

Laboratory Animal Technicians and Support Staff: On the Frontlines of Implementing the 3 R's

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Abstract

While the 3 R's exist as a framework for ethical use of laboratory animals, they also serve as a valuable educational tool for all levels of staff within a vivarium. This education provides context for the animal studies that staff observe post protocol approval and enables them to participate in implementation of the 3 R's. As part of a laboratory animal department, our actions have direct and indirect impacts on the research animals housed in the vivarium and on the overall research outcomes. The 3 R's explain how animal welfare and sound scientific research are dependent upon each other. This framework furthers staff's ability to take pride in their work and understand the importance of their contributions as animal care and support technicians.

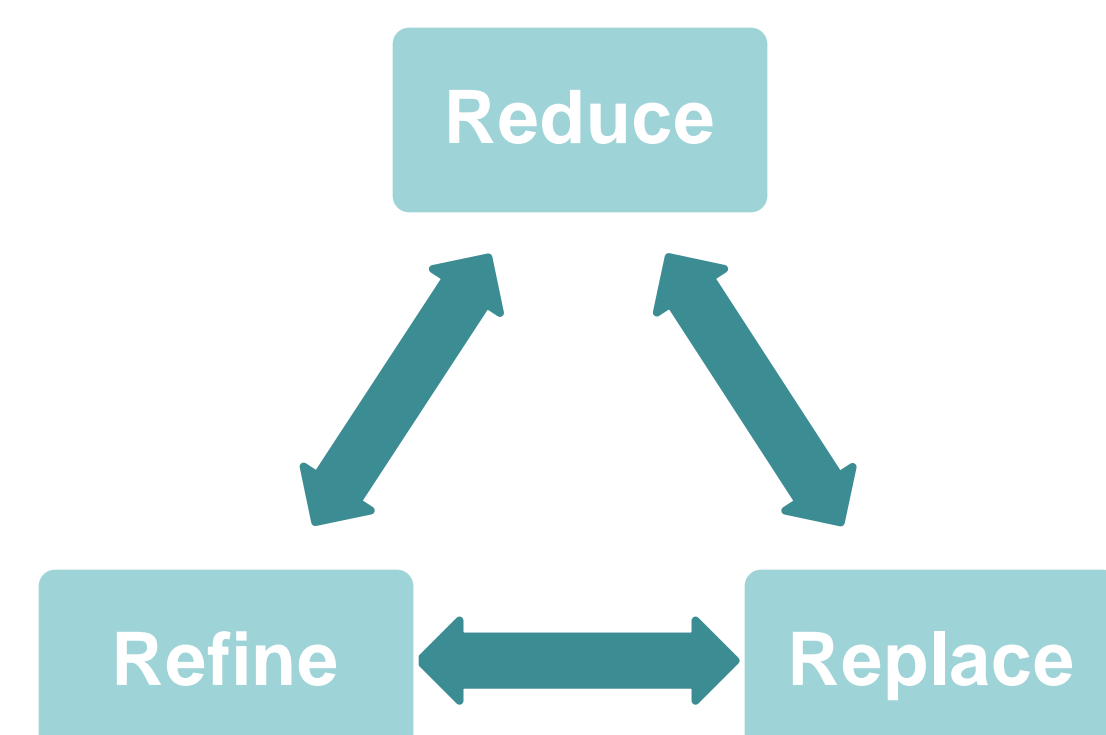
The 3 R's and the Impact of Laboratory Animal and Support Technicians

What are the 3 R's?

| | |
|--|--|
| | Replacement Experimental models that replace live animals with alternate methods. • Example: computer modeling instead of mice or eliminating sentinel animals |
| | Reduction Practices that reduce the number of animals used per experiment. • Example: maintaining accurate breeding records that prevent superfluous births |
| | Refinement Methods that are refined to minimize animal suffering and improve welfare. • Example: improving surgical techniques or providing enrichment |

While the 3 R's exist as a framework for ethical use of laboratory animals, they also serve as a valuable educational tool for all staff working in a vivarium by:

- Providing context for the animal studies staff observe post protocol approval
- Enabling staff to participate in implementing 3 R's
- Reinforcing how staff activities have direct and indirect impact on research animals and success of research outcomes
- Explaining how animal welfare and sound scientific research are dependent upon each other
- Furthering staff's ability to take pride in their work and understand the importance of their contributions as animal care and support technicians



The 3 R's can be interconnected. For example, refining a surgical procedure can reduce morbidity and/or mortality rates, reducing overall animals used.

Replacement in Practice

It is important for all animal care staff to be aware that IACUC approval of a study is contingent on consideration of possible alternatives to animal models. At CCHMC, each protocol has a replacement section that describes what other species and non-animal models were considered and the scientific justification for their choice of species.

Replacement can also be implemented directly within the animal care program. Many facilities are moving away from the use of live sentinel animals and are instead using filter media paper or plenum swabbing of racks as PCR surveillance methods have improved.

CCHMC has implemented filter media paper in "sentinel cages" with dirty bedding to **replace** the use of live sentinel animals.



Reduction in Practice

Laboratory Animal Technicians and Reduction

During husbandry, laboratory animal technicians (LATs) reduce animal use by:

- Correctly marking birth dates and keeping accurate breeding records
- Sending weaning alerts before a second litter is born
- Being proficient in sexing animals when performing weaning/separation for a lab
- Ensuring no live animals are missed during cage changes

| PUPS | |
|--|--|
| DOB | |
| 21 Days Date | |
| Over Crowd Date | |
| Submitted 17 days <input type="checkbox"/> | |
| Wean Range: 18-28 days | |
| Double Litter = Emergency Wean | |
| Non-Compliant on 29th day | |

Pups tag used at CCHMC include a checkbox to notify lab when pups are 17 days old.

Feedback provided by LATs that contributes to reduction:

- Recording non-experimental variables such as room temperature and humidity
- Noting any changes in health and alerting research personnel and veterinary staff

This feedback may help researchers gain valuable information and ensures results are reproducible.

Vivarium Support Technicians and Reduction:

Vivarium support teams focus on quality control, eliminating external variation that can lead to repeated studies, therefore reducing number of animals needed.

Examples of reduction by support staff:

- Ensuring equipment is reaching appropriate temperatures to properly clean and/or sterilize
- Providing standardized amounts of feed and bedding
- Maintaining facility sanitation and appropriate feed/bedding storage conditions
- Regular equipment servicing and prompt repairs

The 3 R's Implemented at CCHMC

Mice that would otherwise be euthanized can be used as wet lab mice to train researchers on skills and procedures, such as injections or tissue handling. This is an example of the intersection between reduction and refinement.

Supplies for the Introduction to Mouse Handling 101 Wet Lab given by the Surgical Core at CCHMC, including mouse restraint devices, ear tagging and punching tools, and scissors used to trim nails and malocclusions. This is one of many trainings offered by the Surgical Core.



Refinement in Practice

Of the 3 R's, refinement is where laboratory animal and vivarium support technicians have the biggest impact, at all levels of animal interaction. Examples include:

- **Enrichment**
 - Refers to any stimulus or activity that aims to improve the physical and psychological health of an animal
 - Examples are chewing devices for rats or rooting opportunities for swine, multisensory enrichment for rabbits and other large animals including music, foraging, and interactive play items
 - Aquatic species also benefit from enrichment; enrichment is not just limited to mammals
 - Thoughtful handling of animals to promote positive interactions (tubes for rodents, clicker training or verbal commands for swine)
 - New enrichment ideas should first be approved by PIs, IACUC, and the facility veterinarian
- **Housing**
 - Species-specific housing and enrichment are quality-checked and provided by support teams
 - Support technicians may have novel ideas about how to improve animal housing
- **Cleaning and sanitation**
 - Sanitation of animal housing and enrichment provides a clean and safe environment
 - Sanitation and regular cleaning of the macroenvironment within the vivarium eliminates outside variables
- **Monitoring**
 - Pain and distress affects animal behavior, immunology, and physiology, making experiments less repeatable and less accurate
 - Daily monitoring ensures appropriate use of anesthesia and analgesia to reduce pain
 - Training and acclimating animals to handling and procedures reduces stress



Rack of ventilated mouse cages provided by vivarium support staff. Cages are autoclaved and only opened under a hood. Preventing contamination of the micro-environment helps ensure that experiments are reproducible.

Refinement at CCHMC



Pictured to the left and below: Commercially available large animal enrichment devices have been modified by vivarium support staff at CCHMC to improve the interactive features.



Conclusion

The actions of all staff working within a vivarium have direct and indirect impacts on both the research animals housed in the vivarium and the overall success of research outcomes. These impacts occur through the quality and consistency of work and the observations and feedback of all staff. The 3 R's can provide a framework for all staff to positively contribute and take pride in their work.

Ideas on implementing the 3 R's can come from anywhere.

The work of all employees within a laboratory animal research program is meaningful and necessary.

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