

OCCUPATIONAL HEALTH PART - I



Dept. of Community
Medicine

OVERVIEW

- Introduction
- History of Occupational Medicine
- Burden of occupational diseases
- Classification of occupational diseases
- Pneumoconioses
- Lead poisoning
- Occupational cancers
- Occupational dermatitis
- Radiation hazards
- Hazards due to Industrialization
- Accidents in industry
- Sickness absenteeism
- Occupational hazards of agricultural workers
- References

INTRODUCTION

OCCUPATIONAL HEALTH :

Joint Committee of ILO & WHO, 1950 –

- Promotion & maintenance of the highest degree of physical, mental & social well-being of workers in all occupations
- Prevention amongst workers of departures of health caused by their working conditions
- Protection of workers in their employment from risks resulting from factors adverse to health
- Placing & maintenance of workers in an occupational environment adapted to his physiological & psychological equipment

**THE ADAPTATION OF WORK TO MAN & OF EACH
MAN TO HIS JOB**

HAZARD :

something that can cause harm if not controlled.

WORKPLACE :

setting in which many people spend the largest proportion of their time

DIFFERENCES BETWEEN OCCUPATIONAL DISEASE AND WORK RELATED DISEASE

WORK RELATED DISEASE	OCCUPATIONAL DISEASE
Occurs largely in the community	Occurs mainly among working population
Multifactorial in origin	Cause specific
Exposure at workplace may be a factor	Exposure at workplace is essential
May be notifiable and compensable	Notifiable and compensable

HISTORY OF OCCUPATIONAL HEALTH

BERNARDINO RAMAZZINI (1633-1714)

- Father of Occupational and Industrial medicine
- De Morbis Artificum Diatriba
First edition - 1700
Second edition - 1713
- Connecting the environmental hazards of specific professions to disease
- Health hazards & other disease-causative agents encountered by workers in 52 occupations.



Bernardino Ramazzini, padre della Medicina del Lavoro

11/16/2023

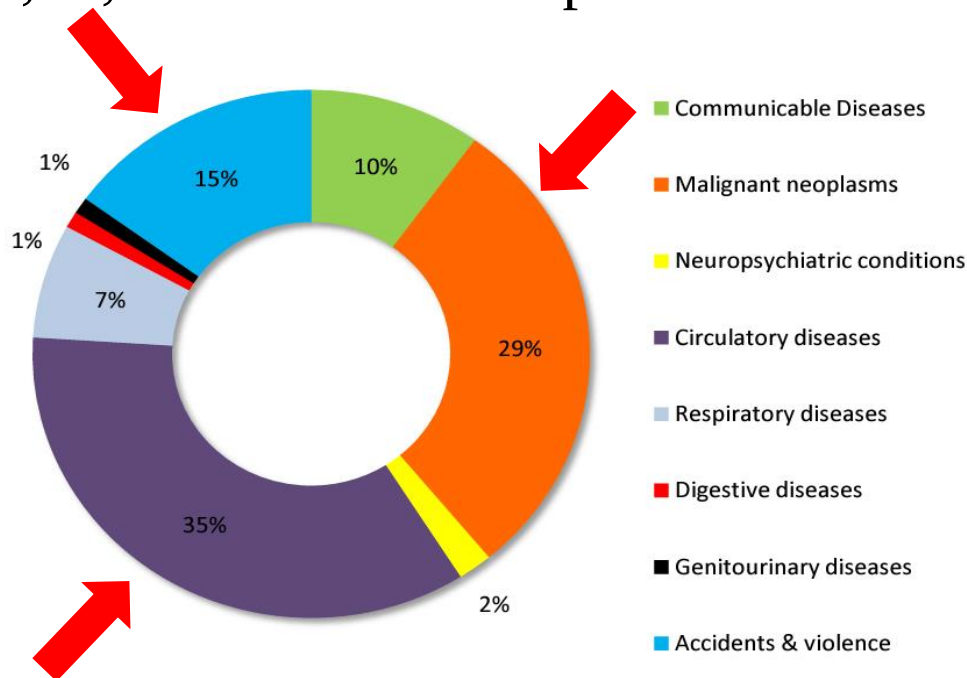
HISTORY OF OCCUPATIONAL HEALTH

SIR PERCIVALL POTT	First to associate cancer with occupational exposure
CHARLES TURNER TACKARRAH	First practitioner of Industrial Medicine
JOHN SIMON	First Medical officer of factories
KARL MARX	Rise of Trade Union Movement
SIR THOMAS MORRISON LEGY	First Medical Inspector of factories
PHILIPPA HOWERDAY	First identified Health nurse
DONALD HUNTER	Wrote 'Diseases of occupations'

BURDEN OF OCCUPATIONAL DISEASES

GLOBAL

- 2.3 million deaths annually - for reasons attributed to work.
- 2 million deaths - work-related diseases
- 3,21,000 deaths - occupational accidents



Global Estimates of Occupational Accidents and Work-related Illnesses 2014



BURDEN OF OCCUPATIONAL DISEASES

- 160 million non-fatal work-related diseases per year
- 317 million non –fatal occupational accidents per year

This means that:

- Every 15 seconds, 151 workers have a work-related accident.
- Every 15 seconds, a worker dies from a work-related accident or disease

Source : World Health Organization website



BURDEN OF OCCUPATIONAL DISEASES

INDIA

- 0.12 million deaths are reported
- 17 million cases of non fatal injuries
- 45,000 fatal injuries
- 1.9 million cases of occupational diseases



Source : National Institute of Occupational Safety and Health

AIMS OF OCCUPATIONAL HEALTH

- Promotion and maintenance of health
- Prevention of diseases
- Protection of workers
- Placing and maintenance of workers in good environment



OCCUPATIONAL HAZARDS

Physical
hazards

Chemical
hazards

Biological
hazards

Mechanical
hazards

Psychological
hazards

HEAT

Physical hazards

The direct effects are :

- Burns
- Heat exhaustion
- Heat stroke
- Heat cramps

The indirect effects are :

- Decreased efficiency
- Increased fatigue
- Enhanced accident rates



Who are at risk ?

Physical hazards

- Agricultural workers
- Fire fighters
- Civil engineers
- Factory workers
- Street sweepers
- Athletes
- Soldiers
- Electrical engineers
- Traffic policemen
- Welders
- Oil refinery workers
- Cooks



COLD

- Chilblains
- Erythrocyanosis
- Immersion foot
- Frostbite as a result of cutaneous vasoconstriction.
- General hypothermia



Who are at risk ?

- Fishermen
- People working in the grocery - frozen food section
- Road construction workers
- Market vendors (fish market, meat market)
- Soldiers during the war



LIGHT

Physical hazards

Poor illumination

Acute effects:

- Eye strain
- Headache
- Eye pain
- Lacrymation
- Congestion around the cornea
- Eye fatigue

Chronic effects :

“Miner's nystagmus”

Excessive brightness or Glare

- Blurring of vision
- Visual fatigue
- Annoyance
- Discomfort



NOISE

Physical hazards

Auditory effects :

Temporary or permanent hearing loss

Non auditory effects :

- Nervousness
- Fatigue
- Interference with communication by speech
- Decreased efficiency
- Annoyance



Who are at risk ?

- Farmers
- Civil engineers
- Construction workers
- Factory workers
- Mining engineers
- Musicians and music teachers
- Airline workers
- Police
- Soldiers
- Pilots



VIBRATION

Physical hazards

- It is encounter in work with drills and hammers
- Spasm of fine blood vessels of the hand – ‘**WHITE FINGERS**’

Who are at risk?

- Hammer drill operators
- Chain saw operators
- Bulldozer drivers
- Loader drivers
- People working with pumps, compressors and generators



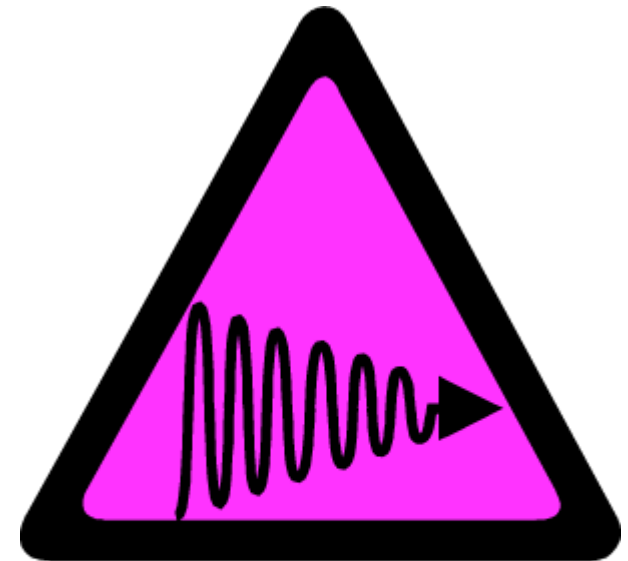
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ULTRAVIOLET RADIATION

Physical
hazards

- Arc & other electric welding process
- Severe conjunctivitis & keratitis

‘WELDER’S FLASH’



ULTRAVIOLET
RADIATION

IONIZING RADIATION

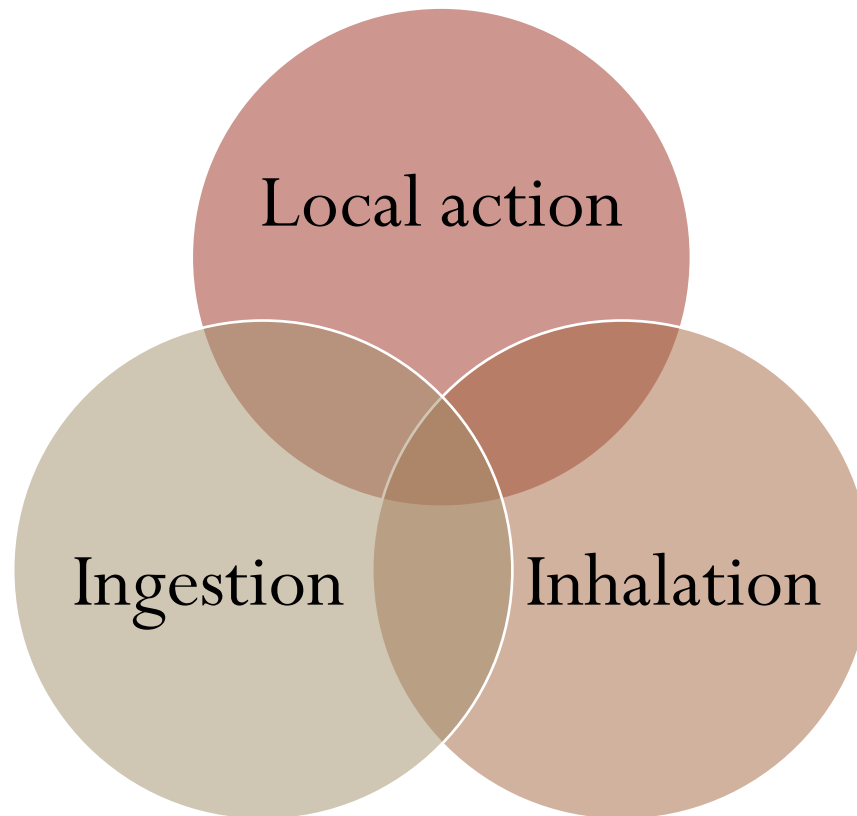
Physical
hazards

Effects due to ionizing radiation are:-

- Genetic changes
- Malformation
- Cancer
- Leukemia
- Ulceration
- Depilation
- Sterility
- Death in extreme cases



Chemical hazards



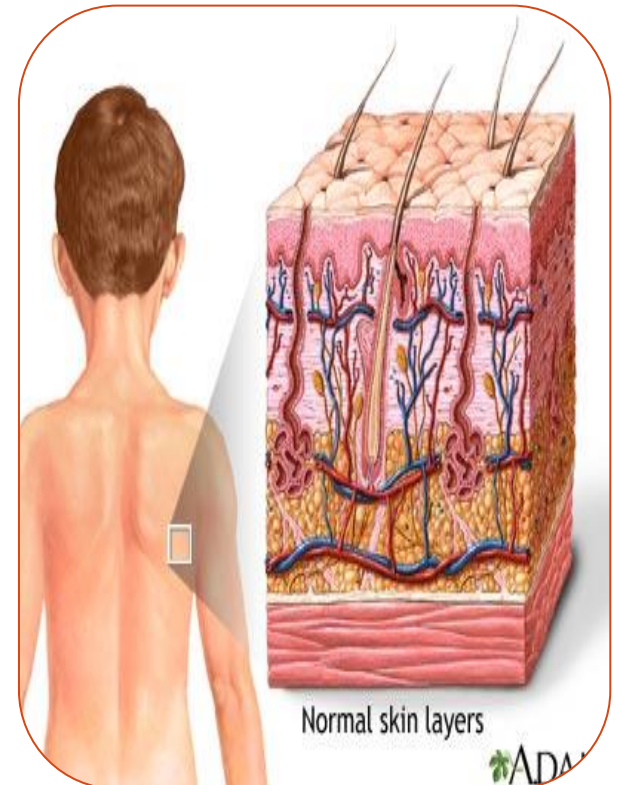
LOCAL ACTION

Chemical hazards

➤ By irritants & sensitizers

Causes:

- Dermatitis
- Eczema
- Ulcers
- Cancer by primary irritant action



INHALATION

Chemical hazards

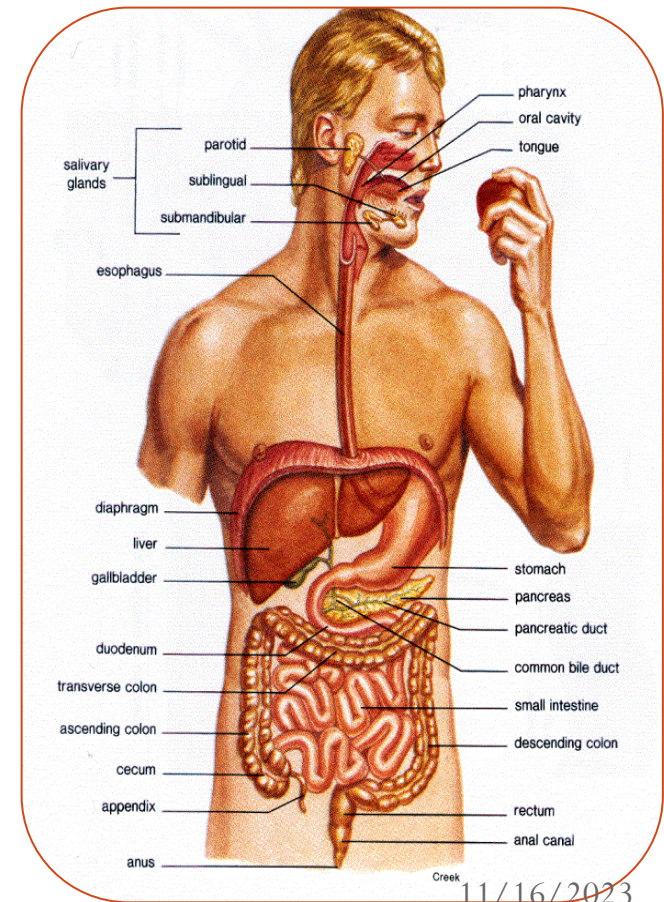
- Dusts
 - Inorganic
 - Organic
 - Soluble
 - Insoluble
- Gases
 - Simple
 - Asphyxiating
 - Anesthetic
- Metals and their compounds



INGESTION

Chemical hazards

- Lead, mercury, arsenic, zinc, chromium, cadmium, phosphorus, antimony, beryllium, cobalt, manganese, etc.



Biological hazards

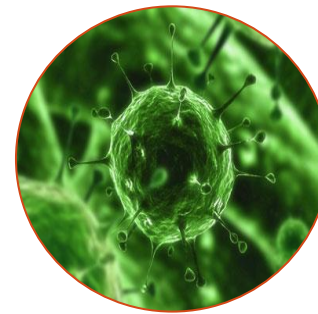
Health care setting workers :

- Hepatitis B & C
- HIV
- Tuberculosis

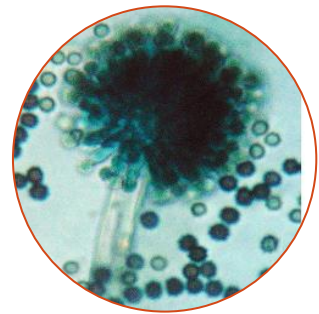
Agricultural workers , Animal husbandry :

- Brucellosis
- Leptospirosis
- Anthrax
- Hydatidosis
- Tetanus
- Encephalitis
- Fungal infections
- Schistosomiasis

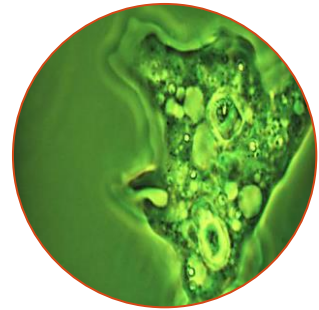
VIRUSES



FUNGI



BACTERIA



PARASITES

Mechanical hazards

- About 10% of accidents in industry are said to be due to mechanical causes

Who are at risk?

- Agricultural workers
- Construction workers
- Transport workers
- Business establishment workers



Psychological hazards

Factors affect health :

- Frustration
- Lack of job satisfaction
- Insecurity
- Poor human relationships
- Emotional tension

Health effects :

- (a) Psychological and behavioural changes
- (b) Psychosomatic ill health



CLASSIFICATION OF OCCUPATIONAL DISEASES

PHYSICAL AGENTS	
Heat	Heat hyperpyrexia, heat exhaustion, heat syncope, heat cramps, burns and local effects such as prickly heat.
Cold	Trench foot, frost bite, chilblains
Light	Occupational cataract, miner's nystagmus
Pressure	Caisson disease, air embolism, blast (explosion)
Noise	Occupational deafness
Radiation	Cancer, leukaemia, aplastic anaemia. Pancytopenia
Mechanical	Injuries, accidents factors
Electricity	Burns

CHEMICAL AGENTS

Gases	CO, CO ₂ , HCN, NH ₃ , N ₂ , H ₂ S, HCl, SO ₂
Dusts (Pneumoconiosis)	
Inorganic dusts	
(a) Coal dust	Anthracosis
(b) Silica	Silicosis
(c) Asbestos	Asbestosis, cancer lung
(d) Iron	Siderosis
Organic (vegetable) Dusts	
(a) Cane fibre	Bagassosis
(b) Cotton dust	Byssinosis
(c) Tobacco	Tobacosis
(d) Hay or grain dust	Farmers' lung
Metals and their compounds	lead, mercury, cadmium, manganese, beryllium, arsenic, chromium
Chemicals	Acids, alkalies, pesticides
Solvents	Carbon bisulphide, benzene, trichloroethylene. chloroform,

OTHERS

Diseases due to biological agents

Brucellosis, leptospirosis, anthrax, actinomycosis, hydatidosis, psittacosis, tetanus, encephalitis, fungal infections,

Occupational cancers

Cancer of the skin, lungs and the bladder

Occupational dermatosis

Dermatitis, eczema

Diseases of psychological origin

Industrial neurosis, hypertension, peptic ulcer, etc.

PNEUMOCONIOSIS

- Pneumons = lungs ; konia = dust
- Group of diseases occurring out of the specific occupation, caused by inhalation of insoluble dust, over a long period of exposure
- Also known as ‘Dust diseases’
- Factors:
 - Concentration of dust in the air
 - Composition of the dust
 - Size of the dust particles
 - Duration of exposure
 - Individual susceptibility

SILICOSIS

- Also known as **Grinder's disease & Potter's rot**
- Commonest, major, most serious
- Due to inhalation of dust containing free silica or silicon dioxide, as Quartz
- First reported in India – Kolar Gold mines (Mysore) in 1947
- Industries :
 - Mining industries (34%)
 - Pottery & ceramic industry (15%)
 - Sand blasting
 - Metal grinding
 - Building & construction work
 - Rock mining
 - Iron & steel industry



SILICOSIS

INCUBATION PERIOD :

Few months to 6years

CLINICAL FEATURES :

- Irritant cough
- Dyspnoea on exertion
- Loss of weight
- Emphysema
- Pain in the chest
- Silico-tuberculosis

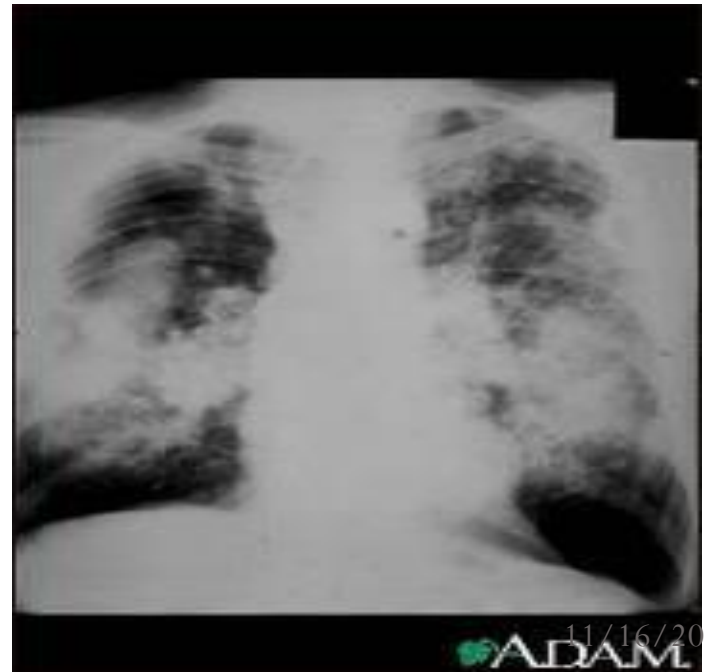
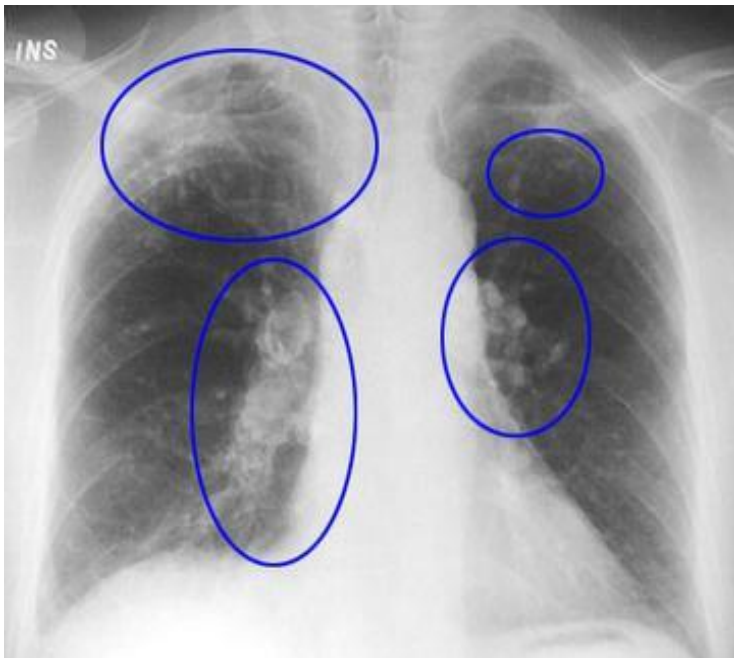


SILICOSIS

DIAGNOSIS :

X – ray chest –

Snow – storm appearance / Ball of wool appearance (apex of lung)



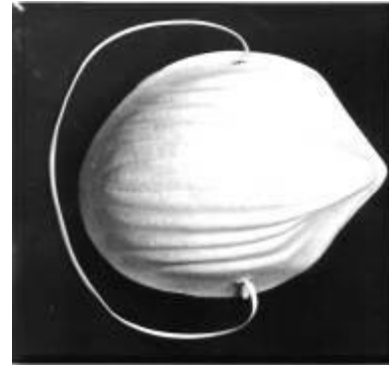
SILICOSIS

TREATMENT:

No treatment for silicosis

PREVENTIVE MEASURES :

- Rigorous dust control measures
 - Substitution
 - Complete enclosure
 - Isolation
 - Hydrobasting
 - Good house keeping
 - Personal protective measures
- Regular physical examination of workers



11/16/2023

ASBESTOSIS

- Due to inhalation of asbestos dust over a long period of time
- It is commercial name given to fibrous mineral silicate – silica combined with oxygen & other elements like calcium, magnesium, iron, sodium or aluminium
- Industries: Asbestos cement factory
Fireproof textiles
Roof tilting
Brake lining



ASBESTOSIS

DIAGNOSIS :

Sputum – Asbestos bodies

X – ray chest –

Ground glass appearance (lower two-third of lung)



ASBESTOSIS

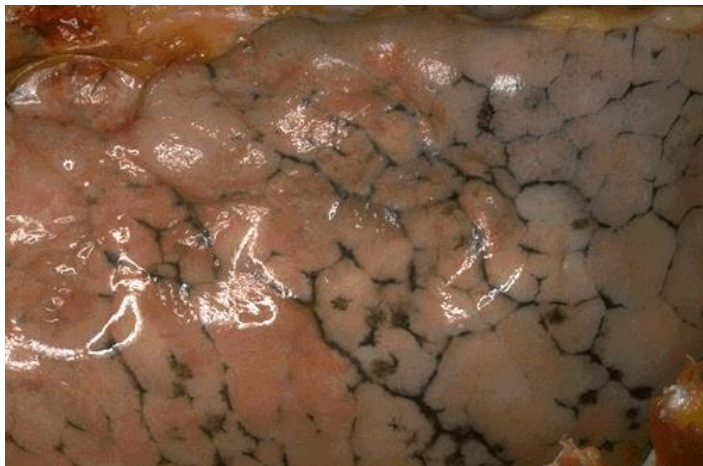
PREVENTIVE MEASURES:

- Use of safer types of asbestos (chrysolite and amosite)
- Substitution of other insulants: glass fibre, mineral wool, calcium silicate, plastic foams, etc.
- Rigorous dust control (2 fibres/ml of air)
- Periodic examination of workers
- Personal protective measures
- Health education of the workers



ANTHRACOSIS

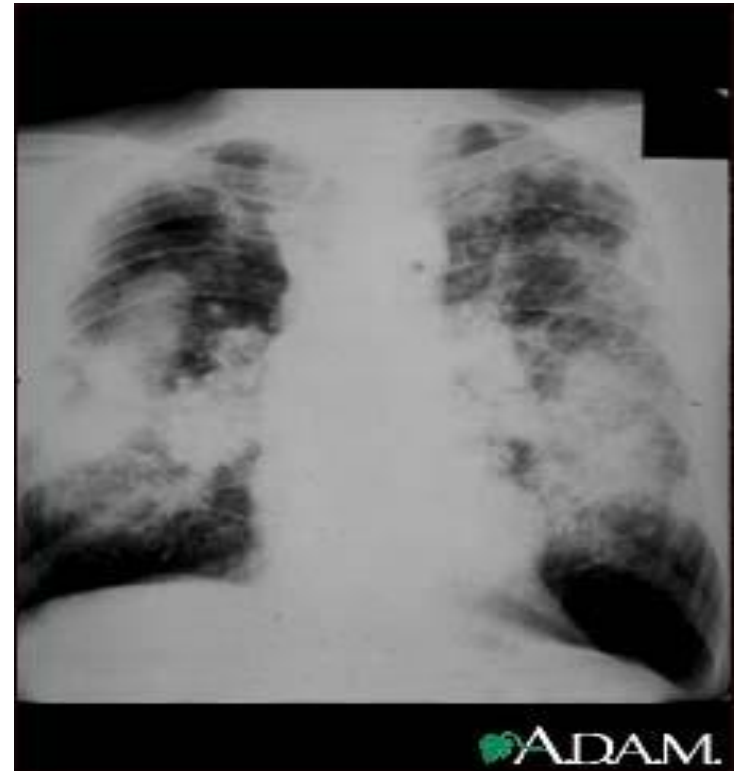
- Also known as **Coal Workers' pneumoconiosis** or **Miners' black lung**
- Due to inhalation of coal dust over a long period of time
- Two phases :
 - Simple pneumoconiosis
 - Progressive massive fibrosis



ANTHRACOSIS

- DIAGNOSIS :

X ray chest – multiple nodular densities ‘BLACK LUNG’



BYSSINOSIS

- Due to inhalation of cotton dust over a long period of time
- It is also called ‘Monday Fever’
- Common in textile industries
- India – 35% workers in textile industries
- Incidence – 7-8% of textile workers
- *Aerobacter cloacae* – contaminates the cotton fibres



BAGASSOSIS

- Due to inhalation of cane-sugar dust (bagasse)
- Sugar factories, paper, cardboard and rayon factories
- First reported from Kolkata by Ganguly & Pal in a cardboard factory, 1955
- Growth of fungi – *Thermoactinomyces sacchari*



BAGASSOSIS

- **DIAGNOSIS :**

X ray chest – **Mottling appearance** in lung fields

- **PREVENTIVE MEASURES :**

- Dust control
- Personal protection
- Medical control
- Bagasse control

FARMER'S LUNG

- Due to inhalation of mouldy hay or grain dust.

- *Micropolyspora faeni* (thermophilic actinomycetes) - main cause

- **CLINICAL FEATURES :**

Bronchial asthma - eosinophilia, allergic bronchitis

Repeated attacks - Pulmonary fibrosis and cor pulmonale

- **DIANOSIS :**

X ray chest – fine nodular density



LEAD POISONING

- Most toxic metal poisoning
- Also called as **Saturnism, Plumbism, or Painter's colic.**
- Toxic lead compound – Lead arsenate

Lead carbonate

Lead oxide

- Least toxic – Lead sulphide
- Body stores – 150-400mg
- Adult – 0.2-0.3mg / day



LEAD POISONING

SOURCES :

Occupational :

- Mines of lead ores
- Manufacture of storage batteries
- Glass manufacture
- Printing & potteries
- Rubber industry
- Ship building
- Plumbing works



LEAD POISONING

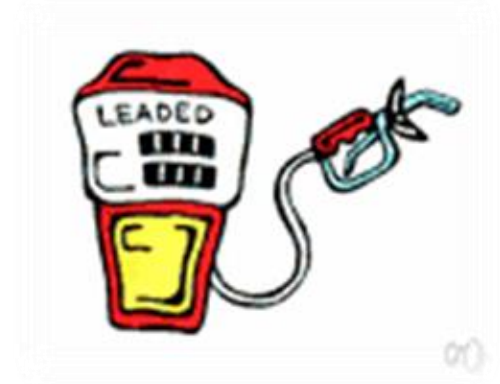
SOURCES :

Non- Occupational :

- Gasoline (leaded petrol)
- Drinking water
- Fruits & vegetables – insecticides
- Children – Pica

Chewing lead paint on
windows & toys

Lead pencils



LEAD POISONING

CLINICAL FEATURES :

Inorganic lead poisoning :

Anaemia, **B**lue lines on the gums (Burton's lines / Burtonian lines),
Colicky abdomen, **D**iarrhea, **E**ncephalopathy, **F**atigue, **G**rowth
failure among children, **H**eadache, **I**rritability, **J**oint pains, **K**idney
damage, **L**assitude, **M**ental retardation, **N**ausea, **O**liguria, **P**aralysis
(Lead palsy – wrist drop), **S**terility, **T**remors, **V**ertigo, **W**eakness

Organic lead poisoning :

Insomnia, Mental confusion, Delirium, Coma, Death

LEAD POISONING

LAB. DIAGNOSIS :

	NORMAL LEVEL	DANGEROUS LEVEL
Blood level	25-40 mcg / 100ml	> 70 mcg / 100ml
Urinary level	0.2-0.8 mg / L	> 0.8 mg / L
Urinary Amino Levulinic Acid (ALA)	6mg / L	60mg / L
Urinary corpoporphyrin	< 150mcg / L	> 250 mcg / L

Peripheral blood smear : Microcytic Hypochromic anaemia

Basophilic stippling of RBCs

LEAD POISONING

MANAGEMENT :

- Prevention of further exposure of lead – change of job
- Saline purge
- Chelating agents :
 - Ca - EDTA
 - d - penicillamine



LEAD POISONING

PREVENTION & CONTROL :

- Pre-placement examination
- Periodical examination of workers
- Substitution
- Isolation
- Local exhaust ventilation
- Good house-keeping
- Working atmosphere (2mg /10 cubic meter of air)
- Personal protective equipments
- Personal hygiene
- Use of unleaded petrol
- Health education

KEEP
THE
LEAD
OUT

Here are five steps to protect yourself from the hazards of lead:

- 1 - TEST** Check with your supervisor about testing. Pay attention to any signs or symptoms of lead poisoning, such as fatigue, loss of appetite, and weight loss. If you experience these symptoms, tell your supervisor immediately.
- 2 - CONTROL** Know any signs or symptoms of lead poisoning. If you experience these symptoms, tell your supervisor immediately. Wash hands and face after work. Do not eat, drink, or use tobacco products while working. Do not use hand tools or equipment that are damaged or worn. Do not use lead-based paint or materials that contain lead.
- 3 - PROTECT** Use appropriate personal protective equipment (PPE) to protect yourself from lead. Wear a respirator when working in areas with lead dust or fumes. Wear gloves when handling lead-based paint or materials. Wear a protective suit when working in areas with lead dust or fumes.
- 4 - CLEAN-UP** Clean up lead dust and fumes immediately. Use a vacuum cleaner or wet mop to clean up lead dust. Do not use dry sweeping or brooms. Wash hands and face after work. Do not eat, drink, or use tobacco products while working.
- 5 - DISPOSE** Dispose of lead-based paint and materials properly. Do not throw lead-based paint or materials away. Do not use lead-based paint or materials in your home.

RESPIRATOR GUIDE

The following chart lists suitable methods, possible lead exposure levels, and required respirator:

Method	Lead Exposure Level (mg/m³)	Required Respirator
Manual sanding, grinding, or buffing of lead-based paint or materials	≤ 0.05 mg/m³	NIOSH-approved respirator with HEPA filter
Use of lead-based paint or materials in a confined space	≤ 0.25 mg/m³	NIOSH-approved respirator with HEPA filter
Use of lead-based paint or materials in a confined space with a fan or blower	≤ 0.25 mg/m³	NIOSH-approved respirator with HEPA filter
Use of lead-based paint or materials in a confined space with a fan or blower and a respirator	≤ 0.25 mg/m³	NIOSH-approved respirator with HEPA filter
Use of lead-based paint or materials in a confined space with a fan or blower and a respirator and a fan	≤ 0.25 mg/m³	NIOSH-approved respirator with HEPA filter
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OCCUPATIONAL CANCERS

- Also called as Industrial cancers
- The common ones are -
 - Skin cancer
 - Lung cancer
 - Cancer bladder
 - Leukaemia



OCCUPATIONAL CANCERS

- SKIN CANCER

- 75% of occupational cancers
- **Carcinogens** – anthracene, coal tar, soot, oils & dyes, acids, UV rays,

X rays

- LUNG CANCER

- **Carcinogens** – arsenic, asbestos, beryllium, chromium, tobacco, coal workers, dye stuff workers, road

tar, nickel

- CANCER BLADDER

makers, oil refiners, farmers, radiology dept.

• **At risk** – Asbestos factory,

uranium mines, nickel refineries, gas industry, tobacco industry

- LEUKEMIA

OCCUPATIONAL CANCERS

- SKIN CANCER
- LUNG CANCER
- CANCER BLADDER
- LEUKEMIA

Carcinogens – aromatic amines, b- naphthylamine, benzidine, para amino diphenyl, auramine & magenta

At risk – dye stuffs & dyeing industry, Rubber industry, Gas industry, Benzol, roentgen rays, Electric cable industry substances

At risk – radiology dept., atomic energy research stations

OCCUPATIONAL DERMATITIS

- These are the diseases of the skin arising out of the occupation or during the course of employment
- 40 – 70% of occupational diseases
- **Agents causing dermatitis :**

Primary irritants

Sensitizing substances



OCCUPATIONAL DERMATITIS

- **CAUSES :**

- **PHYSICAL**

Heat, Cold, Moisture,
Friction, Pressure, X- rays

- **CHEMICAL**

Acids, alkalies, grease, oils,
phenols, dyes, solvents, tar

- **BIOLOGICAL**

Viruses, bacteria, fungi, parasites

- **PLANT PRODUCTS**

Leaves, fruits, flowers,
vegetables, plants







RADIATION HAZARDS

Who are at risk ?

- Radiologists, X ray aides & technicians
- Workers at mining fields
- Nuclear power plant operators
- Air craft worker
- Luminous dial painters
- Military personnel
- Manufacture of radioactive paints



RADIATION HAZARDS

Effects of Radiation:

- Acute burns
- Dermatitis
- Blood dyscrasias
- Genetic effects
- Malignancies
- Lung cancer



INDUSTRIALIZATION

ENVIRONMENTAL SANITATION

PROBLEMS :

- Housing
- Water pollution
- Air pollution
- Sewage disposal



COMMUNICABLE DISEASES :

TB, venereal diseases, food & waterborne
diseases, vector borne diseases

INDUSTRIALIZATION

FOOD SANITATION :

Typhoid, viral hepatitis

MENTAL HEALTH :

Psychoneurosis, behavioral disorders,
delinquency

ACCIDENTS :

Congestion, increased vehicular
traffic, increased tempo of life



INDUSTRILIZATION

SOCIAL PROBLEMS :

Alcoholism, drug addiction, gambling,
prostitution, increased divorce,
increased crime

MORBIDITY & MORTALITY :

Ch. Bronchitis, Ca lung



ACCIDENTS IN INDUSTRY

- Common in coal & other mining industries, quarries, construction work
- India - 3 million man days yearly – accidents
- Accident rate – 0.14/1000 workers/year
- 92% - temporary disablement
- 5-6% - permanent disablement
- 2-3% - fatal



ACCIDENTS IN INDUSTRY

HUMAN FACTORS :

85% of all accidents

- Physical

Impaired hearing,
inadequate visual acuity

- Physiological

Age, Sex, Experience,

Time, Duration of work

- Psychological

Carelessness, overconfidence,
lack of concentration,

ENVIRONMENTAL FACTORS :

ignorance, emotional stress,
Temperature, poor
illumination, humidity, noise,
unsafe machines

SICKNESS ABSENTEEISM

- It means remaining absent from the work by the industrial worker due to certified sickness or injury, but not due to pregnancy or confinement
- Expressed in 2 ways :
 - No. of days remaining absent per person per year
 - Sickness absenteeism rate (SAR)

$$\text{SAR} = \frac{\text{No. of workers remaining absent during a year}}{\text{Total no. of workers}} \times 100$$

SICKNESS ABSENTEEISM

- CAUSES :
 - Medical causes
 - Economic causes
 - Social factors
 - Other causes



OCCUPATIONAL HAZARDS OF AGRICULTURAL WORKERS

- Major, oldest & largest in our country
- Constitute largest segment of unorganized sector
- WHO definition :



It is an industry comprising of all forms of activities connected with growing, harvesting & primary processing of all types of crops. It also includes activities related to breeding, raising, caring for animals in the farms & tending gardens & nurseries

OCCUPATIONAL HAZARDS OF AGRICULTURAL WORKERS

PHYSICAL HAZARDS :

- Temperature
- Humidity
- Solar radiation
- Excessive noise and vibrations
- Inadequate Ventilation



CHEMICAL HAZARDS :

- Fertilizers
- Insecticides
- Pesticides



OCCUPATIONAL HAZARDS OF AGRICULTURAL WORKERS

BIOLOGICAL HAZARDS :

- Brucellosis
- Anthrax
- Leptospirosis
- Tetanus
- Tuberculosis(bovine)
- Q fever



ACCIDENTS :

- Agricultural machinery
- Insect bites
- Snake bites



OCCUPATIONAL HAZARDS OF AGRICULTURAL WORKERS

RESPIRATORY DISEASES :

- Bagassosis
- Byssinosis
- Farmer's lung
- Tobaccosis
- Asthma
- COPD
- Respiratory allergy
- Carcinoma nasal septum



OCCUPATIONAL HAZARDS OF AGRICULTURAL WORKERS

SOCIAL CAUSES :

- Poverty
- Illiteracy
- Poor standard of living
- Overcrowding
- Lack of knowledge
- Traditional culture
- Blind beliefs
- Ignorance



Left to Right - Budhia (Raghubir Yadav), Nacha (Omkar Das), Dhanya (Shalini Vatsal)

WRITTEN & DIRECTED BY ANUSHA RIZVI
PRODUCED BY JAMES KHAN AND KIRAN RAO
CO-PRODUCED RONNIE SCHWARTZ

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THANK YOU !