DISEASES AT WORK

NOTIFIABLE DISEASES

SIGNS • SYMPTOMS • DIAGNOSIS

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Introduction

The incidence of notifiable diseases recorded with the Factory Inspectorate is insignificant, less than a few hundred. It does not mean that working conditions in India are extremely good and that only few workers are affected by the notifiable diseases. In Nandesary (Gujarat), the doctors treat many workers for dermatitis, which is a notifiable disease, if it is related to the occupation of the worker. In many cases in fact it is so. Yet to the best of our knowledge not a single case of dermatitis has been notified in that area.

Notifiable diseases are a part of the occupational diseases selected by the Factories Act (1948). The Act also says that any doctor who treats a worker affected by any of the notifiable diseases, should notify it to the Factory Inspectorate. The expectation is that this notification will draw the attention of the management and/or the governmental machinery and in response they will singly or jointly take suitable remedial steps and that eventually it will lead to improvement in the working conditions.

These reference sheets are an attempt to disseminate information about notifiable diseases among the clinicians, workers and others interested in this area. These sheets are in no way substitutes for reference books.

These sheets are based on the Encyclopaedia of Occupational Health and Safety by the ILO (1983) and Chemical Hazards of the Workplace (Proctor and Hughes, 1978). Attempt has been made to extract and incorporate as many pointers for detection as possible in these sheets. This is just a beginning', hence the possible treatment of these notifiable diseases and the possible precautions/changes necessary at the workplace, have not been included here.

We hope that reading through these sheets will increase the interest of the clinicians looking after the health of the workers. In this present form, the sheets could appear more complicated and technical and thereby less useful to workers. We hope and plan to further simplify and to bring out such material which will be useful to workers as well.

Diseases caused by lead and its inorganic compounds

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Alloys Ammunition Ceramics Inks Insecticides Printing presses Plumbing Rubber Storage batteries Lead lining	**Non specific:** initial weakness, insomnia, restlessness, forgetfulness, facial pallor, pallor of eyes; weight loss. **Further exposure leads to:** abdominal discomfort, colic — many cases wrongly diagnosed as surgical diseases. Lead line on gingival tissues. Motor weakness including paralysis of extensor muscles of wrist and possibly ankles, muscle tenderness and afterwards signs and symptoms of neuropathy. Reproductive organs affected, impaired fertility, still births. In males — hypospermia, asthenospermia, teratospermia, chronic nephritis.	1. Occupational history and haemopoietic changes e.g. anaemia, basophilic stipplings over R.B.C.s etc. are prime elements in diagnosis. 2. For workers in fertile age, lead in blood should not exceed 30 micro-gm/100 ml; for others, it should not exceed 40 micro-gm/100 ml. If lead in blood found in excess, then stoppage of exposure to be recommended (WHO 1980). 3. Lead in urine should not exceed 65 micro-gm/l. Samples should be collected at the end of the work-shift. 4. Zinc-protoporphyrin level should not exceed 3 micro-gm/gm Hb.

Diseases caused by lead tetra ethyl

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Gasoline fuel for internal combustion engines, (for use as 'anti-knock' agent) Refineries	**Mild manifestations:** Insomnia, lassitude, nervous excitation, lurid dreams in association with tremors and, spasmodic muscular contractions. **More severe responses:** Complete disorientation with hallucinations, facial contortions, episodes of hallucinations may be converted into maniacal or violent convulsive seizures which may terminate in coma or death.	Valid history of occupational exposure with increased level of lead in urine more than 350 micro-gm/litre and lead in blood less than 50 micro-gm/ 100 ml.

Diseases caused by phosphorus and its compounds

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Chemicals Detergents Explosives Fertilizers Fireworks Ignition compounds Incendiaries Insecticides Phosphorus bronze Iridescent metallic deposits Rodenticides Rust-proofing of metals Safety matches	Irritation of respiratory tract, toothache, excessive salivation followed by pain and swelling of jaw and osteomyelitis of the jaw bone or 'phossy jaw', facial distortion.	1. Occupational history. 2. Regular X-rays of teeth. 3. After suspicion of jaw injury further exposure should be stopped. 4. Pulmonary oedema may occur in case of exposure to PC 15 (Phosphorus-pentachloride).

Diseases caused by mercury and its compounds

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Acetaldehyde and acetylene Acetic acid Agricultural and Industrial poisons Antifouling paint Artificial silk Barometers Chlorine Electrical apparatus Incandescent bulbs Amalgams manufacture Mercury vapour tubes Rectifier batteries Silver ores Textiles Thermometers Treatment of gold Vacuum pumps X-ray tubes	**Most common:** Gingivitis, metallic or bitter taste in mouth, bluish line on gums, slate grey pigmentation on vestibular side of gums or on the palate or inside of the cheeks, gastritis; possible dermatitis; cough, breathlessness, bronchitis, pneumonitis; psychic — euphoria and erethism. Nervous system involvement on two lines a) Fine intention tremors resembling that in multiple sclerosis. b) Parkinsonism with tremors at rest and reduced motor function, this may occur without gastro-intestinal symptoms, unsteady staggering gait, mask-like faces, absence of balance recovery reflexes, tremor begins with subtle trembling of fingers. Eyes — reddish-grey discoloration of crystalline lens.	1. Occupational history. 2. Mercury in urine should not exceed 50 micro-gm/litre. 3. Mercury in blood should not exceed 3 micro-gm/litre. 4. Examination for presence of tremors at rest or with movement.

Diseases caused by manganese

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with 'Anti-knock' agent in petrol Ceramics Driers of linseed oil Dyeing and bleaching of textiles Electrode coating of welding rods Glass Inks Mining of manganese Paints and pesticides Production of fertilizers Production of steel and alloy steels, aluminium alloys, copper alloys, drycell batteries, potassium permanganate and other manganese compounds Tanning of leather	Chills, fever, dryness in mouth, headache, influenza like illness, weakness. **Nervous form of poisoning:** **Initial symptoms** — difficult to diagnose but most important phase as removal from exposure at this stage may arrest course of poisoning. These include weakness, apathy, headache, vertigo, bouts of excitability, unsteady gait, difficulty in co-ordinated movements, may be period of sexual excitation followed by hypogenesis followed by increasing indifference **Objective symptoms** — voice becomes monotonous and sinks to whisper, speech irregular; inability to run, fixed appearance of face — hilarious or dazed; difficulty in walking backwards. **Further** — disorders affecting galt become more pronounced (cannot walk backwards), tremors in lower limbs.	1. Based on personal occupational history, information from relatives, friends, colleagues should be collected for diagnosis. 2. Manganese content in hair is normally below 4 micro-gm/kg. 3. Manganese in urine of non exposed persons is from 1 to 8 micro-gm/litre but may be upto 21 micro-gm/litre. 4. Manganese in faeces 60 micro-gm/kg or above suggests occupational exposure.

Diseases caused by arsenic

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Insecticides and fungicides Manufacture of certain types of glass Metallurgy — in hardening of copper, lead, alloys Pigment production Rodent poison Smelting of copper ores (as by-product)	Conjunctivitis, visual disturbances; ulceration and perforation of nasal septum; pharyngitis, pulmonary irritation, peripheral neuropathy; hyper-pigmentation of skin, palmar and plantar hyper-keratoses, dermatitis, skin cancer; may cause cancer of the lung, larynx, lymphatic system or viscera. Impairment of peripheral circulation, resulting in gangrene of the fingers and toes. Liver damage has been observed in the animals. A fatal case following a spill of arsenic trichloride has been reported. Some organic arsenicals, such as arsanilates, have a selective effect on the optic nerve and can cause blindness. Excess lung cancer mortality has been observed. Acute intoxication with arsenic compounds is usually accompanied by anaemia and leucopenia. These also occur in cases of chronic arsenic poisoning. Dermatological disorders may occur. Possible incidence of resorption and malformed offspring in a smelting environment.	1. The diagnosis depends upon analysis of urine for arsenic. Urinary levels of arsenic above 0.7 to 1.0 mg/litre in exposed individuals may indicate harmful exposure, but dietary factors must first be ruled out. 2. A determination of arsenic in hair and nails may be useful, although its value has been questioned in industrial exposures because of the difficulty in removing all external contamination.

Diseases caused by nitrous fumes

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Bleaching of rayon (as stabilizer) Manufacture of nitric acid Many industries (as by-product, intermediate product)	Powerful lung irritants. High concentrations may cause sudden death. Death may be caused by delayed pulmonary oedema, initial signs on exposure may be no more than moderate irritation of eyes and respiratory tract. Possibility of death may ensue sometimes even several weeks after exposure and may be associated with bronchiolitis fibrosa obliterans. Chronic effects — drowsiness, dizziness, vomiting, associated with presence of methaemoglobin in blood, lung function may be affected.	1. Occupational history. 2. Chest X-rays for basal scars. 3. Blood test for methaemoglobin.

Diseases caused by carbon disulphide

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Industrial solvent (widely used for alkalies, cellulose, fats, oils, resins and waxes) Manufacture of optical glass Oil extraction Pesticides (is itself used as a pesticide) Viscose rayon	This is primarily a neurotoxic poison. Symptoms indicating central and peripheral nervous system are most important. In chronic poisoning, the damage may be permanent. In acute poisoning, early excitation of the nervous system resembling alcoholic intoxication occurs, followed by depression, with stupor, restlessness, unconsciousness and possibly death. Nausea, vomiting, headache are common. In chronic poisoning, neuritis and disturbance of vision are common. Sensory changes such as a crawling sensation in the skin, sensations of heaviness and coldness, and visually "veiling" of objects are noticed first. Gradual loss of strength follows. Also wasting of the muscles. Mental symptoms vary from simple excitation or depression and irritability to mental deterioration, Parkinsonian paralysis and even insanity, insomnia, loss of memory and personality changes. Chronic fatigue is very common. Sexual disorders in women, menstrual disturbances and more frequent abortions are described. Carbon Disulphide passes the placenta and may be present in the tissues of the fetus.	1. Carbon Disulphide effect can be measured by determining the amount in urine, blood or expired air. These are rough estimations. A widely used test is iodine-azide test based on a special test of the urine. 2. Two or three medical examinations annually are advisable. A neurologist and a psychiatrist should participate in such examinations.

Diseases caused by benzene

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Chemical syntheses (widely used as a fuel, a chemical reagent, a solvent, an additive of motor fuel, and a raw material) Manufacture of detergents, pesticides, solvents and paint removers Production of styrene, phenol, cyclohexane and other organic chemicals Shoe-making	**Acute poisoning** — narcotic action, a local irritant effect on the skin and mucous membranes, central nervous system depression. **Chronic poisoning** — damages blood-forming tissues and results in hyporegenerative anaemia. The ultimate injury may be potentially incurable. **Early symptoms** — vague complaints of fatigue, loss of appetite, headache, dizziness and an anaemic appearance. **Confinued exposure** — may cause euphoria, nausea, a staggering gait and coma. Inhalation of lower concentrations (250 to 500 ppm) produces vertigo, drowsiness, headache and nausea. It often causes irreversible injury to the bone marrow. This may develop into true aplastic anaemia leading to total or partial destruction of all elements of the bone marrow. Leukopenia, pancytopenia and thrombocytopenia (all related to destruction of cells in the blood) may be caused. A clear relationship between exposure to benzene and the large incidence of leukaemia has been established.	1. Tests for phenol levels in urine have been used as an index of benzene exposure. 2. If signs, symptoms of CNS depression occur, obtain blood glucose and rectal temperature; perform a complete neurologic examination. 3. A complete blood count is necessary (anaemia is severe and is normochromic and normocytic in type; platelets are reduced in numbers aspirated bone marrow is usually acellular).

Diseases caused by chromium

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Chromium plating Chromium salts Leather tanning Metallurgy Photomechanical processing Refractory bricks	Ulcers (even sometimes perforation) of the nasal septum and fingers; irritation of the conjunctiva pharynx and larynx and asthmatic bronchitis. Frontal headaches; wheezing; dyspnea; cough and pain on inspiration; jaundice; impaired liver function; lung cancer.	1. Diagnostic studies should include electrocardiogram, sputum gram stain and culture, differential white blood cell count, and arterial blood gas analysis. 2. Increased levels of chromium in the urine are indicative of occupational exposure but should be interpreted with caution.

Anthrax

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Abattoirs Agriculture Bone and bone meal processing Breeding Butchery Hair and bristle processing Ivory and horn processing Stock farming Tanneries Veterinary work Wood industry	**Cutaneous anthrax**: A red spot appears at the site of the infection, which develops into a papule with a necrotic centre. Large collateral oedema develops around the pustule. **Pulmonary anthrax** begins suddenly and assumes form of severe haemorrhagic pneumonia and death follows within 24-28 hours.	Cutaneous-epidemiological data (i.e. contact with infected animals or their products) and the characteristic clinical symptoms. Examination should be made of cultures from the pustule. Intestinal and pulmonary forms — based mainly on epidemiological data — exposure or occupation. Sputum in pulmonary form and blood in the septic form need to be tested. The detection of Gram-positive bacteria, immunofluorescence tests may be used as diagnostic techniques. The skin allergic test with anthraxin is most sensitive.

Silicosis

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Certain foundry operations like sandblasting etc. Cutting of quartzite, agate, gneiss, granite and slate Manufacture of glass and porcelain etc. Manufacture of pottery Mines and quarries Stripping and relining of steel furnaces	Initial micronodular stages of silicosis are asymptomatic and are revealed only by periodic radiological examinations. The first symptom of silicosis is dyspnoea on exertion. As a rule there are no other subjective symptoms. The three chief complications of silicosis, which are also the most frequent causes of death are: pulmonary tuberculosis, respiratory insufficiency, and acute pulmonary infection. The clinical signs and symptoms tend to be progressive with continued exposure to silica. Symptoms become exacerbated by pulmonary infections and cardiac decompensation. Symptoms include cough, dyspnoea, wheezing, and repeated nonspecific chest illnesses.	1. The radiological feature is due to the occurrence of "egg-shell" type calcification of the lymph glands in 2-4% of silicosis cases. 2. A detailed record of occupational history is necessary. This may include the duration and degree of exposure to dust, the probable proportion of quartz or other forms of free crystalline silica in the dust. 3. A good chest X-ray together with the case history must form the basis for the diagnosis.

Diseases caused by chlorine

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Bleaching agents (it is itself a bleaching agent) De-tinning and de-zincing of iron Metal fluxing Processes of chlorination of chemicals Production of chlorine Sterilization of water supplies and swimming pools Synthetic chemistry (as a reagent)	Chlorine is a potent irritant of the eyes, mucous membranes, respiratory system and skin; exposure causes pulmonary irritation. Accidental exposure of humans to unmeasured but high concentrations for a brief period causes burning of the eyes with lacrimation, burning of the nose and the mouth with rhinorrhea, cough, choking sensation, and substernal pain. These symptoms are frequently accompanied by nausea, vomiting, headache, dizziness and sometimes syncope. Vomit frequently contains blood due to the lesions of the mucous membrane. The cough may be intense and associated with pain behind the breastbone. Cellular damage may occur with excretion of fluid in the alveoli, which may be fatal if adequate treatment is not given immediately. Massive inhalation produces pulmonary oedema, fall of blood pressure, and in a few minutes, cardiac arrest. Prolonged exposure to atmospheric chlorine concentrations of 5 ppm results in disease of the bronchi and a pre-disposition to tuberculosis.	Diagnostic studies should include electrocardiogram, sputum gram stain and culture, differential white blood cell count, and arterial blood gas analysis.

Diseases caused by bromine

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with 'Anti-knock' compounds for gasoline Bleaching agent Dyestuffs Fuel additives production Gold extraction Military gas Production of bromine	It is a severe irritant of the eyes, mucous membranes, lungs and skin. Exposure to low concentrations results in copious mucous secretion in the upper air ways, inflammation of the eye-lids, lacrimation, coughing, epistaxis respiratory difficulties, vertigo and headaches. Occasionally, these symptoms are followed a few hours later by nausea, diarrhoea, accompanied by stomach pains, hoarseness and respiratory difficulty with symptoms of asthma; crepitations are heard in the lungs. Inhalation of high bromine concentrations causes inflammatory lesions to the mucous membranes of the upper airways. The tongue and palate appear inflamed. Asthmatic bronchitis, photophobia and blepharospasm may occur. Fatal chemical burns of lungs are possible.	These should include electrocardiogram, sputum gram stain and culture, differential white blood cell count and arterial blood gas analysis.

Diseases caused by iodine

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Photographic film (Rare occurrence in industry, used only if no substitute is found)	Iodine vapour, even in low concentrations, is extremely irritating to the respiratory tract, eyes and to a lesser extent, to the skin. Exposed workers experience a burning sensation in the eyes, lacrimation, blepharitis, rhinitis, stomatitis and chronic pharyngitis. Headaches and a feeling of tightness in the chest have been reported.	If severe exposures are suspected, diagnostic studies should include electrocardiogram, sputum gram stain and culture, differential white blood cell count, and arterial blood gas analysis.

Diseases caused by fluorine

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Aircraft piston engines Conversion of uranium tetrafluoride to uranium hexafluoride Electrolytic refining and pickling of metals Electroplating Etching of glassware Manufacture of artificial cryolite, certain refrigerants and insecticides Production of metallic aluminium (to make aluminium fluoride intermediate) Synthesis of high octane petrol by alkylation (as hydrofluoric acid)	Inhalation of high concentrations causes larygeal spasm, bronchospasm, followed by delayed pulmonary oedema. Mice exposed to sublethal concentrations had pulmonary irritation and delayed development of neurosis in the liver and the kidneys. Chronic inhalation to low doses may produce mild dyspepsia.	Mucous membrane irritation may be similar to viral upper respiratory tract infection but the latter may be characterised by fever, myalgias, and lymphocytosis. Abnormal radiographs of bones particularly tibia and fibula bearing small bony spicules are characteristic of chronic exposure. Excretion of fluorides in mother's milk and urine of exposed persons is characteristically high.

Diseases caused by halogen derivatives of aliphatic hydrocarbons*

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Chemicals (as solvents, refrigerants, anaesthetics, fumigants, etc.) Plastic intermediates Gauge fluids *Some examples of above type of chemicals are chloroform, chloromethane, vinyl chloride, carbon tetrachloride, etc.	These chemicals are lung irritants. The severity of effect depends on the particular chemical in question and its concentrations. They cause injuries to eyes and repeated exposure to fumes may result in irreversible damage. Affected skin is dry and is cracked, chapped on repeated contact. Vinyl chloride is a carcinogen and other chemicals of the above type are suspects. Effects on the nervous system — inebriation, excitation, passing into necrosis is typical. Death may result due to acute severe exposure. Headache, nausea, convulsions, paralysis, visual disturbances, tremors, affected speech are evidence of complicated involvement of the central nervous system. Harmful effects on kidneys, liver are reported.	1. Occupational history. 2. Referring to literature on the particular chemical in question. 3. In case of CNS depression, blood glucose, rectal temperature to be noted and complete neurological examination to be done. 4. Liver function tests, if liver injury is suspected.

Pathological manifestations due to exposure to radioactive substances and X-rays

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Industrial radiography Nuclear reactors Radium dial painting Uranium mining Use, analysis, or manufacture of radioactive materials X-ray clinics	Exposure of the entire body or large portion of the body to doses of radiation in excess of 1 Gray (Gy), results in nausea, vomiting, perhaps diarrhoea within hours of exposure. Gastro-intestinal symptoms usually improve in a day — then second phase starts — a period of relative well being, may last upto a week. Third or toxic phase is characterised by recurrence of intestinal symptoms, ulcerations occur in mouth and throat, may lose hair, gross intestinal bleeding may be present. Acute effects — drop in lymphocyte count, interstitial fibrosis in case of localised exposure. Late effects — leukaemia and other forms of cancer. If embryo is exposed — morphological abnormalities in development of nervous system or death of infants is possible depending upon the dose and duration of exposure.	Drop in the lymphocyte count followed by slower and biphasic fall in granulocyte and platelet counts. Possible gradual fall in red blood cell count. In intestine, ulceration of mucous membrane is possible.

Skin cancer

Industrial occurrence	Agent	Signs and symptoms	Diagnosis, special tests
In industries associated with Arsenical insecticides	arsenic	Firm non inflammatory waxy papule which may have uniformly dark pigmentation.	Skin cancer takes many years to develop, early stages readily detectable by visual inspection.
Coal, gas, coke, asphalt etc.	pitch, tar, or tarry products	Squamous cell carcinoma appears as a small but firm erythematous nodule. Tumouous growth.	Occupational history indicates regular checking for skin cancer.
Outdoor workers and industrial ultra-violet use	ultra-violet radiation	Brown black coloured lesion that starts to enlarge, change colour, bleed or ulcerate. The lesion is more often smaller than 1.5 mm	
Radiation workers	ionising radiation		
Shale oil refining, cotton industry, paraffin wax, oil refinery etc.	lubricating and cutting oils		

Toxic anaemia

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Exposure to — Benzene X-rays Ionising radiation Lead Carbon monoxide Arsine Aromatic amines Nitro compounds (like nitro-benzene, aniline, TNT) Alkaline chlorates Nitrites Nitrates Insecticides Manufacture of phenyl hydrazine, toluene, acetanilamide, methyl chloride, mercury	Pallor, easy fatigue, breathlessness on exertion, giddiness, palpitation	1. Occupational history 2. The agents listed have different effects eg. exposure to carbon monoxide forms carboxyhaemoglobin in blood. Some haematological indicators: lead : basophilic stippling of erythrocytes nitro compounds aromatic amines : occurrence of reticulocytosis in regenerative phase of haemolytic anaemia ionising radiation : increase in binuclear lymphocytes. 3. Spectrophotometric analysis of denaturated haemoglobin.

Toxic jaundice

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Arsenic, antimony and ferrous iron compounds Carbon tetrachloride (widely used in dry cleaning, as constituent of fire extinguishers and as industrial solvent) Chlorophenothane (DDT) Methyl chloride, tetrachloroethane, chloroform, nitrobenzenes, dinitrophenol, trinitrotoluene, toluene, chlorinated naphthalenes, and chlorinated diphenyl (used as solvents, degreasers and refrigerants, and in polishes, dyes and explosives) Vinyl chloride (in production of polyvinyl chloride) Yellow phosphorus	Loss of appetite, nausea, vomiting and abdominal pain are followed by a tender, enlarged liver and jaundice, with pale stools and dark urine. Hepato-toxic High fever, rapidly increasing jaundice, mental confusion and coma with a fatal termination from massive necrosis of the liver.	An important biochemical feature is the high level of serum amino — transferase (transaminase) A full occupational history is necessary. The presence of hepatitis B surface antigen and antibody should be determined. Hepatosplenomegaly may be detected clinically, by radiography or more precisely by grey scale ultrasonography.

Occupational dermatitis due to primary irritants and sensitizers

Occupations	Irritants	Sensitizers	Signs and symptoms	Diagnosis, special tests
Bakers, chemical, cleaners, construction, electroplating, engineering, leather, metal, paint, pharmaceutical, plastic, printing, rubber, textile, etc.	Cement, lime, detergents, organic solvents, soaps, turpentine, synthetic coolants abrasives, nitro-paints, acids, hardeners, dyes, alkalies, peroxides, pesticides, weed-killers, gum, inks, chlorinated diphenyls, disinfectants, etc.	Chromium, nickel, mercury and cobalt salts, epoxy resins, turpentine, azo dyes, formaldehyde, fungicides, etc.	Eczematous lesions	Occupational history Referring to detailed list of irritants, sensitizers Observing if many workers in identical situations develop cutaneous changes, patch tests.

Byssinosis

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Cotton, flax and soft hemp (especially in ginneries, bale pressing plants, mixing and card rooms, and linen, rope, textiles and twine making)	Early stages — occasional chest tightness or respiratory irritation on the first day of the working week. As the disease progresses — chest tightness and/or shortness of breath extends to the other days of the week. Eventually, the worker may become severely affected on every working day with permanent and severe effort intolerance.	1. Characteristic history of chest tightness. 2. There is a marked fall in ventilatory capacity during work. 3. Measurement of FEV 10 or airway resistance at the beginning and end of the work shift on the first day of the week may help not only to confirm the diagnosis, but also to identify workers who are susceptible to the dust without visible symptoms. 4. Diagnosis is made primarily from a history of exposure to cotton dust.

Asbestosis

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Brake linings Cement Filler for plastics Fire smothering blankets Mining of asbestos Safety garments Thermal and electric insulation	Increased breathlessness on exertion, aching or transient sharp pains in the chest; persistent dull chest pains; haemoptysis; presence of high-pitched fine crepitations at full inspiration and persisting after coughing. Chronic and acute pleurisy is now a recognised sequel to asbestos dust exposure. Acute pleurisy is associated with pain in chest, fever, leucocytosis and a raised erithrocyte sedimentation rate in blood. Greater vulnerability to lung cancer. Others include, localised pleural thickenings, which may become radiopaque through calcification; restrictive pulmonary function; rales; dyspnoea; cyanosis, dry cough and finger clubbing.	Detailed occupational history of exposure to asbestos is a prime element in diagnosis. The chest radiograph is important. The pattern of lung function provides the important third component in diagnosis. The total lung volume is reduced and especially the forced vital capacity (FVC), is reduced.

Noise induced hearing loss

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with High noise levels (in textiles, engineering, boilers, compressors etc.)	Four phases of development of the chronic effect: 1. Ringing in the ear at the end of the work shift, slight headache, tiredness, dizziness. 2. Intermittent ringing in ears. 3. Normal hearing is affected — if background noise is present, incapability of picking up components of a conversation, cannot hear ticking clock, etc. 4. Feeling of hearing insufficiency is manifest. Reduction in hearing capacity is not only quantitative but also qualitative, that is, sounds are perceived in an abnormal manner.	Monitoring noise levels at the work place. Audiometric examination.

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Diseases caused by beryllium

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Alloys (as hardening agent) Nuclear reactors (as moderator)	**Acute effects** — swollen and hyperaemic mucous membranes, bleeding points, fissures and ulceration. Severe chemical pneumonia with pulmonary oedema, may result in death. **Chronic** — due to inhalation, onset characterised by weakness, easy fatigue and weight loss without cough. Following an illness nonproductive coughing, shortness of breath is felt. Joint pains. X-ray changes, may be renal calculi will occur. **Skin injuries** — allergic contact dermatitis on exposed parts of the body. If it enters in an abrasion, granulomata formation takes place. Conjunctivitis with severe periorbital oedema with dermatitis or alone may occur.	1. History of exposure. 2. Consistent clinical findings. 3. Tissue assays of beryllium. Concentration in lung tissue as high as 0.05 micro-gm per 100 gm is a strong indicator. 4. Differentiation from sarcoidosis is difficult; in beryllium disease lymph node and ocular involvement, hypercalcemia are absent.

Diseases caused by carbon monoxide

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Blast furnaces Boilers Garages Industrial gases Metallurgy (as reducing agent) Mines Organic syntheses Production of metal carbonyls Tunnel construction and maintenance	Headache, tachypnoea, nausea, weakness, dizziness, mental confusion, hallucinations; cyanosis, syncope. Acute exposure may lead to death. Residual mental damage may persist even after signs of improvement. Exposure to 50 ppm for 90 minutes may cause aggravation of angina pectoris.	1. History of exposure. 2. Blood cherry pink in colour. 3. Level of carboxyhaemoglobin above 40% — collapse, above 25% — headache, nausea. 4. Depression of the S-T segment of electrocardiogram.

Diseases caused by phosgene

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Industrial syntheses (such as manufacture of dyestuffs, coal tar, urea, isocyanates and their derivatives, carbonic acid esters, acid chlorides) Insecticides production Metallurgy Pharmaceuticals	Eye irritation, dryness or burning sensation of the throat, vomiting, pain in chest, cyanosis. Severe skin or eye burns due to splashes of liquefied phosgene. The symptoms of severe respiratory distress may be delayed upto 72 hours. Delayed onset of pulmonary oedema with cough and foamy sputum, severe cyanosis, may lead to pneumonia. Death possible also due to cardiac failure.	1. Occupational history. 2. Electrocardiogram, sputum gram stain and culture should be included.

Diseases caused by isocyanates

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Manufacture of elastomers of polyurethane Paints Pesticides Polyurethane foam Varnishes	Irritation of skin may range from itching to widespread eczema. Irritation of mucous membranes. Lacrimation of eyes is common but, rarely, even conjuctivitis is noticed. Most serious and common are effects on respiratory system. May begin with asthmatic attacks, may lead to unconsciousness. Rhinitis is also possible.	1. Occupational history. 2. Workers with allergic cutaneous or respiratory antecedents are more affected.

Coal miner's pneumoconiosis

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Coal mines High coal dust concentrations	Minor respiratory impairment in case of simple pneumoconiosis. Severe respiratory disability in case of complicated pneumoconiosis.	1. Occupational history. 2. Lung X-rays with radiological technique of high order and presence of consistent shadows in X-ray plates. Linear (irregular), or rounded (regular) opacities, frequently located in the upper lung zones. Refer to ILO classification of pneumoconiosis (1971; 1980)

Occupational cancer

Occupational cancer does not differ clinically and histopathologically from other cancers. In diagnosis, detailed occupational history is the main diagnostic assessment. As a useful tool the following table (which is not exhaustive) is given.

Industrial occurrence	Reported or suspected agent	Site of the cancer
In industries associated with		
Asbestos production	asbestos	lung, pleura
Boot, shoe manufacture and repairs	leather dust, benzene	nose, bone marrow
Chemicals production		
vinyl chloride	vinyl chloride monomer	liver
isopropyl alcohol	not identified	paranasal sinuses
dyes (also users)	benzidine, 2-naphthylamine, 4-aminodiphenyl	bladder
BCME, CMME	BCME, CMME	lung
auramine	auramine and other aromatic amines	bladder
Chromate production, plating, pigment	chromium	lung
Copper smelting	arsenic	lung
Construction		
insulation, pipe covering	asbestos	lung

(continued)

Occupational cancer (continued)

Industrial occurrence	Reported or suspected agent	Site of the cancer
Furniture	wood dust	nose
Gas production		
coke plants	benzo(a) pyrene	lung
gas works	coal carbonisation products, alpha and beta naphthylamine	lung, bladder, scrotum
Mining		
arsenic	arsenic	lung, skin
asbestos	asbestos	lung
iron	not identified	lung
uranium	radon	lung
Nickel refining	nickel	nasal sinuses, lung
Petroleum	polycyclic hydrocarbons	scrotum
Roofing, asphalt work	benzo(a) pyrene	lung
Rubber, tyres	benzene	lymphatic and haematopoietic system (leukaemia), bladder
Ship building, motor vehicles, transport	asbestos	lung
Steel production	benzo(a) pyrene	lung

Toxic nephritis

Industrial occurrence	Signs and symptoms	Diagnosis, special tests
In industries associated with Aromatic amines Cadmium Carbon disulphide (bisulphide) Cresol Lead Lithium Mercury Naphthalene Phenol	Oliguria and signs similar to arteriosclerotic renal disease. In case of carbon disulphide, pathological changes in cardiovascular system with predilection for cerebral, coronary, and renal circulation. In case of cadmium, proteinuria involving proteins of low molecular weight (20,000-30,000) is observed. Exposure following inhalation of metallic mercury for months or years may lead to glomerular lesions.	1. Occupational history. 2. Urine analysis (table attached for limits in urine). 3. The above should be backed up by more detailed analysis, such as renal clearance. Urine exam (routine) will show high specific gravity and presence of albumin. 4. Blood exam will show high levels of urea, creatinin. On the whole renal functions are depressed showing accumulation of waste metabolites. 5. In case of workers exposed to mercury, cadmium, and aromatic amines, even slight haematuria should be considered.

FACTORIES ACT, 1948

The Schedule

(See sections 89 and 90)

LIST OF NOTIFIABLE DISEASES

1. Lead poisoning, including poisoning by any preparation or compound of lead or their sequelae.
2. Lead tetra-ethyl poisoning.
3. Phosphorus poisoning or its sequelae.
4. Mercury poisoning or its sequelae.
5. Manganese poisoning or its sequelae.
6. Arsenic poisoning or its sequelae.
7. Poisoning by nitrous fumes.
8. Carbon bisulphide poisoning.
9. Benzene poisoning, including poisoning by any of its homologues, their nitro or amido derivatives or its sequelae.
10. Chrome ulceration or its sequelae.
11. Anthrax.
12. Silicosis.
13. Poisoning by halogens or halogen derivates of the hydrocarbons of the aliphatic series.
14. Pathological manifestations due to —
    (a) Radium or other radioactive substances;
    (b) X-rays.
15. Primary epitheliomatous cancer ot the skin.
16. Toxic anaemia.
17. Toxic jaundice due to poisonous substances.
18. Oil acne or dermatitis due to mineral oils and compounds containing mineral oil base.
19. Byssionosis.
20. Asbestosis.
21. Occupational or contract dermatitis caused by direct contract with chemicals and paints. These are of two types, that is, primary irritants and allergic sensitizers.
22. Noise induced hearing loss (exposure to high noise levels).
23. Poisoning by beryllium.
24. Poisoning by carbon monoxide.
25. Poisoning by phosgene.
26. Poisoning by isocyanates
27. Coal miner's pneumoconiosis.
28. Occupational cancer.
29. Toxic nephritis.

Items 23 to 29 added by amendment.

Exposure limits : biological

Toxic substance	Normal values			Biological exposure limits		
	Blood	Urine	Other	Blood	Urine	Other
Arsenic	0.05 mg/l	0.35 mg/l	2 micro-gm/gm hair	—	1 mg/l	—
Fluorine	—	1 mg/l	—	—	5 mg/l	—
Chromium	—	10 micro-gm/24 h	—	10 micro-gm/ 100 ml	25 micro-gm/l	
Lead	—	—	400 micro-gm/l (persons over reproductive age) 300 micro-gm/l (women of reproductive age)	—	—	—
Protoporphyrin IX (PP)			laboratory "normal" upper limit mean + 2SD)			
Mercury (metallic)	—	—	—	—	50 micro-gm/gm creatinine	—

Based on 'Encyclopaedia of Occupational Health and Safety'; ILO (1983), P. 818

About Us

The Society for Participatory Research in Asia (PRIA) is a non-profit voluntary organization registered under the Indian Society's Act.

We work with local groups and activists involved in the education, empowerment and organization building efforts and struggle of the marginalized and underprivileged sections of society. We extend support through research, training, networking with groups on common issues and preparation and dissemination of learning materials. During the last six years of our work we have involved ourselves on various issues on primary health care and adult non-formal education, problems of deforestation, land alienation and large dams, women and work, rural sanitation, management of NGOs and occupational health and safety, and workers' education.

This booklet is prepared in support to our involvement on the issue of occupational health and safety.

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