6. MEDICAL AND LEGAL DIAGNOSTIC PROCESSES OF OCCUPATIONAL DISEASES

What Will We Learn in This Section?

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Frequently Asked Questions

1) How are occupational diseases detected?

2) What is the importance of detecting occupational diseases?

Targeted Achievements and Acquisition Methods

Subject	**Achievement**	**How to achieve or improve the acquisition**
Occupational diseases	Learning the definitions of occupational diseases	
Detection of occupational diseases	Learning how occupational diseases are diagnosed	

Key Terms

- Occupational disease

Entry

The institutions authorized in diagnosing occupational diseases are: Occupational diseases hospitals, medical faculties of state universities, and state training and research hospitals The following is the way to find out if there is an occupational disease in a person who is admitted with a suspicion of occupational disease in these hospitals:

• Identification of an exposure that may cause disease,

Examination of clinical signs known to be associated with special exposure,

• Exclusion of non-professional factors as a possible cause of the disease,

• Reaching a conclusion about the presence or absence of occupational disease,

• Creation of recommendations for preventive measures at work,

* Notification of occupational diseases to the competent authorities.

In this regard, the categories of work-related diseases and diseases affecting employees are outside the category of occupational diseases and workers do not have the right to receive compensation. It is believed that the detection of these diseases can have a significant impact on preventive and control measures.

Laboratory tests used in the process of diagnosing the occupational disease can be grouped into 5 titles:

1. General health assessment: blood count, chest X-ray, ECG, complete urine analysis.

2. Nonspecific tests of exposure: mean corpuscular volume, mean corpuscular hemoglobin concentration, eosinophil, liver enzymes, respiratory function test.

3. Tests of the exposed agent or its metabolites: hippuric acid in the urine when exposed to toluene, lead analysis in the blood for inorganic lead poisoning, etc.

4. Genetic or allergy tests: serum alpha 1 antitrypsin deficiency in chronic obstructive pulmonary diseases, glucose 6 phosphate dehydrogenase deficiency insensitivity to hemolytic chemicals, looking for IgE or IgG, in organic matter hypersensitivities, etc.

5. Chromosomal changes: Some physical and chemical agent exposures can cause chromosomal changes.

If for any reason there is a suspicion that the disease in the employee who is sick at work is an occupational disease, the method to be followed should be as follows:

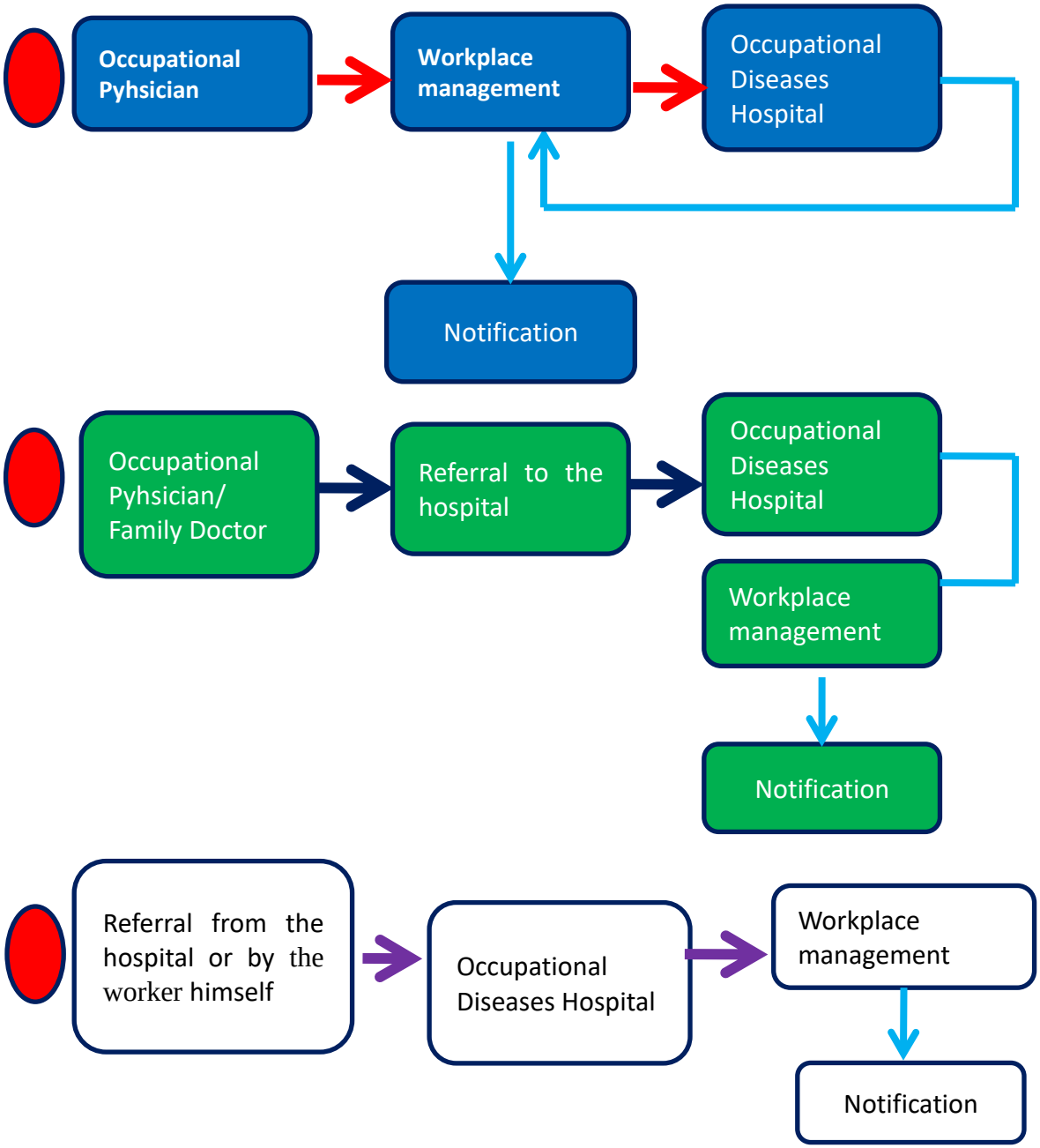
If the occupational physician is the first to see the employee with suspected illness, he directs the employee to the employer for referral to the Occupational Diseases Hospital. The

employer is obliged to make an occupational disease notification about the employee within 72 hours (figure 1.)

If the first person who sees the sick employee and suspects an occupational disease is a family doctor, the patient is referred to an Occupational Disease Hospital. From here, the employer is notified to give notice again within 72 hours.

In another option, the worker himself can apply to the Occupational Diseases Hospital. In the same way, the Hospital notifies the employer to provide notification within 72 hours.

Figure 1.: The Referral Chain for Suspected Occupational Disease



6.1. Occupational Diseases Caused by Dust

Dusts are dry, solid particles of various sizes. Their size can reach up to 300µ. They form as a result of abrasion, fragmentation, grinding, and burning in various organic and inorganic substances. Based on their chemical properties dust are divided into two groups: organic and inorganic Organic dust can be of natural origin like vegetables (e.g. cottonseed, wood dust, flour dust) and animals (such as feathers, hair, etc.) in addition, dust can also be caused by synthetic components (DDT, trinitro, toluene, etc.) Inorganic dust can be classified as; metallic dust (iron, copper, zinc powder, etc.), non-metallic dust (sulfur, coal powder), the dust of chemical compounds (zinc oxide, manganese oxide, etc.), and dust of natural compounds (minerals, clays, mineral ores, etc.)

Dusts are formed in areas such as mining enterprises, quarries cement and lime industry porcelain and ceramic industry, glass industry during works such as digging, blasting, crushing, abrasion, shredding, grinding and drilling.

Dusts are taken into the body by the respiratory tract. Inhaled dust particles enter the respiratory tract in different ways according to their aerodynamic diameter. Particles in the bronchi return to the oral mucosa with swallowing or coughing, while non-soluble particles can remain in the same area for months or years when they pass into the alveoli. The main task in eliminating particles retained in the alveoli is performed by macrophages. Macrophages receiving the particle release a mediator that attracts inflammatory cells. If the state of exposure spreads over the years, the bronchoalveolar elimination capacity may be insufficient to cope, leading to the development of chronic inflammation in the peripheral and central respiratory tract systems. Severe inflammation of the respiratory tract is called bronchitis The development of chronic bronchitis as a reaction to dust sometimes takes years to form, sometimes decades. In this case, the clinical symptoms are cough and sputum production, but respiratory distress may be added to the picture in the later stages. As with smoking cough, symptoms such as coughing and sputum production are not perceived as a sign of illness even by the people who are sick. The first symptom that is usually associated with poor performance in the patient is the diagnosis of respiratory distress or obstructive ventilation disorder, which is observed only during a physical activity at the initial stage. Chronic bronchitis is a very common type of disease. Among the accompanying factors are not only exposure to dust in workplaces, but also the smoking habit of the society, frequently recurring viral infections of the respiratory tract, general air pollution and certain predisposing factors.

The general name of diseases that are caused by dust is pneumoconiosis. Pneumoconiosis is named according to the dust that causes it. Depending on the occupational groups, diseases such as silicosis, asbestosis, berylliosis, and byssinosis occur most often.

In order for pneumoconiosis to be considered an occupational disease, the insured person must have worked for a total of at least three years in underground and above-ground

jobs where there is dust in the air of density and feature to cause pneumoconiosis. The 3-year period can be reduced, provided that the approval of the Higher Medical Council approves.

Silicosis: it is a lung fibrosis that occurs with silica oxide It is a common and a dangerous dust disease. There is a danger of silicosis in all mineral ores obtained from quartz stones. Silicosis can develop in workers working in the mining of gold, copper, lead, zinc, iron, anthracite coal, and base coal. Those who work in the foundry, tunneling, quarrying, sandstone grinding, concrete crushing, granite carving, and porcelain or ceramic pottery sectors are at risk of silicosis. Silicosis is a disabling and irreversible lung disease, sometimes fatal, caused by the lungs' overexposure to respirable crystalline silica. The effects of crystalline silica dust (including cristobalite and tridymite) are determined by the level of free silica in the dust entering the respiratory tract, the dose, and form of exposure, as well as the condition of the person. In the alveolar region of the lung, SiO2 particles come into contact with alveolar macrophages. The particles are phagocytized, and then the phagocytized SiO2 causes the destruction of macrophages. The particles released from the macrophages are phagocytized again and the cycle of cell damage is repeated. Silica is the second most common mineral of the earth's crust and is the main element of sand, rock and other mineral and mineral ores. Excessive exposure to dust containing microscopic particles of crystallized silicane can cause scar tissue in the lungs that reduces the ability to receive oxygen from the air through breathing. Typical sand, which is found on the sea sides, does not pose a threat of silicosis hazard.

The symptoms in patients with silicosis are; shortness of breath, cough, and expectoration. In rare cases, severe advanced silicosis may cause shortness of breath and chronic cor pulmonale due to restrictive pulmonary function abnormality. The diagnosis of quartz dust lung is made on the basis of radiography in the presence of related work history.

Although there is no cure for the disease, it is a disease that can be fully prevented if the necessary preventive measures are taken. In addition to silicosis, the inhalation of crystalline silica particles can lead to diseases such as bronchitis and tuberculosis. According to some studies, the inhalation of crystalline silica particles is associated with lung cancer.

Asbestosis: it is bronchopulmonary fibrosis that occurs due to the inhalation of asbestos fibers. Exposure to asbestos is seen in industries such as textile industry, (fibers, fabrics, ropes) asbestos cement industry (sheet metal, pipe), building materials industry (processing of asbestos cement products), chemical industry (paint, filler, synthetic resins compression molding materials, rubber products), insulation industry (thermal insulation, sound insulation, and fire insulation) paper industry (asbestos paper, paperboard) production of brake pads and clutches, construction of wagons and ships.

The production and use of asbestos in Turkey is only possible during demolition, repair, and maintenance, with the entry into force of the "Regulation on the Amendments to the Regulation on the Restrictions on the Production, Supply, and Use of Certain Hazardous Substances, Preparations and Goods", on 31.12.2010.

Asbestos fiber is considered dangerous if it has a diameter of < 3 μm, a length of > 5 μm, and the length-to-diameter ratio is >5:1. The dust is taken into the body by air (respiratory) routes. The effects of the powder depend on the asbestos content (chrysotile, crozidolite, amosite, anthophyllite, actinolite, tremolite), the dose and continuity of the powder entering the respiratory tract, and personal sensitivity. fibers up to 400 μm long tend to enter directly through the airway.

There are no acute and subacute effects of asbestos inhalation. Symptoms of asbestosis usually depend on the prevalence of anatomical changes Complications can make the symptoms more severe The first symptoms of asbestos inhalation are those associated with restrictive pulmonary function abnormality The symptoms in patients with silicosis are; shortness of breath, cough, and expectoration. Whether the employee has asbestosis is determined by the severity of chronic bronchitis and the extent of pulmonary fibrosis. The same applies to listening signs such as crepitations. The diagnosis of asbestosis is made on the basis of radiography in the presence of related work history. In addition, in the advanced stages of the disease, a shrinkage in the most vital fibrotic lung areas can be seen.

Asbestos-related lung fibrosis usually progress slowly. In most cases of asbestosis, workers have been exposed to asbestos fiber-containing dust for many years. However, even with less than a year of exposure, it is possible to develop asbestosis. The latent period for cases of bronchial carcinoma and mesothelioma, which are usually caused by asbestos fiber-containing dust, is more than 10 years. Mesotheliomas can also develop after low doses and short exposures.

Berylliosis: it is a common broncho-pneumoconiosis that occurs due to the inhalation of beryllium powders.

Byssinosis: it is the fibrosis that is characterized by asthma attacks that manifest themselves at certain times, which occur by inhaling cotton fibers, leaf, linen, and hemp dust.

Siderosis:it is the pneumoconiosis that is caused by exposure to iron dust Anthracosis: is the pneumoconiosis that is caused by exposure to coal dust.

6.2. Occupational Diseases Caused by Heavy Metal Exposure

Around 0.01-3% of the particles found in nature are formed by heavy metals, that have very toxic effects on health. Their importance from the point of view of health stems from the fact that they have the property of accumulating in human tissues and their possible synergistic effect. In addition to the airborne particles taken into the body through respiration, a significant amount of metallic particulate matter is also taken into the body through the food we eat and the water we drink. Metals, which make up a part of atmospheric pollution, spread to the environment as a result of fossil fuel usage, industrial processes, and the burning of metal-containing products in incinerators.

Lead, cadmium, nickel, and mercury, which are commonly found in the atmosphere, are important among the metals that have a negative impact on human health on a large scale. While

some of the other metals are of fundamental importance in human life, the concentration of the other part is not a level to threaten human health. Any metal that is above certain limits have a toxic effect on human health.

Lead: it is a soft metal of a bluish or silvery-gray color. As organic components of lead, such as tetraethyl or tetramethyl are used as fuel additives they are important pollutant parameters. Both tetraethyl lead and tetramethyl lead are colorless liquids with boiling points of 110°C and 200°C, respectively. Due to the fact that their volatility is greater than other oil components, they also increase the volatility of the fuel to which they are added. As lead interacts with different enzyme systems, many organs or systems form focal points for lead accumulation. Negative health effects are observed if the concentration of lead in the blood exceeds the limit of 0.2 µg/ml. When lead concentration in the blood exceeds the limit of 0.2 µg/ml, blood synthesis inhibition is observed. When it exceeds the limit of 0.3-0.8 µg/ml, a decrease in communication between motor and sensory neurons is observed. In addition it has been observed that when the lead concentration in the blood exceeds the limit of 1.2 µg/ml, irreversible brain damage occurs. There is a linear relationship between the concentration of lead in the air and the concentration of lead in the blood. It was found that the concentration of lead in the air of 1 µg / m3 forms a concentration of 0.01-0.02 µg/ml in the blood. The concentration of lead in humans was determined to be 0.04-0.06 µg/ml, and in those living in urban areas it was determined to be 0.1 µg/ml. The World Health Organization, in order not to exceed the 0.1 µg/ml blood lead concentration limit, where adverse effects on health are not observed; recommends targeting the lead concentration in urban air as 0.5-1 µg/m3.

Exposure to lead can be experienced in jobs and processes like; the use of lead-containing paint polish, glass, and ceramics in paste or solidified thermoplastics, the use of lead-containing pigmented pastes and prints, or the use of lead-containing paints used as thermoplastics, brazing with lead-containing solder, smelting of lead ores and concentrated lead blocks, melting lead-containing waste and secondary raw material for recycling, loading, and unloading of lead-containing particles (blue powder), ash or other dusty material into the conveyor, lead refining, the use of lead as coating, preparation and loading of lead crystal blends, spraying lead-containing paints or other lead-containing products, the use of powdered lead compounds in the manufacture of paints, batteries and plastic objects, welding or oxygen welding of lead-containing metal parts or coatings, roofing with lead-containing materials, painting glass, tinning, dismantling of obsolete lead-containing devices, production and processing of lead-containing free-wrought steel, the use of lead-containing explosives and cleaning of areas where these materials are used.

Mainly, lead is taken into the body through the respiratory and gastrointestinal tract in the form of dust or smoke. Lead has effects, especially on hemoglobin synthesis and erythropoiesis, smooth muscle system, peripheral and central nervous system, and vascular system. Acute effects of lead are rarely observed Symptoms such as mild anemia, basophilic stippling in erythrocytes, pale skin and mucous membranes, general fatigue, anorexia, headache, weakness, pain in the limbs and sometimes the joints, and gastrointestinal disorders such as constipation are observed due to chronic lead exposure.

Cadmium (Cd): is a silver-white colored metal. It quickly turns into cadmium oxide in air. Its organic salts such as cadmium sulfate, cadmium nitrate, and cadmium chloride are water-soluble. In the case of the concentration of cadmium fumes in the air exceeding the limit of 1mg/m3, it is possible to observe acute effects on respiration. Due to the low excretion rate of cadmium from the body and its accumulation, its negative effects on health are observed over time. The organs that will be affected the most by prolonged exposure are the kidneys. Studies showed that; if the cadmium concentration (based on weight) in the kidneys reaches 200 mg/ kg, deteriorations in kidney functions are observed. The damage to the kidney is not reversible. The effect of cadmium in the formation of lung and prostate cancers has been determined precisely. For the protection of human health, the World Health Organization recommends that the concentration of cadmium in the air should not exceed 1-5 ng/m3 in rural areas and, 10-20 ng/m3 in urban and industrial areas without agricultural activities.

Exposure to cadmium is experienced in jobs and processes like; processing cadmium or cadmium alloys, cutting and welding cadmium-coated objects, production of nickel-cadmium accumulators, use of soluble cadmium compounds, cadmium pigments, and cadmium-containing stabilizers, incineration of cadmium-containing garbage and scrap, removal of cadmium-containing coatings and cutting of cadmium-containing metal parts by welding, cadmium electrolytic production, demolition work in the production of cadmium and cadmium compounds, the use of cadmium-containing pigments to color plastics and paints, production and processing of cadmium-containing enamel, ceramic paint, and lacquer, the use of soluble cadmium compounds in film, glass, rubber and jewelry sectors and the mechanical processing of cadmium-containing material.

Mainly, cadmium is taken into the body from the respiratory and gastrointestinal tract in the form of dust and smoke. Some of its inorganic compounds can also be taken into the body through the skin. A large amount of cadmium taken into the body spreads to the tissues through the liver. Most of the cadmium taken by the body is excreted through feces. However, its excretion through the urine and feces is very slow. The irritation of the mucous membranes of the nose, throat, larynx, and bronchi, which has acute effects, develops hours after inhalation of cadmium vapors or fumes and it may cause cough, dyspnea, difficulty swallowing, chest pains, and even pulmonary edema and kidney damage in some cases. Chronic intoxication manifests itself with renal tubular damage, especially with lung inflammation and proteinuria, both conditions depend on the intensity of exposure and personal sensitivity. In addition, anemia, liver damage, and bone mineralization disorders may develop.

Nickel :is a silvery-white, hard metal. Nickel compounds are practically insoluble in water. Its water-soluble salts are chloride, sulfate and nitrate. In biological systems, nickel forms complexes with adenosine triphosphate, amino acids, peptides, proteins, and deoxyribonucleic acids. As a result of inhalation of nickel compounds in the air, abnormal functions such as; respiratory tract irritation, respiratory tract destruction, immunological change, an increase in the number of alveolar macrophage cells, a decrease in cilia activity, and immune system power occur in relation to the respiratory defense system. As a result of skin absorption, allergic skin diseases occur. Although there is no reliable evidence about the effects

of long-term exposure to nickel in the air on human health; nickel has been proven to cause nasal and laryngeal cancers, as well as adverse health effects such as asthma in those working in the nickel business. Due to its carcinogenic effect, it is not possible to specify the safety limit.

Exposure to nickel can be experienced in jobs and sectors like; preparation and processing of nickel ores to obtain nickel and nickel compounds, production and processing of nickel and nickel compounds in powder form, production of nickel-containing accumulators, magnets, and spirals, demolition works where nickel and nickel compounds are produced, in electroplating, at temperatures higher than 65°C, in alloy production, in steelmaking and foundries where nickel is added to molten iron, and during the preparation of nickel-containing special steels.

Nickel and nickel compounds are mainly taken in the form of dust, smoke, or aerosols through the air, through the skin, and through the gastrointestinal tract. After the inhalation, local carcinogenic effects on the airways and nasal mucosa may occur. In the acute and subacute stages, the toxic concentrations of nickel carbonyl cause damage, especially to the airways and lungs, and sometimes pulmonary edema. In the chronic stage, inhalation of inorganic nickel compounds, especially compounds such as trinickel disulfide and nickel oxide, although rarely, causes cancer cases in the nasal cavities, sinuses, and lungs.

An important area of exposure that leads to occupational disease in the industry is caused by chemicals. In addition, conditions such as working in hot or cold and working with screened tools can also make workers sick.

6.3. Occupational Diseases Caused by Exposure to Solvents

Solvents are used in almost every sector of industry. Paint, varnish, lacquer manufacturing, application, removal, metal polishing, ink, toner printing jobs used, priming, coating jobs, and dry cleaning are jobs that use heavy solvents. Solvents have wider use in industry; solvents are used in metal goods production before painting, in degreasing before welding, in the washing machines in parts machine maintenance, in almost every stage in the production of plastic goods, in almost all works where adhesives are used, in the manufacture of insecticides, in the manufacture of chemicals and even in the production of cosmetics. The material safety forms of the solvents should be obtained and the chemicals they contain and their health effects should be examined.

Solvents enter the human body in three ways:

1. Through inhalation: Most solvents can evaporate rapidly at room temperature. Solvent vapor, particles, and solvent-contaminated powders easily get into the blood flow through the lungs. This is the most important way of being affected

2. By swallowing: Ingestion of food eaten with solvent-contaminated hands or direct consumption of solvent-contaminated food causes exposure through digestion.

3. Through the skin: they reduce the protective effect of the skin with their fat-dissolving characteristics They are easily absorbed through the skin and pass into the blood.

Many of the solvents are flammable, volatile, easily evaporated, and can give toxic or explosive gas mixtures to the environment. Some solvents have sedative effects. With these characteristics, they can contribute directly or indirectly to the occurrence of occupational accidents. Solvents containing halogens, form toxic gases such as dioxin and furan as a result of their combustion.

The effects of solvents vary depending on the duration and the dose of exposure. The effects seen in workeres with short-term exposures are mostly temporary. Short-term exposure to solvents can lead to skin problems such as drying, cracking, redness, and the formation of fluid-filled blisters in the area of the skin that has contacted with the solvent. Other symptoms of short-term solvent exposure are headache, drowsiness, distraction, nausea, and a feeling of discomfort.

The effects start quickly and end relatively quickly. The termination of effects sometimes takes place only minutes after exposure is over. However, it should be remembered that intense exposure can also lead to fainting and even death. A feeling of itching in the respiratory tract occurs as a result of short-term exposure. As well as coughing, it leads to a burning sensation in the nose, larynx, and lungs. An intense impaction can lead to pulmonary edema.

In prolonged exposure, there is relatively low intensity and repeated exposure. Health disorders progress slowly, but when they occur, their treatment is either difficult or impossible. Diseases caused by solvent exposure are diseases that impair the quality of human life. These diseases can deteriorate the health of the workers severely and sometimes shorten the life span of the workers.

Repeated prolonged exposure to solvents leads to health disorders in the brain and nervous system, skin, liver, blood production system, kidneys, male and female reproductive systems, and the fetus in pregnant women. Recurrent irritation of the respiratory tract causes inflammation of the bronchi, leading to chronic cough and sputum complaints. Repeated exposure to the skin leads to chronic skin inflammation. In that situation, the skin is dry, hard, thick, cracked, and flaky in appearance.

Many solvents affect the central nervous system, especially the brain. As the exposure increases, the severity of the symptoms also increases. Feeling of being lifted off the ground, sensitivity, irritability, weakness, fatigue, dizziness, drowsiness, disorientation, convulsions and fainting can develop as a result of solvent exposure Long-term effects can cause difficulty in concentrating on thoughts and personality changes.

Some solvents, such as n-hexane, carbon disulfide, and methyl n-butyl ketone, affect the "nerve endings", which are the nerves of the sense organs and muscles. This effect is firstly

seen in the fingers and then leads to fatigue, loss of sensation, pain, and loss of movement in the legs and arms.

Some solvents, especially chlorines, can cause liver damage. Symptoms are not observed in most cases. Several solvents, including ethylene glycol, adversely affect blood cell count and function by damaging circulating blood cells or disrupting blood cell production. With an advanced decrease in the number of blood cells, fatigue is observed and resistance to infections decreases. Exposure to high doses of benzene leads to a decrease in the number of blood cells and leukemia.

Benzene can lead to cancer in affected workers. Vinyl chloride causes liver cancer in humans. In animal experiments, some solvents such as carbon tetrachloride, chloroform, 1,4-dioxane, trichlorethylene have been proven to cause cancer in the pancreas, lung, kidney, bladder.

Exposure to solvents during pregnancy can lead to low birth weight and death in the womb. It has been proven that tetrachlorethylene, toluene and aliphatic hydrocarbons can cause miscarriages. The risk of spontaneous abortion, low-weight baby birth, and congenital anomaly was found to be high in the pregnancy of the spouses of painters and woodworkers exposed to mixed solvents such as toluene, xylene, and paint thinners.

6.4. Occupational Diseases Caused by Exposure to Hazardous Gases

Gases can be released at every production stage in the industry and can adversely affect the health of workers.

Of the lethal chemical agents; sulfur lewisite and mustard burn and scorch the skin and eyes, as well as shocking the lungs. Phosgene and chlorine irritate the eyes.

Gases such as hydrogen cyanide and sarin prevent nerve conduction, causing tremors, and death by paralysis of the respiratory organs.

Due to their physical properties, mustards are resistant to cold and heat changes. If the latent period of 2-24 hours between exposure to caustic agents and the observation of symptoms is exceeded, it may be too late for treatment. If the dose taken is too high, the exposed person usually dies within 48 hours from pulmonary edema, mechanical asphyxia due to plugs formed by bronchial secretions, or opportunistic infections facilitated by a disturbed immune response.

Protection against caustic agents can be achieved with full protective wear. Mustard gas does not cause any sensitivity or symptoms on the skin until several hours after the exposure. The deactivation time is up to 12 hours.

Air is a mixture of gases that make up the atmosphere. Pure air consists of a mixture of primarily nitrogen and oxygen, as well as argon, carbon dioxide, water vapor, neon, helium, methane, krypton, hydrogen, nitrogen monoxide, xenon, ozone, ammonia, and nitrogen dioxide. The ratio of nitrogen in the distribution of these gases in the atmosphere is 78%.

Oxygen, which makes up 21% of air by volume and 23% by weight, is a highly reactive gas. Other gases, on the other hand, make up 1% of the volume of the atmosphere. Of these gases that make up the atmosphere, the most unstable are water vapor and carbon dioxide. The amount of water vapor in the atmosphere increases with the evaporation from the seas, lakes, rivers, and plants, and also decreases with the formation of fog, dew, and rain from the clouds. This variability of water vapor balances each other with these events in such a way that the amount of water vapor in the atmosphere does not change. Normally, carbon dioxide is a coalescence that makes up a very small portion of the atmosphere. The amount of carbon dioxide in the atmosphere is kept in balance by the inhalation of humans and animals and the photosynthesis of plants. The nitrogen in the atmosphere forms as a result of natural atmospheric phenomena such as forest fires, lightning, and burning.

Naturally, the pure atmosphere is polluted by the production of fewer impurities most of which are artificial. Oil products and industrial pollutants are the main ones. Especially in recent years, with the increase in industrial activity, urbanization and population, the use and the number of pollutants has been increasing rapidly. The pollutants which pollute the atmosphere by dispersing into it are in the form of solids, liquids, and gases. Pollutants from various sources pass into the air in the form of dust, soot, fog, steam, ash, smoke, etc.

These pollutants in the atmosphere are found in two ways: pollutants that are directly given to the atmosphere from polluting sources and pollutants that form as a result of chemical events between pollutants and atmospheric properties. Pollutants emitted into the atmosphere from sources of pollutants are sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and suspended solid particles.

And;

Sulfur Compounds: Sulfur gas is released during the combustion of sulfur-containing substances such as oil and coal, as well as during the processing of certain sulfur-containing substances. Inhalation of these sulfur compounds can lead to diseases such as bronchitis and asthma.

Oxides of Nitrogen: Nitrogen oxides are emitted mainly from power plants and exhaust pipes of motor vehicles. Inhalation of nitrogen dioxide, which is nitrous oxide, leads to heart, lung, and liver disorders and respiratory diseases.

Carbon Oxides: as a consequence of the use of fossil fuels and forest fires, a large proportion of carbon dioxide gas is emitted into the atmosphere. In addition, carbon monoxide gas, which is formed by the reaction of methane with oxygen, is also a pollutant. Carbon oxides cause dizziness and slowing of reflexes. Their presence in the air at high rates can lead to death.

Hydrocarbons: The incomplete combustion of petroleum used in motor vehicles causes the release of hydrocarbons such as ethylene and benzene into the environment. These hydrocarbons have harmful effects on the eyes and respiratory tract when they react with other chemicals in the air.

In today's modern life, it has become almost impossible to escape from the noise. Noisy workplaces are found in many branches of industry, particularly in mining, iron and metal industry, the production of stone and other raw materials, woodworking, textile, and leather construction, in the printing and, paper industry.

6.5. Noise

Any type of sound that is not desirable is called noise. Noise affects the mental health and the nervous system, as well as the sense of hearing. The unit of the loudness of sound is decibel. It is denoted by the letters dB. The threshold for hearing is zero (0) decibels. Sounds below zero decibels are not heard. sounds above 75 decibels are dangerous. In those who are exposed to loud noises experience a decrease in their concentration, attention, and reaction capacity. Sleeping disorders, headaches, and circulatory system disorders are commonly seen symptoms in workers who are exposed to loud noises. These symptoms vary depending on various factors of noise. For example, high-frequency sounds are more effective than low-frequency sounds. The effects of working in noisy work environments on hearing function depend on factors such as the duration of exposure to noise, the intensity of the noise, its frequency, the age of the worker, individual sensitivities, the functional condition of the inner ear, and previous or ongoing diseases. Firstly, temporary deafness in workers exposed to loud noise occurs. If the exposure continues, hearing loss progresses and may turn into complete deafness. Deafness initially occurs against high-frequency tones around 4000 Hertz (Hz), to which the ear is sensitive, and then is seen at other frequencies.

The threshold value at which noise is harmful to human health is considered to be 85 dB. Hearing damage may occur as a result of exposure to noise levels of 85 dB(A) or above daily. While hearing loss at daily noise levels of 85 to 89 dB(A) may occur only after prolonged exposure, at levels of 90 dB(A) and above, the risk of damage is significantly higher. Noise exposure levels of less than 85 dB(A) per day are unlikely to cause noise-related hearing damage.

6.6. Occupational Diseases Due to Working in Cold Conditions

A person can be assumed to have been exposed to cold stress when working in technologically cooled spaces below -25°C unless the exposure to low temperatures is short. Cold stress is expected to occur during working in cold rooms, freezing rooms, freeze-drying places, and low-temperature research cabinets, including repair work. Employees are especially at risk in workplaces where wind or air currents increase the cooling effect on the body.

Circulatory disorders may occur in the skin and mucous membranes that are caused by local cooling Cold burns, discharge, or inflammatory reactions of the mucosa are observed on the skin exposed to cold. The general effect of cold is directly on the cardiovascular system, respiratory system, and metabolism. Working in cold working environments can lead to the danger of angina pectoris, bronchospasm, tremors, tremors or stiffness of the muscles, decrease in body temperature, fatigue, slowing and weakening of respiratory and cardiac activity, shock. Workers may even experience cardiac arrhythmia or ventricular fibrillation, adverse effects on

blood and tissue electrolyte balance, loss of consciousness, and working in cold working environments can sometimes result in death.

6.7. Occupational Diseases Caused by Working in Cold Conditions

Workplaces in which workers work under hot working conditions, foundries, rolling mills, blast furnaces, boiler rooms, cement and lime factories, bread factories and ovens, thermal power plants, natural gas conversion plants, heat treatment units, and similar workplaces with sections where hot working conditions occur. The same effects of working in hot workplaces are seen in workers working outdoors under the sun.

Human thermal comfort is mainly determined by heat generation and loss. Heat loss occurs through convection, conduction, radiation, and the evaporation of sweat. Heat loss may increase as a result of an increase in peripheral blood flow and by an increase in sweat evaporation. The adverse effects on comfort and health are usually caused by the the imbalance between heat loss and generation. This imbalance is usually caused by the overloading of heat loss mechanisms due to heat stress from the combination of physical strength in the workplace with heat generation and the high temperature of the workplace air. Thermal imbalance causes an increase in body temperature that reaches or exceeds the limits of human tolerance. If these limits are exceeded, adverse health effects can be observed. Depending on the body temperature that is reached and the speed of temperature rise, heat stress can cause various diseases. Occupational medical protection is necessary even for workers who work in hot working conditions in short-term or who work in rarely hot conditions. If workers are not acclimatized, all work done in hot conditions involves short-term heat stress. Acute illness can reduce heat tolerance. For that reason, the health of the worker should be taken into account during the medical examination of acute cases, even if the attending physician does not find anything serious. Heat shock, heat cramps, and heatstroke may occur in workers who experience high heat exposure.

6.8. Occupational Diseases Seen in People Working with Screened Tools

The jobs that the employees do by using the visual display unit as an important part of their normal work are workplaces where they work with screened tools. Depending on the intensity and duration of working with the screened tool, -which has restrictive sight distance, or is ergonomically ill-designed - people working with screened tools can develop symptoms such as headaches, burning, and watering of the eyes, and blurred vision and they may develop muscle and joint ailments resulting from poor working positions.

Summary of What We Learned in This Section

In this section, we focused on the importance of detecting occupational diseases and occupational diseases. We have examined the number of occupational diseases in Turkey on the tables.

End-of-chapter-questions

1) If the occupational physician is the first to see the employee with suspected illness, he directs the employee to the employer for referral to the Occupational Diseases Hospital. The employer is obliged to make an occupational disease notification about the employee within ..... hours

2) Laboratory tests used in the process of diagnosing the occupational disease can be grouped into ..... titles Give examples

3) What is the general name of diseases that are caused by dust? Give an example of dust diseases that can develop depending on professional groups

4) In order for pneumoconiosis to be considered an occupational disease, the insured person must have worked for a total of at least ..... years in underground and above-ground jobs where there is dust in the air of density and feature to cause pneumoconiosis.

5) Give examples of 3 industries that can cause asbestos exposure

6) What is the name of the fibrosis that is characterized by asthma attacks that manifest themselves at certain times, which occur by inhaling cotton fibers, leaf, linen, and hemp dust.

7) Give 3 examples of symptoms that can occur as a result of chronic lead exposure.

8) The threshold value at which noise is harmful to human health is considered to be ..... dB.

9) What is the name of pneumoconiosis caused by iron dust exposure?

10) The organs that will be affected the most by prolonged exposure .....

Answers

1) 72 hours

2) Laboratory tests used in the process of diagnosing the occupational disease can be grouped into 5 titles:

- 1. General health assessment: blood count, chest X-ray, ECG, complete urine analysis.
- 2. Nonspecific tests of exposure: mean corpuscular volume, mean corpuscular hemoglobin concentration, eosinophil, liver enzymes, respiratory function test.
- 3. Tests of the exposed agent or its metabolites: hippuric acid in the urine when exposed to toluene, lead analysis in the blood for inorganic lead poisoning, etc.
- 4. Genetic or allergy tests: serum alpha 1 antitrypsin deficiency in chronic obstructive pulmonary diseases, glucose 6 phosphate dehydrogenase deficiency insensitivity to hemolytic chemicals, looking for IgE or IgG, in organic matter hypersensitivities, etc.
- 5. Chromosomal changes: Some physical and chemical agent exposures can cause chromosomal changes.

3) The general name of the diseases that are caused by powders is "Pneumoconiosis". Pneumoconiosis is named according to the dust that causes it. Depending on the occupational groups, diseases such as silicosis, asbestosis, berylliosis, and byssinosis occur most often.

4) 3 years

5) Exposure to asbestos is seen in industries such as textile industry, (fibers, fabrics, ropes) asbestos cement industry (sheet metal, pipe), building materials industry (processing of asbestos cement products), chemical industry (paint, filler, synthetic resins compression molding materials, rubber products), insulation industry (thermal insulation, sound insulation, and fire insulation) paper industry (asbestos paper, paperboard) production of brake pads and clutches, construction of wagons and ships.

6) Bissinose

7) Symptoms such as mild anemia, basophilic stippling in erythrocytes, pale skin and mucous membranes, general fatigue, anorexia, headache, weakness, pain in the limbs and sometimes the joints, and gastrointestinal disorders such as constipation are observed due to chronic lead exposure.

8) 85

9) Siderosis

10) the kidneys