# OCCUPATIONAL DISEASES

**TEXTBOOK**

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In the national textbook the modern data from different chapters of occupational pathology is represented. The textbook's contents comply with the standard curriculum of the academic discipline Occupational Diseases with due consideration of the principles of the credit-module system.

The normative documents (the list of occupational diseases, the instruction for its application, standards of preliminary and periodical medical examinations, antidote therapy) are given in the appendixes.

Intended for fifth- and sixth-year students of higher medical education establishments, interns and medical practitioners.

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SECTION 2

**FEATURES OF DEVELOPMENT AND COURSE OF OCCUPATIONAL DISEASES IN MAIN PRODUCTION AREAS**

# ABBREVIATIONS

AP — Arsenic-containing pesticides
BA — Bronchial asthma
HIV — Human immunodeficiency virus
WHO — World Health Organization
IN — Industrial noise
VD — Vibration disease
MPC — Maximum permissible concentration
MPL — Maximum permissible level
ARVI — Acute respiratory viral infections
TLC — Total lung capacity
MCC — Medical consultation commission
MEC — Medical expert commission
ET — Exercise therapy
IARC — International Agency for Research on Cancer
ICD — International classification of diseases
MH — Ministry of health
MSEC — Medico-social expert commission
MU — Medical unit
UHF — Ultra high frequency
SNHL — Sensorineural hearing loss
CF — Circulatory failure
FEV1 — Forced expiratory volume per first second
OA — Occupational asthma
SES — Sanitary and epidemiological station
TMTD — Tetramethylthiuram disulfide
USG — Ultrasonography
FVC — Forced vital capacity
COPD — Chronic obstructive pulmonary disease
Rtot — Total airway resistance of bronchi

# PREFACE

One of the most important points in the medical educational system is the training based on the occupational pathology. Future doctors of any specialty will definitely need the adequate knowledge in the occupational pathology in order to provide medical care for workers of industrial enterprises, to prevent possible adverse influence of harmful effects of occupational environment on the human body.

Medical information volume is constantly increasing. In this regard the most recent information technologies are widely used. They make it possible not only obtaining new knowledge and exchanging information, but also tosynthesize it effectively. Nowadays severe forms of acute intoxication by industrial poisons of carbon oxides and nitrogen oxides, hydrogen sulfide, aromatic nitro- and amino compounds are almost not observed; severe forms of chronic poisoning by lead, tetraethyl lead, mercury, manganese, benzene and other toxic substances are quite rare. However, scientific and technological progress, changing the character of labour fundamentally, causes new factors of occupational environment, which have adverse effect on workers. But the risk of influence of existing occupational hazards due to intensification of industrial processes has increased in some fields. First of all it concerns with the spread of production of plastics, synthetic resin, leather, rubber, organic colours, chemical fertilizers, pesticides as well as medications.

The concepts of factors of low intensity, combined influence of several harmful factors of occupational environment and thus the necessity of search for criteria of early diagnosis of occupational diseases have appeared.

Nowadays the problem concerning pulmonary diseases caused by dust is current in occupational pathology, as they are the most widespread in morbidity structure. Besides, together with pneumoconiosis, chronic obstructive pulmonary disease of occupational etiology has become quite spread.

Intensive development of electronics and radio-engineering has induced the necessity of studying the influence of electromagnetic emission on people working in this industry with the aim of early detection.

Introduction of super high-speed equipment into different fields of industry and agriculture, which generates vibration, is the noise source leading to the vibratory disease and neuro-sensory deafness. And, despite of the elaborated methods aimed at decreasing of these factors influence, vibration disease is still one of the most widespread diseases in the occupational pathology structure.

Comprehensive mechanization and automation of manufacturing process along with enhancement of efficiency of labour have made it possible to reduce the muscular system load. At the same time incomplete mechanization and automation in some enterprises cause the physical overload of the musculoskeletal system, the overexertion of the

muscles, especially due to frequent repetitious movements at the very quick rate. Thus, occupational diseases of muscles, peripheral nerves, musculoskeletal system are observed quite frequently, requiring early diagnosis and carrying out preventive and curative measures.

Adequate assessment of sanitary-hygienical labour conditions, intensity and duration of these factors influence should be made for the purpose of early diagnosis and treatment of patients with the occupational diseases.

All these facrors are considered to be the reason for preparation of the base course book dealing with the occupational diseases for students of higher medical education establishments.

The mainproblems concerning the occupational pathology taking into account fundamental knowledge, which students have obtained at theoretical, clinical and hygienical departments, are reviewed in this course book. New material about harmful factors of occupational environment leading to development of neoplasms, non-specific syndromes, diseases derived from biological factors influence as well as detailed information dealing with diseases in specific fields of commercial production and agriculture are presented in the book.

Every chapter ends with the tests and keys to them.

The appendix contains the specification documents (the list of the occupational diseases, the instruction for use of the occupational diseases list, the extract from the nomenclature of specialties etc.). The subject index at the end of the book makes use of the book much easier.

The book has been prepared by the team of the authors according to the new academic program on the occupational diseases (Kyiv, 2012) for students of higher medical education establishments of Ukraine.

The course book is recommended for students of state higher medical education establishments of Ukraine.

The authors hope that this course book will be useful not only for students, but also for teachers and practitioners in Ukraine as well as abroad. Continuous support with updates and supplements is conducted by requests to occdis@hnmu.org.ua. All comments, suggestions as for further improvement of the book will be gratefully taken into account.

# Section 1

# GENERAL QUESTIONS OF THE OCCUPATIONAL PATHOLOGY; OCCUPATIONAL DISEASES CAUSED BY EXPOSURE TO INDUSTRIAL AEROSOLS, PHYSICAL AND CHEMICAL FACTORS

Chapter 1

# PECULIARITIES OF THE DIAGNOSIS OF OCCUPATIONAL DISEASES; OCCUPATIONAL PATHOLOGY CAUSED BY INDUSTRIAL AEROSOLS

## 1.1. GENERAL ISSUES OF THE OCCUPATIONAL PATHOLOGY

### 1.1.1. Introduction to the subject of the occupational diseases

Occupational pathology is a field of clinical medicine dealing with the study of diseases occurring under influence of harmful factors of occupational environment or in the process of work.

The occupational pathology is widely integrated with different fields of medicine. In order to study the occupational diseases as a course unit successfully, using the knowledge obtained in attendant subjects is necessary.

In practice, making diagnosis of the occupational disease, curing the patient, taking the medical-labour expert commission, elabouration of sustainable preventive measures are not possible to be carried out without use of interdisciplinary connection of the occupational pathology with medical as well as nonmedical sciences.

Numerous achievements of the occupational pathology in their turn are widely used in different clinical fields of medicine, particularly in the aspect of differential diagnosis of diseases.

The main tasks of the occupational pathology are:

- Study of the occupational diseases, their pathogenesis, symptoms and signs, course, remote effects, therapy, medical rehabilitation, working capacity examination; and the early diagnosis of the occupational diseases is of a great importance.
- Study of the non-specific action of occupational factors, their role in development, course and consequences of common non-occupational diseases.

The term *"harmful occupational factor"* is used for the working-environment factor as well as peculiarities of manufacturing process, which can have harmful effect on a worker's organism and lead to the disease development.

According to the action on the human body all dangerous and harmful factors of the working-environment are divided into physical, chemical, biological and psychophysiological; besides, *the* ***occupational dust*** is considered to be a separate group of factors.

***The physical factor includes*** machinery and mechanisms, which move; movable parts of the operating equipment; caving subsurface rocks; elevated or reduced temperature of surfaces; equipment; workspace air; increased level of noise; vibration at a workplace; increased or decreased pressure at workspace or its violent change; increased level of ionizing emission, etc.

***The chemical factor means*** organic and inorganic compounds in the form of gas, steam, aerosol, and liquid.

***The biological factor includes*** biological objects, which have pathogenic microorganisms (bacteria, viri, rickettsiae, spirochaetes, fungi, protozoa), their waste products and some organic substances of natural origin.

***The psychophysiological factors are as follows:*** physical and neuropsychiatric overloads, which in their turn are divided into the mental and emotional overexertion, the analysers' overexertion, and the work monotonicity.

Occurrence of dangerous and harmful factors in industry can be caused by:

— The wrong work management (non-rational labour and rest routine, required body position, excessive tension of some organs and systems);

— The poor manufacturing culture;

— Absence or the unsatisfactory work of sanitary-engineering devices and equipment;

— Difficulty in solution of sanitary-engineering problems in some producing operations (dust prevention in the coal-mining industry and metal mining industry, normalization of microclimate at workplaces of ironworks and non-ferrous smelters, in the deep mines);

— Peculiarities of the working process associated with exertion of neuroemotional system (the hard operator work in the compressed time condition).

Negative influence of harmful factors, which form the chronic occupational pathology are in most cases connected with imperfection of technologies and constructive defects of machinery and mechanisms as well as with absence, proper quality or non-use of the personal protective equipment. The issues concerning prevention of the occupational morbidity in the stateas well as theadverse influence of harmful occupational factors on the workers' health need a complex scientifically grounded approach for creation of the system of the safe working conditions and prevention of the occupational diseases, following of the legal requirements concerning labour protection and the guidelines of the public health legal system, provision of the qualified health workers.

It should be taken into account that the harmful factors of labour can be not only the cause of the occupational disease formation, but also pathogenic factors of general diseases development, which do not belong to occupational ones.

The harmful occupational factors influence different organs and systems of workers' organism.

### *Classification of the Occupational Diseases*

There are several principles of classification of the occupational diseases. Each one is directed to complete certain tasks of the theoretical, practical and educational character.

**1. According to specificity the** occupational diseases are divided into *specific and non-specific.*

*1.1. The specific* occupational diseases are those ones, which develop only due to the occupational factors. They can be absolutely specific and relatively specific.

*1.1.1. The absolutely specific* occupational diseases develop under the action of occupational factors and they can never develop under non-occupational conditions. They are also called *the true occupational diseases.* The examples of the absolutely specific diseases can be pneumoconiosis or the vibration disease.

*1.1.2. The relatively specific* diseases are the pathologic conditions, which sometimes can be of household origin, develop as a result of the emergency ecological situation, but more frequently they occur under occupational conditions (intoxication by manganese, lead, mercury, arsenic, pesticides), and also the radiation disease and diseases of arms caused by the functional overload.

*1.2. The nonspecific* occupational diseases can be caused not only by occupational, but also by other harmful factors, though in certain occupations under influence of specific occupational hazards, they occur more frequently than under other conditions (asthma in furriers and pharmacy technicians, chronic bronchitis in workers of dust occupations, etc.). This group of the occupational diseases is also called *conditionally occupational* due to the fact that the clinical diagnosis is made according to common principles, and the occupational cause of the disease is made only under certain conditions, i.e. when the etiological factor of the disease is the occupational hazard by itself.

**2. The etiological classification** is the most concrete, as for each individual case of the occupational disease there is the only one etiological factor (or their pathogenetically close group). *According to the etiological criterion* the following groups are distinguished:

2.1. The occupational diseases caused by the action of industrial dust (pneumoconiosis, bronchitis caused by dust, occupational COPD).

2.2. The occupational diseases caused by the influence of physical factors of the occupational environment (the vibration disease, cochlear neuritis, damages caused by the action of different kinds of emission, high and low temperatures, etc.).

2.3. The occupational diseases caused by chemical factors of the occupational environment (acute and chronic intoxications).

2.4. The occupational diseases associated with physical activities and overexertion of some organs and systems (coordination neurosis, diseases of the peripheral nervous and musculoskeletal systems, i.e. mono- and polyneuropathy, in particular the compression vegetative sensory neuropathy, cervical and lumbosacral radiculopathy, chronic myofibrosis, epicondylosis of the upper arm, humeroscapular periarthrosis, bursitis; strongly pronounced varicose veins of the lower limbs); the diseases caused by overstrain of the vocal apparatus (chronic laryngitis, vasomotor monochondritis, nodules of the vocal cords) and the organs of vision (progressive myopia).

2.5. The occupational diseases caused by the action of biological factors (infectious and parasitic diseases developing in people who are in contact with different infectious materials and animals that have infectious diseases, and in those who work at TB health centers and other medical establishments of infectious diseases; diseases caused by antibiotics, fungus-producers, etc.).

Within this classification there are also two additional groups: the allergic diseases (conjunctivitis, rhinitis, asthma, exogenous allergic alveolitis, Quincke's edema, urticaria, anaphylactic shock, etc.) and the oncological diseases of occupational origin (tumors of the skin, oral cavity, liver, urinary bladder, gastric carcinoma, leucosis, and the bone tumors).

**3.** Sometimes the system-organ principle is used in classification of the occupational diseases (the occupational diseases of respiratory, nervous, musculoskeletal systems, blood system, organs of vision and hearing, etc.).