



**Improving welfare in the care and use of animals – the Singapore experience**

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## Brief history of lab animals in Singapore

- ▶ 1970s: Laboratory Animals Centre, National University of Singapore (NUS) bred and supplied lab animals
- ▶ 1982: Experimental Surgery Unit began at Singapore General Hospital
- ▶ 1983: Animal Holding Unit built at NUS
- ▶ 1989: Veterinary Surgeon hired at NUS for Laboratory Animals Centre and Animal Holding Unit
- ▶ 1990s: "International Guiding Principles for Biomedical Research Involving Animals" by CIOMS adopted by Laboratory Animals Centre and Animal Holding Unit
- ▶ 1998: Animal Ethics Committee formed at Faculty of Medicine, NUS
- ▶ 2003: National Advisory Committee on Laboratory Animal Research (NACLAR) appointed
- ▶ 2004: NACLAR Guidelines published in October
- ▶ 2004: Rules for the Care and Use of Animals for Scientific Purposes enforced in November
- ▶ 2005: 1<sup>st</sup> Annual SALAS Fall Conference, and 1<sup>st</sup> Annual IACUC training course
- ▶ 2006: First 2 AAALAC accredited programs in Singapore
- ▶ 2014: First 2 Singapore citizens to be Board Certified by ACLAM and ACVP
- ▶ 2016: NACLAR re-convened
- ▶ 2019: **NACLAR Guidelines 2nd edition – on the way!**

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## NACLAR

- ▶ scientists, veterinarians, non-scientists
- ▶ academia, government, ethics, private sector
- ▶ expert panel
- ▶ endorsed by Ministerial Committee
- ▶ NACLAR Guidelines (2004)
  - ▶ 3 sections - Guiding Principles, IACUC, Training

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## Guiding Principles section

- ▶ aim to promote the humane and responsible care and use of animals for scientific purposes in Singapore.
- ▶ 3Rs – Replacement, Reduction and Refinement
- ▶ scope covers all aspects of the care and use of animals for scientific purposes including their use in teaching, field trials, environmental studies, research, diagnosis, product testing, and the production of biological products.
- ▶ responsibilities of institutions, investigators and persons involved in the care and use of animals for scientific purposes.
- ▶ all research facilities which house and use animals for scientific purposes to operate in accordance with the Guidelines to qualify for licensing.

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## IACUC section

- ▶ the operational aspects pertaining to the IACUC
- ▶ IACUC is responsible for the oversight and evaluation of the animal care and use program of an institution, and is responsible for ensuring that the care and use of animals for scientific purposes and all animal experimental procedures are in compliance with the Guidelines.
- ▶ all institutions with research facilities are required to establish their own IACUC to assume this function.

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## Training section

- ▶ scope of the core curriculum and the relevant core competencies, such as special courses for animal procedures.
- ▶ require all users of animals for research to undergo appropriate training before carrying out any experiments using animals.
- ▶ assist IACUCs in determining the scope and depth of education training program that will meet both institutional needs and the requirements of NACLAR.

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## The Animals and Birds (Care and Use of animals for Scientific Purposes) Rules 2014

- ▶ require any research facilities that intend to use animals for scientific purposes to apply for and obtain a licence before commencement of work on animals.
- ▶ transitional period of six months for institutions to appoint an IACUC, twelve months to employ an Attending Veterinarian, and for the completion of the required training as specified in the guidelines for all investigators and personnel in the care and use of animals for scientific purposes; and eighteen months to comply with provisions in the guidelines relating to infrastructure in respect of those premises.

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## Laws and regulations

- ▶ self-regulation as an enforcement mechanism in Singapore.
- ▶ research facilities are licensed, but not individual researchers or their animal use protocols.
- ▶ licensing mechanism makes each research facility accountable for the conduct of all live animals used for scientific purposes it is responsible for.
- ▶ research facility must comply with NACLAR Guidelines.
- ▶ IACUC at each facility is the approval and auditing authority body.
- ▶ also required to conduct internal audits by reviewing the animal care and use program and conducting facility inspections.
- ▶ research facilities are required to submit an annual report to the licensing authority, who will carry out inspections before licenses are considered for renewal.

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## Penalty

- ▶ Rules state that any person or licensee who contravenes them or fails to comply with any directive issued by the licensing authority, shall be guilty of an offence and shall be liable on conviction to a fine not exceeding S\$10,000, or to imprisonment for a term not exceeding twelve months, or to both.

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## AAALAC

- ▶ 5 programs fully accredited by AAALAC.
- ▶ 1 Board of Trustee member, 1 Council Emeritus, 2 Council Members, 5 Ad Hocs in Pacific Rim Section from programs in Singapore.
- ▶ since July 2013, positions of Section Leader, or Assistant Section Leader, or both, for the Pacific Rim Section have been filled by a Council Member from a Singapore AAALAC-accredited facility.

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## SALAS

- ▶ founded in 2004 and has held a conference annually since 2005.
- ▶ established links with regional (Asian Federation of Laboratory Animal Science Associations) and international (International Council for Laboratory Animal Science) associations to promote collaboration and awareness of recent developments in the field of laboratory animals.
- ▶ through SALAS, Singapore has the largest number (292 as of February 2016) of laboratory animal science staff outside of the US certified by the American Association for Laboratory Animal Science.

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## GLP

- ▶ 5 GLP registered facilities in Singapore.
- ▶ GLP Compliance Program initiated to recognize facilities which provide non-clinical safety testing in accordance with the Organization for Economic Co-operation and Development (OECD) Principles of GLP.
- ▶ ensures a facility's processes and conditions in which laboratory studies using animals are planned, performed, monitored, recorded, reported and archived meet international requirements.
- ▶ Singapore has been a member of the OECD Mutual Acceptance of Data framework since January 2010.
- ▶ from 2012, the Singapore Accreditation Council was entrusted with the task of managing the SAC GLP Compliance Monitoring program.

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## NACLAR Guidelines - Review

- ▶ began late 2016 to update and align it with the latest edition of the ILAR Guide for the Care and Use of Laboratory Animals, notably in the areas of occupational health and safety, special considerations for the IACUC, and methods of euthanasia.

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## Review Process

- ▶ members appointed by National Research Foundation
- ▶ comments solicited from stakeholders
- ▶ considered by NACLAR and its subcommittees
- ▶ revised versions of other guidelines considered
- ▶ numerous meetings and assignments by NACLAR and subcommittees

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## Objectives of Revision

- ▶ update to be current with selected internationally recognized guidelines
- ▶ be responsive to stakeholders' comments and requests
- ▶ attempt to reduce repetition/redundancy
- ▶ referenced other sections, rather than repeating
- ▶ moved some sub-sections around
- ▶ deleted and clarified points

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## Five (instead three) sections

- ▶ new sections on 'Introduction' and 'Occupational Health and Safety Guidelines' added
- ▶ draft revised NACLAR Guidelines now consists of:
  - ▶ Introduction
  - ▶ Guiding Principles
  - ▶ Institutional Animal Care and Use Committee Guidelines
  - ▶ Occupational Health and Safety Guidelines
  - ▶ Training Guidelines

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## Guiding Principles section

- ▶ new species included – cephalopods
- ▶ new definitions
  - ▶ adverse event
  - ▶ embryo
  - ▶ experimental endpoint
  - ▶ humane endpoint
  - ▶ may, should, must, shall
  - ▶ sedation
  - ▶ teaching activity

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## CEO vs IO

### Original

- ▶ CEO: The Chief Executive Officer (or person of like standing by whatever name called) of institution who is in the position to grant resources to the institution's IACUC and to enforce the recommendations of the IACUC.

### Revised/Proposed/Draft

- ▶ IO: The Institutional Official who is in the position to obtain resources for the institution's IACUC and to enforce the recommendations of the IACUC

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## Investigator

### Original

- ▶ Investigator: A person who proposes or has approval to conduct a Project involving use of animals

### Revised/Proposed/Draft

- ▶ Principal Investigator (PI): A person who proposes and/or has approval to conduct a Project involving use of animals, and has overall responsibility of a Project

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## Proposal vs Protocol

### Original

- ▶ Proposal: A written outline of a Project put forward for consideration by an IACUC.

### Revised/Proposed/Draft

- ▶ Protocol: A proposal reviewed by an IACUC.

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## Wildlife

### Original

- ▶ **Wildlife:** All species of animals from free living populations whether indigenous or otherwise, but does not include domestic dogs and cats, horses, cattle, sheep, goats, pigs, poultry and ducks.

### Revised/Proposed/Draft

- ▶ **Wildlife:** All species of animals from free populations whether indigenous or otherwise.

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## May, Should, Must, Shall

- ▶ **“May”** – a discretionary action
- ▶ **“Should”** – strong recommendation for achieving a goal; however, there may be valid reasons in particular circumstances to justify an alternative strategy but the full implications must be understood and weighed before choosing the alternative
- ▶ **“Must”** – actions that are an absolute requirement
- ▶ **“Shall”** – same as “must”

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## Preoperative Planning

### Original

- ▶ “. . . sick animals should be rejected.”

### Revised/Proposed/Draft

- ▶ “sick animals should be rejected, unless the illness is intended for studying the animal as a model of specific human disease.”

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## IACUC section

### Original

- ▶ “Programme” : relevant policies and protocols established in the Institution pertaining to the care and use of animals for scientific purposes as well as the Institutional philosophy underpinning the protocols.

### Revised/Proposed/Draft

- ▶ “Programme” : relevant policies, procedures, standards, organizational structure, staffing, facilities and practices established in the Institution pertaining to the care and use of animals for scientific purposes.

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## Non-Affiliated IACUC Member

### Revised/Proposed/Draft

- ▶ “a person not \*currently affiliated in any way with the Institution and not a member of the immediate family of a person who is affiliated with the Institution; who represents the general community and is not and had not been a user of animals for any scientific purposes.”

\*the word ‘currently’ was added, because of concerns that graduates/alumni would not be eligible to serve on their alma mater’s IACUC.

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## Alternate Members

- ▶ may be appointed to IACUC by IO to represent specific IACUC members.
- ▶ IACUC member and his/her alternate(s) may not count toward a quorum at the same time.
- ▶ may not act in an official member capacity at the same time.
- ▶ should receive training identical to the training provided to regular IACUC members.

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## Designated Member Review

### Original

- ▶ Full committee review of Proposals requires a convened meeting of a quorum of IACUC members to review initial (new) protocols . . (face-to-face)

### Revised/Proposed/Draft

- ▶ IACUC may, under certain extenuating circumstances, allow DMR of new protocols.
- ▶ DMR should be conducted by at least the AV (or the alternate) and two other members of the IACUC as assigned by the IACUC Chair.
- ▶ each institution should develop a policy on what can be approved by DMR.
- ▶ to be endorsed/approved by majority of IACUC (electronic OK)

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## Programme Review and Facility Inspection

### Original

- ▶ Programme Review twice a year
- ▶ Facility Inspection once a year

### Revised/Proposed/Draft

- ▶ Programme Review once a year
- ▶ Facility Inspection still once a year, but 5 to 7 month separation period between a Facility Inspection and a Programme Review

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## Post-Approval Monitoring (PAM)

### Original

- ▶ Two pages
- ▶ “After IACUC has approved a protocol, it has a responsibility to ensure that procedures are carried out in the laboratory or classroom as described in the protocol.”

### Revised/Proposed/Draft

- ▶ Four pages
- ▶ “PAM should be part of IACUC oversight responsibilities with the purpose of facilitating on-going assessment of protocol conduct and compliance.”

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## Occupational Health and Safety section

- ▶ new section covering OHS regulations, protocols and procedures
- ▶ Guide for the Care and Use of Laboratory Animals used as the primary reference
- ▶ ensured that content aligned with Singapore’s existing legislations
- ▶ highlighted that nature of OHS program will depend on the facility, research activities, hazards and animal species involved.
- ▶ outlined what is expected of institution in terms of:
  - ▶ overall committee requirements (Institutional Biosafety Committee, Institutional Review Board)
  - ▶ an effective OHS program
  - ▶ duties of PI and other staff

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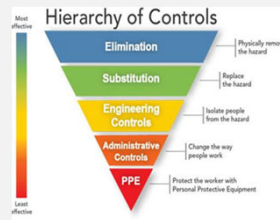
## Hazard Identification and Risk Assessment

- ▶ emphasizes need to identify potential hazard in the work environment and conduct critical assessment of the associated risks.
- ▶ risks assessments categorised into protocol based risk and personal health risk
- ▶ hazards are biological material, chemical agents, radiation, physical hazards or hazards that arise from unusual circumstances e.g. field studies
- ▶ emphasizes having accident procedures and emergency response plans in place.

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## Control and Prevention Strategies

- ▶ Introduces hierarchy of control (NIOSH, 2006) and prevention strategies that are based on the identification of hazards and the assessment of risk associated with those hazards.



- ▶ Engineering controls: use of appropriate design, operation of facilities and safety equipment
- ▶ Administration controls: development of processes and standard operating procedures

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## Managing Animal Experimentation Involving Hazards

- ▶ lists types of procedures that should be given careful attention when selecting specific safeguards for animal experimentation with hazardous agents.
- ▶ emphasizes importance of having:
  - ▶ written policies governing experimentation with hazardous biological materials, chemical, radiation, sharps and other physical agents.
  - ▶ oversight process (such as the use of a safety committee) to involve persons who are knowledgeable in the evaluation and safe use of hazardous materials or procedures.
  - ▶ PAM

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## Medical Evaluation and Preventative Medicine for Personnel

- ▶ OHS programs should strive to:
  - ▶ prevent occupational illnesses and injuries
  - ▶ reduce aggravation of pre-existing conditions
  - ▶ recognise early health alternations due to occupational exposures
  - ▶ treat and manage occupationally acquired illnesses and injuries
- OHS programs should include/consider:
  - pre-employment evaluation (consider immunisations and serum banking)
  - periodic medical evaluation
  - laboratory animal allergy checks
  - zoonosis surveillance e.g. tetanus, tuberculosis, Herpes B

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## Facilities, Equipment and Monitoring

### ▶ With focus on:

- ▶ scope and activities of an OHS program determining the design of facility required
- ▶ use engineering controls (i.e. equipment, HVAC) to minimize anticipated hazards
- ▶ consideration given to noise control, ventilation system, space arrangement and layout, support areas, traffic patterns and access to utilities and mechanical areas
- ▶ selection of appropriate animal housing systems using professional knowledge and judgment
- ▶ safety equipment being properly maintained and its function periodically validated.

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## Training Section

- ▶ **Redefinition of staff categories (including those that must be trained)**
  - ▶ feedback received that existing categories of personnel were too broad
  - ▶ consequently, that there were varying understandings of what/who each personnel category entailed
  - ▶ re-defined personnel categories to improve the understanding, and implemented consistency throughout the Guidelines

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## Redefinition of staff categories – animal facility personnel

### ▶ Original:

- ▶ Lab animal caretakers, technicians, managers, veterinarians

### ▶ Revised/Proposed/Draft: Animal Facility Personnel

- ▶ (a) Personnel who do not handle live animals but perform Support Services
- ▶ (b) Personnel who perform Husbandry
- ▶ (c) Personnel who perform Animal Procedures
- ▶ (d) Personnel who supervise (a), (b) and (c)

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## Redefinition of staff categories – other categories

### Original:

- ▶ Research personnel, IACUC members, service personnel, teachers

### Revised/Proposed/Draft:

- ▶ Veterinary personnel
- ▶ Research personnel
- ▶ IACUC Members and Secretariat
- ▶ Service personnel
- ▶ Teachers at tertiary institutions involved with using animals for teaching and/or educational purposes.

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## Training

### Animal Facility Personnel

- ▶ widened lecture topics for those who perform Support Services, to expand personnel's knowledge and skills
- ▶ highly recommended Husbandry personnel be minimally certified at ALAT level ... LAT and LATG levels were encouraged
- ▶ supervisors should have LAT, and certification from ILAM and CMAR

### Veterinarians

- ▶ encouraged to obtain certification through ACLAM
- ▶ reduced information on training

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## RCULA - didactic

- ▶ may be delivered through lectures or online modules
- ▶ scope expanded
- ▶ refresher didactic sessions to be completed every 5 years to keep personnel abreast on matters; especially with regard to updates on regulations, guidelines and/or ethics

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## RCULA – hands-on

- ▶ encouraged species-specific training and use of inanimate substitutions (Replacement)
- ▶ exercises on basic biology of species highlighting unique features (conducted before or during hands-on training) and harvesting tissues
- ▶ individuals with a hands-on practice lapse of 2 or more years were recommended to attend hands-on refresher training/assessment of competency to ensure their capabilities
- ▶ contents of RCULA should be reviewed, evaluated for effectiveness and updated regularly by the IACUC in collaboration with AV

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## Acknowledgements

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**THANK YOU** 😊

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