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Functional, Structural and Morphological State Of Tissues and Organs of the Oral Cavity in People Employed in Mining and Metallurgical Factories

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Article Info
Volume 83
Page Number: 667 - 675
Publication Issue:
March - April 2020

Article History
Article Received*: 24 July 2019*
Revised*: 12 September 2019*
Accepted*: 15 February 2020*
Publication*: 12 March 2020*

Abstract:
On the effect of toxic substances in small concentrations on the functional state of the organism, there are two main views. According to a number of authors [1, 2, 5, 6, 11, 12], under the influence of low intensity physical and chemical factors on the body as a result of training compensatory reactions, a state of nonspecific increased resistance is created. This article will elucidate medical state of people related to mining and metallurgy.

Keywords*: mining industry, stomatology of the workers, functional and morphological state of the mouth authorities, production factors.*

I. Introduction

If the force of influence of the chemical factor that caused the excess does not decrease, then the habituation phase will gradually go into the phase of increased sensitivity of the body to this poison. Other authors believe that any reaction of an organism to the action of a chemical substance cannot be indifferent to it [3, 4, 7, 8, 10, 13, 14]. Addiction is only a peculiar form of development of chronic intoxication. A number of works [5, 6, 9] confirm the presence in the air of the working zone of petrochemical, mining and metallurgical plants and factories producing furan compounds with an increased concentration of furfural, acetone, fury alcohol, phenol, formaldehyde, monofurilideneacetone, etc. Along with this, the problem of dentists, diseases under the influence of mixtures of harmful chemicals, studied far from completely.

The purpose of the study was to assess the state of dental morbidity and to study the pathogenic mechanisms of functional-structural and morphological lesions of organs and tissues of the oral cavity (RP) in workers of the Almalyk mining and metallurgical plant (AMMC group 2) and the Nizhny Gravel metallurgical plant (NGISW 3-group) to justify the planning and development of methods of prevention, treatment, determining the needs of workers in dental care.

A total of 1120 people were examined, including 818 workers from 2 industrial enterprises studied (409 people each) and 302 people from the control group (CG) (in the city of Fergana, group 1), the most numerous age group were people aged 35-44 years and with experience of 11-15 years - 79.5% of workers. Based on the WHO map (1997), the dental status of workers was evaluated; indicators of caries and non-carious lesions of teeth, orthopedic status, diagnosed with periodontal disease and diseases of the oral mucosa (CO) of the oral cavity (RBCU) were used by the MMMA classification (1983). To clarify the nature and extent of the impact

of the complex of harmful substances on the organs and tissues of workers' RP, the tooth's sensitivity, pain and discriminatory sensitivity of RBCU, the threshold of taste perception and functional mobility of the taste of the tongue were studied; microhardness of enamel and dentin, microelement composition of teeth, saliva, blood, hair by neutron activation method and comparison with standard samples of IAEA N-4 and NN-1 were determined, the morphological structure of bio substrates was studied using an experiment.

II. Literature Review

For a hygienic assessment of production conditions and levels of pollution of harmful air from the working area, an analysis of the results of laboratory studies performed by factory laboratories and sanitary and epidemiological institutions for the period from 2015 to 2018 was carried out and regional normative and methodological documents approved by the Ministry of Labor and Social Protection of the Russian Federation were used to evaluate the results. In order to study the effect of emissions of AMMC and NGCIW; furfurals, formaldehyde, phenol, acetone on the organism of warm-blooded animals, an experiment was conducted on 280 white rats for 4 months in 200-liter hermetic chambers for industrial production, into which purified atmospheric air was supplied with a speed of 35 l / min, 21-fold air exchange took place in the chambers to prevent ammonia, CO2 and water vapor in it; special dispensers were used to deliver the mixture and the seed was carried out 4 hours 6 times a week. White rats weighing 90-100 gr. were divided into 4 groups and studied 3 levels of concentration: - high level of concentration - up to 5 maximums permissible concentration (MPC) in the air of the working zone of each substance (1 group); furfural - 50.05 + 0.26 mg / m3 formaldehyde - 2.5 + 0.03 mg / m3, phenol - 1.48 + 0.02 mg / m3, acetone - 0.99 + 0.02 mg / m3.

- at the MPC level in the air of the working zone of each substance (group 2); 9.7 + 0.1 each; 0.51 + 0.006; 0.29 + 0.01; 0.19 + 0.006 g / m3, respectively.

- low level of concentration - 1/5 MAC in the air of the working area (3 group); 2.06 + 0.04; 0.1 + 0.005; 0.06 + 0.005; 0.04 + 0.001 mg / m3, respectively. - 4 group served as a conditionally control (UKG). in the ratio of MPC

During the experiment, animals were weighed, the content of hemoglobin, erythrocytes and leukocytes in peripheral blood was studied, the content of sulfhydryl groups in the blood, the activity of cholinesterase (Ache) in whole blood, the activity of alkaline phosphatase (ALP), acid phosphatase (CF)), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) in blood serum, liver enzymes: succinate dehydrogenase (SDH) and histidine in blood serum and the sorption capacity of erythrocytes (SSE) was determined. The periodicity was: background, 0.5; 1; 2; 3; 4 months and a month recovery period

At the end of the experiment, the functional activity of the metabolizing function of the liver (AMPP) was studied by the duration of hexenal sleep (CS), the content of medium molecular peptide (MMP) in plasma, the electrical permeability of erythrocyte membranes (EPEM) were determined and morphological studies of internal organs and RP were carried out.

After completion of the experiment, the rats were killed by decapitation and for morphological studies, pieces of CO of the gums, cheeks and liver were taken, which were fixed in 12% r/d of neutral formalin. After appropriate wiring and pouring into paraffin, sections 4–5μm thick were stained with hematoxylin and eosin, examined and photographed using an MBI-15 microscope.

Statistical processing of data obtained as a result of sanitary-hygienic, clinical-functional and experimental studies was carried out by the traditional student method using the application package for IBM PC AT. The results of the materials obtained and their discussion. In all studied industries among workers, as well as in the CG, the prevalence of caries was very high: at AMMC -

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88%, at NGCIW - 88.6% in the CG - 86.2%. Among workers and among people of the 1st group, the prevalence of caries increased with age, while the highest prevalence among workers at AMMC was found in the group of 45 years and older (97.1%), and in at NGCIW - in the group of 35-44 years and older than 45 years. (96.8% each), group 1 at this age, the prevalence of caries did not exceed 88.5%. The intensity of caries increased with age as well as the indicators of CPU in general in workers; it was found that carious teeth are more common in women than in men, at 41.1 and 33.3% at AMMC, respectively at 37.2 and 32 at NGCIW, 82, in individuals of the 1st group the ratio was the opposite - 36.5 and 41.6%.

III. Analysis

Tooth damage by chemical necrosis was 22.4% at AMMC and 24% at NGCIW, and detection was approximately the same across the sexes: their frequency increased with age and experience. Pathological tooth abrasion was found in 26% of workers, both enterprises, much less - in the 1st group. Generalized forms of pathological tooth abrasion in workers increased with their age: it is more characteristic for a group of workers with a working experience of 1-5 years (at AMMC - up to 75%, at NGCIW - up to 77.7%), with an increase in the length of service, a transition of a localized form is observed generalized with maximum performance, that is, with experience of 16 years or more. . Mechanical damage to tooth enamel was detected in 34.3% of AMHC workers; 26% - NTMK, in the 1st group 7.8%, and this pathology is also characterized by an increase with age and experience. The frequency of tartar deposits in group 2-3 was higher than in group; respectively, 44.3%, 56% versus 37.9%.

In all groups, participants were affected by periodontitis: 69.9% at AMMC, the frequency of gingivitis up to 31.3% at NTMK, periodontal disease up to 19.6% at AMMC. The prevalence of gingivitis at the AMMC was 3.5 times, and at NGCIW it was almost 2 times higher than that of the first group (16.3%). The frequency of gingivitis lesions increased with age and the highest rates in the age group of 30-44 years: at AMMC - 43.7%, at NGCIW - 50.2%, and with an experience of 6-10 years and 11-15 years; 42.06%, 34.10%, respectively.

The incidence of COPD diseases in the 2nd and 3rd groups was approximately the same (within 36.1-38.7%), but was significantly higher than in individuals of the 1st group (7.9%). The workers of the studied industries examined by us have leukoplakia of professional origin with its various elements (spots, plaques, erosion) against the background of clouding of OCR. It can be assumed that clouding of OCR is the first protective reaction of the tissue to chronic irritation and is accompanied by an increase in keratinization of the integumentary epithelium with leukokeratosis (up to 8.94%), which were 3 times more common in men than in women. Among the workers were people in need of prosthetics (43.5% -54.6%), as well as with the presence of dentures (27.1% -31.4%). The proportion of workers who do not need prosthetics ranged from 18.2-25.0%, and workers with malocclusion - 8.0% -15.3%. The number of workers in need of prosthetics, as a rule, decreased among workers with age and length of service, and the presence of dentures and the need for dentures increased, because both of these indicators are closely related. A sharp decrease in the threshold of excitability of teeth was revealed in workers of groups 2 and 3, compared with group 1 ($P < 0.001$); up to 6 times on molars and fangs, 4 times on incisors. Persons with an experience of more than 10 years have a tendency to decrease in sensitivity on molars (54.8μA), incisors (31.3μA), fangs (36.6μA). And the threshold of pain sensitivity of the mucous membrane of the vestibular surface of the alveolar ridge in the region of 4, 6 teeth on the palatine side was significantly reduced compared with the 1st group ($P < 0.01$). Discrimination sensitivity in workers of groups 2 and 3, it was reduced in all areas ($P < 0.01$), in workers of group 2 a decrease in taste sensitivity was found: increase in the threshold of taste for acidic (in 31.2%) and bitter (in 25 %),

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lowering the threshold for sweet (in 53.1%) and salty (59.4%). Changes in the layer-by-layer orientation of the micro hardness of tooth enamel were revealed in workers of the AMMC, since its strength at the surface layer and in the thickness of the enamel differs insignificantly, and the lowest hardness is noted for the dentin-enamel compound. If the micro hardness of various layers of enamel of teeth of the 1st group is taken as 100%, then it was lower for workers at the AMMC: in the surface layer - by 13%, in the thickness of enamel - by 11.8%, in dentin-enamel layer - on the contrary, increased by 1.2%. In the same case, in workers of the studied industries in saliva, there is an increase in CF activity and a decrease in alkaline phosphatase activity, which is associated with exposure to harmful finely dispersed dust, of the studied industries that affect phosphorus and carbonate buffer systems, which disrupts saliva homeostasis.

The study of the microelement composition of enamel, dentin and cement of teeth by neutron activation in 26 workers of the 2nd group, 19 workers of the 3rd group, 31 residents of the 1st group showed that the spectrum of trace elements found in the hard tissues of the teeth of workers is not the same in different enterprises studied; for example, the Ag content in enamel in workers of groups 2 and 3 was close to the 1-group; in dentin, on the contrary, the workers of groups 2 and 3 did not have Ag groups; the contents of Ag in cement differed even more. Workers of 2–3 groups are only 1.8 and 4.4 times respectively. The content of Ca + 2 in tooth enamel in groups 2 and 3 was higher than in group. Unlike enamel, in dentin, the Ca + 2 content tended to decrease: in workers 2, in the group 1.4 times, in workers in the 3-group, almost 8 times. The same tendency was observed in determining the Ca + 2 content in tooth cement in both groups of examined workers.

Table number 1.

The content of trace elements (Ca, Zn, Fe, Ag) in teeth, saliva, blood in workers, in μg/g.

Object of study Microelements Control Workers of AMMC Workers of NGCIW

Ca + 2 10.9 + 0.71 12.6 + 0.7 11.2 + 0.51
Blood Zn 112.0 + 10.6 89.6 + 5.1 * 76.4 + 4.52 *
Fe 124.0 + 6.4 100.8 + 2.61 * 96.0 + 4.1 *
Ag 0.24 + 0.01 0.22 + 0.01 * 0.20 + 0.01 *
Ca + 2 8.31 + 0.29 8.8 + 0.21 7.72 + 0.61
Saliva Zn 30.8 + 1.46 62.8 + 1.87 * 74.6 + 3.78 *
Fe 88.4 + 3.1 74.6 + 3.18 * 62.1 + 2.78
Ag 0.08 + 0.004 0.09 + 0.001 * 0.06 + 0.001
Ca + 2 25.3 + 1.48 29.5 + 1.13 * 30.8 + 1.36
Enamel Zn 185.0 + 11.3 5361.0 + 261.0 * 3763.0 + 131.0 *
Fe 32.0 + 1.41 4.4 + 0.33 * 63.1 + 0.86 *
Ag 2.2 + 0.01 1.45 + 0.22 * 1.45 + 0.02
Ca + 2 36.0 + 1.6 4.5 + 0.91 * 29.8 + 1.4
Dentin Zn 368.0 + 19.4 5173.1 + 98.6 * 3881.0 + 144.0 *
Fe - <1.0 -
Ag 0.56 + 0.01 - -
Ca + 2 26.0 + 0.91 2.99 + 0.32 * 24.8 + 0.84
Cement Zn 92.0 + 3.6 2351.0 + 49.0 * 3036.2 + 131.4 *
Fe 0.1 + 0.001 0.98 + 0.01 * 471.8 + 42.1 *
Ag 0.27 + 0.01 0.51 + 0.013 * 1.24 + 0.23 *
Ag 0.27 + 0.01 0.51 + 0.013 * 1.24 + 0.23 *

Note: * - indicators with significant differences with control are noted.

The Zn content in the enamel of teeth of groups 2 and 3 of the workers was sharply increased, moreover, in workers of the 2nd group - 17 times versus the 1st group. In dental dentin, the content of Zn in all groups of workers significantly exceeded its k - content (17, 12 times, respectively). In the cement of teeth of those workers of groups 2 and 3, an increase in its content was noted (by 4–11 times). The microelement composition of the hair was studied in 62 workers of AMMC with the determination of 17 microelements in them and studies showed the content in the hair of workers, essential (Ca, Co, Cr, Fe) and toxic (Sb, U) elements, at the same time, a decrease was noted the content of the vital element - Cu, which can lead to a deterioration in their health.

Table number 2.

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The content of trace elements in the hair, (mg / kg, M + m)
Shop 2 Shop 3 Shop 4 Shop 7 Shop 8 Counter
Au 0.015 + 0.004 * 0.027 + 0.003 * 0.058 + 0.024 * 0.017 + 0.007 * 0.018 + 0.003 * 0.0121 + 0.0008
Br 1.4 + 0.38 * 2.2 + 0.2 3.8 + 0.85 2.7 + 0.22 * 1.8 + 0.19 3, + 0.28
CA 7020 + 4890 3480 + 420 * 4580 + 845 * 2910 + 225 * 4100 + 810 * 1060 + 174
Cl 540 + 240 * 970 + 210 * 1530 + 410 1600 + 340 1120 + 200 * 1896 + 200
Co 0.13 + 0.061 0.11 + 0.024 * 0.085 + 0.014 * 0.068 + 0.014 * 0.17 + 0.021 * 0.31 + 0.0065
Cr 0.65 + 0.19 * 0.75 + 0.094 * 0.57 + 0.075 0.58 + 0.08 1.8 + 0.5 * 0.33 + 0.051
Cu 11 + 0.5 * 9 + 1 * 11 + 2.7 * 13.3.5 9 + 1.6 * 17 + 0.82
Hg 0.15 + 0.68 0.15 + 0.019 0.2 + 0.022 0.044 + 0.022 0.24 + 0.051 0.14 + 0.016
Fe 78 + 16 * 58 + 6 * 44 + 8 * 47 + 10 * 138 + 37 * 18 + 1.6
La 0.15 + 0.055 0.14 + 0.034 0.18 + 0.039 * 0.16 + 0.033 * 0.13 + 0.024 * 0.03 + 0.006
Mn 1.5 + 0.83 1.1 + 0.2 * 1.8 + 0.74 * 0.87 + 0.12 * 3.1 + 0.62 * 0.49 + 0.069
Na 250 + 76 340 + 60 440 + 150 340 + 60 600 + 140 * 213 + 30
Sb 0.27 + 0.046 * 0.34 + 0.033 * 0.26 + 0.041 * 0.27 + 0.083 0.51 + 0.1 * 0.11 + 0.015
SC 0.0089 + 0.003 0.017 + 0.002 * 0.012 + 0.002 0.012 + 0.003 0.019 + 0.003 * 0.006 + 0.003
Se 0.59 + 0.13 0.68 + 0.087 0.52 + 0.037 0.89 + 0.24 0.71 + 0.042 0.51 + 0.029
Zn 240 + 25 210 + 7.5 210 + 30 184 + 8.2 260 + 37 225 + 8
U 0.83 + 0.38 * 0.47 + 0.083 * 0.85 + 0.2 * 0.22 + 0.04 0.45 + 0.08 * 0.12 + 0.04
Note: * -P <0.05 significance of differences with control.

The results of experimental observation of animals showed that the white rats of the experimental groups, receiving an inhaled mixture of furfural, formaldehyde, phenol and acetone at concentrations higher, lower and at the MPC level in the air of the working zone at the beginning of the experiment, were very restless. After 2-3 days, the animals became inactive, lethargic, reluctantly ate food, and only 2 weeks after the start of the experiment, the condition of the animals returned to normal, due to the gradual adaptation of the rats to the conditions of the inhalation effect of the mixture. Nevertheless, the animals of the 1st group by the end of the 3rd month of the experiment by body weight lagged behind the animals of the UCGS-(P <0.05). By the end of the 4th month of priming, the body mass gain lagged behind the UCGS - values not only in animals of the 1st group, but also in the 2nd group. The average body weight in rats of the 3rd group did not differ from the UCGS levels. The state of the mink reflex in white rats under chronic inhalation exposure by the end of the experiment in rats of the 1st and 2nd groups was observed inhibition of this indicator by 1.5-2 times (P <0.05). The hemoglobin content in peripheral blood after 2 months from the onset of seeding in animals of the 1st group was 118 g / l at 135 g / l in UCGS (P <0.05), after 3 months - 101 g / l with UCGS - 129 g / l (P <0.05), after 4 months - 90 g / l with UKG - 138 g / l (P <0.05). The monthly recovery period was sufficient to normalize the hemoglobin content in animals of this group. In the second group of animals, the hemoglobin content in the blood statistically significantly decreased only at the end of the experiment and amounted to 110 g / l with UKG - 138 g / l (P <0.05). In the same direction, a decrease in the number of red blood cells in the peripheral blood in the first 2 groups was noted. Table 3. The content of red blood cells in the peripheral blood of white rats. (Teri / L).
Groups Duration of research (months)
background 0.5 1 2 3 4 Restore Period
I. 5.1 + 0.12 5.02 + 0.1 4.96 + 0.02 4.68 + 0.05 * 4.61 + 0.09 * 4.64 + 0.02 * 5.12 + 0.03
II. 5.03 + 0.13 5.12 + 0.03 5.11 + 0.08 5.07 + 0.09 * 4.78 + 0.02 * 4.96 + 0.02 * 5.17 + 0.02
III. 4.98 + 0.17 5.01 + 0.03 5.19 + 0.02 5.03 + 0.03 5.20 + 0.02 4.99 + 0.02 5.08 + 0.06

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IV. (cont.) 5.2 + 0.03 5.07 + 0.02 5.02 + 0.02 5.12 + 0.03 5.19 + 0.02 4.96 + 0.02 5.17 + 0.02
Note: * - P <0.05 with respect to the control group.

The content of leukocytes in the blood of animals of the 1st group began to increase, and by the end of the experiment reached a level of 11.6 Giga / l, with a control of 8.01 Giga / l. In animals of the 2nd group containing leukocytes in the blood for the same period was 8.54 gig / l. The results of the study, the content of sulfhydryl groups in the blood in animals of the 1st group was reduced, starting from the 2nd month of the experiment, reaching 0.342 gig / l, with a control of 0.507 gig / l by the end of the experiment (P <0.05). In animals of the second group, this indicator decreased to 0.367 gig / l only at the end of the seed (P <0.05).

IV. Discussion

The activity of alkaline phosphatase, AST and ALT in the blood serum of the 1st group of animals increased significantly already after the 1st month of seeding to 1.5 mmol/Lh, 2.08 mmol/Lh, 1.39 mmol /Lh respectively Tween. During the experiment and towards the end of its activity, alkaline phosphatase increased almost 2.5 times (P <0.05), AST - 2.4 times (P <0.05), ALT - 2, 3 times (P <0.05)

ACE in whole blood in rats until the end of the experiment was 44% (P <0.05). In animals of the 2nd group, inhibition to 26.5% was also noted (P <0.05). Animals of group 3 in terms of Ache in the blood did not differ from k - levels. An increase in histidine activity was established, starting from the 2nd month of the experiment, in the 1st group of animals. In the 2nd group of animals after the recovery period, the activity of histidine was at the level of CCG data.

Table number 4.

Histidine activity in white serum (mmol / l / h). Table 4. Histidase activity in white serum (mmol / l / h).
Groups Duration of research (months)
Background 0.5 1 2 3 4 Restore Period
I. 0.24 + 0.03 0.26 + 0.03 0.28 + 0.04 0.43 + 0.05 * 0.62 + 0.08 * 0.70 + 0.07 * 0.71+ 0.06 *
II. 0.23 + 0.05 0.29 + 0.04 0.27 + 0.04 0.28 + 0.04 0.42 + 0.04 * 0.48 + 0.09 * 0.30 + 0 04
III. 0.25 + 0.04 0.24 + 0.035 0.27 + 0.04 0.28 + 0.03 0.26 + 0.05 0.28 + 0.05 0.31 + 0.05
IV. (cont.) 0.26 + 0.04 0.25 + 0.025 0.29 + 0.05 0.29 + 0.03 0.25 + 0.02 0.26 + 0.02 0.29 + 0, 04
Note: * - P <0.05 with respect to the control group.

The activity of sorbitol dehydrogenase (SVG) in the blood serum of animals of the 1st group increased by more than 2 times, but the recovery period significantly brought this indicator closer to the level of UCGS. In the 2nd group of animals, the activity of SVG in serum changed slightly. At the end of the experiment, a hexenal sleep induction test was performed; it was noted that in animals of the 1st group, the sleep time was statistically significantly prolonged (P <0.05), which indicates a pronounced decrease in functional AMPP. The content of SMP in plasma is reduced in animals of the 1st and 2nd groups. Moreover, in rats of the 1st group, the changes were statistically significant (P <0.05). The monthly recovery period was sufficient to restore the SMP in the plasma to control values.

The results of studies on the study of SSE presented in table No. 5 confirmed that this diagnostic method is highly informative and early to detect intoxication.

Table number 5.

Sorption capacity of red blood cells of white rats (%).Table 5. Sorption capacity of red blood cells of white rats (%).
Groups Duration of research (months)
Background 0.5 1 2 3 4 Restore Period
I. 49.7 + 1.6 49.3 + 1.4 46.6 + 0.3 40.4 + 2.4 * 36.1 + 2.1 34.2 + 1.3 44.7 + 3, 3
II. 49.9 + 1.5 53.9 + 1.5 52.0 + 1.2 53.3 + 0.2 42.3 + 1.5 39.9 + 3.3 * 49.9 + 1, 3
II.I 49.9 + 1.5 54.7 + 2.4 53.5 + 2.2 54.4 + 3.8 56.1 + 1.4 54.2 + 2.1 55.3 + 1.2
IV. control role) 52.9 + 0.8 55.1 + 1.2 55.0 + 1.1 56.6 + 1.4 54.2 + 2.2 52.2 + 1.6 51.7 +2.2
Note: * - P <0.05 with respect to the control group

The EPM in the 1st group increased almost 2 times compared with the UCGS and the monthly

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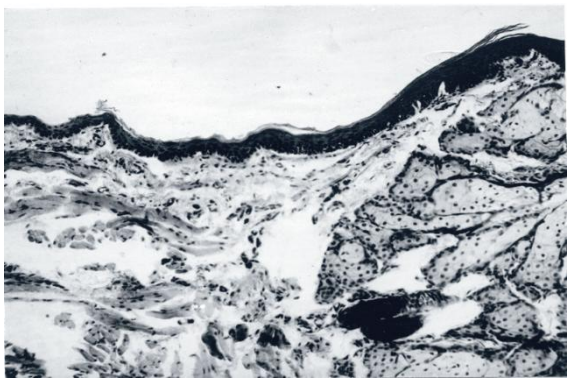
recovery period was insufficient for it normalization. In animals of the 2nd and 3rd groups, permeability disturbance was less pronounced, however, a high statistical significance of the shifts remained ($P < 0.05$). A monthly recovery period normalized this indicator in animals of the 2nd and 3rd groups.

As a result of morphological studies at low concentrations of injected substances in the stroma of the cheek, mild discirculatory and inflammatory changes are noted, such as edema of the underlying connective tissue, mild diffuse infiltration and blood vessels. At a concentration at the MPC level, it leads in the CO cheeks to a greater extent of atrophied epithelium sites in comparison with CCG, as well as to more significant inflammatory and vascular disorders in the stroma, manifested in an increase in its vasculature, blood vessels, increase in cell density stromal infiltration and coarsening of its fibers. At a high level of concentration of the mixture, the state of CO cheeks is heterogeneous throughout. Compared with the UKG, the epithelium over a large extent is thinned. It is represented by 4-5 rows of cells with a thin horny layer. In some areas, the stratum conium is exfoliated or completely absent. The basement membrane is thin, very slightly convoluted (Fig. 1).



At low concentrations of the maximum permissible concentration of CO of the gum, it turned out to be very weak and some areas of moderate atrophy of the epithelium were manifested, a slight decrease in keratinization processes and stromal edema. At concentrations at the MPC levels in the gingival system, some increase in path morphological shifts is observed in the form of increased vascularization of the stroma, its edema, inflammatory and lymph histiocytic reaction with the presence of plasma and mast cells, which suggests their autoimmune nature.

At a high level of concentration of harmful substances in the gum epithelium mixture, in all the studied cases, it is heterogeneous in thickness, and at a greater extent it is atrophied with a smoothed papillary layer, an even, poorly expressed basal membrane, which only forms a slightly winding line in some areas. The epithelium is represented by 4-5 rows of cells. Areas of thickening of the epithelial cover are characterized by loosening, edema, and an increase in the number of cell rows. The phenomena of acanthosis with the introduction of epithelial cords into the connective tissue are noted (Fig. 2).
Morphological changes in the liver when exposed to low concentrations of injected substances were manifested in reversible changes in hepatocytes in the form of granular and small-droplet fatty degeneration, the appearance of 2 nuclear and polyploidy forms. as well as the development of discirculatory changes in the stroma with the phenomena of congestive plethora. At the level of MPC values, the liver develops deeper dystrophic changes in hepatocytes in the form of fatty, vacuole, their dystrophy, pronounced discirculatory and

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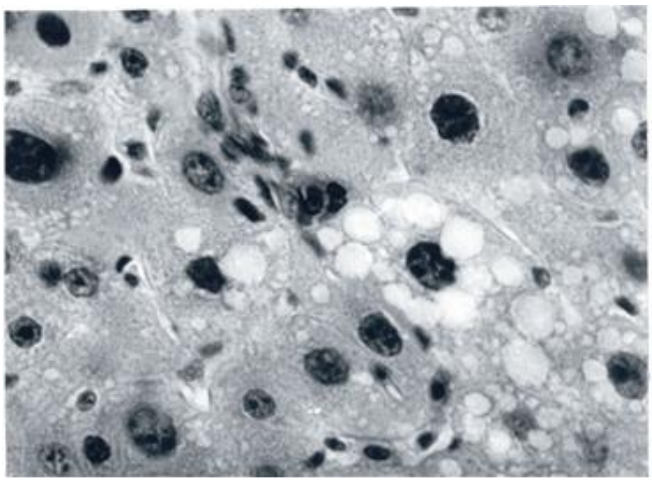
inflammatory changes with the presence of perivascular places. At a high level of concentration, the lobular and beam structures of the liver are not preserved throughout. Sinusoidal capillaries are narrow, only at the periphery of the lobules are slightly expanded.



Liver (Fig. 3.) with a high level of MPC stained with hematoxylin and eosin. SW 600x.

V. Conclusion

The levels and proportion of major dental diseases and the needs of orthopedic care for workers in the studied industries remain quite high, despite the general tendency to decrease them; their prevalence and intensity are not the same for men and women; the proportion, as a rule, increases with age and work experience: - the state of functional indicators and nonspecific reactivity of RP tissues in workers is violated, there is a decrease in the threshold of excitability of teeth and paradental tissues, a threshold of pain, gustatory and discriminatory sensitivity, changes in the micro hardness of tooth enamel and dentin, the macro and microelement compositions of teeth and hair are disturbed due to working pollution zones: - in the main workshops of the studied productions of AMMC and NGCIW, the air of the working area is polluted with a complex of harmful chemicals, including mixtures of substances of hazard classes 1 and 2, depending on the nature of the products, the technology used, the availability and efficiency of the existing sanitary equipment.

At a high level of concentration of the mixtures, it exerted a polytrophic effect on the organism of white rats, mainly it affected the functions of the liver, central nervous system, and irritated CO. The mixture at the level of existing MPC in the air of the working zone exerted its effect on the body as a "summation of effects". Chronic inhalation caused in small concentrations general biological changes in various organs and systems on the effect of the studied substances, i.e. protective reaction, as a peculiar form of development of chronic intoxication. - chronic seeding of animals with a combination at different values of MPC leads the CO of the cheek, gum and liver to changes in a number of morphological indicators, the intensity of which increases in parallel with the increase in their concentration.

The obtained results give us the opportunity to discover and scientifically substantiate the pathogenic mechanisms of the adverse effect of a complex of harmful industrial substances on the liver, soft and hard tissues of RP, plan, develop and create treatment and preventive measures and favorable conditions for workers at production plants such as AMMC and NGCIW taking into account workplace conditions.

The objects of study were the Almalyk and Nizhny Gravel mining and metallurgical plants, their working contingent; for experiment white rats.

The aim of the study was to compare and determine the dental status, level, functional, structural and morphological structure of the organs of the oral cavity, in workers of mining and metallurgical plants, to study the pathogenic mechanisms of a number of diseases, as well as to plan and develop methods for the prevention, treatment, determination and justification of the need for dental care workers of these manufacturing plants. It was determined that the functional parameters and nonspecific reactivity of RP tissues were violated in workers, a decrease in the threshold of excitability of teeth and paradental tissues, a threshold of pain, gustatory and discriminatory sensitivity, changes in the micro hardness of tooth

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enamel and dentin were observed, and macro and microelement compositions of teeth and hair associated with work area pollution.

The authors will conclude that for theoretical judgments on the mechanism of pathological processes and morph functional disorders on the part of organs and tissues of RP and liver working at the mining and metallurgical industry, it serves as the basis for the development of methods for pathogenetic prevention and treatment of identified dental diseases of the future.

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