



History and development of laboratory animal science in Sri Lanka

Mangala Gunatilake

Department of Physiology, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka

Correspondence

Mangala Gunatilake, Department of Physiology, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka.
Email: mangalagunatilake@hotmail.com

Funding information

Grants/funds provided by the National Science Foundation of Sri Lanka, The American Physiological Society, AAALAC International, Laboratory Animals Limited of UK, ICLAS and the AFLAS-ETALAST program for the activities conducted by UCFM and SLALAS leading to the development of the LAS field in Sri Lanka are greatly appreciated.

Abstract

The Faculty of Medicine, University of Colombo (UCFM), is the forerunner in the laboratory animal science (LAS) field in Sri Lanka. Here laboratory animals such as rats, frogs and rabbits were used in medical education to demonstrate physiological principles in the early 1950s. The establishment of the first animal house in 1969 at UCFM better facilitated the use of laboratory animals in medical education and research. By 2006, lack of ethical guide lines was an issue and a set of ethical guidelines was developed and published in 2009, which today are followed by researchers and reviewers in many universities and research institutions in the country. With this development, there was a need for an organized system of education for the LAS discipline. This was fulfilled by conducting the first certificate course on LAS in the Asian region in 2011 in collaboration with the Utrecht University, Netherlands. The Sri Lanka Association for LAS has continued LAS education since its establishment in 2012 at UCFM by conducting workshops and short courses.

KEYWORDS

history, laboratory animal science, LAS education, SLALAS, Sri Lanka, UCFM

1 | INTRODUCTION

Being a Buddhist country in the Asian region, rulers and the people have since ancient times been very kind to animals. Hospitals were established and physicians allocated specifically for treating animals in ancient Ceylon (now Sri Lanka) by King Buddhadasa (AD 340–368), who was a physician by himself. Down the line, King Pandukabahaya (4th century BC) and King Parakramabahu I (AD 1153–1186) also encouraged treatment of animals during their respective reigns.¹ However, with developments in the country over time, concern for animal welfare and the humane treatment of animals did not prevent the use of animals for the advancement of knowledge in science and medicine. The history of laboratory animal use in medical education in Sri Lanka dates back to the 1950s according to archived information (tracings of frog and rabbit cardiac muscle action potentials and changes in the presence of different ions, etc.

by the physiologist Dr H. D. W. Jansz in 1951 and 1952) in the Department of Physiology, Faculty of Medicine, University of Colombo (UCFM), although there is no evidence to support the presence of a separate animal facility/house at that time at UCFM, which is the second oldest medical school in Australasia, established as the “Ceylon Medical School” in 1870.² Available records show that the first animal house in the country for teaching and experimental purposes was established at UCFM in 1969.

2 | ROLE OF LAB ANIMALS IN MEDICAL EDUCATION IN SRI LANKA

From the inception of the animal house until 1987, there was a special concern to demonstrate physiological concepts using hearts of amphibians, rats and rabbits, to medical students of UCFM. These

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2018 The Author. *Animal Models and Experimental Medicine* published by John Wiley & Sons Australia, Ltd on behalf of The Chinese Association for Laboratory Animal Sciences

live demonstrations facilitated learning and understanding of the generation of action potentials in the cardiac muscle, the physiological effects of ions on cardiac muscle, the effects of changes in the autonomic nervous system on heart function in animals and thereby implications for the treatment of humans. Studies involved not only heart function but also the effects of the autonomic nervous system on intestinal movements using dissected out parts of intestines kept in intestinal jar baths. The instruments used during these physiology practical demonstrations can be seen by visitors to the physiology museum of UCFM. Although these animal-based teaching/learning methods could show physiological concepts and the relevance of animal studies to humans, the use of animals in medical education was abandoned in 1987 with the changes in the medical curriculum.

3 | ROLE OF LAB ANIMALS IN MICROBIOLOGICAL INVESTIGATIONS

The Animal House of UCFM housed frogs, rats and rabbits, and also ruminants for microbiological purposes. Blood collection from several sheep and goats were routinely performed for years to supply blood samples for the preparation of blood agar plates for microbiological investigations. However, since the early 1990s, space limitations with further developments on the UCFM campus have not supported housing these large animals.

4 | ROLE OF LAB ANIMALS IN RESEARCH

According to the earliest available evidence, the late Professor K. N. Seneviratne, a neurophysiologist (1969-1981), used rat models for his research work. He was working with the isolated sciatic nerves of healthy and alloxan-diabetic rats in order to determine permeability of blood-nerve barriers in diabetes and to understand why diabetic patients develop nerve damage.³⁻⁵ From the inception of the UCFM Animal House, lab animals, especially the Sprague-Dawley rat model, were the “guinea-pigs” in research conducted leading to the postgraduate research degrees of academics and researchers at University of Colombo and other universities of Sri Lanka. Facilities available at the Animal House of UCFM enable research using mice, hamsters, rabbits and locally caught wild Torque monkeys. Currently, this Animal House manages breeding of Sprague-Dawley rats to supply the demand of researchers, while the other animal models and Wistar rats are purchased from the Animal Centre of the Medical Research Institute (MRI), Colombo, by the researchers, depending on the animal model selected for their research work. Since its inception, many students/researchers have used the animal facility of UCFM for their undergraduate and postgraduate research studies. These studies include use of Torque monkeys for malaria-related research, rats for pharmacological and toxicological studies of different kinds of venom, natural products, herbs and herbal compounds and rabbits for venom toxicity and antibody production studies.

5 | THE REVIVAL OF LABORATORY ANIMAL SCIENCE IN SRI LANKA, LEADING TO THE DEVELOPMENT OF ETHICAL GUIDELINES FOR THE USE OF ANIMALS IN RESEARCH

Unethical surgeries performed on 3 dogs, leading to their deaths in 2006,⁶ were the beginning of the second phase of LAS in the country. The lack of ethical guidelines to follow when conducting research using animals came to light following this incident. As the only Ethics Review Committee (ERC) that had international recognition at that time, the ERC of UCFM was tasked with developing a comprehensive set of guidelines for the use of animals in research. At the workshop conducted in UCFM in 2008, involving stakeholders representing all parts of the country, the draft guidelines were discussed and later fine-tuned at several subsequent meetings and published in 2009.⁷ This is the one and only set of comprehensive guidelines available in the country and is followed by researchers engaged in animal-based research at all Sri Lankan universities and institutions.

6 | DISSEMINATION OF KNOWLEDGE ON ETHICS IN LAS

Workshops on ethics organized by the ERC of UCFM, the Sri Lanka Medical Association and the National Science Foundation of Sri Lanka provided a great opportunity to impart knowledge on ethical considerations in the use of animals in research until 2012. Since then the Sri Lanka Association for LAS has undertaken this activity.

7 | INITIATION OF LAS EDUCATION IN SRI LANKA

Since the establishment of the UCFM Animal house until 2011, there had been no organized training courses on LAS to impart the necessary knowledge and skills to researchers. Hence, the First International Certificate course on LAS in the Asian region was conducted at the UCFM in November/December 2011 in collaboration with the Utrecht University, Netherlands. It was a great success, thanks to Laboratory Animals Ltd, UK and the International Council for Laboratory Animal Science (ICLAS), who supported this endeavor by providing grants. These grants enabled the organizer to sponsor international specialists in LAS from The Netherlands, Singapore and Thailand and several other resource persons at local level. The teaching/learning program of this 2-week intensive course was organized according to FELASA category C and 42 participants; including 2 internationals from Thailand and Malaysia successfully completed the course. Practical sessions were conducted at the MRI under the guidance of international specialists, Professor Vera Baumans, Dr Jan Meijer, Dr Harry Blom and Mr Pim Roomans from The Netherlands.

8 | ESTABLISHMENT OF THE SRI LANKA ASSOCIATION FOR LAS

The need for an association for LAS in the country was identified at the end of the Certificate course conducted in 2011 and work towards its establishment began. In the year 2012, on 21 December, 37 academics and researchers with an interest in the field of LAS met at UCFM and established Sri Lanka Association for LAS (SLALAS), the prime objectives of which were to advance scientific understanding and knowledge of the use, care and welfare of laboratory animals and promote the 3Rs concept. At the same meeting, the use of the concept of telemetry to monitor laboratory animals in research was introduced for the first time to Sri Lankan researchers with a demonstration by Mr. Aas Mohammad, Senior Application Specialist from ADI Instruments, India.

Current membership of SLALAS includes 64 life members and 5 honorary members. Honorary members are Emeritus Professor Vera Baumans of The Netherlands; Emeritus Professor Noriyuki Kasai, AFLAS Vice President & Secretary General; Dr Arvind Ingle, AFLAS President; Dr Vijay Pal Singh of India; and D. Sharmini Jayasekera, Former Head of the Animal Centre at MRI. SLALAS is registered as a non-profit, limited-liability professional association under the Registrar of Companies in Sri Lanka. Currently, SLALAS is the youngest member of AFLAS. SLALAS joined ICLAS too as a scientific member in 2013.

9 | ACTIVITIES OF SLALAS

Sri Lanka Association for LAS is a very young association, but during the short period since its foundation it has organized nine workshops and a basic course on LAS and related topics in order to achieve its prime objective, with good participation of junior researchers from different universities and research institutions. The international researchers who have shared their knowledge at these educational activities include Professor Kasuo Goto of Teikyo University of Japan in 2013, Dr Arvind Ingle of the Advanced Centre for Treatment, Research and Education in Cancer, Tata Memorial Centre, Navi Mumbai, in 2015 and Professor M. A. Akbarsha of Mahatma Gandhi Doerenkamp Centre, Bharathidasan University, India in 2016.

Members of the association are informed about the activities of SLALAS, details for submission of abstracts for annual scientific sessions, news on international conferences, updates related to LAS in other countries, relevant invited articles, etc. via a SLALAS newsletter, which is published twice a year.

10 | ANNUAL SCIENTIFIC CONFERENCES OF SLALAS

As a professional association we have been able to conduct scientific conferences on an annual basis since 2014 with contributions from international speakers, including Professor Vera Baumans, Professor Noriyuki Koibuchi of Japan, Dr Jan Meijer, Dr Montip Gettayacamin of Thailand, Dr S. G. Ramachandra of India and Dr Patri Vergara of

Spain. The inaugural conference, held in January 2014, with scientific sessions and the introduction of the “alternatives” concept at the pre- and post-conference workshops, was a memorable event in the history of SLALAS. The “alternatives”, zebrafish(ZF) embryo, Integrated discrete Multiple Organ Co-culture (IdMOC) and *in vitro* Epi-skin were the models introduced at this conference. Dr Francois Busquet, Europe Policy Coordinator, Center for Alternatives to Animal Testing (CAAT), Johns Hopkins University, Baltimore, USA and University of Kontaz, Germany was the resource person who introduced ZF embryo model to Sri Lankan Scientists while Professor M. A. Akbarsha introduced the IdMOC model.⁸⁻¹¹

The contributions of international speakers Dr Arvind Ingle, Dr Vijay Pal Singh, Professor Noriyuki Kasai and Dr Jon Day of the British Society of Animal Science, UK, to the annual conference scientific sessions of 2016 and 2017 were invaluable.

11 | WEBSITE OF SLALAS

It was in 2014, at the inaugural scientific conference, that the website of SLALAS hosted by the National Science Foundation of Sri Lanka was launched by Professor Vera Baumans, the Chief Guest at the conference. The SLALAS website address is <http://vishwa.nsf.ac.lk/slalas/>.

12 | CONTRIBUTION OF THE MRI ANIMAL CENTRE TO THE DEVELOPMENT OF FIELD OF LAS

The Animal Centre at MRI was established in 1990 with financial support from the Japan International Cooperation Agency. It is designed according to international standards with adequate space and facilities. This animal center breeds and maintains different type of animal models such as New Zealand white rabbits, Wistar rats, ICR mice, BALB/cA mice, C57BI/6N mice, C3H/HeN mice, Hartley guinea-pigs, and Golden and Albino hamsters, for research purposes. It also maintains sheep and geese for blood samples required for media preparation in microbiological investigations and for various other diagnostic purposes. Other activities at this center include breeding mice for vaccine quality testing procedures at MRI, supporting polyclonal antibody production for research and diagnostic purposes, and training of researchers in animal handling and specific procedures/techniques to conduct research activities.¹⁰⁻¹² Animals purchased from the MRI Animal Centre are taken by the researchers to the animal facilities of individual institutions/universities to conduct their research studies.

13 | FUTURE TRENDS IN LAS EDUCATION IN SRI LANKA

In 2014, work was initiated on designing two advanced courses— a postgraduate certificate and a diploma courses in LAS, which are at Sri Lanka Qualifications Frame Work levels 7 and 8—by UCFM in

collaboration with the Utrecht University, Netherlands, based on international trends in LAS education. These courses have features of education and training frameworks such as modularization, harmonization, mutual recognition and quality assurance. Teaching/learning materials in these courses are arranged into 12 compulsory modules, with 20 credits allocation in both these courses, while completion of a project is compulsory to acquire the total of 26 credits needed for the diploma. This educational program is intended to transfer the knowledge, understanding, application, analysis, evaluation, creativity, adaptability and flexibility that enable participants to reach different levels on the education ladder. The University Grants Commission of Sri Lanka recognizes these courses. Accreditation of these courses by a recognized international body is the future plan.

In addition to these postgraduate courses, a basic course in LAS will be conducted on an annual basis by SLALAS especially for junior researchers, undergraduates and technical officers.

The first Certificate Course on Applied Physiology of Pain, Analgesia, Anaesthesia and Euthanasia for laboratory animals was conducted from 30 October to 3 November 2017 at UCFM in collaboration with Newcastle University, UK.

14 | TRENDS IN 3RS IN SRI LANKA

Most of researchers are very keen on working with alternative models, thus applying the 3Rs concept. However, lack of financial support, leading to lack of facilities, is the bottleneck for the use of alternative models in research. New alternatives such as the common marmoset for non-human primates and hydra, an invertebrate, for toxicity testing were introduced as new research models to Sri Lankan researchers at the annual scientific conferences in 2016 and 2017.

15 | CONCLUSION

The increasing trend since 2009 for the development of research and education in the LAS discipline in Sri Lanka, with an emphasis on the “replacement” concept of the 3Rs principle, is a commendable achievement. Almost all these achievements were supported by UCFM, as the forerunner of LAS in Sri Lanka.

ACKNOWLEDGEMENTS

The information provided by Professor Kamani Tennekoon, former professor of physiology, UCFM, Technical officers Mrs Vajira

Nandasena (retired), Mrs Chandraknathi Tissera of the Dept of Physiology, Mr. Kamal Perera (retired) and Mr. Manjula Dissanayake, former Technical Officers of UCFM Animal House, related to establishment of the UCFM animal house and use of animals in physiology education, is highly appreciated.

CONFLICT OF INTEREST

None.

REFERENCES

1. Piyadasa HD. Traditional systems for preventing and treating animal diseases in Sri Lanka. *Rev Sci Tech (International Office of Epizootics)*. 1994;13:471-486.
2. Dissanayake VH, Lanerolle RD, Mendis N. Research ethics and ethical review committees in Sri Lanka: a 25 year journey. *Ceylon Med J*. 2006;51:110-113.
3. Seneviratne KN, Peiris OA. The effects of hypoxia on the excitability of the isolated peripheral nerves of alloxan-diabetic rats. *J Neurol Neurosurg Psychiatry*. 1969;32:462-469.
4. Seneviratne KN. Permeability of blood nerve barriers in the diabetic rat. *J Neurol Neurosurg Psychiatry*. 1972;35:156-162.
5. Seneviratne KN, Weerasuriya A. Nodal gap substance in diabetic nerve. *J Neurol Neurosurg Psychiatry*. 1974;37:502-513.
6. Dogs taken for adoption, subjected to unethical surgery. *The Sunday Times* 2007;42(2). <http://www.sundaytimes.lk/070610/News/news9.htm>. (Accessed on 9th March 2018).
7. Guidelines for ethics review of research proposals involving animals in Sri Lanka. In Dissanayake VHW, Gunatilake M, Chenthuran T, Madhubashini Jayamanne NM, eds. Forum of Ethics Review Committees of Sri Lanka and Ethics Review Committee, Faculty of Medicine, University of Colombo, 2009.
8. President's message and SLALAS inaugural workshop. *SLALAS Newsletter*, 2013;1(1).
9. *SLALAS Newsletter* 2014; 2 and 2015; 3(1&2).
10. Proceedings of the Inaugural Scientific Conference of the Sri Lanka Association for Laboratory Animal Science, 2014.
11. Gunatilake M, Busquet F, Akbarsha MA. Alternatives initiative in Sri Lanka: pre- and Post-Conference Workshops at the Inaugural Scientific Conference of the Sri Lanka Association for Laboratory Animal Science. *Altex*. 2014;31:224-226.
12. Animal Centre of Medical Research Institute of Sri Lanka. <http://mri.gov.lk/departments/animal-centre/>. (Accessed on 3rd March 2017).

How to cite this article: Gunatilake M. History and development of laboratory animal science in Sri Lanka. *Anim Models Exp Med*. 2018;1:3-6. <https://doi.org/10.1002/ame2.12003>