

 BROWN	Institutional Animal Care and Use Committee (IACUC): Program to Promote the Psychological Well-Being of Nonhuman Primates SOP	SOP 10.10.02
		Effective Date: March 3, 2017

1.0 Standard Operating Procedure (SOP) Purpose

The purpose of this SOP (referred to as “the program”) is to provide for the psychological well-being and physiological health of all nonhuman primates (NHPs) at Brown University. Veterinary staff, animal care technicians, and laboratory personnel all play an important role in the implementation of the program. The program was developed in accordance with the Animal Welfare Act, the *Guide for the Care and Use of Laboratory Animals*, and Brown University’s Institutional Animal Care and Use Committee’s (IACUC) expectations for use of NHPs at Brown University.

2.0 SOP

Below are key elements of Brown’s program to promote the psychological well-being of NHPs in its care and associated expectations for the Center for Animal Resources and Education (CARE) staff and lab staff.

2.1 Environmental Enrichment

Environmental Enrichment is a key feature to ensure the psychological well-being of NHPs. The following procedures have been developed to provide for the social needs of NHPs and enrichment of their physical environment in order to encourage and enable the expression of beneficial and species-specific behaviors.

Environmental Enrichment involves:

- Creating a complex environment for NHPs to help to promote species-typical behaviors and reduce boredom and stress that may result in abnormal behaviors. Enrichment techniques fall under the following categories: physical, nutritional, sensory, social, and occupational.
- Key concepts to Environmental Enrichment are novelty, complexity, and control. Novel, or new, objects, foods, and other items increase attention and use. Because novelty may quickly wear off, rotation of objects helps to maintain higher levels of interest, and the use of complex objects results in a longer latency to habituation.
- Offering NHPs choices in their daily lives enhances their ability to control the environment. Items that can be moved, manipulated, changed, and used to cause a desired effect can provide a level of control, which has positive effects on behavior and psychological well-being.

The program provides for the following exemptions to Environmental Enrichment:

- The Attending Veterinarian (AV) may exempt an individual NHP from components of the Environmental Enrichment procedures outlined above because of its health or condition, or in consideration of its well-being. The basis of the exemption will be recorded by the veterinary staff for each exempted NHP. Unless the basis for the exemption is a permanent condition, the exemption will be reviewed at least every 30 days by the AV or the AV's designee.
- The IACUC may exempt an individual NHP from all or parts of the Environmental Enrichment procedures for scientific reasons set forth in the IACUC-approved animal use protocol. The basis of the exemption will be documented in the IACUC-approved protocol and must be reviewed at appropriate intervals as determined by the IACUC, and no less than annually.
- Records of any exemptions will be maintained and will be made available upon request to United States Department of Agriculture (USDA) officials and to officials of any pertinent funding agency.

2.2 Physical Enrichment

Physical Enrichment includes additions to, and variety in, the physical environment of the animal. These additions and variations promote species-typical manual manipulation and locomotor patterns, and also provide visual barriers for privacy. They can include both manipulable enrichment and structural enrichment.

2.2.1 Manipulable Objects as Enrichment

Durable manipulable objects, such as plastic balls and toys, and rubber toys of various shapes, are available to all NHPs. Smaller toys are attached to the animal's enclosure with short chains to provide opportunities for manipulation without the possibility of them being washed down the drain. Animals 0-3 years of age receive at least three different devices per animal; animals ages three years and older receive at least two. Manipulanda are rotated and sanitized regularly.

Plastic or stainless-steel mirrors can be attached to the outside of some cages or hung from chains. NHPs may handle the mirrors and use them to watch areas otherwise out of view.

2.2.2 Structural Enrichment

Structural enrichment may include cages, perches, view boxes, visual barriers, and play cages, as described below:

- Cages: Cages can be divided horizontally or vertically to promote climbing behaviors and allow for variation in cage configuration.
- Perches: All NHP cages have at least one permanently fixed perch that increases utilization of available cage space.

- View boxes: All NHP cages are equipped with view boxes, which provide enhanced visual access by allowing NHPs to see additional animals and provide a different perspective of their environment.
- Visual barriers: Cages have partial visual screens or solid partitions to provide barriers, an important environmental feature for territorial species.
- Play cages: A large play cage with multiple toys and structures for perching and climbing is available to the animals on a rotating basis. The schedule varies and is determined by training, working, and clinical procedures.

2.3 Nutritional Enrichment

Nutritional Enrichment includes novel food items approved by veterinarians and presented in a variety of ways that increase the diversity of the animals' diets. These items are provided as long as an animal's diet is not restricted due to health concerns or IACUC-approved study restrictions. Enrichment logs must be filled out whenever Nutritional Enrichment is provided to an animal or group of animals. Examples of Nutritional Enrichment include the following:

- Fresh fruits and vegetables: A variety of fresh fruits and vegetables is provided to NHPs on a regular basis. Whole pieces of fruit or vegetables with peels still intact encourage the same sort of manipulation and processing prior to consumption that an NHP would have to employ in the wild. Produce can also be cut up into unique shapes or pieces of varying size to increase novelty and prevent the animal from becoming bored.
- Novel food items: A diverse assortment of novel food items is supplied by the CARE and lab staff to increase the variety of the animals' diets, including but not limited to, shelled peanuts, dried fruits and vegetables, fruit-flavored gelatin, PRIMA-Treats®, and Fruity Bites™.

2.4 Sensory Enrichment

Sensory Enrichment includes items that promote auditory, visual, and olfactory stimulation. Examples of Sensory Enrichment include the following:

- Radios: For added auditory variety, radios are available in most animal housing rooms. Volume is kept at a reasonable level. Radios can be played for one to eight hours per day, but they are turned off at the end of the day.
- Televisions: Televisions with built-in DVD players are available in all NHP rooms to add auditory and visual stimulation. There are a variety of children's and nature DVDs available, and they are rotated regularly. The televisions can be operated by the CARE staff and remain on for one to eight hours each day but are turned off at the end of the day.
- Shower curtains: Plastic shower curtains depicting nature, animals, or abstract colorful scenes are hung in the animal housing rooms either on the wall or on a portable stand for visual stimulation. They are regularly removed, washed, and rotated for variety.
- Popcorn popper: Approximately once a month an air popcorn popper is used in the animal housing rooms. The popcorn is popped in the room and is passed out to the animals afterward. This provides visual, auditory, and olfactory stimulation as well as Nutritional Enrichment.

- Aromatherapy: Occasionally, an essential oil diffuser is placed in animal housing rooms to provide olfactory stimulation. A diffuser is never left in a housing room overnight. They are turned off and removed at the end of the day.

2.5 Occupational Enrichment

Occupational Enrichment includes feeder devices to stimulate problem-solving, motor skills, and coordination. Also included is Positive Reinforcement Training to provide animals with a way to occupy their time, to reinforce positive human interactions, and to minimize the stress of handling and other routine procedures on both animals and humans.

- Feeder devices: A number of feeding and foraging devices are available. They are usually filled with grain, treats, or sticky substances and hung on the outside of the primate's cage.
- Positive Reinforcement Training: Whenever possible, positive reinforcement is used to shape an NHP's behavior and encourage cooperation in research procedures. Animals are rewarded for performing desired behaviors, which builds a more positive relationship with the caregiver and provides goal-directed, enriching activities. Training provides a sense of control and predictability for the animals, minimizes environmental stressors, and reduces time and labor for care staff.

2.6 Social Enrichment

2.6.1 Social Housing

Social housing is recommended for naturally socially living NHPs, like macaques. A social partner is perhaps the most important and basic environmental variable because it provides constantly changing stimuli and challenges the animal's social and cognitive functioning. Forming social pairs of NHPs is not without risks; however, the benefits of social housing usually outweigh the risks. Additional benefits of social housing can include a reduction in abnormal behavior such as self-injurious behavior, regurgitation, and locomotor and other stereotypies.

Brown purchases and receives macaques from the vendor in established pairs whenever possible. CARE makes every attempt to keep animals received in established pairs pair housed. Individual primates may be exempted from social housing while recovering from an illness or injury, when taking part in an IACUC-approved research project, prior to shipment to another facility, during quarantine upon arriving at the facility, or due to behavioral incompatibility. All singly housed NHPs have auditory, visual, and olfactory contact with conspecifics and, occasionally, are provided with tactile contact via grooming/contact bars.

If there are two singly housed primates eligible for social housing that are potentially compatible, an attempt will be made to pair house them. Compatibility of NHPs will be determined in accordance with generally accepted professional practices and actual observations, as directed by the Attending Veterinarian (AV) or the AV's designee, to ensure that the NHPs are in fact compatible. Attempts to pair house will use methodologies delineated in *Enrichment for Nonhuman Primates - Macaques, NIH Pub No. 05-5744*,

2.6.2 Exemptions from Social Housing

NHPs may be housed singly under specific circumstances. Single housing may be approved for the following reasons:

- **Experimental reasons:** A primate on an approved active research protocol may not be able to be housed with another animal because of the experimental design or the primate's infectious status in relation to other animals. This exemption must be approved by the IACUC.
- **Incompatibility:** An NHP may not be able to be housed with another animal due to behavioral incompatibility as determined by high levels of aggression or submission, weight loss due to monopolization of food, or evidence of physical injury to either animal. Attempts will be made to find compatible partners; however, there may be some cases in which this is not possible.
- **Health:** An NHP may be temporarily singly caged due to severe illness or injury.
- **Quarantine:** An NHP may be singly caged after arrival at the facility for quarantine purposes. NHPs awaiting shipment to another facility may also be held in single cages for short periods of time.

2.7 Human Interaction

Positive human interaction is important to develop rapport and good relations with NHPs, especially those being handled frequently. They are visited at least twice daily by CARE staff and once daily by the veterinary staff, who are encouraged to talk to them and hand out enrichment. Additionally, animals are frequently visited by lab personnel who also interact with them via talking, enrichment, and training.

2.8 Record Keeping

2.8.1 Medical Records

The NHP's clinical history for the current calendar year is in the animal health records that are maintained within the animal holding room. Any diagnostic results are also maintained in the animal's medical record. Clinical records, including results of diagnostic and semiannual testing, from previous years are maintained by the veterinary staff in the veterinary technician office.

2.8.2 Enrichment Records

An NHP enrichment log is filled out daily by the CARE and the lab staff and posted on the door to each animal holding room. For the CARE staff, the enrichment log permits them to confirm that the minimum required enrichment is present; note any additional enrichment given; record comments and observations, including strong likes and/or dislikes of specific animals; and provide the caretaker's initials. For the lab staff, the enrichment log allows them

to record when supplemental enrichment was given, what the enrichment was, the NHP's response to the enrichment, and the lab staff's initials. Enrichment logs are collected and filed monthly in the relevant animal health records.

2.9 Special Considerations

If the CARE staff or the lab staff observe any evidence of psychological distress in an NHP, such as excessive auto-grooming or hairpulling, self-injurious behavior, and/or stereotypical behaviors and movements (i.e., circling, pacing, somersaulting, saluting, ear-pulling), the observer will record such evidence in the daily health report and bring it to the attention of the veterinary staff. Observations made by the veterinary staff are noted in the appropriate medical record, and the AV or the AV's designee will assess the need for a more individualized Environmental Enrichment plan or modification for that animal.

If an IACUC-approved animal use protocol involves the use of restraint devices, the veterinary staff, in consultation with the IACUC and the Principal Investigator, will develop guidelines for these animals in accordance with the Animal Welfare Act. In instances where long-term (*i.e.*, more than 12 hours) restraint is required, NHPs will be provided the opportunity daily for unrestrained activity for at least one continuous hour during the period of restraint, unless continuous restraint is required by the IACUC-approved animal use protocol.

3.0 Definitions

For the purpose of this SOP, the terms below have the following definitions:

Environmental Enrichment: manipulations to an animal's housing room and cage to improve the environments of captive primates to enhance psychological well-being and provide opportunities for the expression of species-typical activities in an otherwise restrictive and limited environment.

Nutritional Enrichment: providing novel food items presented in a variety of ways in order to increase the diversity of the animals' diets.

Occupational Enrichment: providing opportunities for NHPs to obtain physical and/or mental stimulation. Occupational Enrichment includes both exercise and problem-solving tasks, and incorporates feeding devices, Positive Reinforcement Training, and research associated training.

Physical Enrichment: includes items designed to provide physical structure (such as perches, floor substrate, climbing areas, and play cages) and items that provide opportunities to explore or manipulate (such as toys, mirrors, etc.).

Positive Reinforcement Training: standard operant conditioning techniques in which animals, presented with a stimulus, perform a target behavior and subsequently receive a desired reward; these techniques allow the animals to cooperate voluntarily with husbandry and/or research procedures.

Sensory Enrichment: provides animals with visual, tactile, and olfactory opportunities and includes exposure to various sights, sounds, and smells.

Social Enrichment: typically consists of housing individuals with conspecifics, although it may also include interaction between an NHP and its caretaker.

4.0 Responsibilities

All individuals to whom this SOP applies are responsible for becoming familiar with and following this SOP. University supervisors are responsible for promoting the understanding of this SOP and for taking appropriate steps to help ensure compliance with it.

5.0 Related Information

Brown University is a community in which employees are encouraged to share workplace concerns with University leadership. Additionally, **Brown's Ethics and Compliance Reporting** System allows anonymous and confidential reporting on matters of concern online or by phone (877-318-9184).

The following information complements and supplements this document. The information is intended to help explain this SOP and is not an all-inclusive list of policies, procedures, laws and requirements.

5.1 Related University Policies: N/A

5.2 Related SOPs: N/A

5.3 Related Forms: N/A

5.4 Frequently Asked Questions (FAQs): N/A

5.5 References:

- Abney DM, Weed JL. 2006. Methods for successfully pair housing adult male rhesus macaques (*Macaca mulatta*). *Am J Primatol* 68(Suppl. 1):59.
- Bloomsmith M, Brent LY, Schapiro SJ. 1991. Guidelines for developing and managing an environmental enrichment program for nonhuman primates. *Lab. Anim. Sci.* 41(4):372-377.
- Committee on Well-Being of Nonhuman Primates. 1998. *The Psychological Well-Being of Nonhuman Primates*. ILAR, Commission on Life Sciences, National Research Council. National Academy Press, Washington, D.C.
- Kathryn B. (ed). 2005. *Enrichment for Nonhuman Primates – Macaques*, NIH Pub No. 05-5744, Department of Health and Human Services, NIH, Office of Laboratory Animal Welfare.
- Lutz CK, Novak MA. 2005. Environmental Enrichment for Nonhuman Primates: Theory and Application. *ILAR Journal* 46(2):178-191.
- Mason WA. 1991. Effects of social interaction on well-being: development aspects. *Lab. Anim.Sci.* 41:323-328.
- National Research Council. 2011. Guide for the Care and Use of Laboratory Animals. 8th ed. Washington, D.C.: The National Academies Press.
- Reinhardt, V. 2009. *Taking Better Care of Monkeys and Apes*. Washington, D.C.: Animal Welfare Institute.
- Sambrook TD, Buchanan-Smith HM. 1997. Control and complexity in novel object enrichment. *Anim. Welf.* 6:207-216.

- Schapiro SJ. 2017. Handbook of Primate Behavioral Management. Boca Raton: CRC Press.
- Schapiro SJ, Bloomsmith MA, Laule GE. 2003. Positive Reinforcement Training as a Technique to Alter Nonhuman Primate Behavior: Quantitative Assessments of Effectiveness. *J Appl Anim Welf Sci* 6(3):175-187.
- Schapiro SJ, Brent L, Bloomsmith MA, Satterfield WC. 1991. Enrichment devices for nonhuman primates. *Lab. Anim.* 20(6):22-28.
- Southwest National Primate Research Center. 2015. Nonhuman primate environmental enhancement plan of the Southwest National Primate Research Center.
- Wolfensohn S, Honess P. 2005. Handbook of Primate Husbandry and Welfare. Ames: Blackwell Publishing Ltd.

6.0 SOP Owner and Contact

6.1 **SOP Owner:** Vice President for Research

6.2 **SOP Approved by:** Vice President for Research

6.3 **Subject Matter Contact:** Brown University Animal Research Protection Program

- Telephone: 401-863-3050
- Email: IACUC@Brown.edu

7.0 SOP History

7.1 **SOP Effective Date:** March 3, 2017

7.2 **SOP Last Reviewed:** September 28, 2022

7.3 **SOP Update/Review Summary:** This SOP is not new; initially, this was approved as an IACUC policy, however, it has since been converted to the University's new SOP template and re-reviewed by the IACUC at its convened meeting March 6, 2020. Old format version superseded by this SOP:

- IACUC Program to Promote the Psychological Well-Being of Nonhuman Primates
Date of IACUC Review and Approval: March 3, 2017