EVALUATION OF THE EFFECT OF HIGH-DISPERSED AEROSOL ON THE HEALTH OF OPERATORS USING LOW-TEMPERATURE PLASMA [[1]](#footnote-1)\*)

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Plasma cutting is a modern thermal cutting process in metal industry and during this process metals are vaporized and form fine aerosols which can have adverse occupational health effects [1]. Sizes of melted spherical particles at dusting, melting, plasmic-mechanic treatment of metal alloys were mostly of up to 1 µm, 61.3% of particles have a size up to 0.2 microns.

Objective: determination of harmfulness extent of high-disperse aerosol appearing at using low-temperature plasma techniques in comparison with the state of health values of different plasmatic mechanisms operators.

Materials and methods. In the working conditions and clinics of health state assessment of 678 men in the age of 19-45: operators engaged in plasma spraying (group 1), cutting (group 2), surfacing (group 3); professional experience: less 5 years; 5-10 years. Methods: morphological compound of mucous membrane in nasal cavity cells; transport function of upper respiratory truct; bronchopulmonary system state. The control group (108 slesarey- toolmakers) was comparable for age and work experience.

Results. The operators of plasma torches and plasma installations for various purposes with experience up to 5 years diagnosed chronic inflammatory degenerative diseases of the upper respiratory tract, the frequency of which increased with experience: in the 1st group-from 51.4 to 71.1%, in the 2nd group - from 28.1 to 41.1%, in the 3rd group -from 14.2 to 35.7% (p < 0.05). Combined lesions of the nasal cavity and pharynx prevailed in group 1 and 2 (29.6% and 12.5%, respectively, versus 5.6% in the control group). In group 3, isolated lesions of the nasal mucosa prevailed (17.8% of cases). According to rhinocytological studies, as the length of service increased, there was an increase in the process of desquamation of prismatic epithelium cells, the number of their degenerative-altered forms and metaplasia into a multilayer flat epithelium. In 50.0 – 73.2% of the examined workers slowing down of transport function of shimmer epithelium was found out. Bronchopulmonary system changing was of obstructive-restrictive type in 34-44%. The dispersion analysis proved the high degree of effect of concentrations levels in dust-gas mix combinations on formation of pathologic damages in upper respiratory tract mucous membrane.

Discussion. Adverse effects activity of high-disperse aerosol from plasma having increased sorption potential are explained, perhaps, by ultra-low particles presence.

Conclusion. The system of risk management of personal health should take into account the results of pathogenetically directed experimental researches, control of the personal health values in the working experience dynamics, including reaction of the most sensitive internal organs and systems of the body when using plasmatic processes in nanotechnologies.

References

1. Ilnitskaya A.V., Sineva E.L. Features health effects of aerosols generated by plasma and plasmaderived technologies. In: Proceedings of the VII International Symposium on theoretical and applied plasmochemistry.- Ivanovo, 2014.-P.190-192.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Lt/ru/FN-Il'nitskaya.docx) [↑](#footnote-ref-1)