Historically, the use of animals for research has been important in the biomedical sciences and in the field of toxicology, but there are ethical obligations on the scientific community to follow the Three Rs of animal experimentation\(^1\) (i.e. Refinement, Reduction and Replacement), whenever it is feasible. There are also scientific, economic and regulatory restrictions, as well as societal concerns, relating to the use of animals. As a result, there have been intense research and policy efforts to develop innovative and non-animal alternatives to animal testing. These efforts focus on both in vitro and in silico approaches and methods. These models can produce quick, appropriate and useful results, and have reduced the use of animals.

The Three Rs

The British biologists, William Russell and Rex Burch, introduced the concept of the Three Rs in the 1950s,\(^1\) with the aim of reducing the suffering of laboratory animals in biological research. These are:

- **Replacement**: The scientific community are currently trying to develop in vitro and in silico test methods for assessing the toxicity of drugs and other chemicals and products.
- **Reduction**: Effective and appropriate procedures need to be developed, validated and imple-
mented, to ensure that experiments are properly designed, so that the minimum numbers of live animals are required.

— Refinement: All agencies governing the use of animals in biomedical research are very much concerned about the pain and discomfort involved. This has led to the establishment of strong guidelines and instructions for proper handling, management and protection of animals. So these days, with the advancement of scientific knowledge, experimental animals need to be subjected to less and less pain and distress.

Recently, another ‘R’ has been added to the original Three Rs of Russell and Burch — and this is Responsibility.3 It is to remind scientists and staff involved in biomedical research about their responsibilities toward animal ethics.

The Indian scenario

At the national level, the Indian Council of Medical Research (ICMR), New Delhi, established a Laboratory Animal Information Service (LAIS) unit, for the dissemination of information about the importance of laboratory animals as well as the promotion of animal ethics. This unit was initially located at the Cancer Research Institute, Mumbai, but it was later shifted to the National Institute of Nutrition, Hyderabad. It regularly conducts surveys on the conditions in animal facilities in India. There are many animal facilities in different parts of the country, in both the public and private sectors, which must strictly follow the guidelines adopted by legislative bodies at the national level.

India introduced a law during the 1960s, called the Prevention of Cruelty to Animals Act, which was amended in 1982. This law provides the necessary rules and regulations for the prevention of cruelty to animals, or the infliction of unnecessary pain or suffering on animals. At present, it is undergoing further revision. Key points include:

1. Provision for the control of experimentation on animals.
2. The constitution of an Animal Welfare Board established by the Indian Government for taking care of animal welfare issues.
3. The establishment by the Animal Welfare Board of a Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), which is duty-bound to take all necessary measures to ensure that animals are not subjected to unnecessary pain or suffering before, during, or after the performance of experiments on them. The CPCSEA is responsible for the legal and ethical aspects of the use of experimental animals, including the instigation of preventive measures wherever there is violation of the law.
4. The appointment by the CPCSEA of inspectors who visit various facilities around the country and report on the status of these facilities.
5. The CPCSEA has made it mandatory that every animal facility in the country be registered and has a local Institutional Ethical Committee to monitor the experimental work being undertaken in the facility.
6. The CPCSEA issued a Gazette Notification in December 1998, entitled Breeding of and Experiments on Animals (Control and Supervision) Rules, 1998. It was amended in 2001 and 2006, to better regulate the experimentation on animals. Further refinements to the rules are currently being debated. This will help to channel the current animal rights movement in India into an animal welfare movement, and will pave the way for genuine scientific research to flourish for the benefit of humans and animals alike.

Functions of the CPCSEA

All establishments that are engaged in research and education involving animals are required to comply with the various guidelines, norms and stipulations set out by the CPCSEA. The main functions of the CPCSEA are:

— The registration of establishments conducting animal experimentation or breeding of animals for this purpose.
— The selection and appointment of nominees for the Institutional Animal Ethics Committees of registered establishments.
— The approval of animal house facilities, on the basis of reports of inspections conducted on behalf of the CPCSEA.
— The granting of permission for conducting experiments involving the use of animals.
— To make recommendations for the import of animals for use in experiments.
— To take action against establishments in the case of violation of any legal norm or stipulation.

Conclusion

A number of issues shape the attitudes of people toward animal experimentation. The introduction of the Three Rs concepts into animal usage within the undergraduate curriculum has increased, as has the inclusion of courses on animal ethics in veterinary schools, and efforts put into the development of alternatives. However, it must be noted that
some use of animals in research is currently unavoidable, and the consideration of both human and animal welfare cannot be neglected in this context. Animal experimentation will still be carried out in the foreseeable future, for studying the pathogenesis of different diseases, to carry out drug trials, and to test a variety of biologicals such as immunodiagnostics and vaccines, in the hope of lessening human and animal suffering. In vitro alternative methods cannot replace animal experimentation totally, but can contribute to reductions in the numbers of animals used. Today, the scientific community is putting relentless effort into developing alternative methods so that, in years to come, the use of animals in the testing of drugs and chemicals can hopefully be avoided altogether.

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