Building safety
How to respond to emergency situations?

Training content
1. Perception of risk
2. What is a Self-Protection Plan?
3. Emergency Response Team
4. How to act in emergency situations?
5. Notions on fire and protection equipment

What is a Self-Protection Plan?
Decree 39/2015 Government of Catalonia

OBJECTIVES:
- Getting to know the buildings and their fixtures
- Preventing the causes of emergencies
- Ensuring the reliability of means of protection
- Have organised and trained staff
- Inform everyone in the building

STRUCTURAL FIRE PROTECTION
Key components
- Escape routes
- Fire resistance of building elements
- Fire protection systems
Seguridad, Salud y Medio ambiente en las actividades de laboratorio

Seguridad: Cómo actuar en situaciones de emergencia

Oficina de Seguretat, Salut i Medi ambient

Emergency teams

- When should they participate?
- How?
- With what means?

EMERGENCY TEAMS

First Aid Team  Evacuation and Containment Team  Second Intervention Team

Performances of:

- Emergency Manager
- Intervention Manager
- First Intervention Team
- Second Intervention Team
- Evacuation and Containment Team
- First Aid Team
- Control, Alarm and Communications Centre
- Other staff
Article 4.2 General obligations of users

Persons in the service of an activity have the obligation, in accordance with their capabilities, to participate in the activity’s Self-Protection Plan and to assume their functions, if they are required to do so.

They are also obliged to participate in the training necessary to carry out their tasks and to take part in drills.

YOU MUST NEVER ENDANGER YOUR PHYSICAL INTEGRITY

Types of emergencies:
- Fire
- Explosion
- Substance leakage
- Bomb warning, etc.

Emergency levels:
- Emergency conato: The emergency can be controlled by our own means.
- General emergency: Outside help is needed.
- Out-of-hours emergencies: These occur when there are no staff in the buildings.

How to act in emergency situations?

What to do when an emergency is detected?
1. You have to warn someone
2. Try to fight the emergency with the means at your disposal.
3. If you need help, please contact the Information Point, providing:
   - Your name
   - Location of the emergency
   - Type of emergency

As a last resort, you can press the emergency button, bearing in mind that this will cause the evacuation of the building.

What to do if the evacuation alarm sounds?
1. Informs people in the area that this is an evacuation alarm and that it is necessary to leave the building immediately.
2. Direct the occupants of the area to the escape routes following the emergency signs.
3. Indicates exit from the zone
4. Indicates the exterior Emergency Meeting Point
What to do if the evacuation alarm sounds? (2)

5. Prevents the use of lifts or other types of lifts.
6. If you know a person with a disability in your area, ask for help so that he/she can go out.
7. If someone has suffered an accident, inform the Intervention Manager (Logistics Technician of the building).
8. Check that there is no one left and exit by the nearest route.

What to do if you are caught in a fire?

• If the escape route is obstructed by smoke, find an alternative way.
• Do not go through the smoke unless you know for sure that you will find a way out.
• If the smoke reaches where you are, move forward carefully by kneeling or stretching, as the air at ground level is cleaner and cooler. If you can, use a damp cloth.
• If you cannot get out of where you are, close the door and, from a window, call for help.
• If smoke starts to enter, cover all cracks where it can enter with some clothes, preferably wet, and call for help.
• If the fire catches your clothes, or someone else’s, do not run. Drop to the ground and roll over yourself, or cover yourself with a fire blanket.

Notions on fire and protective equipment

• Chemical reaction
• Oxidation chemical reaction
• Oxidation chemical reaction of exothermic nature
THE FIRE TETRAHEDRON

Necessary elements:
- **Fuel**: Any material that reacts when the temperature rises (e.g., gasoline, butane, ...).
- **Oxidiser**: Oxidising agent necessary for combustion (oxygen or halogens such as chlorine, fluorine, ...).
- **Activation energy**: Minimum temperature required.

Factors for a fire to sustain
- Chain reaction

FIRE EXTINGUISHING METHODS

- **Cooling**
- **Starvation**
- **Smothering**
- **Inhibition**

Fire classification

**Category A**: Solid products (wood, paper, ...)

**Category B**: Flammable liquids or low melting point solids (gasolina, petroleum, ...)

**Category C**: Flammable gases (butane, acetilene, ...)

**Category D**: Combustible metals, reactive compounds (sodium, potassium, titanium, ...)

FIRE PROTECTION INSTALLATIONS

**Detection and alarm**
- Pushbuttons and detectors: These are fundamental elements in protection, as they reduce the time it takes to act in the event of a fire risk.

Fire extinguishing systems

- Equipped fire hydrant
- Fire extinguisher
- Fire blanket
- Sprinkler
- Dry standpipe
- Hydrant

Characteristics and types of extinguishing agent

**Water (BIE's)**: Very effective and abundant, acts by cooling
- **Advantages**
  - Economical
  - Easily accessible
- **Disadvantages**
  - Electrically conductive (risk of electrical contact with equipment)
  - Can spread fires of flammable liquids that cannot be mixed easily
  - Possibility of explosion with reactive metals (sodium, potassium, ...)

Range: 25 m (20 m hose + 5 m water beam), covers about 50 m.
Seguridad, Salud y Medio ambiente en las actividades de laboratorio

Seguridad: Cómo actuar en situaciones de emergencia

Oficina de Seguretat, Salut i Medi ambient

Multi-purpose owder - ABC powder

Composed of monoammonium phosphate

- Suffocates the fire by interposing itself between the fuel and the oxidizing agent

**Advantages**

- Highly effective against A, B and C fires
- Does not conduct electric current in 220-380V installations

**Disadvantages**

- It is a dirty product and can damage equipment
- Its versatility makes it the most widely used product

**Advantages**

- Highly effective against A, B and C fires
- Does not conduct electric current
- Clean, non-damaging extinguishing agent

**Disadvantages**

- Not very effective against embers
- Can cause cryogenic burns

**Advantages**

- Does not conduct electric current
- Clean, non-damaging extinguishing agent

**Disadvantages**

- Not very effective against embers
- Can cause cryogenic burns

Carbon dioxide CO₂

Compound packaged under pressure

- Cool because it is a gas that discharges at -63 °C
- Suffocates by displacing air - oxygen

**Advantages**

- Does not conduct electric current
- Clean, non-damaging extinguishing agent

**Disadvantages**

- Not very effective against embers
- Can cause cryogenic burns

**Advantages**

- Does not conduct electric current
- Clean, non-damaging extinguishing agent

**Disadvantages**

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Extinguishers for category

None of the above agents are suitable for metal fires

Combustible metals can explode in the presence of water, flammable gases, etc.

If they are present in your laboratory, it is necessary to provide them with special extinguishers

<table>
<thead>
<tr>
<th>Extinguishing agent</th>
<th>Na</th>
<th>K</th>
<th>Li</th>
<th>Cd</th>
<th>Mg</th>
<th>Al</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 pyrene powder</td>
<td>100</td>
<td>30</td>
<td>15</td>
<td>30</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Metal-guard powder</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Metal in powder</td>
<td>100</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Graphite</td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Instructions for the use of fire extinguishers

1. Unlock the extinguisher.
2. Check that the extinguishing agent is suitable for the type of fire to be extinguished (solid, liquid, gas, etc.).
3. Remove the seal of the extinguisher.
4. Give a small discharge, pointing it at the ground to check that it is working properly.
5. Slowly approach the fire with the wind at your back.
6. Apply the extinguishing agent in a zigzag pattern, applying the base of the flames.
7. Encourage the extinguisher completely until the fire is extinguished.
8. Retreat without turning your back to the fire.
9. Check that the fire has been extinguished and if not, find another extinguisher and repeat the operation.

THANK YOU VERY MUCH AND GOOD EMERGENCY SIMULATION

Cristóbal Alcalá - calcala@ub.edu

http://www.ub.edu/ossma
Risk Prevention in Research Laboratories

Exposure control to chemical, physical and biological agents

Danger? - Risk?

Most frequent accidents in laboratories
- Cuts with glass material
- Chemical splashes
- Burns with hot materials

Risk factors
- Lack of knowledge of the hazardous characteristics of the material used
- Use of intrinsically hazardous working methods and procedures
- Bad working practices
- Use of inappropriate laboratory equipment
- Defective installations
- Non-ergonomic design and lack of space
- Pollution of the working environment
Risk Prevention in Research Laboratories

Exposure control to chemical, physical and biological agents

What I will work with:
- Chemical products
- Biological agents
- Physical agents

How can I find out:
- Regulations
- Other resources

How it can affect me:
- Effects of toxins on the body
- Routes of entry
- Diseases caused by biological agents
- Effects of exposure to physical agents

How I can contact request:
- Collective personal equipment
- Personal protective equipment

Labels

Caution phrases
- Danger

Safety data sheets

INFORMATION ON THE PRODUCT BEING HANDLED

Elements of the CLP hazard label

Pictogram according to REACH

Health effects

Pictograms according to RD 363/95 i 255/2003

Elements of the CLP hazard label

Product identifiers
Pictogram
Signal word
Hazard statements
Precautionary statements
Supplemental hazard statement
Supplier identity

ABC-33
Danger

H311 Toxic in contact with skin

P233 Keep container tightly closed

P211 Do not spray on an open flame or other ignition source

P314 Get medical advice/attention if you feel unwell

Contains…

Danger
Risk Prevention in Research Laboratories
Exposure control to chemical, physical and biological agents

H phrases of hazard and P of precaution of chemicals

H 2__ Physical hazards
H 3__ Health hazards
H 4__ Environmental hazards

P 1__ General precautionary statements
P 2__ Prevention statements
P 3__ Intervention Statements
P 4__ Storage recommendations
P 5__ Disposal recommendations

R and S phrases: Specific hazards and safety advice for dangerous substances and preparations

R15: Reacts with water and releases extremely flammable gases
R29: In contact with water, it releases toxic gases
R15/29: In contact with water, it releases toxic and extremely flammable gases
S30: Do not throw water on this product
S33: Avoid accumulation of electrostatic charges
S62: If swallowed, do not induce vomiting: seek medical advice immediately and show the label or container
S36/39: Wear appropriate clothing and eye/face protection
S3/7: Keep container tightly closed and in a fresh area

Safety Data Sheet
1. Identification of substance or mixture and of the company or undertaking
2. Hazard identification
3. Composition / Information on Components
4. First Aid
5. Fire-fighting measures
6. Measures in case of accidental discharge
7. Handling and storage
8. Exposure controls / personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

www.sigmaaldrich.com
Risk of health disturbance

- Main influencing factors:
  - Toxicity of pollutants
  - Concentration of these substances in the air
  - Exposure time

Effects of toxic substances on the body

- Corrosives: Destruction of the tissues on which the toxicant acts.
- Irritants: Irritation of the skin or mucous membranes in contact with the toxicant.
- Pneumoconiotic agents: Lung irritation by solid particles.
- Asphyxiants: Displacement of oxygen from the air.
- Anesthetics and Narcotics: Central nervous system depression.
- Systemic: Alterations of specific organs or systems (liver, kidney, etc.).

What I will work with:
- Chemical products
- Biological agents
- Physical agents

How can I find out:
- Regulations
- Other resources

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- Routes of entry
- Diseases caused by biological agents

How I can protect myself:
- Collective protection equipment
- Personal protection equipment

Routes of entry into the body
Risk Prevention in Research Laboratories

Exposure control to chemical, physical and biological agents

Airway

Factors that influence the absorption of the contaminant:
- Size of the particles
- Ease of passage to the blood in the pulmonary alveoli
- Ability of the contaminant to be retained in the respiratory system

Inhalation of airborne microorganisms
Aerosol formation in the handling of biological agents

Dermal route

Factors that influence the absorption of the contaminant:
- Ease of contaminant dissolving in water and fat
- Skin condition
- Peripheral blood circulation

Digestive route

- Eating, drinking and smoking in the lab.
- Mouth-watering.
- Transfer to the mouth with contaminated fingers or utensils (pen, pencil, ...).

Parenteral / dermal (skin / eyes)

For the skin
- By accidental inoculation with a hypodermic needle and other sharp instruments
- Cuts, scratches

For the eyes
- Splashes of infectious material into the eyes

What I will work with
Chemical products
Biological agents
Physical agents

How can I find out
Regulatory
Other resources

How it can affect me
Effects of toxins on the body
Route of entry

How I can protect myself
Collective protection equipment
Personal protective equipment

Collective protection equipment
Personal protective equipment

When can there be biological risk?

Exposure to biological agents:

- virus
- bacteria
- protozoa
- mushrooms and yeast
- parasites
- laboratory animals
- genetically modified organisms
- tissue samples, blood, plasma, urine

What does the risk of biological agents depend on?

- Ability to cause disease
- Danger to exposed workers
- Contagiousness
- Existence of effective treatment

Classification according to R.D.664 / 1997

<table>
<thead>
<tr>
<th>GROUP</th>
<th>RISK OF INFECTION</th>
<th>RISK OF PROPAGATION IN THE COMMUNITY</th>
<th>PROPHYLAXIS OR EFFECTIVE TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unlikely to cause disease</td>
<td>No</td>
<td>Unnecessary</td>
</tr>
<tr>
<td>2</td>
<td>May cause illness and be a hazard to the worker</td>
<td>Likely</td>
<td>Generally possible</td>
</tr>
<tr>
<td>3</td>
<td>May cause serious illness and constitute a serious danger to workers</td>
<td>High</td>
<td>Not currently known</td>
</tr>
<tr>
<td>4</td>
<td>Causes serious illness and constitutes a serious danger to workers</td>
<td>High</td>
<td>Not currently known</td>
</tr>
</tbody>
</table>

Precautionary measures

- Frequent basic hygiene
- Vaccination
- Surface disinfection

Preventive actions

For the worker

- Training and information
- Reduced exposure time
- Closing of the process/worker
- Personal protective equipment
Risk Prevention in Research Laboratories
Exposure control to chemical, physical and biological agents

Basic preventive measures
- In the laboratory the use of gowns and safety glasses is mandatory.
- Have the safety data sheet / instruction manual, etc. at hand. Before use, do not handle any product, equipment or device without having read and understood all the safety precautions.
- Handle chemicals and assemblies under a fume hood.
- Handle biological agents under a biosafety cabinet.
- Contaminated clothing must not leave the work space.
- Do not breathe dust or mist or generate aerosols.
- Use respiratory protection equipment if necessary.
- Handle cutting and stabbing material with care.
- Clean and disinfect instruments and work area properly.
- If you are in a particularly sensitive situation, inform OSSMA.

Collective protection equipment

Personal protective equipment

Task-related PPE (Examples)

- Gloves (chemical resistance). Safety glasses.
- Cryogenic gloves. Safety glasses / face shield
- Thermal protection gloves (kevlar, aramid, aluminitzats)
- Heat-resistant apron/clothing. Safety glasses. Dust and particle mask

Prevention is thinking before you do

Here’s an overview: before we start
Here's an overview: at work

Remember:
Designing non-hazardous or low-hazardous experiments helps to avoid risks and waste

And most of all...
To help integrate prevention at all levels and in all activities in order to achieve a real and effective preventive culture at the UB

Thank you!

HAZARDOUS WASTE MANAGEMENT

Waste management hierarchy

HAZARDOUS WASTE MANAGEMENT

WASTE
Any substance or object that the holder discards
HAZARDOUS WASTE MANAGEMENT

WASTE MANAGEMENT
Set of operations that ensure that the waste receives the intended destination in accordance with the legislation in force.

HAZARDOUS WASTE MANAGEMENT

MANAGEMENT OPERATIONS
Identification/classification
Labeling
Transport
Storage
Waste collection
Transport

Treatment
• Disposal
• Incineration
• Sterilization
• Stabilization

Valorization
• Recycling
• Recovery
• Regeneration
• Composting

HAZARDOUS WASTE MANAGEMENT

The 3 Rs

1. Reduce Quantity

Danger
• Microscale experiments while maintaining analytical rigor
• Adjust the amount of reagent.
• Minimization in the design of the experiment.
• Purchase forecast.

Quantity

Danger

The 3 Rs

1. Reduce

Reduce
Reuse
Recycle

HAZARDOUS WASTE MANAGEMENT

The 3 Rs

1. Reduce

Replace dangerous products

Alternatives to ethidium bromide

SYBR® Safe [Invitrogen]
GelRed & GelGreen [BioFire]
Nancy 520 [Sigma-Aldrich]
SERVA DNA Stain G [Bio Connect]
HydroGreen™ [DiGal]
Novel Juice [GeneDireX]

HAZARDOUS WASTE MANAGEMENT

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HAZARDOUS WASTE MANAGEMENT
HAZARDOUS WASTE MANAGEMENT

The 3 Rs
1. **Reduce**
   - Quantity
   - Danger
2. **Reuse**
   - Use of by-products of an experiment as new reagents
   - Recovery of reagents by distillation
   - Reusable materials (e.g. instruments)
3. **Recycle**
   - Classify
   - Temporary storage (each waste in its place)
   - Collection by external manager

Identification and classification

<table>
<thead>
<tr>
<th>Group</th>
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<tr>
<td>Halogenated compounds</td>
<td>140602</td>
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<tr>
<td>Non-halogenated compounds</td>
<td>140603</td>
</tr>
<tr>
<td>Organic or high COD solutions</td>
<td>160508</td>
</tr>
<tr>
<td>Inorganic compounds</td>
<td>160507</td>
</tr>
<tr>
<td>Inorganic acids</td>
<td>0601xx</td>
</tr>
<tr>
<td>Inorganic bases</td>
<td>0602xx</td>
</tr>
<tr>
<td>Mineral oils</td>
<td>1302xx</td>
</tr>
<tr>
<td>Highly dangerous</td>
<td>160506</td>
</tr>
<tr>
<td>Obsolete pure reagents</td>
<td>1603xx</td>
</tr>
<tr>
<td>Contaminated solids</td>
<td>150202</td>
</tr>
<tr>
<td>Contaminated packaging</td>
<td>150110</td>
</tr>
<tr>
<td>Uncontaminated toilet</td>
<td>180103</td>
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<tr>
<td>Biohazardous</td>
<td>180101</td>
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<tr>
<td>-02</td>
<td></td>
</tr>
<tr>
<td>Cytotoxic (carcinogenic/mutagenic)</td>
<td>180108</td>
</tr>
<tr>
<td>-02</td>
<td></td>
</tr>
<tr>
<td>Experimental animals</td>
<td>180202</td>
</tr>
<tr>
<td>-03</td>
<td></td>
</tr>
<tr>
<td>Anatomical remains</td>
<td>180102</td>
</tr>
<tr>
<td>-02</td>
<td></td>
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</table>

http://www.ub.edu/ossma/residus

http://www.ub.edu/ossma/residus/cercador‐residus‐laboratori/
HAZARDOUS WASTE MANAGEMENT

Identification and classification
Composition of the waste label

Hazardous Waste Management

Production unit data

Waste group

Hazard pictograms

H (risk) and P (prevention) phrases

ADR Code

European waste catalogue code

Group identification color

Identification and classification
Composition of the waste label

HAZARDOUS WASTE MANAGEMENT

Storage (each waste in its place)

Drums of different volumes (up to 30 liters)
Rigid, watertight and opaque containers
Resistant to chemicals
Mouth of variable width, with thread
Filling up to 90% capacity
Avoiding Transfers

HAZARDOUS WASTE MANAGEMENT

What?
Where?

Uncontaminated material

Blood and blood products
Cultures and tissue samples
Sharp and non-sharp material that has been in contact
Live and attenuated vaccines

SANITARY WASTE

Classify / Label / Store

Sanitary Waste

Uncontaminated material
Biologically safe cultures and tissue samples
Material in contact with these agents

What?

Special thickness bags (220 microns)

Where?

Refuse container

HAZARDOUS WASTE MANAGEMENT

Sort / Label / Storing

Sanitary Waste

Uncontaminated material
Material contaminated with biohazardous agents
Cytotoxic container

What?

What?

Where?

Where?

HAZARDOUS WASTE MANAGEMENT

Store (each residue in its place)

Groups of different volumes for punches (up to 10 liters)
Black toilet containers (10-60 liters)
Rigid, watertight, opaque and autoclavable containers
Resistance to breakage & hermetic closing
Filling up to the weight limits set by the regulations (60 liters = 18 kg / 30 liters = 9 kg)

HAZARDOUS WASTE MANAGEMENT

SANITARY WASTE

Classify / Label / Store

SANITARY WASTE

HAZARDOUS WASTE MANAGEMENT

Sorting / Labeling / Storing

Sanitary Waste

Uncontaminated material
Material contaminated with biohazardous agents
Cytotoxic container

What?

What?

Where?

Where?
HAZARDOUS WASTE MANAGEMENT

Store (each residue in its place)
- Blue containers of variable volume (30-60 liters)
- Rigid, watertight, opaque and incinerable containers
- Resistance to breakage and chemicals
- Hermetic closing
- Filling up to the weight limits set by the regulations (60 liters = 18 kg / 30 liters = 9 kg)

Occupational exposure limits for chemical agents in Spain (in Spanish) www.insst.es/

HAZARDOUS WASTE MANAGEMENT

Sanitary Waste
- Uncontaminated material
- Material contaminated with biocarcinogenic, mutagenic or reproductive (CMR) products
- Experimental animal corpses
- HEPA filters from contaminated cabinets

What?

HAZARDOUS WASTE MANAGEMENT

What?

Where?

Experimental animal corpses
Plastic bag properly closed put inside original filter box and seal

HAZARDOUS WASTE MANAGEMENT

Storage
- The same requirements apply as for product storage
- Classification of spaces according to danger and incompatibility
- Respect maximum storage times
- Chemicals < 6 months
- Sanitaries = 1 month
- Safety requirements apply to both laboratory and final storage
- Good storage management reduces risks and environmental impact of hazardous waste

HAZARDOUS WASTE MANAGEMENT

Common errors
Exceeding the maximum storage time

Evaporation of toxic and/or dangerous product in the laboratory and warehouse, risk of spillage

HAZARDOUS WASTE MANAGEMENT

Common errors
Not labelling a product

These products will be considered as highly dangerous, with a management cost up to 10 times higher than it would be if properly identified (environmental cost is also higher)

HAZARDOUS WASTE MANAGEMENT

Common errors
Putting waste in the wrong container

A biohazardous into cytotoxic container

It will be incinerated, applying a more expensive treatment both economically and environmentally
HAZARDOUS WASTE MANAGEMENT

Common errors

Putting waste in the wrong container

A cytotoxic into the biohazardous container

It will only be sterilized, so that the contaminating product is released into the environment

HAZARDOUS WASTE MANAGEMENT

Common errors

To make use of the first available container to put waste from another group, such as biohazardous for contaminated solids

Although we label it as contaminated solids, it will be managed as biohazardous waste

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More Information

HAZARDOUS WASTE MANAGEMENT

Common errors

HAZARDOUS WASTE MANAGEMENT

Useful Tips

HAZARDOUS WASTE MANAGEMENT

Parameters for considering a hazardous waste substance

HAZARDOUS WASTE MANAGEMENT

OBJECTIVE

This risk prevention course is designed to make you familiar with the specific risks related to your work at the University and to ensure that you know the preventive measures that you need to take to eliminate these risks or reduce them to non-harmful levels.

Specifically:

- Musculoskeletal disorder
- Manual handling of loads
- Forced positions in the laboratory.

Humatech®

EHS UCLA® Safety Pippeting Video

Uncontaminated pipette tips that may be sharp can be placed in a plastic bottle and handled as refuse.
Ultimately, the risk of musculoskeletal pain or injury depends on a combination of risk factors:

- Force (effort)
- Frequency (number of times minute/hour/day/month)
- Position (how you work)

Musculoskeletal disorders

*Font: Ergonomics for Laboratory Researchers and Technicians Pocket Primer, Humantech*

Main ergonomic risks in labs

Inappropriate positions, effort and repetitiveness in the performance of tasks can cause decreases or injury to muscle groups, ligaments and joints, and nerve tissue, specifically in the following areas:

- Wrist
- Shoulders
- Back
- Neck

*Font: Ergonomics for Laboratory Researchers and Technicians Pocket Primer, Humantech*

**FORCED POSITIONS**

**General principles**

Practical examples

Peter Opsvik® 1978, 1984
http://www.opsvik.no/

**MANUAL HANDLING OF LOADS**

When you need to move materials, be careful to use the safe lifting method to avoid strain.

**Principles of biomechanics**

**Basic principles**

- How a simple lever works
- Centre of gravity for heavy objects and for the human body
- Balance
- Force (in kg) required to lift a load

**Safe lifting method**

- Move your body as close as possible to the load.
- Bend your knees, keeping your back as straight as possible.
- Reach out with both hands, take hold of the load firmly with both hands.
- Straighten your legs to lift your body.
- Your legs should do all the work, while your back holds the load as close to your body as possible and keeps your back straight.
- Do not move the load, keep it close to your body and keep your back straight.
- Use a trolley or other vehicle to load heavy objects.
**Manual Handling of Loads**

**Safe Lifting Method**
- Using the safe lifting method distributes the pressure on the discs between the vertebrae of your backbone as evenly as possible.
- Avoiding risk of injury:
  - Lower back pain
  - Slipped discs
  - Sciatica

**Bad Habits to Eliminate**
- Do not bend your torso when you are lifting or handling a heavy object.
- You should also avoid air currents that could affect your balance.

**Basic Principles**
- Bend your knees.
- Take hold of the object firmly and lift it keeping your back as straight as possible and using only the strength of your legs.
- Keep the load as close as possible to your body.
- For heavy loads, ask for help or, if possible, use mechanical assistance (e.g., a trolley or another mechanical device).
- Do not twist your back when you are handling loads.
- Avoid air currents.

**Legal Considerations**
- Maximum weight recommended for lifting loads in ideal conditions:
  - In general: 25 kg
  - Greater protection: 15 kg
  - Trained staff (isolated situations): 40 kg

  Total accumulation:
  - Up to 10 m: 15,000 kg
  - 10 m and over: 6,000 kg

*However, if the individual handling loads are women, young workers or older workers and our aim is to protect the majority of the population, they should not handle loads greater than 15 kg.*

**Static Work**
- Activities that require maintaining fixed positions for long periods of time and that typically involve adopting inappropriate work positions.
- Maintaining fixed postures for long periods of time.
- Deformities, permanent injuries.
- Any static position can potentially cause injury.
• **Problem:** Soreness or injury to back, neck and legs.

• **Solution:** Use a chair that is adjustable.

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• **Problem:** Chair is not appropriate to user, causing soreness or injury to back, neck and legs.

• **Solution:** Adjust chair correctly, remove objects located beneath the lab bench, use a footrest if there is no surface to rest your feet on. Alternate your work position between sitting and standing.

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• **Problem:** Working standing up. Cumulative fatigue, incorrect back positions, neck twisting and stretching, and tasks with your arms raised above your shoulders.

• **Solution:** Move your work tools within reach of your arms, add a surface to support your feet and eliminate. Use anti-fatigue matting. Alternate work positions between standing and sitting, and take breaks.

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• **Problem:** Using lab tools and instruments with your wrist in an inappropriate position (bent and extended and/or with cubital or radial deviation).

• **Solution:** Use appropriate lab tools and instruments, which should be in good condition in a well-organized work space. The closer your arms are to your torso, the better. When you use the pipette, raise your dominant forearm no more than 45 degrees.

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• **Problem:** Bending your neck, overburdening your shoulders, adopting inappropriate postures with your back, putting pressure at the base of your wrists.

• **Solution:** Remove materials stacked under the biosafety cabinets or fume hoods to ensure that the user takes the correct position and does not put pressure on the base of the cabinet or the corner of the cabinet. Position the work process within the angle of vision: vertical angle at 5-35 degrees, horizontal angle at 60 degrees.
ERGONOMIC TIPS

**Problem:** Excessive straining from manual handling of loads.

**Tip 7:** Avoid manual handling of loads, store the heaviest objects on lower shelves.

**Solution:** Use mechanical aids, e.g. trolleys. To lift weights, follow the safe method for handling loads. Be safe and sensible when you are storing objects.

**Problem:** Inappropriate use of PVDs in the lab, muscle fatigue and eye strain.

**Tip 8:** Adapt your workspace according to ergonomic principles.

**Solution:** You should sit with your back straight and well-supported by your chair. The lab bench should be at the same height as your elbows: adjust the height of your chair, if necessary. Put your computer screen directly in front of you and place the keyboard between yourself and the screen. Leave enough space to support your wrists (10 cm.). Screens should be perpendicular to light sources (windows, lamps, overhead lighting, etc.). You should use a chair with adjustable height. The upper part of your monitor should be at eye level.

**MUSCLE RELAXATION EXERCISES**

Without making any abrupt movements, lift your right shoulder and tilt it to the side and then back to its normal position...
Presentaciones
- Laboratorio Ergonomía, Washington University in St. Louis
- UCLA Ergonomics, University of California L.A.
- Occupational Ergonomics, Ming the Task to the Worker, University of Minnesota, Duluth
- Laboratorio Ergonomía, Harvard Campus Services.

Bibliografía

Technical guidelines (INSHT)
- INSHT (1997). Guia tècnica d’avaluació i prevenció dels riscos relatius a la manipulació manual de càrregues que comporta riscos, en particular dorsolumbars, per als treballadors.

Videos
- UCLA. EHS Pippeting safety

Applicable legislation
- Llei 31/1995, de 8 de novembre, de prevenció de riscos laborals.
- Real decreto 487/1997, de 14 d’abril, sobre disposicions mínimes de seguretat i salut rellevants a la manipulació manual de càrregues que comporten riscos, en particular dorsolumbals, per als treballadors.
- Real decreto 488/1997, de 14 d’abril, sobre disposicions mínimes de seguretat i salut rellevants al treball amb equips que inclouen pantalles de visualització.
- Real decreto 486/1997, de 14 d’abril, pel qual s’estableixen les disposicions mínimes de seguretat i salut en el lloc de treball.

NOCIONS DE PRIMERS AUXILIS

PROTOCOL PAS

PENSAR
AVISAR
SOCÓRRER

PENSAR

En la meva protecció
En l’entorn
En la víctima

CONTROL DE LA SITUACIÓ
INFORMACIÓ:

- Tipus d’accident i estat de l’accidentat (si està conscient, si respira, …)
- Situació del accident
- Número de telèfon i número de la persona de contacte

EMERGÈNCIES

02022

Informació d’Emergències

SERVEI MÈDIC 24597

ACTUAR SEGONS ELS NOSTRES CONEIXEMENTS

- Cremades
- Ferides
- Traumatismes
- Efectes dels tòxics

BECARIS DE COL·LABORACIÓ

SENSE SEGURETAT SOCIAL

ACCIDENTS EN EL DESENYOLIPMENT DE LA SEVA ACTIVITAT

- Sèrie de col·laboració: (Departaments, Serveis, Biblioteques, Units de la UB)
- Amb assegurança UNIPSA (‘cum laude’):
  - Institut Dexeus (Passeig Bonanova 67)
  - Clínica Labor (Balmes, 25)
  - Clínica Muntaner (Av. Príncep d’Astúries)

- Amb assegurança UNIPSA (‘cum laude’):

BECARIS DE RESECCIA

- Amb Seguretat Social

ACCIDENTS EN EL DESENYOLIPMENT DE LA SEVA ACTIVITAT:

- Programa ALBAN:
  (a partir de l’any 2005 poden escollir l’assegurança que desitgin)
  Solicita assegurança amb ALLIANZ WORLDWIDE CARE. Línia d’assitència telefònica: 3531 630 1304.

- Programa MAE-AECI

- Amb Seguretat Social

MALALTIA COMUNA / ACCIDENT NO LABORAL

- Centres d’atenció primària i hospitals de la xarxa sanitària pública.
- (o els centres privats que cobreixi la seva asseguradora)

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- (o els centres privats que cobreixi la seva asseguradora)
**Cremades: segons profunditat**

<table>
<thead>
<tr>
<th>Nivell de profunditat</th>
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</thead>
<tbody>
<tr>
<td>Molt profund</td>
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**Cremades: segons extensió**

- **Lleus < 10%**
- **Greus fins a 30%**
- **Molt greus fins a 50%**
- **Mortals > 50%**

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**Cremades: tractament**

Renteu i refredeu la zona cremada entre 15 i 20 minuts.

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**Cremades per fred (criogènics)**

- Utilitzeu aigua tebia (NO AIGUA CALENTA NI ALTRA FONT DE CALOR)
- Eviteu els traumatismes i no feu massatges

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**Cremades químiques**

- Propietat físico-químiques de l’agent
- Temps d’exposició
- Quantitat de producte
- TEMPS D’INICI DEL TRACTAMENT

**PRONÓSTIC**

- treieu la roba impregnada
- renteu amb aigua, millor corrent
- cobriu amb gases
- aneu a un centre sanitari
**Cremades: Què NO s'ha de fer**

- No apliqueu ungüents, pomades, cremes o remeis casolars,…
- No utilitzeu cotó o esparadrap
- No trenqueu les butllofes

**Lesions oculars**

- Renteu amb aigua un mínim de 20 minuts
- Traslladeu a un centre sanitari

**Ferides lleus**

- netegeu amb aigua i sabó
- desinfecteu amb solució antisèptica
- deixeu a l'aire o cobriu amb gases

**Hemorràgies**

**Traumatismes**

Apliqueu fred local 10 minuts i immobilitzeu la zona

Si sospitueu una fractura, immobilitzeu i traslladeu a un centre sanitari

**Intoxicació per inhalació**

1) Separeu l'intoxicat del lloc on s'ha produït la intoxicació o ventileu la zona
2) Actueu segons l'estat de la víctima: traslladeu-la a un centre sanitari o avisteu al 061

PENSAR
VALOREU L’ESTAT DE CONSCIÈNCIA

- Aproximació a l’accidentat
- Estimulació mitjançant la veu
- Estimulació mitjançant el tacte

LIPOTÍMIA O DESMAI

- Busqueu un lloc fresc i a l’ombra
- Col·loqueu la víctima en decúbit supí amb les cames aixecades
- Afluixeu la pressió que pugui efectuar la roba (corbata, subjectador, cinturó, ...)
- Controlar els signes vitals

CONSCIÈNCIA CONSERVADA

Consciència no conservada

POSICIÓ LATERAL DE SEGURETAT (I)

POSICIÓ LATERAL DE SEGURETAT (II)
POSICIÓ LATERAL DE SEGURETAT (III)

OBRIU LA VIA AERIA
SI NO RESPIRA

Si estesteu sols, deixeu a l’accidentat un moment i aneu a trucar al 112/061

FUNCIÓ CARDIO-CIRCULATÒRIA
NO ÉS NECESSARI VALORAR-LA

REANIMACIÓ CARDÍACA

Compressió insuficient Desviament a la compressió

Pla dur

Posició correcta de les mans

Desviament a la compressió

Compressió insuficient
REANIMACIÓN CARDIOPULMONAR
30 compressions  2 insuflaciones

REANIMACIÓN PULMONAR
BOCA A BOCA