

1.4.1 Eosinophilic pneumonias

It is a group of diseases, which have a common characteristic sign-eosinophilic lung infiltration and eosinophilia in the peripheral blood.

- Allergic bronchopulmonary aspergillosis. The most common causative agent is *Aspergillus fumigatus*. The radiographic examination can reveal infiltrations and bronchiectasis.
- Tropical eosinophilia. It is usually caused by filarial infection. A similar type of damage can be seen also in other parasitic diseases as ascariasis, toxocariasis and others.
- Drug induced pneumonias – arise often after nitrofurantoin treatment. Diffuse lung infiltrations can be observed. A similar picture can arise after sulphonamides, penicillins, chlorpromazine, hydralazine and other drug therapy.
- The Loeffler's syndrome is an acute benign pneumonia characterized by migrating lung infiltrates with minimal clinical manifestations.
- Chronic eosinophilic pneumonia with lung infiltration is presented by symptoms as fever, chills, nocturnal sweating, cough, anorexia, weight loss. Sometimes it occurs in patients with bronchial asthma.
- Allergic angiitis and granulomatosis. It is a multisystemic vasculitis, present in the skin, kidneys and nervous system. The lungs are also involved.
- The hypereosinophilic syndrome. Marked eosinophilia in the peripheral blood without any parasitic or allergic disorder is present. Eosinophilic infiltrates occur in the heart, lungs, liver, spleen, skin and nervous system.

1.5 Pulmonary disorders caused by harmful substances in the inhaled air

It is a very important problem for the people exposed to a long lasting effect of unfavourable factors which get into the atmosphere by various human activities.

1. Inorganic dust

Asbestosis Asbestos is a material, consisting of several mineral substances. In people working with asbestos, pneumoconiosis occurs (lung fibrosis), and also higher occurrence of malignant diseases of respiratory system and pleura is observed (less frequently also malignant tumours of peritoneum).

Asbestosis is a diffuse interstitial fibrosis of the lungs, which develops due to the exposure to asbestous dust. Usually it appears after a ten-year lasting exposure.

The inhaled particles of asbestous dust reach the alveoli due to their small size, where they are phagocytized by macrophages. The phagocytosis of asbestic particles damages the membrane of macrophages. This damage results in the release of lysosomal enzymes injuring the lung parenchyma. The clinical manifestations correspond with the general characteristics of other types of lung fibrosis. Fibrotic changes cause obliteration of acinary units. A typical honeycomb-picture of the lungs is formed.

The exposure lasting for 15–20 years leads very often to pulmonary cancer. Simultaneous smoking increases the risk of cancer.

Long-term exposure to asbestous dust is usually associated with the occurrence of pleural or peritoneal mesotheliomas. About 80 per cent of pleural mesotheliomas are usually associated with asbestosis.

Silicosis This condition develops by effect of particles of SiO_2 which are produced in the processing of flint and during several abrasive industrial technologies. In badly ventilated factories (working in tunnels) silicosis can develop already after 10 months of

exposure. It can be lethal in less than 2 years. Silicosis usually develops in the course of 15–20 years. By histological examination an interstitial fibrosis of lungs is observed, caused by the particles of SiO_2 . In some cases it can develop as a nodular fibrosis with a perinodular emphysema. The character of the affliction is determined by different perceptiveness of the individual parts of the lungs to causative agents. The progression of silicosis can result in respiratory failure.

Anthracosis This condition arises in one half of all coal miners after 20 years of exposure. The combination of the coal dust and smoking is very unfavourable. The development of fibrosis is the consequence of the crystalline SiO_2 presence in inhaled aerosol. It is called anthracosilicosis. It reduces significantly the diffusing capacity of the lungs and leads to premature mortality. It is not quite clear why in some cases the fibrosis is accelerated enormously (the progressive fibrosis of the lungs). A great amount of dust can also act as an unfavourable factor. In this case the clearing mechanism of the mucociliary system fails.

It is interesting that the production of collagen is minimal in a pure coal pneumoconiosis. In miners in coal-mines the Caplan's syndrome has been described. It is a seropositive rheumatoid arthritis accompanied with progressive lung fibrosis. Usually antinuclear antibodies and an increased level of gammaglobulins are present.

Berylliosis Beryllium can induce an acute pneumonitis or chronic interstitial pneumonitis. In bioprotic material granulomatous formations resembling those in sarcoidosis can be observed.

Generally, the interstitial fibrotic alterations in lungs can be caused by different kinds of inorganic dust. Some dusts act by their irritant effect on the mucous membrane. As a result a chronic hypersecretion of the mucous membrane and chronic bronchitis develop.

2. Organic dust

The organic dust usually causes hypersensitive pneumonitis and is involved also in the pathogenesis of asthma bronchiale.

Byssinosis The condition develops due to the effect of organic dust present in air during production of yarn of cotton, flax, hemp and jute. The clinical manifestations are dominated by a change in the lung function indicating an obstruction of airways. It is probably caused by the release of histamine.

The farmer's lung In most cases it is an acute state, which develops after 4–8 hours of exposure. The clinical manifestations are dominated by fever, cough and dyspnoea without wheezing. The farmer's lung is a form of exogenous allergic alveolitis (hypersensitive pneumonitis), occurring in agricultural workers. During their work they are in contact with thermophil actinomycetes (in mouldy hay or straw).

Organic dusts occur also in consequence of industrial production, particularly the production of plastic materials. During the plastic material production, especially polyurethans, chronic cough can develop in workers after prolonged exposure. The secretion of mucus increases and asthma bronchiale resembling conditions occur.

3. Carcinogenic substances in the air

Information on carcinogenic substances in the air are gained on the basis of epidemiological observations of people working in specific environments. Several observations were confirmed in experiments with animals. During processing of organic materials one of the intermediary products bis(chlormethyl)ether occurs. The experiments on animals have proven its carcinogenic qualities. However, more often the compounds of chrome, nickel, uranium, oxides of iron, and several organic substances are involved.

4. Air pollution

Air pollution represents a very important problem, namely the active and passive smoking and the noxious gases and substances dispersed in the air. For some of them the lungs serve just as the site of entrance into the organism. The lungs need not be evidently damaged. E.g. benzene enters the organism through the lungs. Its target organ is, however, the bone marrow. There are many similar examples. That is why the fact, that some inhaled substances do not damage the lungs is of no significant value in reference to their malignant influence on the organism.