

อุปกรณ์ป้องกันอันตรายส่วนบุคคล
สำหรับเจ้าหน้าที่ห้องปฏิบัติการ

**PERSONAL PROTECTIVE EQUIPMENT
FOR LABORATORY PERSONNEL**

การเตรียมความพร้อมห้องปฏิบัติการ
เพื่อรับมือการระบาดไวรัสไข้หวัดใหญ่สายพันธุ์ใหม่ 2009 และโรคติดต่ออันตราย
ด้วย Biosafety Level 2 enhanced

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27 July 2009



OUTLINE

- Purpose of PPE
- Choosing PPE
- PPE uses
- Types of PPE
 - Protective laboratory coats : Gown
 - Eye and face protection : Safety glasses/Face shield
 - Respiratory protection : N-95, PAPR
 - Hand protection : Gloves
 - Foot protection : Shoe covers, foot wear
- Required PPE for Working with H1N1 Influenza Virus



PERSONAL PROTECTIVE EQUIPMENT, PPE

Purpose of PPE

- To serve as a barrier against skin, mucous membrane or respiratory exposure to infectious agents in the workplace
- To prevent spread of contamination



CHOOSING PPE

- Conduct risk assessment associated the tasks in the protocol
- Identify routes of exposure or transmission
 - Skin
 - Eye and face
 - Ingestion
 - Inhalation
- Select PPE to block exposure routes



CHOOSING PPE

- Meet National Institute for Occupational Safety and Health (NIOSH) or American National Standards Institute (ANSI) standard

- Operational considerations
 - Motion/dexterity inhibition
 - Heat/physical/psychological stress
 - Vision obstruction

- Training
 - Fit, use, maintenance, storage, disposal
 - Awareness of limitations



PPE USES

All PPE provided, cleaned, repaired, replaced and disposed of at no cost to the employee

- Worn when working in the laboratory
- Removed before leaving the laboratory
- Never taken home
- Should be disposed of or decontamination in the work area where it is used



PERSONAL PROTECTIVE EQUIPMENT

- Protective laboratory coats : Gown
- Eye and face protection : Safety glasses/Face shield
- Respiratory protection : N-95, PAPR
- Hand protection : Gloves
- Foot protection : Shoe covers, foot wear




PROTECTIVE LABORATORY COATS


- Protects the workers from splash and during procedures
- Protects worker's clothing from contamination
- May protect product from contamination



CHOOSING LABORATORY CLOTHING

- Choice of fabric: Must be appropriate for use
 - Describe clothing type required in SOP or Biosafety Manual
 - Laundry facilities must be provide for all laboratory clothing
 - Training on use, disposal and decontamination must be provide
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LABORATORY CLOTHING

- Do not wear PPE clothing outside the laboratory or take home for laundry
 - Change when overly contaminated
 - Single use or disposal suit clothing will be disposed in red biohazard waste containers and decontaminated by autoclave
 - Carefully remove PPE clothing to minimize the creation of infectious aerosols and avoid touching exterior if possible then remove and discard gloves as the last step
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EYE AND FACE PROTECTION


- Always wear safety glasses, goggles, or face shield
- Appropriate for the task:
 - Safety glasses – Must have side protectors
 - Goggles
 - Face shield and goggles if risk of splash and splatter
- Dispose of (if single use) with other contaminated laboratory waste or decontaminated (if multiple use) before reuse.
- In case of wearing eyeglasses, ensure that eye protection is completely cover eyeglasses.




EYE AND FACE PROTECTION




RESPIRATORY PROTECTION

- ◆ Not a substitute for good technique and primary containment
 - ◆ Used as added protection against infectious aerosols and particulates
 - ◆ May be recommended or required in BSL-3 labs, work with M. Tb, H5N1, SARS, infected animal....
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REQUIRED RESPIRATORY PROGRAM

- ◆ OSHA clearly defines requirements for a respirator program in 29 CFR 1910.134 to include:
 - ◆ Pre-use/as needed medical evaluation to determine an individual's fitness (ability) to wear a respirator
 - ◆ This entails evaluation by questionnaire, and discretionary physician exam
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RESPIRATORY PROGRAM

- ◆ Staff must be medically cleared
 - ◆ Respirator must be NIOSH approved and fitted and checked by trained person
 - ◆ Use must be prescribed in SOP or manual
 - ◆ Staff must be trained annually by certified person and records kept
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REQUIRED RESPIRATORY PROGRAM

- ◆ Training
 - ◆ Identifies which respirator is appropriate for particular tasks/use
 - ◆ Identifies limitations of respirators for the intended use
 - ◆ Teach how to put on and remove the respirator
 - ◆ Instructs how to maintain respirator and replace/decontaminate disposable parts
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RESPIRATOR

- ◆ Air purifying
 - ◆ Uses a filter medium to remove contaminant
 - ◆ Reduces aerosols
 - ◆ Non-powered such as—N-95
 - ◆ Powered such as – Powered Air Purifying Respirator (PAPR)



POWERED AIR PURIFYING RESPIRATOR



GLOVES : IMPORTANT CONSIDERATIONS

- ◆ Aim to prevent skin exposure to infectious agents while allowing dexterity
- ◆ Avoid gap between glove and sleeve
 - ◆ For the best protection, the cuffs of the gloves should overlap the lower sleeves of the lab coat.
- ◆ Disposable gloves should **not** be washed, wiped with disinfectant or **reused**




GLOVES : IMPORTANT CONSIDERATIONS


- ◆ Both latex and nitrile disposable gloves will prevent exposure to microorganisms. However, nitrile gloves must be worn when handling chemicals, since latex provides little to no protection from chemical exposure.
- ◆ Latex allergies are a problem



GLOVES : IMPORTANT CONSIDERATIONS

- ◆ Provide non-latex alternatives to include nitrile, powder free latex gloves
 - ◆ Allergic reactions – reporting, treatment, provide options
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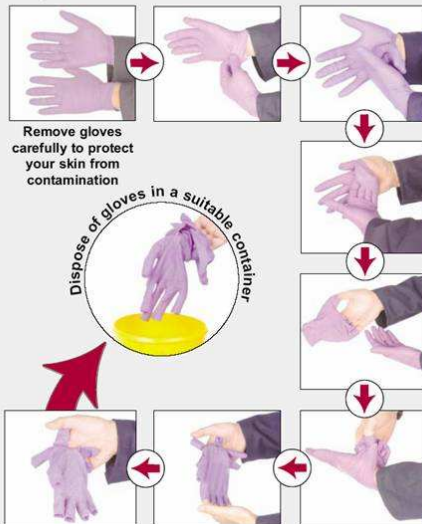
GLOVES : IMPORTANT CONSIDERATIONS

- ◆ Training on aseptic glove removal
 - ◆ Hands must be washed after removing gloves
 - ◆ 20 seconds for lathering – Happy birthday ...
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Correct removal of gloves

Single use gloves (splash resistant)

Follow the steps shown



Proper Glove Removal

GLOVES

- ◆ Latex, nitrile or rubber
 - ◆ Check for holes and tears
 - ◆ Remove carefully- don't contaminate your hands
 - ◆ Wash hands immediately after removal



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www.winterbrookfarmantiques.com




GLOVES

- ◆ Always remove gloves before handling common use objects
- ◆ Change gloves when contaminated
- ◆ Wear single gloves for entry and double gloving is required for work in BSC, transport, and spill clean-up. Gloves must overlap the sleeve of the gown.
- ◆ Always change the second pair of gloves when leaving the BSC.
- ◆ Remove gloves and wash hands before leaving the laboratory.



Six stage handwashing technique



The diagrams illustrate the following steps:

1. Palm to palm
2. Backs of hands
3. Interdigital spaces
4. Fingertips
5. Thumbs and wrists
6. Nails

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SHOE COVERS/FOOT WEAR

- ◆ To protect contamination to street shoes
- ◆ To protect foot from spill or splash

- ◆ Wear closed-toe shoes.
- ◆ Do not use sandals or flip-flops in laboratory areas




Table 11. Personal protective equipment

EQUIPMENT	HAZARD CORRECTED	SAFETY FEATURES
Laboratory coats, gowns, coveralls	Contamination of clothing	<ul style="list-style-type: none"> • Back opening • Cover street clothing
Plastic aprons	Contamination of clothing	<ul style="list-style-type: none"> • Waterproof
Footwear	Impact and splash	<ul style="list-style-type: none"> • Closed-toe
Goggles	Impact and splash	<ul style="list-style-type: none"> • Impact-resistant lenses (must be optically correct or worn over corrective eye glasses) • Side shields
Safety spectacles	Impact	<ul style="list-style-type: none"> • Impact-resistant lenses (must be optically correct) • Side shields
Face shields	Impact and splash	<ul style="list-style-type: none"> • Shield entire face • Easily removable in case of accident
Respirators	Inhalation of aerosols	<ul style="list-style-type: none"> • Designs available include single-use disposable; full-face or half-face air purifying; full-face or hooded powered air purifying (PAPR); and supplied air respirators
Gloves	Direct contact with microorganisms	<ul style="list-style-type: none"> • Disposable microbiologically approved latex, vinyl or nitrile • Hand protection
	Cuts	<ul style="list-style-type: none"> • Mesh



REQUIRED PPE FOR WORKING WITH H1N1 INFLUENZA VIRUS


○ Clinical Laboratory Testing

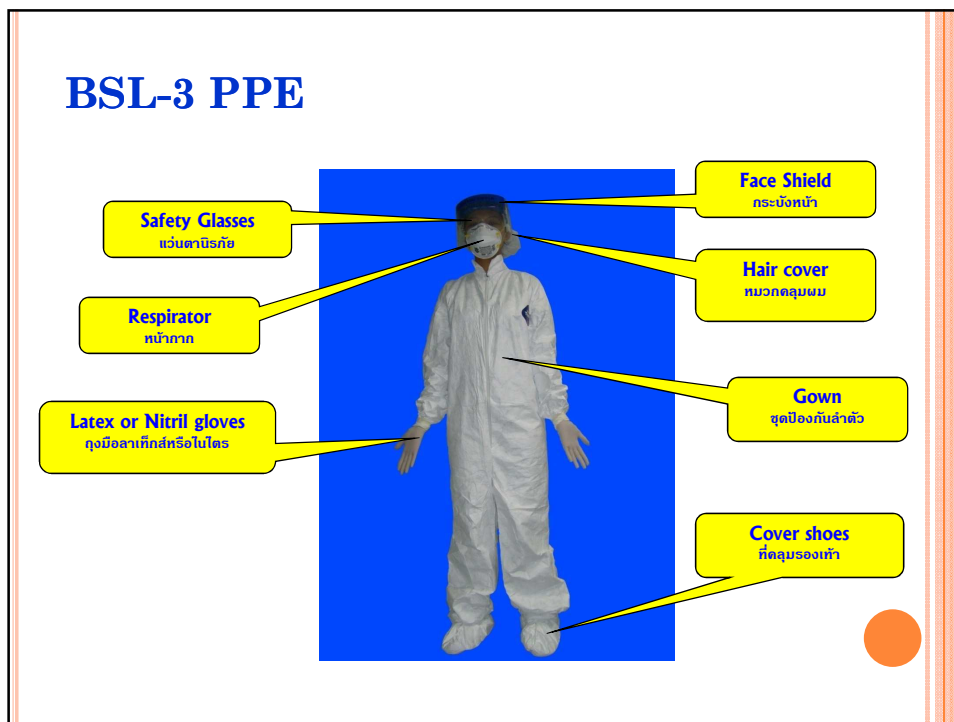
- Gloves
 - Laboratory coat
 - Eye protection
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REQUIRED PPE FOR WORKING WITH H1N1 INFLUENZA VIRUS

○ Viral isolation :

PPE may include the following based on a site specific risk assessment:

- Respiratory protection – fit-tested N95 respirator or higher level of protection.
 - Shoe covers
 - Closed-front gown
 - Double gloves
 - Eye protection
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REFERENCES

- CDC/NIH: Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, 2007
- Laboratory Biosafety Manual, Third edition World Health Organization, 2004
- http://www.cdc.gov/h1n1flu/guidelines_labworkers.htm

**Thank you for your attention
Questions??**

