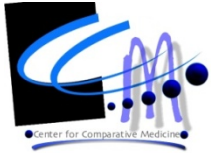


A Psychological Well-being Response Plan for Non-Human Primates

**Center for Comparative Medicine
Massachusetts General Hospital
Charlestown, MA**

American Association for Laboratory Animal Science
60th Annual Meeting, Denver, CO
Abstract # PS84, November 11, 2009



NHP's at MGH



Average daily census = 130

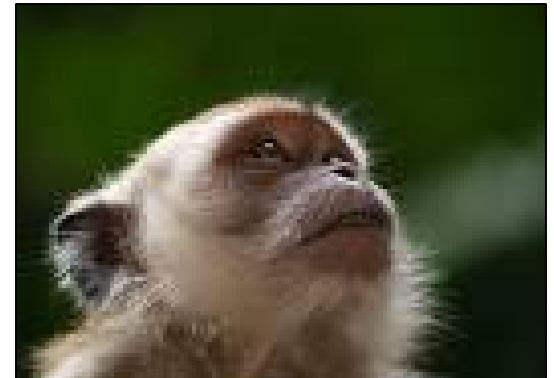
- Rhesus (*Macaca mulatta*)
- Cynomolgus (*Macaca fascicularis*)

Predominantly ♂

4-10 years age range

Scientific Protocols

- Transplantation
- Diabetes
- Immune deficiency
- Neuroscience/Imaging



Routine NHP Environmental Enrichment Components

Social Enrichment

Standard Cage Set up

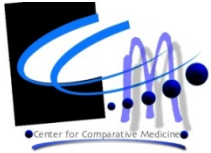
Sensory Enrichment

Nutritive Enrichment

Rotating Enrichment

Novel Enrichment





Sometimes It Fails

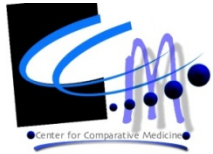


- **Stereotypic/Abnormal Behaviors:**
 - Unusual behavior that appears to serve no purpose or function
 - Disruptive or Injurious to self/others

One study reported 321 of 362 monkeys (89%) observed to exhibit abnormal arrays of behavior (Lutz et al., 2003)

>10% of laboratory macaques present with severe stereotypes (Novak et al., 1998)

<13% of the MGH monkeys were identified to have stereotypic behaviors (2007- Present)

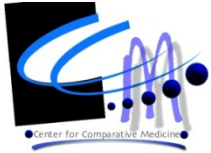


Drivers to Correct Abnormal Behavior



- **Animal Welfare**
 - Clinical/Behavioral Concern
 - Moral/Ethical rationale to provide humane care and wellness
- **Animal Use**
 - How “normal” is abnormal?
 - Behaviorally/Physiologically “normal” animal subjects
 - Threat to scientific validity?
- **Animal Regulations**
 - Requires a plan for animals exhibiting signs of psychological distress.



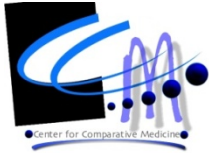


The “Before”



Enrichment Program Manager

- Visited facility on frequent but irregular schedule
- Assessments performed
- Delegated enrichment plans
- **Problems observed:**
 - Delayed response
 - Assessments may not be comprehensive
 - Costly (expensive labor versus tech staff)
 - Unconfirmed enrichment plan follow-throughs
- **Stimulus to review and improve: EPM maternity leave**



Behavioral Assessment Form

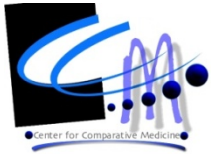


Environmental Conditions: (If * is circled please explain below)	
Have the environmental conditions remained relatively constant?	YES or NO*
Are there any novel objects, people or activities that may affect this animal?	YES* or NO
Are there new animals in the room?	YES* or NO
Does this animal appear agitated or distracted by other animals in the room?	YES* or NO
Notes:	
Physical Conditions: (If * is circled please explain below)	Normal Behaviors
Does this animal have an illness or injury? YES* or NO	<ul style="list-style-type: none"> • Food/Water Consumption • Foraging • Grooming • Manipulation (Play) • Exploration • Locomotion • Visual/Vocal interaction • Physical interaction • Aware of surroundings • Appropriately reacts to events • Responds to offerings • Other:
Has this animal health, appetite and behavior remained constant? YES or NO*	
The animal should perform a wide array of normal behaviors.	
Please describe the animal's behavior during the assessment period. Circle all that apply	
Notes:	

- Assign preliminary cause of behavior
 - Report to EPM/Vet

Massachusetts General Hospital
Center for Comparative Medicine
Non-Human Primate Behavioral Assessment

Animal Identification	
Species: _____	DOB: _____ Sex: _____
PI Protocol: _____	Animal Room: _____ Cage Placement: TOP or BOTTOM
Assessment Date: _____	Performed By: _____
Abnormal Behavior: _____	By Request: _____
<small>This assessment should be filled out by a person with knowledge of the animal. Information on this form will both be known and identified during assessment period. Assessment should be done during the end of the day when room is quiet. Assessor should be in room with animal for ~20 minutes or until the animal is not being stressed in any way.</small>	
Behavior and Hierarchy Assessment:	Characteristics
Which best describes the animal's social rank? Submissive ___ Dominant ___ Neutral ___	<ul style="list-style-type: none"> • Active/Foraging/Restable • Submissive/Play/Social • Aggressive/Unpredictable/Refusing • Dominant/Confident/Bold/Fearless • Calm/Chill
Which best describes the animal's behavioral character? Circle best describes from list on right	<ul style="list-style-type: none"> • Nervous/Slow/Withdrawn • Timid/Overly-Axious • Grumpy/Inedible • Intelligent • Defensive • Other: _____
Notes:	
Environmental Conditions: (If * is circled please explain below)	
Have the environmental conditions remained relatively constant?	YES or NO*
Are there any novel objects, people or activities that may affect this animal?	YES* or NO
Are there new animals in the room?	YES* or NO
Does this animal appear agitated or distracted by other animals in the room?	YES* or NO
Notes:	
Physical Conditions: (If * is circled please explain below)	Normal Behaviors
Does this animal have an illness or injury? YES* or NO	<ul style="list-style-type: none"> • Food/Water Consumption • Foraging • Grooming • Manipulation (Play) • Exploration • Locomotion • Visual/Vocal interaction • Physical interaction • Aware of surroundings • Appropriately reacts to events • Responds to offerings • Other:
Has this animal health, appetite and behavior remained constant? YES or NO*	
The animal should perform a wide array of normal behaviors.	
Please describe the animal's behavior during the assessment period. Circle all that apply	
Notes:	
Physiological Assessment: (If * is circled please explain below)	Abnormal Behaviors
Does this animal appear stressed? (exhibit signs of fear/aggression) YES* or NO	<ul style="list-style-type: none"> • Self-injury behavior • Wet Clasp, drinking urine, mouth-biting, genital manipulation, Eye-bell Press • Inactivity (crouch/huddle) • Self-abuse (biting) • Repetitive Behavior: pace, bounce, rock, excessive rock or head waves • Over grooming/Hair plucking • Inappropriate or Excessive Aggression or Vocalizations • Face-Grooming/Avoidance
Does this animal appear depressed (withdrawn)? YES* or NO	
Does this animal exhibit unusual, uncharacteristic or abnormal behaviors? YES* or NO	
Notes:	



Intervention Form



INITIAL AND DATE & ENRICHMENT ID	MON	TUES	WED	THUR	FRI	SAT	SUN	DATE	QUANTIFY BEHAVIOR (Frequency, Severity or %Alopecia)	ENRICHMENT SUMMARY (Animal Attention and Usage)	INITIAL	

DE: Destructible Enrichment TR: Toy Rotation SOC: Socialization ↑CS: Increased Cage Space RL: Relocation F/F: Fleece/Forage Board
 PH: Pair Housing CB: Contact Bar * Behavioral Occurrence Other: _____

Massachusetts General Hospital
Center for Comparative Medicine
Behavioral Intervention Form

Animal ID: _____ Species: _____ DOB: _____
 PI: _____ Protocol: _____ Behavioral Assessment YES or NO
 Abnormal Behavior: _____ Severity: _____
 Intervention: _____ Intervention Frequency: _____

INITIAL AND DATE & ENRICHMENT ID	MON	TUES	WED	THUR	FRI	SAT	SUN	DATE	QUANTIFY BEHAVIOR (Frequency, Severity or %Alopecia)	ENRICHMENT SUMMARY (Animal Attention and Usage)	INITIAL	

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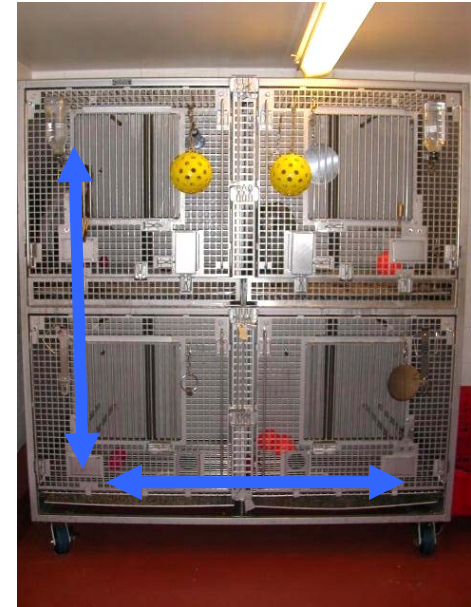
Note: Follow-up with PM Vet after 4 weeks of intervention. Alert PM Vet immediately if behavior worsens.

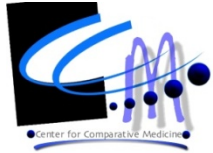
- Visual Cue
 - Enrichment plan & frequency
 - Documentation
- Evaluation
 - Behavior & animal usage

Interventions

Distribution of recommended intervention plans

Diagnosis	Destructible Enrichment	Toy Rotation	Socialization	Expanded Cage Space	Behavioral Consult
Fearful Behavior			✓		
Aggression			✓		
Over-grooming	✓				
Hyperactive Behavior	✓	✓	✓	✓	
Self-Directed Behaviors					✓
Self-Abusive Behavior					✓





Assessing The “After”

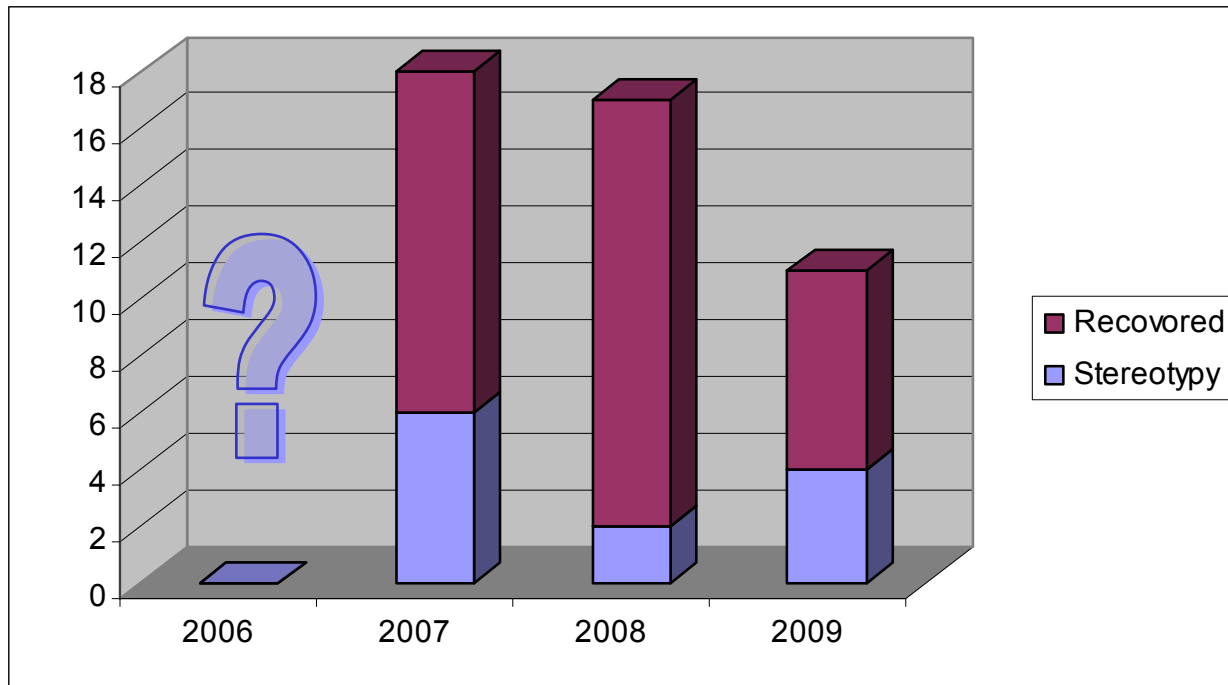


Instituted in 2007

- Reality
 - Were the initiatives realistic?
 - Would the staff maintain compliance with the process initiatives?
 - **90% of the time the staff were able to maintain compliance with the recommendations of the BRP**
- Effectiveness
 - Did the interventions help to reduce or eliminate the abnormal behaviors?
 - **36/46 (78%) NHP cases resolved using within 16 weeks (75% of the cases were over-grooming)**

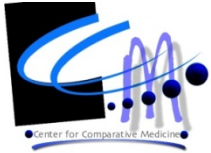
Stereotypic Behavior

- 2007-08: 18/129 (14%). Recovery Rate 67%
- 2008-09: 17/103 (16.5%). Recovery Rate 88%
- 2009 YTD: 11/117 (9%). Recovery Rate 60%*



Unresolved:

- * 2009 Unresolved:
 - 2 Recent Case Findings < 4 weeks
 - 1 mild alopecia (2007-ongoing)
 - 1 severe self-abusive behavior (ongoing case)
 - 1 severe self-abusive behavior (exported 2008)



BRP Outcomes

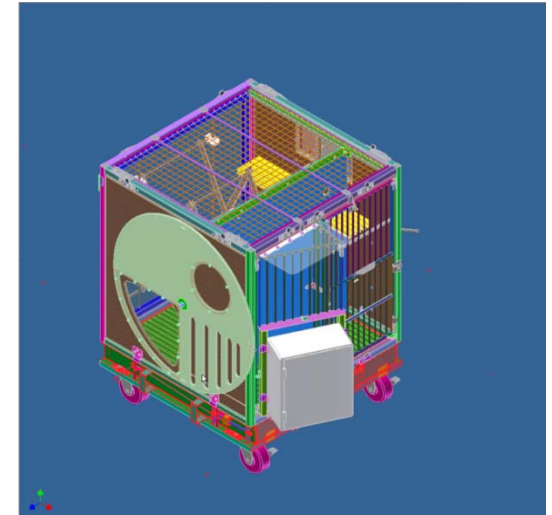


- Identification of abnormal behavior
 - Husbandry staff more likely to see abnormal behaviors as they occur
 - Increase husbandry staff independence/confidence
- Immediate action by the husbandry staff
 - Action taken when behavior occurs vs. identification during ~weekly assessment by Program Manager
- Initiate a formal behavioral assessment (BA Form)
 - Veterinary and/or behavioral staff.
- Initiate a quantitative assessment (intervention form)
 - Frequency and severity
 - Effectiveness of intervention
- Follow-up care
 - Behavioral Rounds

Next Steps?

- Unresolved abnormal behaviors

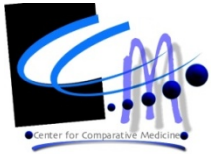
- Novel assessment tools
 - Neurological evaluations?
 - Remote/interpretive video assessments
- Novel treatment approaches?
 - Better pharmacology?
 - Interactive enrichment?



- BRP improvements

- Expand on the scope of behaviors
- Expand on the interventions/treatments
- Improvements to forms and visual cues

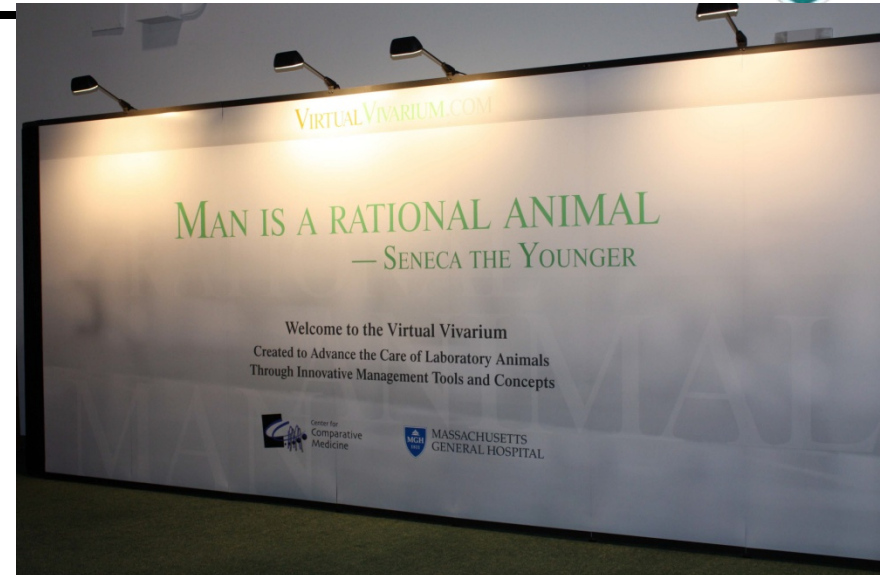




Poster and Forms

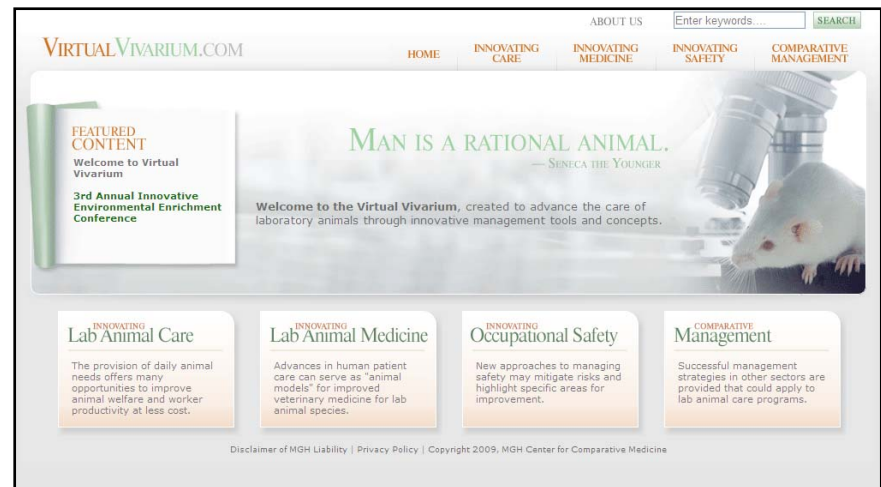


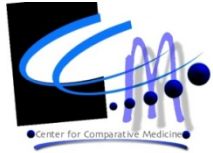
Trade Show
Booth # 2115



Website

www.virtualvivarium.com





Questions?

