

CINETICS OF LEAD IN BIOLOGICAL MEDIA OF HUMAN ORGANISM AND USAGE OF ENTEROSORBTION, MUSCULAR AND HEAT LOADINGS

V.D. Medvedkov, N.I. Medvedkova, P.G. Bagderin, S.V. Ashirova, I.A. Ashirov

Perm State Technical University, 614600, Russia, Perm, Komsomolskiy Prospect, 29a
Perm State University, 614004, Russia, Perm, Bukirev Street, 15

Abstract: In the course of fundamentally applied investigations the possibility of lead unloading of human organism has been established by means of muscular loadings and muscular and heat effects, as well. Dependence has been revealed according to which increasing muscular foot loading in relatively favourable ecological environment increases lead unloading of human biological media. The discovery of detoxication function of directed physical loadings has become the basis for elaborating and receiving a patent for the invention « A Means of Lead Excretion out of the Human Organism.» Ecological, social and economic effects of the received data are as follows. Lead is one of the strongest cancerous substances. Therefore its high concentrations in human organism can lead to reducing the growth of cancer tumour from 25 to 4 years imperceptible for humans. It can shorten the span of human life. It is generally known that the rising amount of lead in human organism can cause human intellect abatement, lack of bone apparatus stability and capacity for work of nervous system, violation of microelement homeostasis. Widely used lead unloading technology would protect man from the harmful factors mentioned above and could call forth positive ecological, social and economic effects.

Key words: organism lead unloading, muscular and heat loadings

On the basis of the materials [1] of the International Committee of Experts on radiative protection some calculations have been carried out by us. It has been demonstrated that intensive sweating an adult male organism during an hour can excrete up to several daily doses of selenium and sodium, 250% of daily dose of iron, 200% of fluor, 39% of chlorine, 23% of zinc, 5% of manganese, etc. It is a good evidence for the possibility of the regulation of human microelement homeostasis using muscular and heat loadings.

Sports nutrition experts have determined a sharp increase of microelement excretion out of human organisms. They also have found out their corresponding negative balance under frequent repetition of large and durable muscular loadings, the reduction of their concentration in most internal and blood of sportsmen.

On the basis of blood, urine, feces, sweat containing microelements tests experts have settled down the expediency to use food additions by the people doing in for different kinds of sports [2-5]. The above-mentioned data have become the basis for putting forward the hypothesis of the muscular and heat loadings for excretion of toxicants and abundance of heavy metals with persons living and working under unfavourable ecological conditions.

The effectiveness of lead unloading of human organism by the complex usage of muscular and heat loadings

Lead concentration in hair, nails and urine of children from Perm has been defined for experimental tests of the hypothesis. The analyses have been carried out in the sanatorium before and after rehabilitation. In the control group only enterosorbent and physical loadings

have been used including muscular and heat ones (the basic method of elimination). Heat and physical exercises have been undertaken to stimulate sweating and metabolism of children dressed in warm clothes and 3-4 times of taking a steam bath. The results of rehabilitation during one month are shown in Table 1.

Using enterosorbent and heat loadings for lead unloading out of human organisms the reduction of lead amount in hair was equal to 4.76 mkg/g (36.84%), in nails did 25.26 mkg/g (46.88%), in urine lead concentration increased by 0.14 mg/l (116.67%).

Using enterosorbent alone the dynamics of lead concentration was the same in all the three biological media, but the amplitude was less and was equal to 3.06 mkg/g (23.22%), 20.05 mkg/g (34.97) and 0.32 mg/l (266.67%) respectively. The basic method (enterosorbent and physical loadings) ensured more considerable reduction of heavy metal amount in solid biological media: in hair – by 1.70 mkg/g (35.71%), in nails – by 5.21 mkg/g (20.63%).

As the concentration of lead in urine of children after rehabilitation was less when using muscular and heat loadings, it is assumed that the excretion of lead at the beginning and in the middle of 24 days period of sanitation by means of the basic method in comparison with the usage of enterosorbent has been more rapid.

The higher eliminational effect has been combined with the considerable increase of the capacity for work of the children. It took less time for covering the distance of 164 metres by the boys at the age of 8 from 52.25 to 49.00 sec.; 210 metres from 85.60 to 81.80. Time of racing test distances was worse among children used enterosorbent alone. On the whole the results of this experiment have demonstrated the stimulation of lead elimination and increasing the capacity for work of rehabilitants using additional muscular and heat loadings during 24 days of rehabilitation.

The effectiveness of lead elimination by muscular loadings

There were two experimental groups consisting of 18 boys and 22 girls and two control groups consisting of 17 boys and 19 girls in the second similar experiment for a month. The average age of children was 7.7 years old. The reduction of lead concentration in hair of boys from the experimental group when using enterosorbent, muscular and heat loadings was equal to 18.53 mkg/g (98.09%), of girls – 11.01 (84.05%) with high reliability ($P<0.001$) of shifts in both groups (see Table 2).

Table 1. Lead Concentration Changes in Children. Hair, nails, urine under rehabilitation.

Method	Quantity	Lead concentration		Changes		Effect of Muscular and Heat Loadings	
		Before R	After R	±absolute	±%	±absolute	±%
In hair, mkg/g							
1	19	12.92	8.16	+4.76	+36.84	+1.7	+35.71
2	5	13.18	10.12	+3.06	+23.22		
In nails, mkg/g							
1	19	53.88	28.62	+25.26	+46.88	+5.21	+20.63
2	5	57.33	37.28	+20.05	+34.97		
In urine, mg/l							
1	19	0.12	0.26	-0.14	-116.67	-0.18	+128.57
2	5	0.12	0.44	-0.32	-266.67		

Designations: 1. Rehabilitation with enterosorbent, muscular and heat loadings (the basic method); 2. Rehabilitation with enterosorbent; R – rehabilitation.

Table 2. Lead Concentration Changes in Children Hair and Urine under Rehabilitation

Lead rate in biological media	Sex	Group	Quantity of persons	Lead concentration		Its changes		R
				Before R	After R	Absolute	Relative	
In hair, mkg/g								
0.71±0.1 2	B	Ex	18	18.89	0.36	+18.53	+98.09	<0.001
		C	16	25.24	9.84	+15.40	+61.01	<0.05
	G	Ex	22	13.10	2.09	+11.01	+84.05	<0.001
		C	19	25.94	14.83	+11.11	+42.83	<0.05
In urine, mkg/l								
246±34	B	Ex	18	394	250	+144	+36.55	>0.05
		C	16	406	244	+162	+39.90	>0.05
	G	Ex	22	359	236	+123	+34.26	>0.05
		C	19	285	211	+74	+25.96	>0.05

Designation: Ex – experimental group, C – control group, R - rehabilitation, B – boys, G – girls.

Using enterosorbent and heat loadings without muscular loadings the similar eliminational effect in control groups was lower and was equal to ($P<0.05$) respectively 11.01 (61.01%) and 11.11 mkg/g (42.83%). The effect of rapidly eliminating part of lead out of hard tissues was equal to 37.08% among boys and 41.22% among girls. The reduction of lead concentration in urine of the children from all the four groups was 25.95 - 39.90% ($P>0.05$). One experimental group has demonstrated the tendency to reducing elimination of the toxicant from the urine of the children, that was higher than in control groups.

Decreasing lead concentration in solid and liquid media of rehabilitants has confirmed partial purification of the children organisms. Muscular loadings stimulated lead elimination out of the organism.

The dependence of lead elimination effect in the human organism on the volume of muscular loadings

The following lead elimination effects have been observed using muscular loadings of various volumes. More effective lead unloading of hard of the organism was seen in the group of girls as the quantity of health trainings increased from 5 till 15 for the period of 28-35 days. Reducing lead concentration in nails was equal to 27.9% ($P<0.001$) without using walks on feet in warm clothes, while using them (10 walks on feet) it was 33.8% ($P>0.05$) and after 15 walks on feet did 92.5% ($P<0.01$).

Correlation coefficient between the reduction of lead concentration in girls' hair and the volume of foot muscular loadings is equal to 0.808 and has demonstrated high correlation of these indexes. Similar data have been received in boys' organisms. Reducing lead concentration in boys' hair in the control group was equal to 31.0% ($P<0.001$), in the result of 5 walks on feet per one month - 76.2% ($P>0.05$), 15 walks on feet - 96.4% ($P<0.05$). Correlation coefficient between the reduction of lead concentration in boys' hair and the volume of foot muscular loadings is rather high and is equal to 0.918, proving the high correlation of these indexes. The amount of lead in girls' urine in the control group decreased after rehabilitation for the period of 28-35 days from 400 to 310 mkg/l (by 22.5%; $P<0.01$), among girls engaged in 10 walks on feet did from 400 to 230 mkg/l (by 42.50%), 15 walks did from 290 to 240 mkg/l (by 17.24%). In boys' urine in the control group lead concentration

decreased after rehabilitation from 410 to 320 mkg/l (by 21.95%, P<0.001), among boys engaged in 5 walks on feet did from 770 to 230 mkg/l (70.13%, P<0.001), 10 walks did from 490 to 200 mkg/l (59.18%, P<0.05), 15 walks did from 330 to 160 mkg/l (51.51%, P<0.001). On the whole in all the experimental groups the reduction of the concentration of this toxicant in urine was higher than in the control ones.

The comparison of normal lead concentrations in urine (246 ± 34) of the children residing at the health resort area in the settlement of Ust-Kachka of Perm Region with its concentration after rehabilitation in liquid media of children in experimental groups has demonstrated that the period of 28-35 days in the sanatorium is enough for the normalization of concentration level in fast metabolism.

Table 3. Lead Concentration Changes in Hair and Urine of Children depending on the Volume of walking muscular Loadings.

Number of walkings	Sex	Quantity of persons	Lead Concentration		Its changes		R
			Befor R	After R	absolute	relative	
In hair norm (0.71 ± 0.12), mkg/g							
0 (CG)	D	76	9.08	6.55	+2.53	+27.86	<0.001
	G	59	7.81	5.43	+2.44	+31.00	<0.001
5 (1-Ex.G)	D	0	-	-	-	-	-
	G	6	5.85	1.39	+4.46	+76.24	>0.05
10 (2-Ex.G)	D	7	3.79	2.51	+1.28	+33.37	>0.05
	G	18	2.30	0.51	+1.79	+77.83	>0.05
15 (3-Ex.G)	D	12	14.60	1.10	+13.50	+92.46	<0.01
	G	23	10.14	0.37	+9.77	+96.35	<0.01
In urine norm (246 ± 34), mkg/l							
0 (CG)	D	76	400	310	+90	22.59	<0.01
	G	59	410	320	+90	21.95	<0.001
5 (1-Ex.G)	D	0	-	-	-	-	-
	G	6	770	230	+540	+70.13	<0.001
10 (2-Ex.G)	D	8	400	230	+170	+42.50	>0.05
	G	18	490	200	+290	+59.18	>0.05
15 (3-Ex.G)	D	12	290	240	+50	+17.24	>0.05
	G	23	330	160	+170	+51.52	<0.001

Designations: Ex.G - experimental group; CG - control group.

Conclusions

It is widely known lead to be a cancerous substance, accelerating carcinogenesis and following tumour forming. Higher amount of lead in biological media of an organism can weaken the nervous system, supporting tissue and can cause iron deficit anaemia, intellectual and physical abilities abatement of adults and their children respectively.

The results of the investigations mentioned above have shown the possibility of lead unloading of human organism by means of muscular and heat loadings and thus have become the basis for the patent № 2085178 «A Means of Lead Excretion out of the Human Organism».

It has been established for the first time that the effectiveness of lead elimination increases with the growth of muscular loadings volume using warm clothes for rehabilitants.

Thus the conclusions are as follows.

1. It is necessary to use muscular and heat loadings for lead unloading of human organism in the favourable ecological environment.
2. The correlation with coefficient equal to 0.8-0.9 exists between the volume of muscular loadings and corresponding lead unloading of solid biological media of human organism.
3. «A Means of Lead Excretion out of the Human Organism» (a patent for the invention № 2085178) is a way of increasing human ecological safety.

References

1. Человек: Медико-биологические данные. Москва, Медицина, 1977 (in Russian).
2. ВОРОНИН С.М. Обмен микроэлементов (железа, меди и марганца) и профилактика их дефицита при ациклических физических нагрузках. Автореферат докторской диссертации. Москва, 1991 (in Russian).
3. ГЛАДКИХ И.П. Обмен железа, меди и марганца в организме юных и взрослых легкоатлетов – бегунов. Автореферат кандидатской диссертации. Иркутск, 1989 (in Russian).
4. НАСОЛОДИН В.В. Обмен железа, меди и марганца в организме спортсменок – лыжниц. Автореферат кандидатской диссертации. Ярославль, 1976 (in Russian).
5. РУСИН В.Я., НАСОЛОДИН В.В., ВОРОБЬЕВ В.А. Особенности обмена железа и меди при спортивной тренировке. Физиология человека, 8(2): 326-332, 1982 (in Russian).
6. СМУЛЬСКИЙ В.Л., ГЛУШЕНКО Т.Н., ВЛАДИМИРОВА Л.И. Микроэлементы и физическая работоспособность. Медико-биологические основы подготовки высококвалифицированных спортсменов. Киев, 108-116, 1986 (in Russian).

КИНЕТИКА СВИНЦА В БИОСРЕДАХ ЧЕЛОВЕКА ПРИ ИСПОЛЬЗОВАНИИ ЭНТЕРОСОРБЦИИ, МЫШЕЧНЫХ И ТЕПЛОВЫХ НАГРУЗОК

**В.Д. Медведков, Н.И. Медведкова, П.Г. Багдерин С.В. Аширова, И.А. Аширов
(Пермь, Россия)**

В результате проведенных фундаментально-прикладных исследований установлена возможность свинцовой разгрузки организма человека мышечными нагрузками, а также мышечно-тепловыми воздействиями. Выявлена зависимость, в соответствии с которой повышение объема мышечных сухопутных нагрузок в экологически относительно чистом месте увеличивает разгрузку биосред организма человека от свинца. Данное открытие детоксикационной функции направленных физических нагрузок явилось основой для разработки и получения патента на изобретение «Способ выведения свинца из организма человека».

Экологический и социально-экономический эффект полученных результатов заключается в следующем. Свинец является одним из сильных коканцерогенов. Высокая концентрация его в организме человека может сократить незаметный для человека рост раковой опухоли с 25 до 4 лет и этим значительно сократить длительность его жизни. Общеизвестно, что с повышением содержания

свинца в организме человека снижается его интеллект, прочность костного аппарата, работоспособность нервной системы, нарушается микроэлементный гомеостаз. Широкое внедрение в практику технологии свинцовой разгрузки организма индивида защитит его от вышеперечисленных факторов, вредных для здоровья, и этим обусловит социально-экономический эффект и повышение экологической безопасности человека. Библ. 6.

Ключевые слова: свинцовая разгрузка организма, мышечные и тепловые нагрузки

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