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Grounding And Solutions of Ecological Sustainability, Stomatology, And Human Health Problems in Scientific-Practical-Experiments

Gafforov Sunnatullo Amrulloyevich[1], Mo'minova Dilnoza Rahimovna[2], Nazarov Ulug'bek Qahramonovich[3], Madaminova Nodira Samandarovna[4], Sobirov Alijon Axmadovich[5], Gafforova Sevara Sunnatulloyevna[6]

Abstract

The results of a long-term scientific study on the negative impact of chemical, physical, biological, physical factors on the organism of workers and environmental environment of industrial enterprises of the Republic of Uzbekistan and neighboring state regions on the cause of the workplaces, the ecogigienic state in the ecological control regime and the production process were comprehensively evaluated. The authors say that to eliminate the influence of negative factors of the ecogigienic system on the human body, it is necessary not only to conduct activities in the area of one state or one territory but also to simultaneously fight the existing states, non-governmental societies and people in the land sphere, to promote environmental concepts in the education widely.

Keywords: *Ecology, Hygiene, Dentistry, Chemical Elements, Physical Factors, Biological Factors, Pollution Of Air, Dental Diseases.*

Introduction

Environmental stability in the 21st century has faced unexpected problems as a result of the improper use of medical resources by mankind, the rapid growth of science and technology in the realization of scientific achievements created by human intelligence, and the fact that the material needs of mankind for the sake of living well-being prevailed over the spiritual views of the ecological environment that has arisen today. It is noted that 30-50 million are needed to extract 300-500 million tons of ore from the ground every day. tons of fuel consumption; 60-80 billion m^3 for their burning of air oxygen and 1-1.5 billion. m^3 of water is consumed, but the useful product obtained is only 2-3%, and at a time when the rest of the mines are expected to pollute the environment as industrial waste, about 1.5 million of the world's population does not have enough food per day, and about 50 thousand people are hungry. as a result, 1.2-1.5 billion people are deprived of clean drinking water, 2 billion people are deprived of electricity, 1.6 billion people are illiterate, and the productivity of the Earth has decreased by 20% - grain areas per capita are from 23 hectares to 0.11 hectares, 20-25 mln. It is noted that a hectare area will become a desert due to sand (Munshed M., 2024) (W.S., 2024).

Currently, 40-50 kg of nitrogen, phosphorus, and potassium fertilizers are used per hectare of fertile land on Earth, and the cost of mineral fertilizers is 300 million per year. per ton; including 180 million for nitrogen. t., phosphorus - 670-700 million. t., potassium - 70 mln. t., these indicators are the fact that 150 kg of nitrogen, 100 kg of phosphorus, and 75 kg of potassium fertilizers per hectare are used in the gray soil lands of the Republic of Uzbekistan (in the UzResStatistics collection (24, 2008). Exactly, in the

[1] Professor Department of Dentistry, Children's Dentistry and Orthodontics, Center for the Development of Professional Qualification of Medical Workers, 100007, Tashkent, Uzbekistan, https://orcid.org/0000-0003-2816-3162, Email: gafforovsunnatullo8@gmail.com, Email: sunnatullogafforov@mail.ru
[2] Department of Dentistry, children's dentistry and orthodontics, Center for the Development of Professional Qualification of Medical Workers, 100007, Tashkent, Uzbekistan, https://orcid.org/0009-0000-5857-7986, Email: dilnozamuminova183@gmail.com
[3] professor, Department of Orthopedic Dentistry, TSMU, 625003, Tyumen, Russian, https://orcid.org/0009-0005-2200-2909, Email: 19ulugbek74@mail.ru
[4] Madaminova Nodira Samandarovna Doctoral student, Department of Dentistry, Children's Dentistry and Orthodontics, Center for the Development of Professional Qualification of Medical Workers, 100007, Tashkent, Uzbekistan, https://orcid.org/0000-0002-5084-336X, Email: madaminova0205@gmail.com
[5] Department of Dentistry, children's dentistry and orthodontics, Center for the Development of Professional Qualification of Medical Workers, 100007, Tashkent, Uzbekistan, https://orcid.org/0009-0002-0296-7867, Email: alijonsobirov204@gmail.com
[6] Department of Therapeutic Dentistry, TDSI, 100047, Tashkent, Uzbekistan, https://orcid.org/0000-0003-0887-4696, Email: sevara_gafforova@mail.ru

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enterprises on the territory of our Republic, pesticides; - nitrogen 600,000 t. (1990 y.), 730,000 tons (2007 y.), including 825,6 tons. - 874.9 t., phosphorous, - 128.9 t., phosphorus mixture, - 149.2 t., nitrate, and other chemical elements were produced, and the indicators have been increasing over the years (Fischer P., 2004) (Xu Q., 2023). Interestingly, according to the World Health Organization (WHO-2020), pathological processes in the human body have increased by 1.2 times over the last 50 years, and new types have increased by 1.2 times. It is necessary to develop environmental strategy plans before representatives (X., 2024) (al.., 2024).

Purpose: Based on the results of retrospective and prospective analysis based on the evidence, to establish the negative effect of the eco-hygienic environment on human health, especially on the activity of organs and tissues of the oral cavity, to improve the prevention, treatment, and rehabilitation of diseases based on scientific, practical and experience.

Materials And Methods

In the first stage - assessment of the importance of the sciences and terminologies related to the field; ecological, hygienic, physiological, clinical-stomatological, morphological, biochemical, biophysical, genetic, immunological, toxicological, and complex analytical bases integrating experimental methods on creatures.

In the second stage; Tashkent, Navoi, Fargona Region Sanitary Epidemiological Service (2022-2024) Fergana Oil Refinery (FerOR) - main group-1 (M/G-1); Almalik Mining and Metallurgical Combine (AlmMMC) main group 2 (M/G-2) and Navoi Chemical Fertilizer Plant (NavFP) main group-3 (M/G-3) workplaces, assessment of the environmental environment around the enterprise, as well as medical sanitation in factories analysis of medical documents of employees of enterprises in the district (A. N. Esen, 2024) (J. Zhou, 2023).

In the third stage; 1600 people; including -1450 workers (M/G-1 - 420; M/G-2 - 425 and M/G-3 - 605 workers) and 150 of those who applied to the polyclinic for dental care not directly related to production - the control group (C/G) the state of the organs and tissues of the oral cavity was assessed using clinical, functional, biochemical, clinical-radiological and clinical-laboratory examinations and returned to the medical record (Table 1).

Table 1. Distribution of people in the research group, age, gender and work experience.

№		The number of people in research		male		female	
	Age and work experience	total number of people	%	total number of people	%	total number of people	%
General	Умумий	1600	100	1052	65,7	548	35,3
	M/G	1450	90,6	980	67,6	470	32,4
	C/G	150	9,4	72	48,0	78	52,0
Age group	20-24 age	165	10,3	125	11,9	40	7,3
	25-29 age	280	17,5	175	16,6	105	19,2
	30-34 age	375	22,3	202	19,2	173	31,5
	35-44 age	400	25,0	200	19,0	200	36,5
	45 years and older	380	23,75	350	33,3	30	5,5
experience (1450 persons)	1-5 yy	425	29,3	270	27,5	155	32,9
	6-10 yy	528	36,4	365	37,2	163	34,7
	11-15 yy	385	26,5	250	25,5	135	28,7
	16 y. and older	112	7,7	95	9,7	17	3,6

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Anamnesis data; objective and subjective conditions - clinical, anatomical, morphological structures and tissues of the oral cavity, as well as sensations, complaints, dental hard tissue caries and notaries injuries, periodontal tissue and oral cavity soft tissue diseases, the presence and need of dental prostheses were evaluated. Tooth sensitivity; optical and discriminative sensitivity of the eye cavity; functional mobility of taste and receptors on the tongue; caries resistance of dental caries, enamel, and dentin microhardness; periodontal tissue cholate (Shiller-Pisareva probe, PMA), oral hygiene cholate, periodontal tissue capillary vessel stability and pH-environment of mixed water (calorimetric method) were studied (X. Hu, 2018) (P. Parno, 2024).

At the fourth level; The annual reports of hygienic toilets in the workplaces of FerOR, AlmMMC and NavFP and in the environmental zone around the enterprise were analyzed and the combined effect of chemical compounds such as furfural, formaldehyde, phenol and acetone on the living organism was more clearly identified in average toilets - with the help of a clinical-experimental study - 120 shots in 3 at different concentration levels: - high concentration - 5 times more than the allowed limit of each chemical compound (1 group (1 g.)), furfural - 50.05 mg/m3, formaldehyde - 2.5 mg/m3, phenol - 1 ,48 mg/m3, acetone - 0,99 mg/m3; at the level of the permitted standard concentration (group 2 (2gr.), - 9.7 mg/m3; - 0.51 mg/m3; - 0.29 mg/m3; - 0.19g/m3 respectively); allowed 5 times less concentration than the standard (LCS) (3 groups 3 g.): - 2.06 mg/m3; - 0.1 mg/m3; - 0.06 mg/m3; - 0.04 mg/m3; - 4 groups (4 groups) were evaluated by creating a chronic inhalation environment without chemical factors (Khasanova, 2024) (Okla, 2024). Holinesterase, acid phosphatase (ALT), liver enzymes: - histidase, erythrocyte sorption capacity 0.5; 2; 4 months. At the end of the clinical experiment, metabolic activity in the liver, the hexenal sleep cycle, the number of molecular peptides in the serum, the permeability of the erythrocyte membrane, as well as the histomorphology of the mucous layer of the liver, the mammary cavity, and the gums were studied. thickness was stained with hematoxylin dye and studied in MBI-15. The results of the data were processed in the generally accepted statistical method - Excel MS Office 2013 based on the Student test (J. Zhou, 2023) (Persoz, 2011) (W. Jiquan, 2009).

Results and its Discussion

In general, ecology and hygiene are important issues to be addressed, environmental hygiene measures should be taken into account, and the individual needs of the population should be taken into account in order to achieve their goals. Ecology “Sanitation Ecology”, “Health Ecology”, “Bioecology Ecology”, “Village Ecology”, “Human Ecology”, “Psychology”, “Social Ecology” should be used to develop sustainable development programs, to improve the quality of life, and to increase awareness of environmental issues. In other words, the model is very sensitive, and the insensitivity of the atrophy of the citizenry is reflected in the fact that the child is a victim of a serious illness. “Hygiene” and “Sanitation” require the use of natural resources, such as medical equipment, medical supplies, and medical equipment. The body, mind, and soul of the person who has been using the body for a long time, and the physiological characteristics of the body, as well as the general knowledge of the body, are the subject of scientific research.

Urbanization - the need to improve the quality of life, safety, and transport - the need to develop the economy of Uzbekistan. The WHO expert group "provides 8-10% of the required amount of water, 20% of the required amount of water, and 50-52% of the required amount of water" is used. The organism is a physiologist and pathophysiologist, and the body is a pathologist. To achieve this, the complexity of tasks and services provided by the authorities is to increase the number of people who have the opportunity to achieve their goals.

It was determined based on the data of sanitary epidemiology service: average in M/G-1: serum hydrogen - 10.0 mg/m³ (LCS=0.008 mg/m³); benzene - 5.0 mg/m³ (LCS=0.1 mg/m³); toluene - 65.0 mg/m³ (LCS=0.8 mg/m³); gasoline - 105.0 mg/m³ (LCS=1.5 mg/m³); phenol - 0.3 mg/m³ (LCS=0.003 mg/m³); hydrocarbons (total) - 358.0 mg/m³ (LCS=0 mg/m³); benzene 21-48% in samples at different points of the enterprise; toluene 15-33% is allowed standard amount; however, it was found out that 13 times more

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sulfur, 12 times more benzene, 4 times more, and 1.8 times more gasoline than allowed were found in the 1st workshop.

M/G-2 in jobs; the presence of hydrogen peroxide, benzene, phenol, and formaldehyde in different amounts - these chemical elements are of the 2nd level of danger, as well as stone and metal dust, sulfuric and acetic acids, methanol, tetrahydrofuran, formaldehyde substances were found to be higher than LCS in some tests.

In M/G-3: NO2, NO3, HCN, CO2, CH3OH, CO, CH3COOH, acetone, ammonia, and the concentration of ammonia and SO from these substances is 1.5-2.0 times; CH3OH 1.2-1.6 times; It was found that NO2, NH3, CO are 1.2-1.3 times higher than the permissible limit in some tests. In the air of working urine in M/G-3, sulfuric acid - 15% of the sample, methanol - 6% of the sample, furfural - 8.5% of the sample, formaldehyde - 4.5% of the sample exceeded the average permissible limit; dust content increased by 16.9 mg/m3, sulfuric acid aerosol increased by 1.1 mg/m3.

The level of VML among workers in 2022 and 2023 is dynamic: - M/G-1 - diseases of the respiratory system (- 25.8%; - 29.8% in compliance); diseases of the digestive system (- 12.5%; - 14.3% in compliance); diseases of the musculoskeletal system (- 9.8%; - 9.6% sequentially), 2.5-3.2% per 100 workers among women at the same time, 53.6-59.1 days of MLK per year; loss of working days due to intestinal infection - 47 days, heart ischemia - 27.8 days, pneumonia - 22.5 days, nervous diseases - 20.5 days, fetal complications - 20.4 days were determined: - M/G-2 breathing system diseases (- 29.3%; - 32.9%); diseases of the digestive system (- 9.8%; - 9.6%); observation of musculoskeletal system diseases (- 11.2%; - 7.6%): diseases of respiratory organs in M/G-3 - 39.6%; musculoskeletal system diseases 8.1%; kidney and urinary system diseases 5.1%; gastrointestinal system and liver diseases 7.2%; other types of disease are observed up to 5.5%, there is a tendency to increase, similar to MLK as in M/G-1 is also observed in M/G-2 and M/G-3. The clinical and stomatological picture of the organs and tissues of the oral cavity of the research group is shown (Table 2): caries prevalence M/G-1 - 92.8%, M/G-2 - 89.9%, M/G-3 - 88 .6%; intensity - CPE (caries, plomb, extraction) - 11.8; 10.2; In 10.4 matches: chemical necrosis M/G-1 - 15.2%, M/G-2 - 17.6%, M/G-3 - 22.6%, among C/G patients these pathologies are several we observe that it is rare in quantity. If tartar and caries: C/G 13.3%, C/G-2 23.3% C/G-3 18.8%, and C/G 12.6%, localization was determined mainly in frontal lower and lateral upper teeth.

Table 2. Those who passed the dental examination by age and gender.

Groups / Stomatological pathologies		FerOR (M/G-1)		AlmMMC(M/G 2)		NavFP (M/G-3)		C/G	
		Number	%	Number	%	Number	%	Number	%
Spread of caries		390	92,8 %	382	89,9 %	536	88,6 %	99	30,7 %
CPE		420	14,8	425	11,6	605	13,2	150	9,6
Of them	C	To one person	8,4	To one person	4,6	To one person	7,0	To one person	2,4
	P		3,4		4,0		4,2		4,8
	E		3,0		3,0		2,0		2,4
Nocaries obstacles	PE	58	13,7 %	67	15,8 %	156	25,8 %	17	11,3 %
	ChN	64	15,2 %	75	17,6 %	137	22,6 %	11	7,7%
	MD	104	24,8 %	69	16,2 %	90	14,8 %	12	8%
	TC	56	13,3 %	99	23,3 %	114	18,8 %	19	12,6 %
Diseases of	gingivitis	75	17,8 %	66	15,5 %	130	21,5 %	13	8,7%

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periodontal tissues	parodontisis	206	49,1 %	223	52,5 %	315	52,1 %	62	41,3 %
	parodontosis	35	8,3%	35	8,2%	60	9,9%	7	4,7%
Diseases of the mucous membrane of the mouth	leukokeratosis	32	7,6%	26	6,1%	61	10,1 %	5	3,3%
	cheilitis	35	8,3%	28	6,6%	59	9,7%	6	4,0%
	leukoplakia	73	17,4 %	62	14,6 %	117	19,3 %	10	6,7%
	glossite	19	4,5%	18	4,2%	47	7,7%	6	4,0%
Orthopedic correct condition and row of teeth	NNP	32	7,6%	38	8,9%	147	24,3 %	90	60,0 %
	PD	37	8,8%	40	9,4%	61	10,1 %	63	42,3 %
	PN	250	59,5 %	251	59,1 %	342	56,5 %	16	10,7 %
	M	151	35,9 %	151	35,5 %	232	38,3 %	15	10,0 %

Note: Pathological Excision-PE; Chemical necrosis-ChN; Mechanical damage-MD; Tartars and calculus-T and C; No need for a prosthesis-NNP; Presence of dentures-PD; Prosthetic need-PN; Malocclusion-M.

According to the research results, periodontal tissue diseases; - M/G-1 – 70.0%; M/G-2 – 75.1%; M/G-3 – 79.0%, as well as C/G – 54%: Including; moderate gingivitis; M/G-1 - 17.8%; M/G-2 – 15.5% and M/G-3 – 21.5%. According to the nature of the clinical course of gingivitis, swollen gums, and roller-like gums were observed, which were spongy and easily separated from the teeth. Also, obvious atrophic processes were detected in the periodontal tissues - pale gums, firmly attached to the teeth, but not to the neck of the teeth, but to their roots. The neck part of the teeth is open, mainly on the lung and tongue sides.

Diseases of the oral mucosa: M/G-1 – 37.8%, M/G-2 – 31.2%, M/G-3 – 46.9% and C/G 18%; including; leukoplakia M/G-1– 17.4%; M/G-2 – 14.6%; M/G-3 – 19.3% copper content is significantly different from C/G (6.7%). Clinical form of leukokeratosis - white, pea-sized spots from the head of the heel to the size of a pea, appeared on the surface of the skin and had a sunken red dot in the center.

In M/G, the need for prosthesis is high; M/G-1 – 59.5%; M/G-2 - 59.05%; M/G-3 - 56.2% and only 7.35% in C/G: - there are dentures; - 8.8%; - 9.41%; - 10.1% in compliance; and C/G - 42.3%: the percentage of workers who did not feel the need for a prosthesis ranged from 7.62 to - 24.9% in M/G, while in C/G this indicator was observed - 58.8%.

Functional studies: - Electroodontometry (EOD) was performed on 126 study participants: 35 workers from each M/G and 31 from C/G for comparison; the upper jaw (u/j), central incisors (I), canines (C), first molars (M) were selected as the research object, while the electron reflectivity (EOD) of 378 teeth was determined: I u/j - 158, C u/ j - 145, M u/j - 75: Results; M/G-1 sensitivity limit decreased - maximum (max) value in MK - 52 μA, minimum (min) - 3 μA: average 28±2.4 μA; At I - 75 μA - upper limit, min - 2 μA, average 33.4±1.8 μA; 44 μA at M, min. - 6 μA, average 40.3±2.4 μA. M/G-2, max. value MK - 44 μA, min - 8 μA; average - 23.3±1.2 μA; At K - 62 μA, upper limit - 6 μA, average - 28.2±1.9 μA; 43 μA at M, min. 8 μA, mean 40.8±2.1 μA. In M/G-3 workers, these indicators were compiled: 58 μA, 4 μA; average 29±1.4 μA; 85 μA in I, 1 μA, mean 31.4±3.8 μA; In M, 40 μA, 4 μA, average 35.3±1.4 μA were plotted respectively. At the same time, when C/G individuals were studied, the results showed that in individuals with intact teeth, the threshold excitability ranged from 5 to 9 μA, with an average of 7.5±1.2 μA in MC and 4.4±1.2 μA in C, M - 5.2±2.2 μA was observed. Analysis of the results indicated that the mobility threshold of all the studied teeth of M/G-1, 2, and 3 workers was significantly decreased compared to C/G ($P<0.001$). At the same time, the amplitude of the decrease was different for different groups of functionally oriented teeth, so the EOD in M and C decreased by 4-7 times.

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The sensitivity of the neuroreceptor sensing apparatus in the mucous cavity of the oral cavity. The results of 120 examinations (30 people from each group) revealed that the sensitivity of the vestibular surface of the mucous cavity of the oral cavity is stronger than that of the oral part of the alveolar cavity (P<0.001). M/G workers had a higher threshold of neuroreceptor perception in the area of 4 teeth compared to the palatal surface of 2 and 6 teeth (P>0.5 - P<0.05). In the M/G group, the limit of 2 teeth on the palatal surface of the vestibular surface was lower than the buccal cavity of the buccal cavity (P<0.05), but there was no significant difference in the indicators between the 2, 4, 6 teeth (P>0.05). 75 subjects (20 workers from each M/G and 15 from C/G) were tested for tongue taste; result 45 M/G workers complained about taste sensitivity disorders: the threshold of taste sensitivity was expressed mostly by sour (31.2%) and bitter (25%) and the most decrease in sweet (53.1%) and salty (59, 4%) was according to; M/G-2 workers - 45.2%; - 34.7%; 41.2% and 39.2%; M/G-3 workers - 22.8%; - 28.9%; - 66.8% and 62.5% respectively. Also, when sweet and salty taste sensitivity was detected in most cases, sour and sour-bitter taste sensitivity disorders were noted: 42.8% in M/G-1; 34.6%; 33.4% in M/G-2; 33.2%; 55% in M/G-3; 44.8% respectively. When the threshold of sour and sour-bitter taste was determined, a violation of the sour-bitter sensation was noted: 22.4% in M/G-1; 31.1%; 43.6% in M/G-2; 48.2%; 35% in M/G-3; respectively in 24.8% of cases. The obtained data indicate that M/G workers have lower sour and bitter taste thresholds and reliable differences with C/G.

An Enamel microhardness study was conducted on 55 molar teeth; M/G-1 - 20; M/G-2 - 20 and 15 teeth from M/G-3; 10 teeth extracted with complications of periodontitis were compared as C/G. Study: a) molar enamel - on the surface, thickness, and at the dentin-enamel junction; b) dentin - 10 measurements were made at the dentin-enamel junction, in the dentin layer, and in the tooth cavity. Microhardness studies of enamel of different layers in C/G individuals showed that superficial layer enamel had the greatest value - it was significantly higher than other layers (P<0.001). Microhardness in the enamel layer is significantly higher (P<0.001) than in the dentin-enamel junction but lower than the surface.

M/G workers were evaluated according to caries resistance test (CRT) Level 4; Level 1 - from 10 to 30%, level 2 - 30-40%, level 3 - 40-50%, and level 4 - more than 50% (Table 3).

Table 3. Condition of the functional indicators of the tested.

Checked groups	CRT	Level of resistance	GI	furnace demineralization	ph-oral fluid
FerOR (M/G -1)	55,1±1,5^{x}	4^{x}	4,9±0,05^{x}	36,8±1,9^{x}	5,2±0,01^{x}
AlmMMC (M/G -2)	34,5±1,2^{x}	2^{x}	3,2±0,06^{x}	28,3±1,9^{x}	6,1±0,01^{x}
NavFP (M/G-3)	52,9±0,9^{x}	4^{x}	4,9±0,05^{x}	33,4± 2,2^{x}	5,4±0,01^{x}
C/G	22,4±1,3	1	1,4±0,03	6,3±1,0	6,8±0,02

Note: ^{x} - reliability of comparison

23.2% of M/G-1 examinees were rated as 1st level of caries resistance, 21.8% as 2nd level, most of them (55%) as 3-4 level. pH-environment in the saliva of M/G workers is acidic in the description, and the salivary pH-environment of C/G individuals is 6.8, which is partially a working environment. In our opinion, the pH-environmental value of saliva is the air entering the oral cavity, acid gases, vapors, microdust and furfural, furan, tetrahydrofuran, tetrahydrofuryl alcohol, furyl alcohol, ethyl alcohol, xylitol, varnishes, nitrogen, copolymers, phenolformaldehyde resins, catalysts, feed changes as a result of interactions with fungi, acetone, sulfuric acid aerosol, hydrocarbons and substances such as acetone.

We studied the microelement composition of enamel, dentin, cementum, hair, blood, and saliva by neutron activation method; materials 20 teeth and 12 hair, blood, and saliva samples were collected from each M/G; literature data were used for control. Results: (Table 4), there is no silver (Ag) in M/G-1 tooth enamel, Ag content in M/G-2 and M/G-3 tooth enamel is 1.45±0.02; -1.88±0.22* is close to the norm. In dentin, on the contrary, the amount of Ag in M/G-2 and M/G-3 is heavy, and in M/G-1 the amount of Ag in dentin is 3-4 times higher than the norm. The amount of Ag in dental cement exceeds the C/G ratio by up to 2

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and several hundred times. In all groups, the amount of calcium (Ca) in tooth enamel is higher than normal, and the amount of Ca in dentin tends to decrease, especially in M/G-3 - 8 times (4.5±0.91*).

Table 4. Amount of trace elements (Ca, Zn, Fe, Ag) in teeth, saliva and blood in employees

Object analysis	Microelements (mg)	C/g	FerOR (A/Г-1)	AlmMMC (A/Г-2)	NavFP (A/Г)
	Ca^{+2}	25,3+1,48	32,0+0,92*	30,8+1,36	29,5+1,13*
Enamel	Zn	185,0+11,3	136,0+16,7*	3763,0+131,0*	5361,0+261,0*
	Fe	32,0+1,41	62,0+0,44*	63,1+0,86*	14,4+0,33*
	Ag	2,2+0,01	-	1,45+0,02	1,88+0,22*
	Ca^{+2}	36,0+1,6	29,0+1,4*	29,8+1,4	4,5+0,91*
Dentin	Zn	368,0+19,4	3780,0+124,0**	3881,0+144,0*	5173,1+98,6*
	Fe	-	3,4+1,68**	-	<1,0
	Ag	0,56+0,01	2,45+0,098	-	-*
	Ca^{+2}	26,0+0,91	0,68+0,041*	24,8+0,84	2,99+0,32*
Cement	Zn	92,0+3,6	28,4+0,42*	3036,2+131,4*	2351,0+49,0*
	Fe	0,1+0,001	1,9+0,44*	471,8+42,1*	0,98+0,01*
	Ag	0,27+0,01	9,0+0,28**	2,4+0,23*	0,51+0,013*
Blood	Ca^{+2}	10,9+0,71	14,2+1,84	11,2+0,91	12,6+1,15
	Zn	112,0+10,6	86,8+3,5	76,4+3,21*	89,6+4,62*
	Fe	124,0+6,4	102,2+4,08*	96,0+3,19*	100,8+4,84*
	Ag	0,24+0,01	0,19+0,08	0,20+0,01*	0,22+0,08*
	Ca^{+2}	8.31+0.29	9,41+0,25	7,72+0,58	8.8+0.58
Oral fluid	Zn	30,8+1,46	36,4+1,94	74,6+3,76*	62,8+2,11*
	Fe	88,4+3,1	84,4+3,44	62,1+2,65	74,6+3,11*
	Ag	0,08+0,004	0,44+0,024*	0,06+0,003	0,09+0,054*
	Ca^{+2}	1060+174	3480+420*	6080+17,44	5044+8,44
Hair	Zn	225+8,5	210+30	180+4,54	140+4,5
	Fe	18+1,6	44,4+1,8*	48+1,64	38,4+1,45
	Ag	0,04+0,06	1,8+0,23	4,88+0,98	1,48+0,44

Note: * - P<0,05 reliability compared to the results of the control group.

In M/G-1 and M/G-2, the amount of iron (Fe) in tooth enamel was 2 times higher than in C/G, and in M/G-3 it was the opposite, that is, it was almost 2.5 times lower. Iron (Fe) is usually undetectable in normal dentin, but in our study, it was present in large amounts (3.4±1.68**) in M/G-1 dentin. Fe content in dental cementum was 18 times higher than C/G in M/G-1, about 450 times higher in M/G-2, and 8 times higher in M/G-3. Zinc (Zn) content in M/G-1 tooth enamel was 1.4 times lower than C/G, 20 times higher in M/G-2, and 37-40 times higher in M/G-3. Zn content in dental dentin was 10-16 times higher than C/G in all groups. The amount of Zn in dental cement was reduced by 3-4 times in M/G-1, while it was 250-300 times higher in M/G-2 and 3 (2351.0±49.0*; 3036.2±131.4*). The results of the microelement spectrum determined in the research show that there are differences in the amount and quality of the microelements of the teeth, which is probably related to the influence of different production environments.

In the blood of all M/G workers, the content of Ca increased (R>0.05) and was in the upper limit; the amount of Ca in saliva was slightly decreased in M/G-2 and significantly increased in M/G-1 and -3. Fe content in blood and saliva was decreased (R<0.05) in all M/G compared to the C/G group.

Also, the increase in acid phosphatase activity in individuals working in M/G-1, 2, and 3 (27.1±1.3; 29.6±1.2; 21.2±1.4) compared to C/G (26.8 ±1.2) (R<0.01) was found to be higher. This is due to the destabilization of lysosomal membranes and the shift of the pH environment of saliva to the acid side. Decreased activity of active phosphatase (6.2±0.61; 6.4±0.72; 7.2±0.54) was lower than C/G (9.1±0.88)

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(R<0.01) reflected in the enrichment of saliva with acid. Based on the above data, there is enough reason to conclude that the change in the enzymatic spectrum of M/G workers is mainly related to the influence of harmful factors in production. The results of the preliminary research are as a result of the analysis, as a result of the exposure of M/G employees working in industrial enterprises to occupational harmful factors, the functioning of the taste analyzer is impaired, the negative change of saliva pH-environment, negative conditions in the indicators of GI, PI and PMA of the oral cavity, microhardness of dental hard tissue, decrease in resistance, confirms that negative clinical conditions of the oral mucosa cavity and periodontal tissue are observed more often, in large quantities and severe forms compared to C/G. At the same time, it was observed that negative changes are inextricably linked with the increase in seniority of workers and the deterioration of the eco-hygienic environment in workplaces.

As mentioned above, chronic intoxication in an artificially created environment - white rats in the experimental groups, with initially very anxious behavior, after 2-3 days, the anxiety subsided, became severe, forced food consumption and only 2 weeks after the start of the experiment, the condition showed moderation. During the experiment, at the end of the 3rd month, the animals of the 1st group lagged behind the C/G in terms of weight (P<0.05), and in the 4th month, the weight gain not only in the animals of the 1st group but also in the animals of the 2nd group lagged behind the C/G (Table 5).

Table 5. Dynamics of biochemical and biophysical indicators during long-term treatment with concentrations of compounds produced by various inhalation devices in white rats.

Groups	Dynamics of body mass (in grams); inspection time (months)						
	Фон	0,5	1	2	3	4	Recovery period
Tana massasi (g)							
I	101,5±3,1	115,8±4,6	121,9±3,6	139,9±2,2	146,8±2,9*	161,7±3,8*	194,9±5,9
II	100,1±2,96	117,3±4,2	131,5±3,73	140,8±2,51	155,7±4,68	170,4±2,94	203,2±3,7
III	102,2±1,38	110,2±3,5	125,1±2,8	139,4±2,67	160,3±2,53	180,3±1,72	202,7±2,8
IV (C/G)	101,9±1,91	111,7±2,2	128,3±1,59	134,3±1,75	160,8±1,82	178,7±1,24	200,4±2,6
Norkov reflex condition (measured during 3 minutes);							
I	10,0±0,8	9,0±0,8	7,0±0,49	7,0±0,45	6,0±0,8	5,0±0,43*	9,0±0,8
II	10,0±0,8	9,0±0,8	8,0±0,8	9,0±0,8	9,0±0,66	7,0±0,43*	9,0±0,8
III	9,0±0,83	10,0±0,67	9,0±0,8	8,0±0,8	9,0±0,8	10,0±0,8	10,0±0,47
IV (C/G)	9,0±0,8	9,0±0,8	10,0±0,67	8,0±0,8	8,0±0,62	9,0±0,46	10,0±0,64
Hemoglobin content in peripheral blood (g/l)							
I	129±5,68	136±7,24	131±5,38	119±4,46*	102±4,86*	91±5,83*	107±4,19
II	133±4,71	132±6,99	135±3,94	138±5,67	127±5,91	111±6,69*	125±3,99
III	228±6,89	133±6,89	129±5,28	131±5,12	135±4,52	134±7,38	130±5,82
IV (C/G)	131±4,26	137±3,83	133±4,56	136±4,95	130±3,68	139±4,45	127±3,98

Two months after the start of the experiment, the amount of hemoglobin in the peripheral blood of animals of the 1st group was 119 g/l, C/G 136 g/l (P<0.05), in the 3rd month 102 g/l, C/G 130 g /l (P<0.05), and 91 g/l in the 4th month, 139 g/l in C/G (P<0.05). One month of rehabilitation was enough to normalize the amount of hemoglobin in animals in this group.

Alkaline phosphatase, AST, and ALT activity in the blood serum of group 1 animals, the amount in the blood increased significantly in the 1st month, the intermediate of which, alkaline phosphatase and ALT activity in group 1 animals did not normalize (P<0.05). The whole blood of rats according to the research

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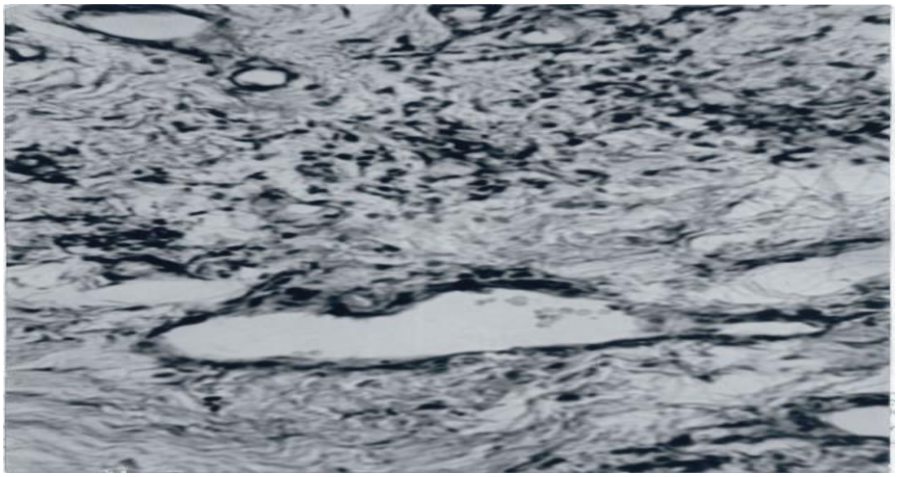
showed that at the end of 2 months, the activity of the enzyme, which was statistically significant (P<0.05), was observed in animals of the 1st group.

At the end of the experiment, it was observed that the sleep time was statistically prolonged (P<0.05) in the animals of group 1, which indicates a decrease in the metabolic activity of the liver. Indicator of endotoxemia is manifested in the inhibition of mitochondrial respiration and disruption of DNA synthesis and transport of amino acids, negative changes in the amount of medium molecular peptides in the serum, especially in animals of groups 1 and 2.

At the end of the experiment, the white rats were killed by the decapitation method, and the histomorphology of the mucous membrane of the oral cavity, myc, and liver tissue was studied. In animals of group 1, the condition of the surface mucous membrane compared to C/G - the epithelium is thin over a long distance, with 4-5 rows of cells and a thin friable layer, in some places the friable layer is separated or completely absent, the basement membrane is thin, very rare; cells are not well differentiated, their nuclei are slightly elongated. The granular layer is thin, and keratohyalin granules are visible. Basal cells are identified, mitotic figures and dystrophic changes are seen, and dyscomplexation in some places (Figure 1).

Figure 1. Facial mucosa in group 1 animals. Expansion of vessels and their filling with blood, coarsening of fibers, focal lymphohistiocytic infiltration. Hematoxylin and eosin. Magnification 200 times.



Compared to C/G (group 4) and acceptable low levels, a coarser and more unfavorable thickness of the epithelium and an increase in signs of atrophic changes and dystrophy were revealed. In some places, the brittle layer is completely absent. In the papillary and lower layers, the presence of sharply expanded blood-filled vessels, among which there are many large mast cells, the spread, and coarsening of muscle and connective tissue fibers, as well as the presence of groups of mucous glands with many large swollen epithelial cells among them are noted.

In animals of the 1st group, the gingival mucous membrane was uneven in thickness, and in most parts, the papillary layer was flattened, the basement membrane was not spread and in some places it was rare. The brittle layer is thin, and separated in some places, sometimes layers are visible on its surface. The granular layer is poorly defined, with elongated cells and few keratohyalin granules. Epithelial thickness planes are characterized by scattering, swelling, and proliferation of cell lines. Signs of acanthosis and infiltration of epithelial tissue into the connective tissue were noted (Figure 2).

Figure 2. Group 1 animals possessing a ciliary layer, epithelial folds, and corneal thickening. Proliferation of cell lines. Stromal swelling. Hematoxylin and eosin. Registration is March 100.

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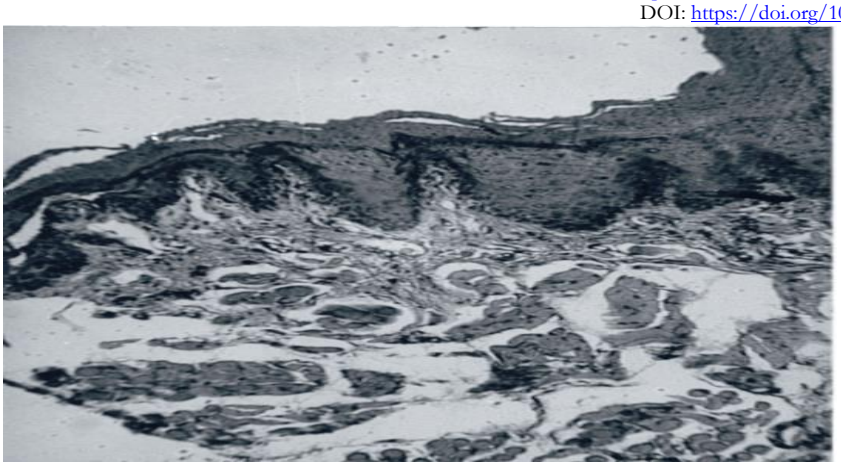
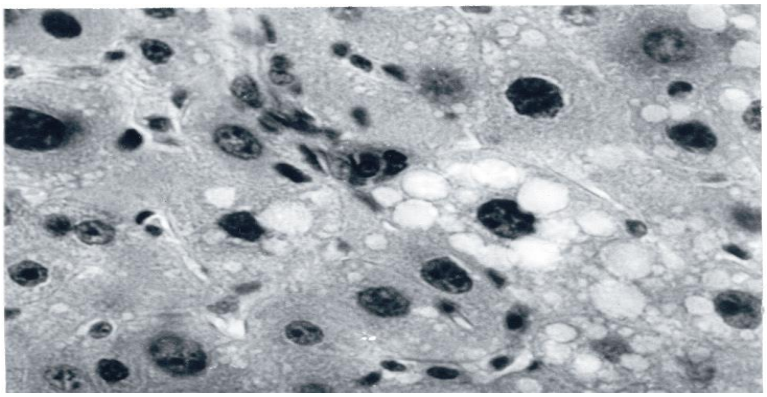


In the liver with changes to the life of the 1st group, the total life of partial and block driving was stored. Sinusoidal capillaries are located in the middle of several in the width of single capillaries. Hepatocyte cell appearance is improved as a result of pericellular fibrosis. There is the proliferation of sinusoidal capillaries and a proliferation of Kupffer cells. Hepatocytes with characteristic, homogenous, weak eosinophilic cytoplasm are mainly composed of heavy (Figure 3) and parts with isolated hyperchromic polyploid nuclei.

Figure 3. In the liver of group 1 animals. Polyploidy nucleus. The presence of large hepatocytes is a condition of vacuolar and fatty dystrophy. Hematoxylin and eosin. 600 times catalyzed.



Thus, the polytropic effect of compounds of high concentration (gr. 1) on the body of white rats is reflected in the activity of the central nervous system, as a result of which the activity of organs and tissues of the oral cavity is negatively affected. In the working environment, the "sum of effects" of the chemical elements in the existing environment on the organism - the type, co-concentration, and duration - showed negative complications. Here, in response to the chronic and increasing influence of negative factors, it leads to the formation of a general biological defense reaction in various organ and tissue systems.

Results

The leading harmful factors in the workplaces of enterprises in M/G-1 and 3 are phenol, formaldehyde, furfural, benzene, hydrogen sulfide, and sodium hypochlorite; In M/G-2, it contains sulfuric acid, benzene, stone and metal dust, and acetic acid, and tetrahydrofuran, which hurts the health of workers. The complex sum of chemicals in the air of these production enterprises causes their transformation into chemical elements of the 1st and 2nd level of toxicity, as well as moisture in the air, the concentration of biological and physical elements in the air causes the formation of negative processes in the body of workers.

Thus, among the workers of FerOR, AlmMMC and NavFP named above, the rate of dental diseases is average; prevalence of caries - 90.43; caries growth index - 0.89; chemical necrosis - 18.43%; pathological

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production - 33.2%; enamel mechanical damage - 19.9%; teeth and dental caries defects - 18.5%; periodontal diseases - 74.7%; stomatitis - 38.7%; exposure to dentures - 58.4%; - temporomandibular joint pathologies - observed in 36.6%, it is important to note that the rates are from 1.5 times to 5.5 times higher than the rates among N/G people in the study.

Indicators of non-specific local immune reactivity in organs and tissues of the oral cavity among M/G workers: - sensitivity of teeth and peri-dental tissues up to 4-6 times; decrease in taste, pain, and discriminative sensitivity from 25% to -59.4% of the norm; tooth enamel and dentin microhardness - up to 13% on the surface of the enamel, 11.8% as it progresses to the inner layer, down to 1.2% at the enamel-dentin border: significant negative changes in the GI, PMA-indices of the oral cavity of the sanitary-hygienic indicators in the workplace confirms the direct or indirect effect on tissues and organs.

The chronic aging process of white rats in the environment created in the experiment; the effects of chemical elements such as furfural, formaldehyde, toluene, and acetone at different levels of the allowed norm in work urine, biological reactions of organisms, substrates in mine and my serum, histomorphological indicators - negative changes in the mucous membrane of the oral cavity, mycelium, and liver tissue, analyzed among the workers in the research group once again confirms the direct role of sanitary-hygienic negative environment in workplaces in functional negative changes.

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