



**SNS COLLEGE OF TECHNOLOGY**



**(An Autonomous Institution)**

**Coimbatore – 641035.**

**Department of Mechanical Engineering**

**INDUSTRIAL SAFETY**

**BIOLOGICAL HAZARDS**



# BIO HAZARDS



- ✓ **Biological** hazards refer to organisms or organic matters produced by organisms that are harmful to human health.
- ✓ These include bacteria, virus, parasites, fungi and their toxins.
- ✓ These may cause harm to human in the form of infections, allergy and poisoning.
- ✓ Biosafety: The containment principles, technologies and practices that are implemented to prevent the unintentional exposure to pathogens and toxins, or their accidental release
- ✓ Biosecurity: Control of accidental and deliberate release of biohazardous material



# Biohazard Levels

- **Biohazard levels**, more commonly referred to as “biological safety levels” or “biosafety levels,” are classifications of safety precautions necessary to be applied in the clinical microbiology laboratory depending on specific pathogens handled when performing laboratory procedures.
- Laboratory facilities are designated as basic – – Biosafety Level 1, – Basic – Biosafety Level 2, – Containment – Biosafety Level 3, – Maximum containment – Biosafety Level 4.



# Biosafety Level



- Biosafety level designations are based on a composite of the design features, construction, containment facilities, equipment, practices and operational procedures required for working with agents from the various risk groups.
- Biohazardous Agents may be classified by Risk Group (RG) that are required biosafety precautions. The risk group classification is used for laboratory work only.



# Risk Group



- **Risk Group 1** (RG1)/Biohazard level 1 • Agents that are not associated with disease in healthy adult humans. • Example: Bacillus subtilis, canine hepatitis, Escherichia coli etc. • Handling these agents require minimum safety measures like gloves, masks etc.
- **Risk Group 2** (RG2)/Biohazard Level 2 • Agents that are associated with human disease which is rarely serious. • Preventative or therapeutic interventions are often available. • E.g., hepatitis A, B, and C, influenza A, Lyme disease, Salmonella, mumps, measles, scrapie, dengue fever. • Laboratory personnel can carry out diagnostic tests on the specimens but need to wear gloves, facial protection, and a gown. • Additionally, standard precautions at this level should be applied when handling clinical samples from the current outbreak investigations of acute respiratory distress syndrome (ARDS) caused by COVID-19..
- **Risk Group 3** (RG3)/ Biohazard Level 3 • Agents that are associated with serious or lethal human disease. • Preventive or therapeutic interventions may be available • High individual risk • Low community risk. • Example: West Nile virus, SARS virus, tuberculosis, typhus, Rift Valley fever, HIV, yellow fever, and malaria.
- **Risk Group 4** (RG 4)/ Biohazard Level 4 • Agents that are likely to cause serious or lethal human disease • Preventive or therapeutic interventions are not usually available • High individual risk • High community risk • Example: Bolivian and Argentine hemorrhagic fevers, Marburg virus, Ebola virus, hantaviruses, Lassa fever virus and Crimean-Congo hemorrhagic fever.



# Classes of Human



**Classes of Human** Pathogens Taxonomic Site of Propagation  
Examples Diseases Prions Intracellular Prion protein  
Creutzfeld- Jacob Disease Viruses Obligate Intracellular Poliovirus  
Poliomyelitis Bacteria 1. Obligate Intracellular 2. Extracellular 3.  
Facultative intracellular 1. Chlamydia trachomatis 2. Strep  
pneumoniae 3. TB Trachoma Pneumonia Tuberculosis Fungi 1.  
Extracellular 2. Facultative intracellular 1. Candida albicans 2.  
Histoplasma capsulatum Thrush Histoplasmosis Protozoa 1.  
Extracellular 2. Facultative intracellular 3. Obligate intracellular 1.  
Trypanosoma gambiense 2. T. cruzi 3. Leishmania donovani 1.  
Sleeping sickness 2. Chagas dse 3. Kala- azar Helminths 1.  
Extracellular 2. Intracellular 1. Wuchereria bancrofti 2. Trichinella  
spiralis 1. Filariasis 2. Trichinosis



# ERGONOMICS

- “ERGONOMICS is the study of the interaction between people and machines and the factors that affect the interaction.” Ergonomics is concerned with designing and arranging things and people use so that the people and things interact most efficiently and safely.



# History & AIMS OF ERGONOMICS



**History Of Ergonomics** Since beginning of time people have been trying to make everything more efficient with less stress In 1857, Wojciech Jastrzebowski created the word “Ergonomics” The name Ergonomics was officially proposed at a 1949 meeting of the British Admiralty

- **AIMS OF ERGONOMICS** Ensures that human needs for safe and efficient working are met in the design of work system è To design Appliances è Technical Systems è Tasks In such a way to improve è Human Safety è Health è Comfort and
- **Basic aims of** ergonomics äEfficiency in purposeful activity To achieve desired result without äWaste äError äDamage to persons äWorking situation in harmony with the activities of the worker by Prof. Hugh Murrell and was officially accepted in the year 1950.





# DEFINITIONS OF ERGONOMICS



- DEFINITIONS OF ERGONOMICS Ergonomics is a means of improving working conditions and reducing illness at work ä Ergonomics attempts to ‘Fit the Job to the Man’ rather than ‘Fit the Man to the Job’ ä It is concerned with the design of systems in which people carry out work ä It optimizes Efficiency, Health, Safety and Comfort of people through better designs of products and work



- **Source: OSHA – Kneeling** for more than 2 hours per day Ergonomic Control Methods
- **Awkward body** postures - solutions – Raise and/or tilt the work for better access – Use a stool for ground-level work Source: NIOSH Source: OSHA Source: OSHA Ergonomic Control Methods
- **Awkward body** postures - solutions – Use tools with longer handles – Alternate between bending, kneeling, sitting, and squatting Source: NIOSH Source: OSHA Source: OSHA Ergonomic Control Methods
- **Awkward grips** - hazards – Gripping 10 or more pounds or force for 2 or more hours per day Source of graphics: OSHA Ergonomic Control Methods
- **Awkward grips** - hazards – Pinching 2 or more pounds of weight or 4 or more pounds of force for 2 or more hours per day Source of graphics: OSHA Ergonomic Control Methods
- **Awkward grips** - solutions – Design work layout to reduce hand-carrying – Reduce amount of items carried at one time – Use non-pinch grip postures – Use ergonomically designed tools/aids – Use job/task rotation Source of graphics: OSHA “C” shaped posture Ergonomic Control Methods



# Some important Ergonomics



**Some important ergonomic** requirements (From ILO Ergonomic Checkpoints) Materials storage and handling Clear and mark transport routes Use mechanical devices for lifting, lowering and moving heavy material Instead of carrying heavy weights divide them into smaller lightweights e.g. 2x10 kg instead of 20 kg. Combine heavy lifting with physically lighter tasks

- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints) Hand Tools Use hanging tools for operations repeated in the same place Provide hand support when using precision tools Provide hand tools with a grip of the proper thickness (hand diameter 30-40 mm, handle length 125 mm and size to fit male hands) Provide a home for each tool (Enables good housekeeping)
- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints) Production machine safety Locate controls in sequence of operations Make displays and signals easy to distinguish and easy to read Use properly fixed guards and interlock devices



# Some important Ergonomics



- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints)  
Improving workstation design Adjust the working height around elbow level Light work: at elbow level Precision work: above elbow level Hard work: below elbow level
- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints)  
Lighting • Increased use of daylight • Light up the work area evenly • Sufficient lighting for working • Local lighting for precision work • Removing shiny surfaces • Avoid glare
- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints)  
Premises Prevent the exposure to excessive heat Install effective local exhaust systems Increase the use of natural ventilation
- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints)  
Welfare facilities • Provide effective and acceptable personal protective devices
- **Some important ergonomic** requirements (From ILO Ergonomic Checkpoints)  
Work Organization • Involve worker in planning • Inform the worker the results of their work • Job enrichment (combine tasks)



**THANK YOU**