PPE in the Animal Facility

Cost, Laboratory Animal Infections and Allergens

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Presentation Outline

- Purpose of PPE
- Animal Facility Hazards
- Laboratory Animal Allergens
- Colony Biosecurity
- PPE Cost & Reduction Strategies

Purpose of PPE

- **Part of a comprehensive program to protect the employee and research colony**
  - Hazard protection
  - Colony biosecurity

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Animal Facility Hazards

- Physical
- Chemical
- Biologic
- Radioactive
- Allergens

Physical Hazards

- Ergonomics
- Equipment
- Slips & falls
- Noise
- Bites & Scratches

Chemical Hazards

- Gases (CO_2, waste anesthetic gases, etc.)
- Strong acids and bases
- Disinfectants and sterilants
- Pharmaceutical agents

Biologic Hazards

- Human source material
- Recombinant DNA
- Viral vectors
- Infectious agents

Radioactive Hazards

- Radiation generating devices
- Radioactive material

Allergens

- Exaggerated immune reaction to animal proteins
- Sources
  - Dander
  - Fur
  - Urine
  - Saliva
  - Serum

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- **Laboratory Animal Allergens (LAA)**
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LAA Background

- 11 to 44% of workers will develop laboratory animal allergies (LAA)
- 4-22% will develop LAA induced asthma
- Risk factors
  - Preexisting allergies
  - Gender
  - Intensity & duration of exposure
  - Route of exposure
  - Smoking

LAA Sources

- Fur
- Dander
- Urine
- Saliva
- Serum

LAA Exposure

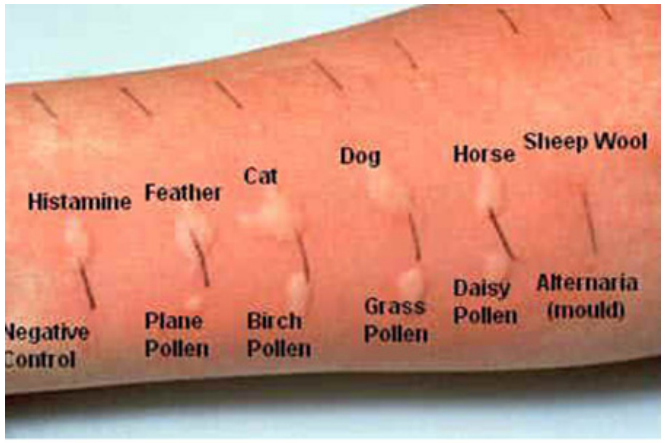
- Inhalation
- Skin & eye contact
- Ingestion
- Percutaneous

Inhalation Causes Most LAA

- Inhalation of aeroallergens is the principal route of exposure
- Cage dumping and clean activities at the highest risk

LAA Symptoms

- Runny nose
- Rash
- Nasal congestion
- Red & itchy eyes
- Coughing
- Wheezing
- Anaphylaxis
- **33% within a year and 70% in 3 years**



Skin Allergy Test

Allergen Prevention

- Medical surveillance and screening
- Engineering controls
- Equipment
- PPE ?
- Hygiene

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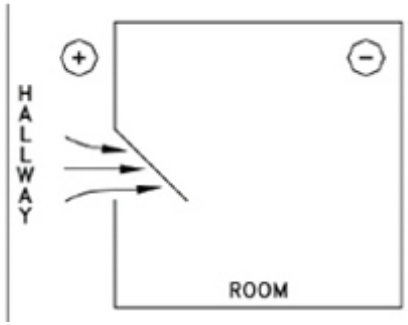
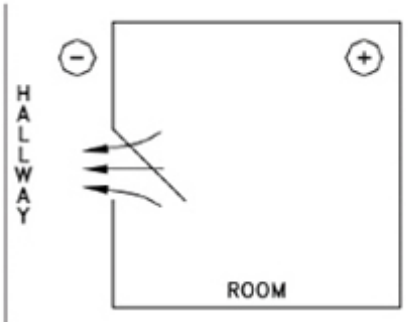
Aims of Colony Biosecurity

- Prevent infections that compromise research and animal welfare
- Maintain consistent microbial quality for reproducible animal experiments
- Prevent zoonotic diseases

Colony Biosecurity Components

- Bio-exclusion lists
- Quarantine & Isolation
- Disease surveillance
- **Engineering controls**
- **Administrative controls**





Biosecurity Engineering Controls

- Facility Design
- Ventilation
- Equipment

Biosecurity Administrative Controls

Barrier at the cage level !

- SOPs & policies
  - Traffic flow
  - Entry procedures
  - Sanitation & disinfection
  - Food & bedding vendors
  - Animal sources
  - Disease control, monitoring & prevention
  - PPE ?

Threats to Colony Biosecurity

- Animals from other sources
- Food & Bedding
- Biologic Material
- Vermin
- Fomites
- Humans – PPE?

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- **PPE Cost & Reduction Strategies**

Cost of PPE

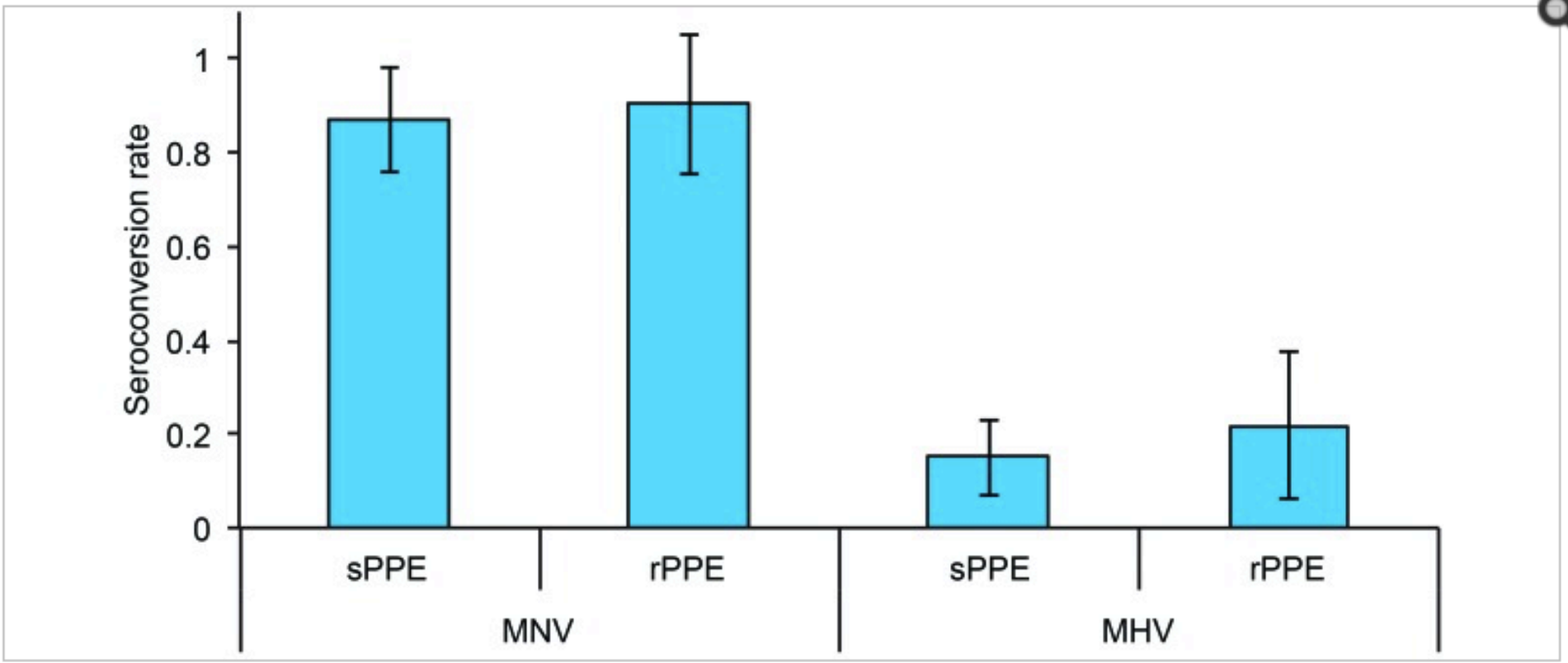
- The use of PPE comes at a cost to the research program
- Impact to Budget (~20 million)
  - FY15 – 233K
  - FY16 – 360K
  - FY17 – 450K

- Approximately every $0.02 of the $1.14 per diem goes to support PPE
  - 1000 cages = $7,300/year
- Important consideration with Questionable NIH Funding

PPE Reduction Strategy

- Limit PPE to animal handling and at risk activities
- Invest in engineering controls, equipment and administrative procedures
- Further evaluate reducing PPE to areas of the body in direct contact with animals
  - LAAs
  - Colony Heath

Reduced PPE No Impact on Colony Health



Baker et. al (2014) **Using Reduced Personal Protective Equipment in an Endemically Infected Mouse Colony**. JAALAS 53(3) 273-277

Broad Variation in Practices for LAA

- Survey of a 198 institutions (J Occup Environ Med. 2012 May;54(5):558-63)
  - 80 % required uniforms and gloves
  - 25 % required respirators
  - 58 % had medical surveillance
  - Less than 29% know the prevalence or incidence in their facility
- Very little is know regarding the effectiveness of PPE and reducing LAA
- Understanding the role of PPE in reducing LAA is the next critical step

Questions?