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The 3Rs

Science and education involving the use of animals is guided by the principles of the 3Rs, originally described by Russell and Burch in 1959 as Replacement, Reduction and Refinement. AAALAC International expects accredited institutions to apply these principles in a manner compatible with scientific and/or teaching goals.

Replacement of animals (absolute replacement) must be considered where non-animal models exist that are accepted by the scientific and, where applicable, regulatory communities. Examples may include, but are not limited to, validated, reliable and fit for purpose cell culture systems (including microphysiological systems), environmental health monitoring, computer modeling, simulation systems and other in vitro tests. However, consideration must also be given to relative replacement or use of animals with a lower potential for the perception of pain and distress.

When animal use is necessary in science or education, reduction techniques must be considered to support research rigor and reproducibility while minimizing the number of animals necessary to answer the scientific question. Examples may include, but are not limited to, fit-for-purpose experimental design, sound statistical and analysis practices, tissue sharing, responsible animal breeding, and, in well-justified cases, re-use of animals.

In addition to reduction techniques, refinement must also be considered to minimize pain and distress and provide positive experiences to enhance animal welfare throughout the animals' lifetime. Examples may include, but are not limited to, social housing, biologically relevant enrichment, acclimation, habituation, positive reinforcement training and other welfare improvements to experimental procedures, housing, and handling. As refinements evolve, personnel should have access to current refinement training and educational opportunities.

Institutions should establish a strategy for implementing the 3Rs, considering these guiding principles while complying with all national or regional 3Rs regulations, policies, and guidelines. This strategy may serve as a tool for continuous improvement and can include a combination of practices such as protocol considerations, standard operating procedures (SOPs), elements of veterinary care, and other components of the animal care and use program, including fostering a strong culture of care.

The Institutional Official, the Attending Veterinarian, and the Institutional Animal Care and Use Committee or comparable Oversight Body (IACUC/OB) should promote and advise on the principles of the 3Rs including the protocol review process. All research groups and IACUC/OB members should receive regular training in the concepts of the 3Rs.

Supporting Documents:

1. Russell WMS, & Burch RL. (1959). The principles of humane experimental technique. *Wheathampstead (UK): Universities Federation for Animal Welfare.* Accessible at https://caat.jhsph.edu/the-principles-of-humane-experimental-technique/
2. Balls M. et. al. (1995). The 3 Rs: The Way Forward. The Report and Recommendations of ECVAM Workshop 11. Alt. Lab Anim. 23(6):838-66.
3. Tannenbaum, J. & Bennett, B.T. (2015). Russell and Burch's 3Rs Then and Now: The Need for Clarity in Definition and Purpose. JAALAS 54 (2): 120-132.
4. Grimm, H. et. al. (2023). Advancing the 3Rs: innovation, implementation, ethics and society. Front. in Vet. Sci. (10): 1-13.
5. Lauwereyns, J. et. al. (2024). Toward a common interpretation of the 3Rs principles in animal research. Lab Anim. (53): 347-350.