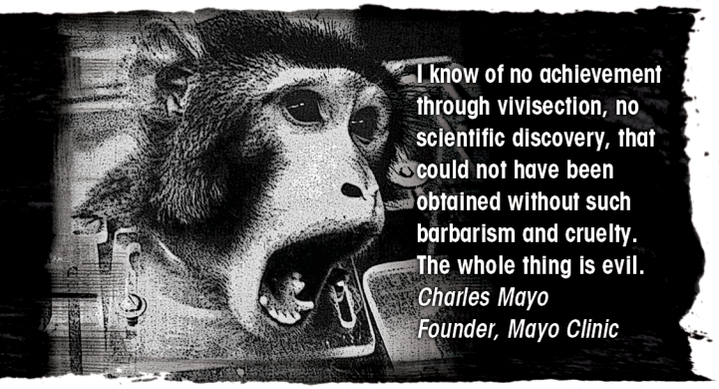
HUMAN-RELEVANT RESEARCH

MICRODOSING ➞ Assesses human metabolism data (metabolomics) for safe human trials earlier in product development. Nearly half of all drugs flunk Phase 1 clinicals. An accelerator mass spectrometry (AMS) measuring system screens out doomed drugs quickly, economically. Microdosing is a more precise predictor of human metabolic response to a new drug.



I know of no achievement through vivisection, no scientific discovery, that could not have been obtained without such barbarism and cruelty. The whole thing is evil.
Charles Mayo
Founder, Mayo Clinic

GENOMICS & SYNTHETIC BIOLOGY ➞ Use of recombinant DNA, DNA sequencing, and bioinformatics to assess genome structure and function. Vast potential for genomic data on entire populations. Assimilation of informatics (diverse data formats) with genomic data can show genetic origins of disease and drug reaction.

DNA CHIPS ➞ Genes or DNA fragments on a teeny glass slide interact with a test drug to ultimately reveal which genes are activated or depressed. DNA chips facilitate the notion of individualized medicine based on each person's different genetic blueprint.

MICROFLUIDICS CHIPS ➞ Receptacles on a 2-cm wide chip each hold a tissue specimen. A test compound is added to a blood surrogate that circulates via connective mircrochannels for small-scale replication of the body's response. Chip sensors relay data for computer assessment. *Hurel (Human RELevant) Corporation* is breaking new ground in this scientific method.

HUMAN TISSUE ➞ **"It is in human tissue that we'll find answers to Alzheimer's, Parkinson's and other neurodegenerative diseases"** *(Dr. John Xuereb, Director, Cambridge Brain Bank and Wolfson Brain Imaging Centre).* All viable knowledge about HIV/AIDS comes from patient tissue/blood; usable data on Alzheimer's and Parkinson's stems from patient tissue analysis. Researchers can ethically acquire tissue samples from informed donors (surgery or biopsy patients; donated at death) prior to re-testing drugs in microdose studies.

COMPUTER MODELING ➞ Enables the molecular architecture of drugs to hone in on specific receptors. Research innovators worldwide are devising a "virtual human" to foretell drug metabolism and metabolite interaction for any organ — data that can never come directly from animals. In mere minutes, scientists can replicate experiments in silico (on computer) to gain insight that takes months to years in a lab or clinic.

AUTOPSY/BIOPSY ➞ Post-mortem studies can analyze full-body disease impacts and amend common misdiagnoses. Animal-free brain studies combine post-mortem exam, human brain tissue, and psychophysics (sensory effects of stimuli on mental states).

EPIDEMIOLOGY ➞ Population studies to uncover meaningful parallels have tied tobacco to cancer; high cholesterol to heart disease; folic acid deficit in pregnancy to spina bifida...

STEM CELL RESEARCH ➞ Stem cells, ethically sourced from donated adult and umbilical cord stem cells, hold promise for many disease therapies. Human stem cells have already remedied some cases of leukemia, heart attack recovery, Parkinson's.

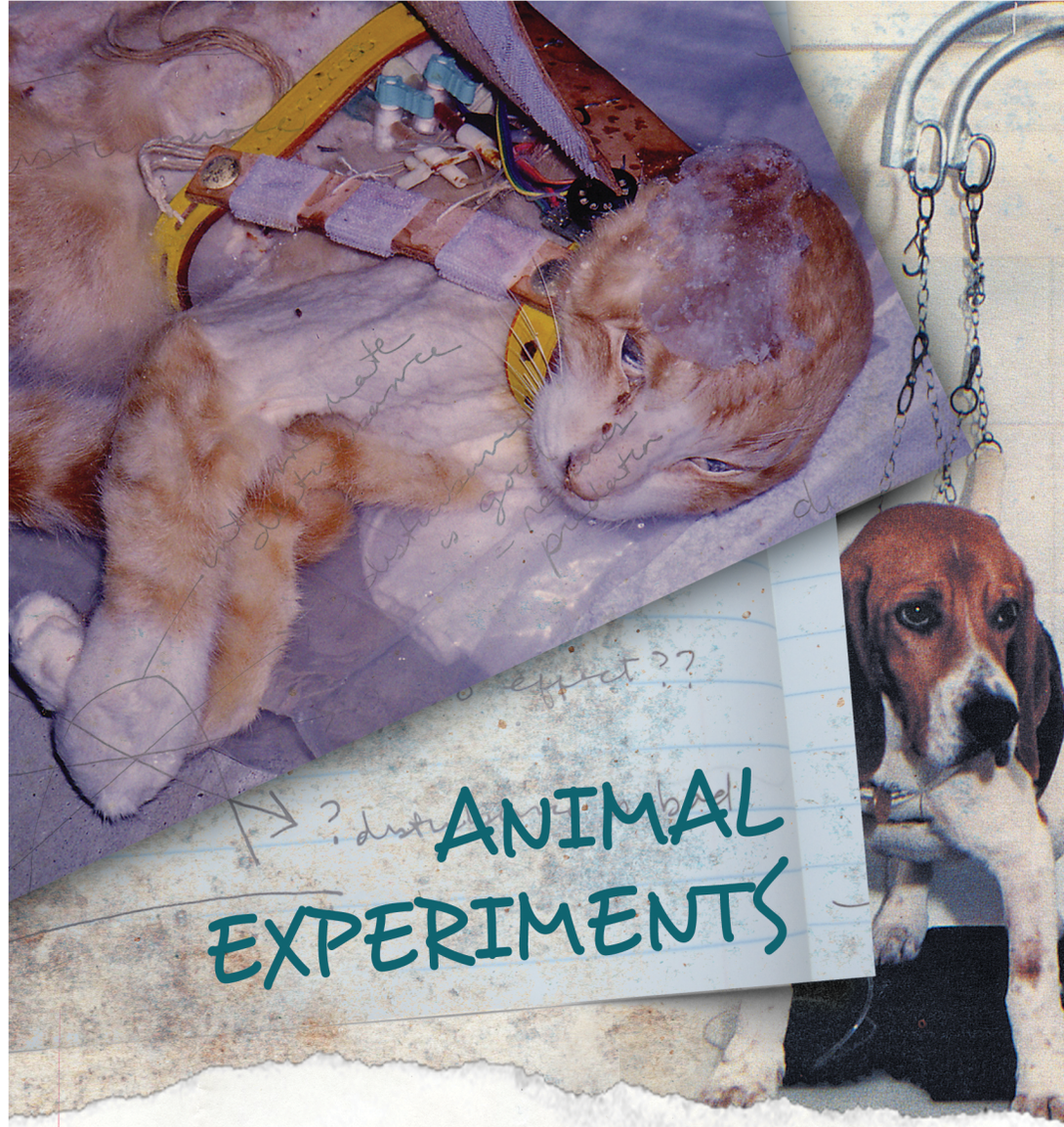
MAGNETIC IMAGING ➞ Advanced imaging — magnetoencephalography (MEG), magnetic resonance imaging (MRI), functional MRI (fMRI), magnetic resonance spectroscopy (MRS), positron emission tomography (PET), etc. — observes human organ structure and function that can't be studied in other species.

POST-MARKET DRUG SURVEILLANCE ➞ Regular tracking of new medical products can identify unforeseen repercussions in a faster time frame.

CLINICAL RESEARCH ➞ Wide scale clinical reviews are key to long-term efficacy of any drug or medical treatment. I.E., Some traditional prescriptions like hormone replacement therapy to deter heart disease or corticosteroids to reduce brain injury wound up hurting people, rather than helping them.

Bear Witness. Speak. Demand. Act.

KINSHIP CIRCLE
www.KinshipCircle.org

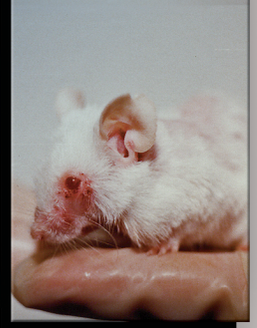


Animal tests are the baseline for all medical product development.
9 out of 10 experimental drugs fail in clinical studies because we cannot accurately predict how they will behave in people based on laboratory and animal studies.
Mike Leavitt, former U.S. Health & Human Services Secretary
ANIMAL EXPERIMENTS HARM HUMANS.

They're so ingrained in trying to cure mice, they forget we're trying to cure humans.
Ronald W. Davis, Stanford University genomics expert, study co-author: Genomic responses in mouse models poorly mimic human inflammatory diseases. *National Academy of Sciences, Feb 2013*

Animal data creates false assumptions that propel new drugs from clinical trials to market, but can lead to unforeseen adverse drug reactions. ADRs are the 4th top cause of USA fatality. Over 2 million people annually suffer ADR disability and hospitalization; 100,000 die *(U.S. Food and Drug Administration).* FDA records show 1,734 drug recalls 2004-2011. Recalls really average once a month (*2012, Brigham and Women's Hospital Study, Archives Of Internal Medicine*). All drugs are animal-tested before human use.

BROKEN



■FUNDAMENTALLY FLAWED: Animals poisoned with test drugs and other substances do not represent human intake or exposure conditions. Animals are perpetually stressed from repeated handling, confinement, noise, isolation, pain, fear... They display quantifiable stress reactions that influence conclusions *(Laboratory Animal Science 2004)*. **C. Glenn Begley, former head of global cancer research at Amgen, found 47 of 53 "landmark" findings can't even be reproduced. "It was shocking. Pharmaceutical industry relies on these findings." Failure was partially blamed on animal models irrelevant to human disease, in an academic arena that fosters poor science, even fraud, as researchers fight for funds.** *(Journal: Nature, March 2012)*

■MISLEADING, INACCURATE: The animal model presumes that harmful impact seen in one species occurs in another. Yet science accepts that vastly different genetic, metabolic, anatomic, physiological, psychological traits make predictive extrapolation to humans unreliable. At best, animal data is of **"questionable relevance"** *(Robinson, et al., 2001; Schardein, 2000; Cohen, 2002 & 2004; Haseman, et al., 1998).*

■WASTE MONEY: Tests drag on for years, with animals warehoused, dosed, sustained, analyzed. Cost per study can soar to millions. *(USEPA)*

BUILDING THE CASE AGAINST ITSELF

STUDY SHOWS MICE EXPERIMENTS WON'T HELP PEOPLE:

Discrepancies between species make mice useless in immune system studies, including cancer and heart disease. Mice, the go-to model for human disease, are 100% inaccurate as data sources for fatal ailments like sepsis, burns, trauma. I.E., All 150 animal-tested sepsis drugs fail in humans. Sepsis, full-body inflammation from infection, annually strikes 750,000 U.S. patients, 1/4 die. Investigators found that humans suppress a gene similar to a gene actively used in mice. If researchers disable this select gene in mice, a test drug works. This variable, applied to people, can have fatal effects. *(Genomic responses in mouse models poorly mimic human inflammatory diseases, Proceedings of the National Academy of Sciences. Feb 2013)*

- **Go to the patients. Get their cells...their tissues whenever you can. [To understand the disease process] you have to go to the patients.** *Dr. Richard Hotchkiss, Washington University researcher*

- **Animal research has a 92% failure rate. Just 8% of drugs that enter Phase 1 and 2 trials reach the marketplace and half of products fail in late stage Phase 3 trials.** *Former FDA Commissioner Lester M. Crawford, The Scientist, 8/6/04*

- **Animal experiments offer the illusion of control. By simplifying and segmenting the life of an organism, we create false data which, combined with differences in species, make our efforts to apply the results to man, useless.** *Dr. Roger E. Ulrich* - **Vivisection is dictated by convenience, not science. It has no place in the meaningful study of human disease and its treatment.** *Dr. David Johnson, MRCS, IRCP MF (Hons.) D. (Obst.), RCOG., 'Animal-oriented medicine: The be-all or the end-all?', DLRM Newsletter, No. 11, 2004*

- **The reason we use animal tests is comfort with the process...not because it is the correct process, not because it gives us new information we need to make decisions.** *Melvin E. Andersen, computational systems biology director, Hamner Institutes for Health Sciences*

■BROKEN MODEL: Animals don't encounter addiction, trauma, disease...as humans do. Plus, each species metabolizes differently. Physiological function of a test drug within a mouse or dog doesn't resemble the same drug in a human system. When surgeries are practiced on animals, medical trainees deal with unreliable variables: Animal incision pressure, skin density, vessels, airways...along with organ size, location, texture and elasticity, all differ significantly from human counterparts. **"No animal model can adequately duplicate the anatomy and physiology of injuries inflicted upon the human body in war"** *(Michael P. Murphy, MD, Operation Iraqi Freedom, medical general counsel for Iraq War Veterans Org; RE: animals shot, bombed, stabbed in combat trauma drills).*

■PROGRESS DELAYED: Pfizer's cholesterol reduction drug Lipitor was initially shelved when animal tests looked unfavorable for human application *(Agres, T. 2006. FDA Input Aids Early Trials. Drug Discovery and Development)*. Tobacco's link to lung cancer, found via epidemiological study in 1954, was ignored when experimenters couldn't reproduce it in animals dosed with nicotine intravenously or by forced inhalation. People are exposed in uneven quantities over long spans. 30 years passed before the U.S. Surgeon General issued a warning. Polio vaccines stalled for decades as researchers induced primates and more animals with infection. When they cultivated the virus in human cells in vitro, a vaccine finally emerged.

■OLD-FASHIONED: **Some animal tests are frozen in time. This is not science. Science always moves ahead** *(Thomas Hartung, head of ECVAM)*. Lethal Dose 50, to measure how much chemical kills half the animals dosed with it, has been around since the 1920s *(British pharmacologist JW Trevan, LD50; banned in EU)*. The 1940s Draize tests *(USDA, John Draize)* still drip toxins into the clipped-back eyes of rabbits or smear poison over shaved skin to assess eye-skin irritation. National Cancer Institute's 1950s carcinogens test doses rats and mice for 2 years...

FIRST, DO NO HARM: ANIMAL-FREE

- **Animal toxicity testing is expensive, time-consuming, uses animals in large numbers...and doesn't always work.** *Francis Collins, director, NIH's National Human Genome Research Institute, 2008*

- A major prototype shift is urged, that **focuses on in vitro methods that use cells, cell lines, or cellular components...of human origin. The new approach would generate more-relevant data to evaluate risks people face...and reduce time, money, and animals involved.** *U.S. Nat'l Academy of Sciences, www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11970*

BIOTECHNOLOGY IS EVOLVING WITH MORE HUMAN-RELEVANT CELLULAR, GENOMIC & COMPUTATIONAL TOOLS. BUT FUNDING AND SUPPORT ARE NEEDED TO ACCELERATE DEVELOPMENT OF ANIMAL-FREE METHODS.

FUNCTIONAL IN VITRO → In vitro cell and tissue culture analysis utilizes cells, cell lines, or cellular components of human derivation. *MatTek* cultivates human tissues from donor cells to reproduce tissue behavior. *Admet's In Vitro Labs* screen drugs against liver cells and human tissues. *VaxDesign* simulates a human immune system with their dime-sized *Modular Immune In Vitro Construct*. MIMIC can advance vaccine research to stem global killers like AIDS. Aimed at smarter drug design, MIMIC studies autoimmune diseases (multiple sclerosis, rheumatoid arthritis) and inflammatory conditions (Crohn's disease). **FUNCTIONAL IN VITRO: ANIMATE MODELS REPLICATE HUMAN TISSUE DESIGN *AND FUNCTION*.** Vascularized 3D tissues have been engineered for cardiac tissues with "perfusable blood vessels" that not only expand in vitro tissue design, but also have "potential therapeutic applications" *(Nature Communications 4, Article number: 1399. Published 1/29/13)*. In 3D formations, layered cells from building blocks of active human cells that interact with one another.