Some Ecologically Friendly Research Methods

Emerging technology has had a tremendous effect on the development of non-animal research methodologies, and the innovative techniques and procedures that are now defining the frontier of medicine would fill an encyclopaedia. In many countries, such as Japan or the USA, there is no legislative requirement obliging researchers to use alternatives. So in those countries there is absolutely nothing stopping researchers from continuing to conduct cruel animal experiments even if a non-animal replacement is widely available.

***Clinical and epidemiological** studies of maladies which occur naturally in people. Studying illnesses in human populations to understand the roles of genes, lifestyle, diet and occupation, has had a tremendous impact on saving lives, especially from cancer and heart disease.

***Use of human tissues, cells and organs in vitro** (kept alive in Petri dishes and test tubes outside the body). **Cell cultures** have been central to key research into cancers, sepsis, kidney disease and AIDS, and are routinely used in chemical safety testing, vaccine production, drug development and to diagnose disease. **Human tissues** can be donated from human volunteers after biopsies, surgery or death. Blood or urine samples can also be easily taken. Post-mortem brain tissue has provided important leads to understanding brain regeneration and the effects of MS. One important alternative is the Reconstituted Human Epidermis (RHE) skin model (Trade names, Episkin, Epiderm and SkinEthic). These used reconstituted human skin derived from donated, unwanted skin from cosmetic surgery. The models are used to test the likely irritancy of chemicals and cosmetics to the skin. One model has recently been shown to be more effective than the original rabbit Draize skin test which it replaces.

***Use of discarded human placenta/umbilical cords** for practice in micro vascular surgery and for accurate data on toxic reactions to drugs and chemicals.

***Chromatography and mass spectrometry** to separate drugs at the molecular level to identify their properties.

***Radioimmunoassay** using radioactive elements similar to those in the human body to analyze chemical substances.

***Mechanical models and simulators** of, for example, respiratory and circulatory systems, to teach and test.

***Mathematical modeling** in which computers simulate parts of the human body as mathematical equations.

***Quantum pharmacology** using quantum mechanics to understand the molecular structure of chemicals.

***Use of human volunteers** paid to participate in drug testing and controlled studies of diets, vitamins and conditions that affect the rate of disease. Examples of this include Magnetic Resonance Imaging (MRI) which generates detailed pictures of the brain and, when used in conjunction with other techniques, can identify the location of specific brain activities, and microdosing which involves giving very tiny doses of a chemical compound to human volunteers in order to monitor where it goes in the body.

***Use of audio-visual aids** instead of animals for teaching medical and veterinary students.

***QSARS (QUANTITATIVE STRUCTURE/ACTIVITY RELATIONSHIP PROGRAMS)** are computer programs which can predict the toxicity of new chemicals or drugs based on their similarity to more established compounds.

***SILICON CHIP TECHNOLOGY** allows rapid identification of genes whose activity changes in response to certain diseases and drugs. Can help identify whether a drug or chemical is going to be therapeutic or harmful.

*** Diagnostic imaging technology, including magnetic resonance imaging (MRI), positron electron tomography (PET), computer-aided tomography (CAT) and ultrasound.** Functional MRI or functional Magnetic Resonance Imaging (fMRI) is a type of specialized MRI scan. It measures the hemodynamic response (change in blood flow) related to neural activity in the brain or spinal cord of humans. It is one of the most recently developed forms of neuroimaging. Since the early 1990s, fMRI has come to dominate the brain mapping field due to its relatively low invasiveness, absence of radiation exposure, and relatively wide availability.

Number of Animals Used in Canada

In 2008, 2,272,815 animals were used in research, teaching, testing and production of biological products for scientific purposes. This number represents an 11% increase relative to the 2007 numbers.

As in 2007, 6% of animals were used in 2008 in studies of CI E, the most invasive level. Anaesthetics and analgesics can be withheld. Animals used at a level E of invasiveness in 2008 were primarily (66%) used for regulatory testing, as has been the case since 1996.

The number of mice used has been increasing since 1998 and has reached a new peak of 1,053,946 in 2008. Dog and cat numbers are down but are still 10,525 and 3,720 respectively. Many were former animal companions taken from pounds/SPCAs. The number of 4,919 non-human primates used has increased by 40% between 2007 and 2008 .