

MEETING REPORTS AND ANNOUNCEMENTS

Report on first certificate course on applied physiology of pain, analgesia, anesthesia, and euthanasia for laboratory animals held in Sri Lanka

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Gunatilake M. Report on first certificate course on applied physiology of pain, analgesia, anesthesia, and euthanasia for laboratory animals held in Sri Lanka. *Adv Physiol Educ* 42: 263–266, 2018; doi:10.1152/advan.00019.2018.—Similar to human beings, pain is an unpleasant sensation experienced by animals as well. There is no exception when the animals are subjected to experimental procedures. Our duty as researchers/scientists is to prevent or minimize the pain in animals so as to lessen their suffering and distress during experimental procedures. The basics of the physiology of pain and pain perception, analgesia, anesthesia, and euthanasia of laboratory animals were included to complete the program, before the practical part was attempted and before advanced topics, such as comparison of anesthetic combinations, were discussed. Therefore, this course was organized in Sri Lanka for the first time in collaboration with the Comparative Biology Centre of Newcastle University, UK. During this course, we were able to demonstrate how an anesthesia machine could be used in laboratory animal anesthesia for the first time in the country. None of the animal houses in the country were equipped with an anesthesia machine at the time of conducting the course.

analgesia; anesthesia; laboratory animals; pain; physiology

INTRODUCTION

Sri Lanka is a multiethnic, multireligious country. There was a time in Sri Lanka when animals played a prominent role in transport, agriculture, religious functions, processions, tourism, etc. The adoption of global technical developments in these areas by Sri Lanka reduced the use of animals in every field. Also, the concerns raised by animal welfare organizations in recent times have affected the use of animals in various activities. Furthermore, there was an ethical issue regarding the use of animals for research purposes, which led to the development of a draft Animal Welfare Act in 2006 and a set of guidelines for the ethics review of research proposals involving animals in Sri Lanka, which was published in 2009. Although the draft Animal Welfare Act was subjected to several rounds of revisions, this act has not yet been enacted. In the act, there is a provision for the use of animals in research while encouraging the use of replacement models. This draft act highlights that animal welfare with no or minimal suffering should be the prime concern of the researchers when animals are subjected to research. On the other hand, until very recent times, anesthetic ether was the substance used for anesthesia in small laboratory animals during research procedures. The world has already

moved away from ether, as it has been identified as an irritant, leading to suffering of animals during procedures. In addition, none of the animal houses in the country where animal research is conducted were equipped with an anesthesia machine at the time of the course was conducted. In this context, it was needed to educate scientists/researchers/relevant professionals in the country on the ways that animal suffering could be identified and minimized during research procedures.

Pain is an unpleasant sensation experienced by all of us. It is generally accepted that laboratory animals also experience pain as a result of some of the experimental procedures to which they are subjected by researchers/scientists. Pain gives rise to suffering and distress in laboratory animals. As researchers/scientists, it is our ethical and legal duty to adopt different refinement methods during our procedures to prevent this pain or reduce it to the minimum possible. Pain is also a major biological stressor that influences numerous body systems. Reducing these generalized effects of pain often enhances the accuracy and validity of research data obtained from these animals.

To use different analgesics to reduce animal pain and suffering, it is necessary to have an understanding of the physiology of pain, the ways in which pain can be expressed in animals, the different types of analgesics available and their actions, and the analgesics and anesthetics that can be used for different types of animal models and different types of experiments. This knowledge is essential for a junior researcher/scientist before engaging in experiments with animals. Therefore, this “First Certificate Course on Applied Physiology of Pain, Analgesia, Anaesthesia and Euthanasia for laboratory animals” was planned and finalized in collaboration with Emeritus Professor Paul Flecknell of Comparative Biology Centre of Newcastle University, UK, and this course was conducted for 5 days from October 30 to November 3, 2017, at the Faculty of Medicine, University of Colombo. Practical sessions on analgesia and anesthesia were conducted at the Faculty Animal House. In addition, following the discussions conducted with the Sri Lanka College of Veterinary Surgeons, the Council agreed to collaborate by awarding 2.0 Continuing Professional Development points for the veterinary graduates who followed this course.

A set of documents (course handbook) in spiral-bound form as course material was distributed among all of the participants and resource persons on the first day of the course. Certificates were handed out to participants, resource persons, and to the organizer at the farewell ceremony held on the last day of the course.

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Teaching/Learning Activities Conducted

International experts from the Newcastle University principally covered lectures, group discussions, and practical sessions in this course. They were Prof. Paul Flecknell (former Director of the Comparative Biology Centre), Dr. Matthew Leach, and Dr. Kathy Murphy (Director of the Comparative Biology Centre). Lecture topics covered by the international experts were as follows: Pain Perception in Animals, Analgesics—Practical Pharmacology, Pain Assessment in Laboratory Animals—“Cage-Side” Behavioral Assessments and Pain Faces, Pain Assessment in Laboratory Animals—Research Methods, Management of Pain During Experimental Procedures, Experimental Animal Euthanasia, Refining Anesthesia—Anesthetic Agents for Laboratory Animals, and Refining Anesthesia—Perioperative Care. Pain sensation in humans and humane endpoints in animal experimentation were covered by a neurophysiologist, Dr. Dilshani Dissanayake and the course organizer, respectively.

Dr. Matthew Leach, using video clips, conducted two sessions of pain scoring exercise. Course participants were requested to assess the stage of animal suffering either as mild, moderate, or severe per each video clip. Accuracy of the assessment by the participants was discussed at the end of each session.

Participants were divided into 10 groups, with 2–3 members in each group. Details of assignment of participants to groups and the journal articles allocated to each group with clear instructions were included in the course handbook. While the group discussions among 16 participants were going on under the supervision of Dr. Matthew Leach, a group of 8 participants was at the animal house attending practical anesthesia exercise.

During group discussions, participants were concentrating on different drugs or drug combinations used for anesthesia and analgesia, advantages and disadvantages of these drugs, adherence of researchers to ARRIVE (Animal Research: Reporting of In Vivo Experiments) guidelines, etc., as per the published journal articles distributed among participants. All 10 groups presented their findings and discussed them with

other participants and resource persons on the last day of the course.

Three practical anesthesia exercise sessions were conducted during the course under the instructions and supervision of Prof. Paul Flecknell and Dr. Kathy Murphy, who are veterinary experts in animal/laboratory animal anesthesia. Once the demonstration on how to use an anesthesia machine and monitoring of anesthesia during each session was conducted by the two international experts, eight participants were divided into two subgroups. In each subgroup, participants were allowed hands-on practice; i.e., to practice different combinations of anesthetic drugs allocated to each subgroup, the effectiveness of these combinations, how to judge depth of anesthesia, intratracheal intubation, etc., in the presence of one of the international resource persons with each subgroup (1 instructor for 4 students in a subgroup). Small rodents, such as rats and mice (2 animals each for each subgroup) were used during these hands-on sessions. Approval to conduct these sessions was obtained from the faculty administration, while the Animal Research and Welfare Subcommittee of the faculty was also informed. Some of the drugs required for demonstrations were purchased from Ministry of Health drug store and relevant suppliers, with the approval of the faculty administration.

Outcomes/Achievements of the Course

- I. As planned at the beginning, the participants were able to acquire knowledge and basic skills in the following areas:
 - A. Physiological mechanisms related to pain sensation
 - B. Differences in pain sensation between human and animals
 - C. Different methods available for detecting pain in animals during experimental procedures
 - D. Humane endpoints in animal experiments
 - E. How to manage pain in animals during experimental procedures with different drugs (analgesics and anesthetics) and their modes of action
 - F. Practical application of anesthetic techniques for laboratory rodents, including intubation, total intrave-

Table 1. *Feedback of participants*

Questions Included in the Feedback Form	Response, Based on 20 Participants Who Submitted Feedback Forms (%)
Were the objectives of the course clear?	Yes (100)
Course contents met with your expectations.	Yes (95) No (5)
Sequence of course contents is well planned.	Yes (95) No (5)
Course contents were illustrated with adequate number of examples.	Yes (95) Don't know (5)
Were you able to acquire new knowledge and skills by attending this course?	Yes (100)
Lectures were clear and easy to understand.	Yes (100)
Pain assessment exercise sessions were useful for the understanding of the contents.	Yes (95) No response (5)
Practical sessions on analgesia and anesthesia contributed for the enhancement of your knowledge and skills.	Yes (95) No response (5)
Group discussions on published articles were useful in understanding the subject areas covered during the course.	Yes (90) No response (10)
Course material distributed was adequate and useful.	Yes (90) No (5) No response (5)
Did the instructors encourage interaction, and were they helpful?	Yes (90) No response (10)

No. of participants present on the last day of the course was 21; 1 participant did not return the feedback form. Response rate was 95.2% (20/21 × 100%).

Table 2. *Comments of participants on teaching/learning activities*

Additional/Specific Comments Indicated by Participants on Lectures, on Practical Sessions on Pain Assessment, Anesthesia, and Analgesia, and on Group Discussions	No. of Participants Who Commented
Lectures:	
● Very good.	11
● Interesting, thought provoking, and very useful.	8
Practical on pain assessment session:	
● Very useful.	10
● Novel experience.	1
● Good that this session was done after the lectures, so that we got an idea what to look for when assessing pain.	1
Practical on analgesia and anesthesia:	
● Good experience in managing anesthesia and analgesia in animals in a very practical way. It was useful to gain knowledge on what we can encounter as problems during procedures.	12
● New experience.	1
Group discussions:	
● Good and very useful for comparative analysis of findings of different studies.	9
● Really helpful in developing an interest in reading articles.	1
● Good for beginners.	1
● New experience in a course.	1
● Quite boring.	1

nous anesthesia, balanced anesthetic protocols, and physiological monitoring techniques

G. Experimental animal euthanasia

- Group discussions and presentations enabled the participants to interact with each other, with evaluations by resource persons.
- In addition, Prof. Paul Flecknell demonstrated mice handling by cup and tube method on the request of participants. (The posters on this were sent by NC3Rs, London, UK, on the request of the course organizer.)
- Participants from the Department of Wildlife had discussions during the course with the international resource persons about organizing the same course with an emphasis on wild animals.
- Indian scientists expressed their willingness to obtain membership in the Sri Lanka Association for Laboratory Animal Science (SLALAS), if it was open to them. As there is no provision in the constitution of the SLALAS concerning whether or not they could be admitted as members, it was decided to take up this matter at the Annual General Meeting of SLALAS in 2018.

Funding Sources

- American Physiological Society (APS) granted an International Opportunity Programme Award to the organizer, who is a regular member of APS.
- International Council for Laboratory Animal Science (ICLAS).
- Laboratory Animals Limited, UK (LAL).
- Asian Federation of Laboratory Animal Science Associations (AFLAS) approved a grant under their ETALAST (Education and Training Activities of Laboratory Animal Science and Technology) educational program.

Feedback from Participants

Feedback was obtained from participants through a specially prepared form on the last day of the course. Although 24 participated in the course, 3 were absent on the last day. Out of 21 who were present, 1 participant did not return the feedback form. In the feedback obtained, the participants very much appreciated the organization of this course, which led to the

Table 3. *Strengths and weaknesses identified by participants and their suggestions for improvement*

Strengths/Weaknesses/Suggestions for Improvement	No. of Participants Who Commented
Strengths:	
● Well organized, improved knowledge, sequencing of sessions were good.	9
● Providing lecture notes at the beginning of the course was very useful.	1
● Very useful course for researchers in the field of animal research.	1
● Good resource persons who are specialists in the field.	2
Weaknesses:	
● No weaknesses to report.	1
● Time allocation for group discussion was too much.	2
Suggestions for improvement:	
● Include more practical sessions on anesthesia and analgesia.	18 (90%)
● More time for group discussions.	3
● More time on pain scoring exercises.	4
● More details to be included in the lecture handouts.	1
● Better to include management of cardiac and respiratory arrest in animals among course contents.	1
● Please provide accommodation for overseas participants.	2
● Improve methods of advertisement among institutions in local and other Asian countries to attract more participants.	1
● Limit the course to 3 days.	2

meeting, and learning from world-renowned resource persons. Ninety-five percent of participants who responded indicated in the feedback that pain assessment exercise sessions were useful for the understanding of the contents and practical sessions on analgesia and anesthesia, and that they contributed to the enhancement of their knowledge and skills. The participants were happy about all of the activities, with the request for consideration by the majority (90%) to increase the time allocated for practical sessions in the future, if similar kinds of workshops/courses were to be organized. Details of feedback with their comments are given in Tables 1, 2, and 3.

Conclusion

This course was successfully completed while achieving the planned objectives. Twenty-one local participants from different universities and research institutions, and three international scientists from Tamil Nadu, India, actively participated. Among the local participants, there were 13 veterinary surgeons, 5 recent graduates (graduated in 2017), 3 seniors having more than 25 yr of experience as veterinarians from the government and private sector, and 5 from the Department of Wildlife who were interested in the area covered during the course. Twelve participants were scientists/researchers who are engaged in laboratory animal-based research. The only non-graduate who participated in the course was the officer of the Faculty Animal House, where practicals on analgesia and anesthesia were conducted. The participants were happy about all of the activities. There was a request by a majority of the participants to increase the time allocated for practical sessions

in the future, if similar kinds of workshops/courses were to be organized.

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GRANTS

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DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author.

AUTHOR CONTRIBUTIONS

M.G. conceived and designed research, analyzed data, interpreted results of experiments, drafted manuscript, edited and revised manuscript, approved final version of manuscript.