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**PROFESSIONAL RISKS OF THE DEVELOPMENT OF MANUFACTURING  
DISEASE IN WORKERS OF THE PLATING PLANT OF THE LEADING  
METALLURGICAL ENTERPRISE**

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**Summary.** To evaluate the professional risk of professional and industrial disease caused by melting shop to workers conducted an analysis of occupational diseases and morbidity with temporary disability for 4 years. We calculated key occupational risk indicators, such as relative risk (RR), attributive risk (AR), population attributive risk (PAR). It is determined that in the structure of occupational morbidity of workers 80% occupy respiratory diseases. According to figures calculated occupational risk set list of diseases that are conditioned production. Attributive risk of disease for workers repair shop was furnaces (AR 75,7%–37,7%), population attributive risk of disease for the control group (PAR 30,3%–7,8%). The data obtained confirm the need to introduce a system of preventive measures to reduce the incidence among the relevant category of workers.

**Keywords:** professional risk, professional disease, production-related morbidity

Melting production is characterized by a wide variety of operations, which are a source of dangerous and harmful factors of production and also require considerable physical and mental stress.

Leading harmful and dangerous factors of the working environment in the melting shop are: increased levels of air pollution and dust the work area; high or low

temperature working areas; increased noise in the workplace; increased vibration; increased level of infrared radiation [1, p. 684]. Combined with the intensity of the work process, these factors in the work environment can significantly affect the health of workers. The impact of adverse factors on employees may be manifested by the development of specific and nonspecific diseases. Notwithstanding the gradual modernization of outdated equipment of metallurgical enterprises [2, p. 89], all equal jobs were harmful to the working conditions of these companies [3, p. 248]. The methodology of risk assessment, today, is one of contemporary approaches to linking harmful factors of industrial environment and human health. Therefore, the question of assessing and managing occupational risks among the relevant categories of workers in the metallurgical industry to preserve the health of workers remains relevant.

**Aim of the study:** Assessment of occupational risk of development of occupational and production-related morbidity in workers of smelting department of a leading metallurgical enterprise.

**Materials and methods of research:** To study the incidence of occupational diseases among repair shop furnaces were collected, analyzed and calculated. According to the incidence data with temporary disability, the occupational risk indicators were calculated: the level of morbidity (R), relative risk (RR), attributive risk (AR) in absolute terms and in percentages (AR<sub>e</sub>, %), population attributive magnitude (PAR) and in percentage (PAR, %). The indicators were calculated for the workers of the repair shop of metallurgical furnaces, where the working conditions in the workplace correspond to 3 class 4 degree of harmfulness. As a control group, employees of the plant management department who did not work in hazardous and dangerous working conditions (grade 2 – admissible) were used.

The assessment of cause and effect of the factor with the development of morbidity was performed according to the calculated indicators of relative risk.

To study professional pathology were collected, calculated and analyzed cases of occupational diseases among employees melting shop for 4 years.

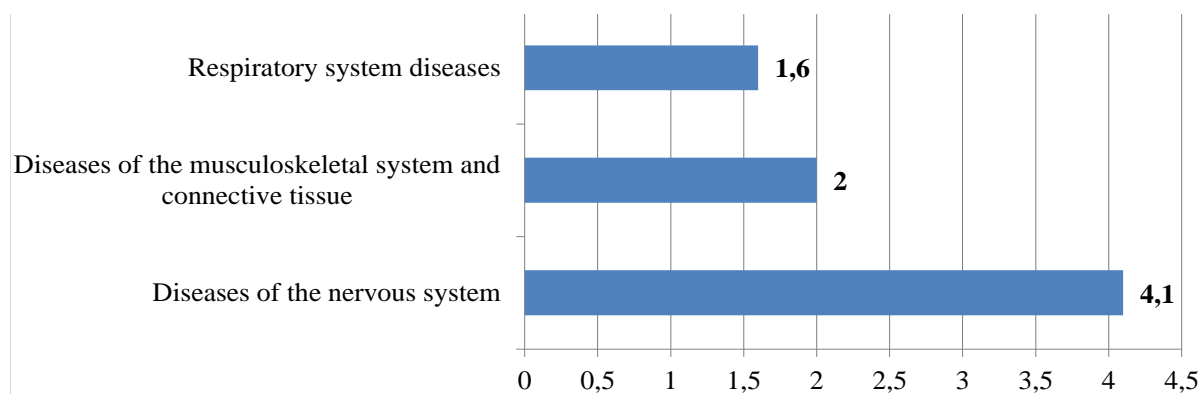
Key occupational risk indicators are: employee morbidity (R), relative risk (RR), attributive risk (AR) in absolute terms and in percentages (ARe,%), population attributive risk in absolute values (PAR) and percent (PAR, %) were calculated according to incidence rates with temporary disability. Indices were calculated for melting shop workers whose working conditions at the workplace match 3 Class 4 level of hazard. As a control group were employees of the administrative department who have acceptable working conditions (grade 2). The assessment of the cause-effect relationship of the factor with the development of morbidity was performed according to the calculated indicators of relative risk.

**The results.** Analysis of occupational diseases of workers in the melting shop, according to entities that confirmed the data from previous studies [4, p. 135], the largest number of cases in this shop occupy respiratory diseases (50%), vibration disease and sensorineural hearing loss of 20% and radiation cataract, which was 10 %. The cases of occupational diseases were recorded among the following professions: driver crane, a painter, a master of plot, of which the largest number were crane drivers – 43%. Among the main factors in the production environment that caused occupational disease in 63,6% of cases are fibrogenic dust (containing free silicon dioxide) and chemicals in the air of the work area, 18,2 % of cases due to the effect of vibration on the employee and 9 % of occupational morbidity is due to the effects of infrared radiation and production noise. The average age and length of service for those with occupational diseases were  $52,7 \pm 1,3$  years and  $22,3 \pm 3,4$  years, respectively.

The results of the calculations occupational risk health disorders melting shop workers found that the greatest risk and significantly higher frequency than in the control group was observed among these forms of lymphoma, diseases of the nervous system, diseases of the musculoskeletal system and connective tissue, respiratory system diseases (Fig. 1).

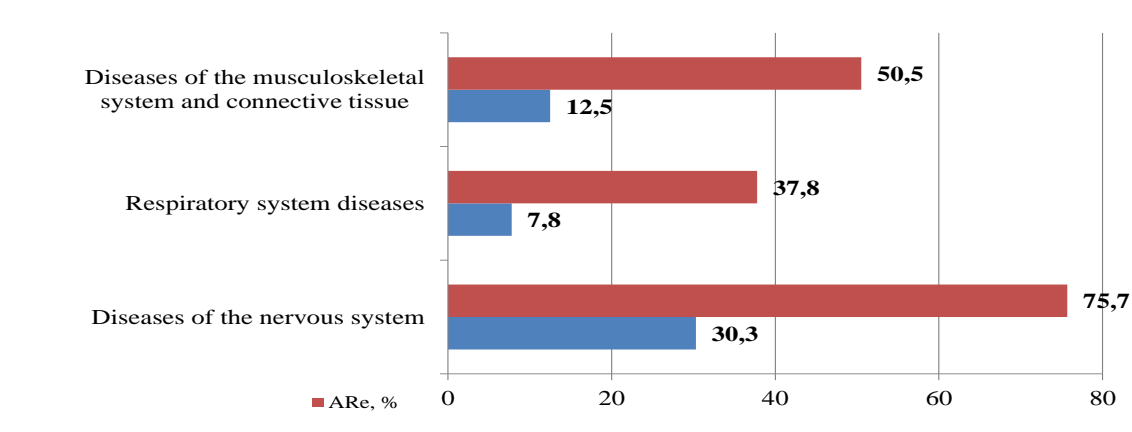
The incidence rate of nervous system disease in smelting workers was 19,2 per 1000 workers, in the control group – 4,6 per 1000 workers. The relative risk for diseases in this group was  $RR = 4,1$  at CI 95% 1,1–14,6, which has a very high degree of

association with working conditions and attributes the disease to production-related conditions.



**Fig. 1. Relative risk (RR) of disease development among smelting workers**

The proportion of diseases caused by working conditions among workers of the smelting shop was 75,7 % (CI 95 %; 13,9–98,1%), which was significantly higher than the corresponding indicator in the general population of PAR – 30,3 % (CI 95 %; 28,9–31,6 %) (Fig. 2).



**Fig. 2. Specific gravity of diseases caused by working conditions among smelting workers (Are,%) and the general population (PAR,%).**

The incidence rate of respiratory disease in smelting workers was 850,9 per 1000 workers, in the control group – 529,6 per 1000 workers. The relative risk was  $RR = 1,6$  with 95 % CI 1,4-1,9 having an average degree of connection with working conditions and attributes the disease to industrial-conditioned. The share of diseases caused by harmful working conditions among workers of smelting plant was AR – 37,7 % (CI 95 %; 26,6 – 47,2 %), among the general population PAR – 7,8 % (CI 95 %; 5,9–9,6 %).



For diseases of the musculoskeletal system and connective tissue, the incidence rate was 86,5 per 1000 workers, in the control group – 42,8 per 1000 workers. The relative risk was  $RR = 2,02$  at CI 95 % 1,2–3,4, which has a high degree of association with working conditions and attributes the disease to production-related conditions. The proportion of diseases caused by hazardous working conditions among smelting workers (AR, %) significantly exceeded the corresponding indicator in the general population (PAR, %) – 50,5 % (CI 95 %; 15,7–70,9 %) and 12,5 % (CI 95%; 10,7–14,2 %), respectively.

### **Conclusions.**

The evaluation of occupational risk, according to the data of occupational diseases and morbidity with temporary disability, indicates very high, high and medium grade professional conditioning of diseases with working conditions of workers melting shop. The proportion of illnesses among these workers is greater (AR 75,7 % –37,7 %) compared to the control group (PAR 30,3 % –7,8 %), which confirms the impact of occupational factors on the health of workers in hazardous conditions labor.

The disruption of the health of workers in the smelter confirms the need to introduce a system of preventive measures to reduce the incidence among the category of these workers.

High levels of risk for the working conditions of smelter workers require that preventative measures be taken to reduce it, both collective and individual.

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