD FLOW IN HUMANS.** Dogs cannot be used to measure coronary blood flow in humans. Human coronary blood flow can only be measured in humans.

38. **MYOCARDIAL PRESERVATION TECHNIQUES.** Scientists at the Middlesex Hospital and Medical School have recently isolated individual heart cells from human heart muscle. The cells are expected to prove useful both for research into heart disease and in the preservation of heart (myocardial) tissue for cardiac surgery, with the added advantage that results are directly applicable to patients because, as the researchers explain, "... it is difficult and often misleading to extrapolate experimental results in animal tissues to man."[76]

39. **BENEFICIAL EFFECTS OF EXERCISE ON HEART (CARDIAC REHABILITATION).** Most of the risk factors linked with heart disease - smoking, high blood pressure, lack of exercise, obesity, and excess cholesterol - have been identified by epidemiology, not by animal research.[77] Clinical research with heart patients has revealed, as well, the beneficial effects of exercise on cardiac rehabilitation.[78] Animal studies again prove useless because there is no way to duplicate experimentally the degenerative conditions in a human that lead to heart disease in the first place. The recovery from an artificially induced heart attack in an otherwise healthy animal is never the same as in human heart patients.

40. **HEART TRANSPLANT.** Dr. M.H. Pappworth, the eminent London physician and internationally known teacher of clinical medicine, wrote: "I am far from convinced that this state of affairs (transplants) is any more tolerable to the patient than the disease for which the transplant was done ... The public should know that transplant surgery never cures the original disease and never makes the recipient a healthy person ... All transplant surgery is a confession of failure, of unsuccessfull early diagnosis and treatment."[79] Nonetheless, thousands of animals have been used to develop transplant techniques. It is revealing that the first human transplant operations were disastrous. Over a nine year period beginning in the 1960s, at Stanford University in California, 400 operations were carried out on dogs, yet the first human patients died because of complications that had not arisen during preliminary animal experiments.[80] By 1980, 65% of transplant recipients at Stanford were still alive after one year, the improvement a result of increased skill gained through clinical experience.[81]

But, why stop with human heart transplants? Dr. Leonard Bailey at the Loma Linda Medical School in California hit the headlines in 1984 when he transplanted a baboon's heart into a two-week-old baby girl with heart disease. Baby Fae, as she came to be known, died 21 days later. At the time of the operation, it was reported that Bailey had virtually no experience in human heart transplants, but had performed about 160 cross-species transplants. None of the animals (except two closely related sub-species of goats) survived longer than six months - hardly a glowing testimony. According to Dr. Martin Ruff, an immunologist at University College, London, rejection of the baboon heart was inevitable because there are no antigens in common between baboons and humans.[82] Either Bailey was so desensitized by his career of vivisection, or so ignorant of the human patient, that he completely ignored the fact that his career-advancing experiment, doomed to failure from the start, would cost Baby Fae untold amounts of suffering before she inevitably died.

41. **CYCLOSPORIN AND ANTI-REJECTION DRUGS.** The development of the so-called "immunosuppressive drugs" cannot be credited to animal research. In fact, the various drugs now used to control the immune response during organ transplantation were well known through clinical observation to be immunosuppressive in actual human patients long before animal tests were conducted. Virtually all of the major immunosuppressive drugs have long been used as cancer chemotherapeutic agents; the well-known - indeed notorious - side-effect of anti-cancer drugs is their ability to suppress the human immune response.[83] Cyclosporin was not a discovery of animal experimention, but was first tested in the test tube, and only subsequently on laboratory animals.[84] However, in 1984 the Stanford Heart Transplant Group reported serious kidney problems in 17 out of 32 heart transplant patients treated with cyclosporin for more than a year. Two of these patients ultimately required dialysis because their kidneys failed.[85] Although cyclosporin-induced kidney damage is a real danger for patients, this side-effect was not seen in any laboratory animals at therapeutic doses except in a certain unusual strain of rat called Kyoto, specially bred to have reduced blood pressure. Thus there was no way to predict with any accuracy that human kidneys would react to cyclosporin in the same way as only one laboratory animal.[86]

42. **ARTIFICIAL HEART.** Another failure of animal research. The conduction system in dogs is superior to humans; blood in dogs is less likely to clot than is human blood; dogs walk on four legs, thereby placing less stress on the circulatory system than upright humans; the ventricles

in dogs are opposite to the human system; and animal recipients of artificial hearts are healthy before the operation. So it is no surprise that after tremendous expenditures of tax dollars and donated funds, and reasonable success in animal tests, the artificial heart led to infections, bleeding, and other serious complications when it was used in human patients.

Barney Clark was the first unlucky "guinea pig" for the Jarvik 7 artificial heart. He survived a miserable 112 days. When Barney was suffering and asked to be allowed to die, Dr. William DeVries, not wanting to admit the failure of the artificial heart, went to court to have Barney declared mentally unfit to decide his own fate, and forced him to live with it until he expired from kidney collapse, the seventh major mishap during his hospital stay.[87] Thus Barney's death could be attributed to causes other than the Jarvik heart. DeVries also had Barney's post-surgical diary destroyed. According to Neal Barnard, M.D., the National Institutes of Health (NIH) wisely chose to cut off funds for this seemingly dead-end research; but politicians - senators from financially-interested states - forced restored funding by threatening to hold up approval of all NIH appropriations.[88]

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