Institutional Animal Care and
Use Committee (IACUC)
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INSTITUTIONAL ANIMAL CARE AND USE POLICY
Sanitization of Research Equipment

Previous Review Date(s): 5/10/2021, 3/7/2022, 12/2/2024
Approval Date: 4/14/2025
Next Review Date: 4/2028

Purpose
This document outlines the procedures and responsibilities to assure proper sanitization of restraint, enrichment and other equipment used in animal studies that cannot be processed through a mechanical cage wash. This equipment is used and sanitized by investigators in non-centralized areas, laboratories, satellite spaces and does not include equipment maintained by the Division of Comparative Medicine (DCM).

Policy
Quality assurance of the proper sanitization of research equipment exposed to animals or carcasses including but not limited to restraint, enrichment and other devices must be quantitatively assessed on an annual basis. The "Guide for the Care and Use of Laboratory Animals", 8th edition recommends that "Sanitation of cages and equipment by hand with hot water and detergents or disinfectants can also be effective but requires considerable attention to detail[1][1]" and also stipulates: "Whether the sanitation process is automated or manual, regular evaluation of sanitation effectiveness is recommended[2][2]".

[1] Guide, 8th ed., 2011, p. 71
[2] Guide, 8th ed., 2011, p. 73

Background
Cleaning and disinfection are necessary to prevent cross-transmission or exposure to microorganisms, excrement, biological fluids, and pheromones from one research subject to another and to remove these substances as well as allergens from work environments shared with humans. When accompanied by mechanical wiping or scrubbing to remove organics and other soilage, effective disinfection by definition eliminates vegetative microorganisms from inanimate objects. Sanitization of cages and equipment by hand with hot water and detergents or disinfectants can also be effective but requires considerable attention to detail. Whether the sanitization process is automated or manual, regular evaluation of sanitization effectiveness is recommended.

Responsibilities:
1. Principal Investigators are responsible for disinfection of all equipment and work surfaces in their laboratory and laboratory equipment that may have come in contact with animals prior to and after use with each animal.
2. Principal Investigators are required to maintain documentation of the dates of equipment sanitization cleaning for all species. The Investigator must also maintain records of sanitization verification testing.
3. Principal Investigators are required to sanitize any equipment before it goes into storage and once it is removed from storage, prior to use.
4. The IACUC reviews sanitization records of all research equipment to ensure adequate sanitization at least once annually.
5. The IACUC reviews lab logs to ensure sanitization is regularly practiced during routine lab

[1] Guide, 8th ed., 2011, p. 71
[2] Guide, 8th ed., 2011, p. 73

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inspections, post-approval monitoring (PAM).

6. The DCM Facility Manager or veterinary services provides oversight of the collection and processing of test samples to monitor the effectiveness of sanitation. Results are provided to PI and/or their designee by email. Any failed result requires re-testing and scheduling another swab test. The lab coordinates with DCM and repeat the process until satisfactory results are obtained. If results continue to fail, alternative cleaning methods must be discussed to find a solution.
7. The Office of the IACUC may coordinate with DCM the schedule sanitization verification tests at the time of semi-annual inspections or post-approval monitoring. DCM coordinates re-testing in the event of a failed test, and investigators may consult with DCM with respect to methods of sanitation and disinfection efficacy.

General Sanitization Procedures

All portable and fixed equipment as well as surfaces that come in contact with animals must be cleaned and disinfected prior to and after each episode of use by the personnel using the equipment and/or procedural areas (e.g., rodent surgery, euthanasia chambers, behavioral testing apparatus, anesthetic chamber, animal restraint device, stereotactic surgical frame, countertop and work surface). Disinfection is made most effective when preceded by effective mechanical cleaning, where applicable. Any direct or indirect bedding used in chambers or pans must be removed prior to sanitization and replaced with fresh, clean substrate following testing. Direct contact bedding changes and sanitization procedures are required between test subjects where a chamber may be used sequentially.

Options for Sanitization

1. Washing in a mechanical washer or, if not possible.
2. Washing by hand may be recommended for housing enclosures that are not conducive to mechanical washing.
3. Hand sanitizing, which is most appropriate for fixed surfaces, stationary equipment and delicate, heat- or moisture-sensitive apparatus.

Recommended Disinfectants – Follow manufacturer recommended contact times for each agent:

Agent	Examples	Comments
Alcohols	70-90% ethyl alcohol 85% isopropyl alcoh Hand gel sanitizers	Remove gross contamination before using. Inexpensive. May damage rubber and plastic items. Alcohols are only acceptable if no other agents can be used on a specific piece of equipment.

Quaternary Ammonium	Roccal®, Quatricide®, CONFLIKT	Safe, generally effective general environmental disinfectant. Rapidly inactivated by organic matter and other environmental materials. Compounds may support growth of Gram-negative bacteria. Quatricide 1:5 dilution **Contraindication**: Quaternary ammonium compounds should be used with caution around breeding animals, as studies have demonstrated decreased fertility in rodents exposed to these chemicals.
Chlorine	Sodium hypochlorite (Clorox ® 10% solution fresh-made), Chlorine dioxide (Clidox®, Alcide®, MB-10®), 15% calcium hypochlorite	Highly effective. Corrosive and oxidizing. Presence of organic matter reduces activity. Unstable – solutions must be fresh. Clidox 1:18 dilution, minimum contact time: 3 minutes at 20°C on pre-cleaned surfaces. MB-10 Prepare according to manufacturer recommendations, minimum contact time: 10 minutes. Strong Bleach Solution: ¼ cup of bleach to 1 gallon of cool water or 1 tablespoon of bleach to 1 quart of cool water (add the bleach to the water in either case). Weak Bleach Solution: 1 tablespoon bleach + 1 gallon of cool water **Contraindication:** It is not recommended that chlorine dioxide-based disinfectants/sterilant be used on stainless steel equipment and surfaces unless it is cleaned off thoroughly with water. If residual odors from the cleaning chemicals might affect study animals, or if chemicals may damage equipment, a special request for exemption from sanitizing equipment must be obtained from the Institutional Animal Care and Use Committee
Phenolics	Lysol®, TBQ® VespheneTM	Broad spectrum activity. Less affected by organic material than other disinfectants. Some may be corrosive, harsh, toxic with a pungent odor. Skin irritant.
Chlorhexidine salts	Nolvasan® Hibiclens®	Presence of blood does not interfere with activity. Rapidly bactericidal and persistent, but bacterial spectrum is narrow. Effective against many viruses.

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Hydrogen peroxide, per-oxygenated compounds	3% hydrogen peroxide, Virkon-S®: Oxivir ®	Broad spectrum of activity. Environmentally safe. Powder is corrosive. 7-day stability. Contact time is 1 to 10 minutes.

Peracetic acid	Minncare® (1% peracetic acid)	Broad spectrum activity. Corrosive in pure form. Biodegradable. Often requires special equipment and/or expertise. Most useful for medical and surgical devices. Strong, pungent odor. Respiratory irritant, and can only be used in DUCTED cabinets.
Hydrogen peroxide, acetic acid	Spor Klenz	

Cleaning Recommendations

- Use fresh cleaning materials (avoid reused cloths or sponges).
- Follow the correct contact time for disinfectants to ensure effectiveness.
- Wipe in a single direction motion than circular motions to prevent recontamination
- Allow the area to fully dry.
- Minimize recontamination by using gloves and tools are clean before use.

Restrainers and Enrichment Devices:

1. Wash and rinse in a mechanical cage washer following facility guidelines
2. Hand wash
   - Pre-clean and remove any visible debris, dust, and residue using a dry lint free cloth or disposable wipe. Use soft bristle brush or cotton swab for crevices.
   - Wash used restrainer or device to remove all organic material.
   - Soak or spray equipment with a suitable sanitizer (see list above)
   - Soak or let sit (for sprayed items) for at least the minimum contact time for the product used.
   - Rinse with clean water, allow to air dry completely.

Test Chambers

1. Remove all loose bedding, feces and other materials from chamber.
2. Wipe down or spray all surfaces with one of the recommended cleaning agents and allow to sit for the minimum contact time.
3. Wipe down surfaces with disposable wipe or dry paper towels.

Stereotaxic and other Surgical, Technical, or Experimental Equipment

1. Wipe all surfaces with appropriate disinfectant.
2. Surgical instruments must be sterilized before use and maintained using aseptic technique (see Rodent Survival Surgery, Large Animal Surgery)

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Verification of Sanitization of Research Equipment and Non-centralized areas
Research equipment located in non-centralized areas, laboratories, and procedure spaces (caging, behavior, imaging, stereotaxic) are typically hand-washed; therefore, a system is needed to ensure proper sanitization of these items. All equipment (caging, behavior, imaging, stereo tax, etc.) that is in contact with animals must be sanitized with each use. It is essential to validate that the process used for disinfection is effective. This may be done in several ways including via Adenosine Triphosphate (ATP) bioluminescence technology which assays for ATP (the "energy source" of living cells).

How Annual Testing Works

- PI, or lab's designee must clean and sanitize 4"x4" area on the equipment.
- **Within four hours**, a research lab member must contact the DCM Facility Manager, who will then swab the effective area within the next 4 hours. Contact DCM here
- DCM staff use a handheld swab testing device that detects Adenosine Triphosphate (ATP) the source of energy for use and storage at the cellular level.
- The fluid inside the swab will combine with any ATP left behind on the piece of equipment during swabbing and will cause a bioluminescent reaction.
- The handheld device will measure the light emitted in Relative Light Units (RLUs).
- Records of disinfection and validation must be maintained and should detail the date and method of testing, and the results. These records must be available to the IACUC as requested.

REFERENCES

1. Adapted from Emory University IACUC Policy, Guidelines and Standard Operating Procedures, (accessed 12/10/2020).
2. Adapted from Purdue University IACUC Policy, ATP Testing of Hand-washed Equipment (Accessed 11/26/2024)
3. Adapted from University of Kentucky IACUC Policy 137, Policy on Validation of Disinfection of Research Equipment Used on Animals and guidelines: Annual Validation of Equipment Cleaning (Accessed 11/26/2024),
4. Guide for the Care and Use of Laboratory Animals, Environment, Housing, and Management, pp72-73

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