OCCUPATIONAL HEALTH

OCCUPATIONAL HAZARDS

~~**Psychosocial hazards.**~~
~~**Biological hazards**~~
Chemical hazards
Physical hazards
Mechanical hazards

VII

Chemical Hazards

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Chemical Hazards

There is hardly any industry which does not make use of chemicals.

The chemical hazards are on the increase with the introduction of newer and complex chemicals.

- The ill-effects produced depend upon the

1. duration of exposure,
2. the quantum of exposure and
3. individual susceptibility.

- Chemical agents act in three ways :

(1)Local Action :

(2)Ingestion

(3)Inhalation :

i)Dusts

ii)Gases

iii) Metals and Their Compounds

Local action
ingestion:
inhalation :
dusts
gases
metals

(1)Local Action :

Some chemicals cause

- ❑ dermatitis, eczema, ulcers and even cancer
- ❖ by *primary irritant action;*
- ➢ some cause dermatitis by an allergic action.
- ✓ Occupational dermatitis is a big problem in industry
- ❖ Some compounds are *absorbed* through the skin and
- ➢ cause systemic effects. such as TNT and aniline

(2) Ingestion:

Occupational diseases may also result from

- ❖ ingestion of chemical substances such as lead, mercury, arsenic, zinc, chromium, cadmium, phosphorus etc.
- ❖ Usually these substances are swallowed in minute amounts through contaminated hands, food or cigarettes.
- ❖ Much of the ingested material is excreted through faeces and only a small proportion may reach the general blood circulation.

Local action
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inhalation :
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(3) Inhalation :

(i) Dusts :

- **Dusts are finely divided solid particles**
- **with size ranging** from **0.1 to 150 microns**.
- They are **released into the atmosphere** during **crushing, grinding, abrading, loading and unloading** operations.
- Dusts are **produced** in a number of industries **mines, foundry**مسبك **quarry**مقلع**, pottery, textile, wood or stone working industries**.
- **Dust particles larger than 10 microns settle down from the air rapidly, while**
- **the smaller ones remain suspended indefinitely**.
- **Particles smaller than 5 microns are directly inhaled into the lungs and retained there**.
- **This type of the dust is called "respirable dust"**, and

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Dusts have been ·classified into

- ***inorganic*** **and** ***organic*** **dusts;**
- ***soluble*** **and** ***insoluble dusts.***

❑ **The inorganic dusts are**

silica, mica, coal, asbestos dust, etc…

❑ **the organic dusts are**

cotton, jute ,,,,,

❑ **The soluble dusts**

❖ **dissolve slowly, enter the systemic circulation and are**

❖ **eventually eliminated by body metabolism.**

❑ **The insoluble dusts**

❑ **remain, more or less, permanently in the lungs.**

❖ **They are mainly the cause of pneumoconiosis.**

Local action
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(ii) Gases :

Exposure to gases is a common hazard in industries.

Gases are sometimes classified as

- ***simple gases ;***(e.g., **oxygen, hydrogen**)

- ***asphyxiating gases ;***(e.g. **carbon monoxide, cyanide gas, sulphur dioxide, chlorine**) and .
- ***anaesthetic gases*** (e.g. **chloroform, ether, trichlorethylene)**

(iii) Metals and Their Compounds:

- **A large number of metals, and their compounds are used throughout the industry e.g. lead, antimony, arsenic, beryllium, cadmium, cobalt, manganese, mercury, phosphorus, chromium, zinc and others.**
- **The chief mode of entry** of s

Local action
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- **The chief mode of entry** of some of them
  - is by **inhalation** as dust or fumes.
- **The ill-effects depend upon**
  - **the duration of exposure and**
  - **the dose or concentration of exposure.**

- **Unlike the pneumoconiosis, most chemical**
- **intoxications respond positively to**
  - **cessation of exposure**
  - **and medical treatment.**

Pneumoconiosis

contents

- Definitions
- Pathogenesis
- Types
- Preventive measures

- Individual diseases
  - Silicosis
  - Asbestosis
  - Anthracosis

Pneumoconiosis

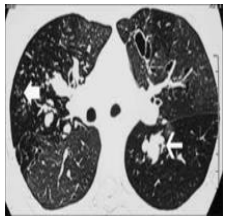
- **Dust within the size range** of **1-5µ** is a **health hazard**
- **after variable period of exposure, producing,**
- **a lung disease known** as **pneumoconiosis,**

Definition

The term **pneumoconiosis derives its meaning from the Greek words**:

pneuma = air and **konis = dust**

- **The International Labour Organization (ILO) define pneumoconiosis as**
- **"the accumulation of dust in the lungs and the tissue reactions to its presence".**



Pneumoconiosis can be defined as
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Pneumoconiosis can be defined as **the non-neoplastic reaction of lungs to inhaled minerals or organic dust and the resultant alteration in their structure**

- **Defined as** the **deposition and lung reaction** to **the dust** (**dust lung diseases).**
- **The distribution of dust lesion follow lymphatic pathways in lung**

Pathogenesis

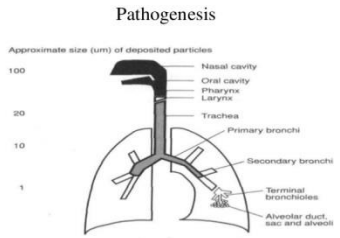
For clinical pneumoconiosis to develop, 3 essential factors are required:

1) **Exposure to specific substance**:
   - **coal,** appear **relatively inert** and may accumulate in considerable amounts with **minimal tissue response**;
   - **while silica** and **asbestos**, have **potent biologic effects**.
2) **Particles of appropriate size to be retained in lung (1-5µ)**
3) **Exposure for a sufficient length of time** (**usually around 10 yrs**)

Pathogenesis

- From an occupational health point of view, dust is classified by size into following categories:

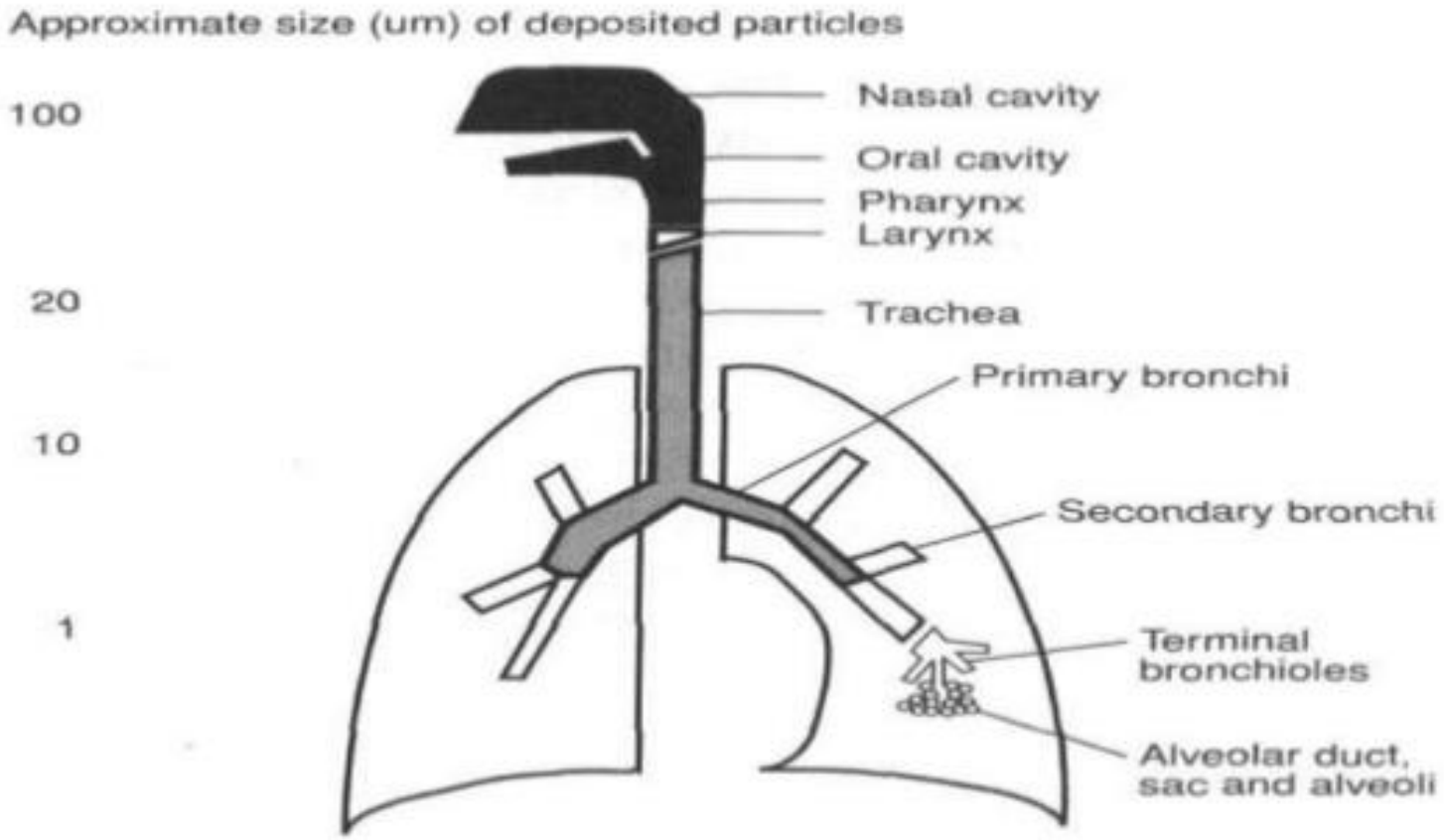
- **Inhalable Dust**:
  - is the one which enters the body, but is trapped in the nose, throat, and upper respiratory tract.
  - Particle size is usually **6-25µ**.



- **Respirable Dust**:
  - particles that are small enough to penetrate the nose and upper respiratory system beyond the body's natural clearance mechanisms of cilia and mucous and are more likely to be retained (maintain)in the lungs.
    - Particle size is usually **1-5µ.**

- **Particles of <1 µ are exhaled out**.

Pathogenesis



- The hazardous effects of dusts on the lungs depend
- upon a number of factors such as:

(a) Chemical composition
(b) Fineness
(c) Concentration of dust in the air
(d) Period of exposure and
(e) Health status of the person exposed.

- Therefore, the threshold limit values for different dusts are different. .
- In addition to the toxic effect of the dust on the lung tissues, the super-imposition of infections like TB may also influence the pattern of pneumoconiosis

- Pneumoconiosis classification;

1- caused by inhalation of inorganic or organic dust
2- severity spectrum of disease

- **Pneumoconiosis may be caused by inhalation of inorganic or organic dust**

Pneumoconiosis

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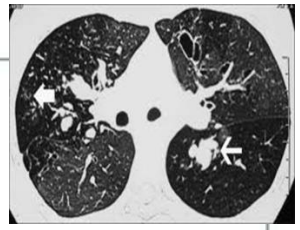
- Is categorized in two ways:

1.

Inorganic dusts		Organic dusts	
DUST	DISEASE	DUST	DISEASE
1. Coal	Anthracosis	1. Cane fiber	Bagassosis
2. Silica	Silicosis	2. Cotton dust	Byssinosis
3. Asbestos	Asbestosis	3. Tobacco	Tobacosis
4. Iron	Siderosis	4. Hay/ Grain dust	Farmer's lung



Pneumoconiosis

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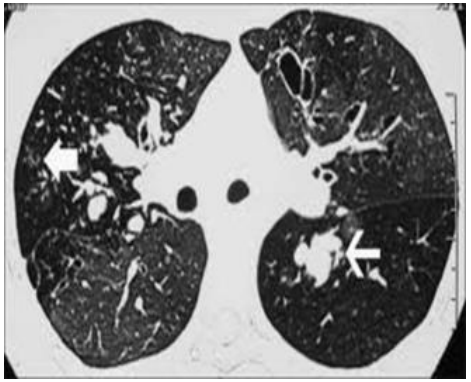
2. - severity spectrum of disease

Classification	Types of pneumoconiosis
1. Major pneumoconiosis	Silicosis, Anthracosis, asbestosis
2. Minor pneumoconiosis	Bagassosis, Byssinosis
3 . Benign pneumoconiosis	Siderosis

Types

Pneumoconiosis is usually divided into three groups:

I. Major pneumoconiosis
II. Minor pneumoconiosis
III. Benign pneumoconiosis

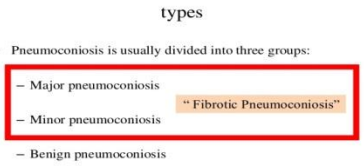


types

- Pneumoconiosis is usually divided into three groups:
  - Major pneumoconiosis
  - Minor pneumoconiosis

“ Fibrotic Pneumoconiosis”

  - Benign pneumoconiosis



III Benign Pneumoconiosis:

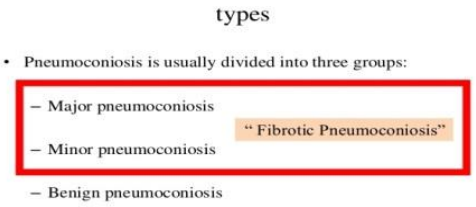
- There **isn't any reaction** in the lungs, **but**
- **dust deposition casts** a **shadow in x-ray of the lung.**
- There is **no fibrosis** and
- **no disturbance** of **lung functions**.

- **They are characterized by the**
- **presence of small rounded dense opacities on a chest film due to perivascular collections of dusts.**
- **The deposits** in the lung **disappear when exposure is discontinued**

- **It can result from the inhalation of:**
  - Iron dust ⟶ siderosis
  - Tin dust ⟶ stannosis
  - Calcium dust ⟶ chalcosis

II. Minor Pneumoconiosis:

- **Inhalation of some dusts** results in **"minor fibrosis"** of the lungs
  - There is **minimal fibrosis of the lungs**
  - **without interference of lung architecture**
  - or lung **function tests.**
- **These dusts include:**
  - **Mica pneumoconiosis**
  - **Koalin (china clay) pneumoconiosis**



I. Major Pneumoconiosis: or Complicated pneumoconiosis

- related to severity of exposure ,
- large lesions
- + fibrosis (major fibrosis)
- + which results in interference of lung architecture or
- lung function tests +
- lung collapse and
- compensatory emphysema.

Examples

- Silica ⟹ silicosis
- Asbestos ⟹ asbestosis
- Coal ⟹ anthracosis

types

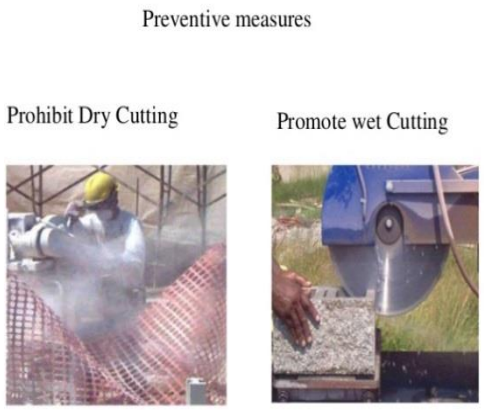
- Major Pneumoconiosis: Inhalation of some dusts results in "major fibrosis" of the lungs, which results in interference of lung architecture or lung function tests.
- Examples are:
  - Silica → silicosis
  - Asbestos → asbestosis
  - Coal → anthracosis

Preventive measures in Pneumoconiosis

- ❑ Engineering measures
- ❑ Medical measures
- ❑ Other measures

❑ Engineering Measures

- ➢ Design of building
- ➢ Conduct air monitoring to measure the workers' exposure to such dust .
- ➢ Minimize exposures by controlling the creation of airborne for example, use wet drilling, local exhaust ventilation.
- ▪ Enclosure / isolation
- ▪ Environmental monitoring
- ▪ Prohibit Dry Cutting Promote wet Cutting



Preventive measures in Pneumoconiosis

- Medical measures
- Engineering measures
- Other measures

❑ Medical measures:

- ➢ Pre-placement examination
- ➢ Periodical examination
- ➢ Medical and health care services
- ➢ Notification
- ➢ Maintenance and analysis of records
- ➢ Health education and counselling
- ➢ Practicing good personal **hygiene**

- ✓ **Washing hands and face** before eating, drinking, smoking or use toilet,
- ✓ **Prevent eat, drink, smoke, in areas where such dust is being used.**
- ✓ **Wear protective clothes** and respiratory protection
- ✓ **Before leaving work, shower and change into clean clothes.**
- ✓ **Leave dusty clothes at work.**

❑ Other Measures:

Legal measures:

- Measures to minimize dust emissions and exposure to dust.
- Law compliance mechanisms, including effective workplace inspection systems
- Cooperation between management and workers and their representatives
- A mechanism for the collection and analysis of data on occupational diseases
- Training of health professionals in occupational diseases to diagnose and prevent occupational diseases.

Preventive measures

Prohibit Dry Cutting

Promote wet Cutting


THANK YOU