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Pharmacological Regulation of Physiological Functions in Space Medicine

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[Article by V. S. Shashkov, Institute of Biomedical Problems, USSR Ministry of Health, Moscow]

[Text] *The body's physiological systems that are most sensitive to the effects of weightlessness and subject to pharmacological adjustment at various stages of space flight are examined. Special attention is given to the design and practical application of cardiovascular preparations, and agents for the prevention of motion sickness, as well as substances that affect metabolic processes and mineral saturation of bone tissue. Emphasis is given to the possible use of medicinal agents in space flights and in practical public health.*

Present-day trends in the development of manned space research have been primarily characterized by longer space missions on orbiting stations with replacement crews, the use of reusable payload space ships, and the development of programs for manned flights to Mars and the colonization of the moon.

In general, potential medical problems in space flight do not fundamentally differ from those that can occur under land gravitational conditions inasmuch as the basic biological processes of the body can proceed without interruption. The maintenance of elementary biological processes in weightlessness is the principal precondition for sustaining space flights that are commensurate with prolonged active human life [4]. That is why traditional methods and principles of contemporary medicine in general, and pharmacology in particular, are applicable to those processes. However, one must keep in mind the fact that weightlessness in optimally designed closed ecological systems requires a different approach to the application of diagnostic, prophylactic, and therapeutic procedures.

A considerable amount of data has been accumulated in space medicine that indicate that the human body has physiological systems that are particularly sensitive to the effects of an evolutionarily non-determinant state of weightlessness and that potentially require pharmacological adjustments.

The following changes may occur under weightlessness conditions: alterations in the functional state of the cardiovascular system and redistribution of the body's fluid media; the development of motion sickness symptoms; changes in the mineral saturation of bone tissue; rearrangement of water-salt balance, metabolism, and neurohumoral regulation; shifts in the immunobiological response system; loss of muscle and body mass; anemic syndrome; sleep cycle disturbances and other shifts that affect vitality and work efficiency.

The enumerated complex of symptoms have necessitated the development of medicinal agents to prevent and correct space flight factors that adversely affect the human body and its ability to function and operate equipment more efficiently [5]. Special significance in this regard is given to problems dealing with cosmonaut activity outside space craft when entering open space in autonomous life-support systems (space suits) and to the problem of radiation safety during interplanetary flights.

From the practice gained thus far in space medicine, space flight support entails the following series of stages: the training period; launch of the ship and its passage into orbit; free space flight with cosmonaut entry into free space; prelanding and landing periods and medical support during the readaptation to land gravitational conditions. Each one of these stages has specific aspects of pharmacological support.

Depending on the flight program which is based on previous experimental and clinical research, the composition and quantity of medicinal substances essential to the flight are determined during the pre-flight period. Individuals are tested for their tolerance for a number of medicinal preparations and possible side effects (allergies, distorted effects, etc.). The cosmonaut learns the rules and manner for taking the drugs, and their indications and contraindications. Particular attention in this regard is given to possible allergic reactions to medicinal substances, and to the doses that can be tolerated upon repeated use with a view to changes in pharmacodynamics and pharmacokinetics. In the event of untoward test results for a preparation or combination of substances, such drugs are eliminated from the pharmacy stock and replaced by preparations that are well tolerated by each specific cosmonaut.

When necessary, the efficacy of medicinal substances is evaluated during the pre-flight preparation period either experimentally on animals or under clinical conditions that simulate space flight factors. Testing the body's reaction to medicinal substances during the simulation of weightlessness takes on special significance during this period.

Laboratory studies were made of changes in animal sensitivity to narcotics, CNS stimulants, and radioprotectors during different periods of motor activity restriction.

An evaluation of the available information on this question would indicate that it does not at all offer fundamentally practical solutions for the selection and design of procedures employing medicinal substances in space flights. But these studies do indicate the need to account for changes in a body's reactivity in space flights that are brought about by unconventional habitat environs, changes in hemodynamics, metabolism, and possibly changes in drug pharmacodynamics. This kind of approach seems preferable to us since it enables one to undertake similar studies in model experiments including human participation which is of fundamental

importance in planning the efficient utilization of medicinal substances in space flights for preventive and therapeutic purposes.

The effects of weightlessness which man has encountered for the first time are variable, but the pathogenetic mechanisms underlying the manifestation of a number of them require clarification and a more precise understanding. The degree to which these phenomena are manifested is quite ambiguous. It depends on the length of the flight and is largely determined by the individual characteristics of the organism.

Valuable information on the effects of weightlessness on the human body and other space flight effects has been obtained in completed flights and from post-flight studies. However, these data were obtained from a small number of groups. That is why broadly based studies are being undertaken that simulate space flight factors on the ground. Inasmuch as the principal etiological factor, the absence of gravity, is practically impossible to reproduce on the ground, wide use is being made of simulating individual physiological effects of space flight factors. Such studies can be undertaken at different levels of the biological systems employing the most modern methods of research. Widely employed for these purposes are hypokinesia with prolonged bedrest at variably inclined anti-orthostatic positions, immersion in fluid media, creation of alternating gravitational force, short-term and long-term rotation in special systems, immobilization, and denervation.

One of the imitation methods is the use of pharmacological agents to disengage skeletal musculature, redistribution of blood in various regions of the body, alterations in water-salt balance, and functions of the vestibular analyzer, etc. As regards the simulation of other space flight factors (radiation, acceleration, gas medium changes, etc.), they can be technically reproduced on the ground in any range and at all levels.

One must say that far from all medicinal substances that have traditionally been employed in various types of pathology and dysfunctions can yield the desired prophylactic or therapeutic effect under unusual conditions such as weightlessness. The reactions between the body and a medicinal substance under the new conditions can produce unknown links of disturbances and new aspects of drug action. For example, data are available on changes in the pharmacokinetics of acetylsalicylic acid which American astronauts have been taking on flights on shuttle ships [7]. There is complete justification for the manufacture of new preparations and drug forms that are specially designed for use in space flights.

It is essential to note that the pharmacological problems in this area are quite broad in scope and are not restricted to the interests of space medicine inasmuch as problems such as combatting fatigue and excessive neuro-emotional stress and the design of methods to heighten the body's resistance to the adverse effects of a habitation medium and special types of work tasks are

directly applicable to practical public health problems. One need only mention here the problem of harnessing the resources of the world's oceans and the earth's mineral resources, etc. This is sufficient reason for a radical reexamination of pharmacology's role in the indicated areas of human industrial and scientific-technological endeavors both in the present and foreseeable future (prophylactic pharmacology).

One might consider an example of this approach the preparation of glucamax (potassium, magnesium, and calcium glutamates) under the supervision of Professor N. N. Suvorov, which is intended to prevent disturbances of mineral saturation of bone tissue in space flights. Preclinical pharmacological studies have shown that under experimental pathological conditions glucamax has a pronounced effect on bone tissue mineralization in fractures and osteoporosis, and surpasses panagin in anti-arthritic properties. Clinical tests of the preparation have been successfully completed.

As applied to space medicine the body's loss of calcium and phosphorus during extensive flights results in a negative calcium balance, alterations in the blood's ionic composition, and demineralization of bone tissue. Tendencies toward a normalization of the indicated functions have not been observed in the course of longer flights in spite of the prophylactic agents, particularly a pre-planned regimen of physical training exercises. Calcium loss from bone tissue is continuous and is characteristic of prolonged space flights and primarily associated with the effect of weightlessness on the body.

The development and search for pharmacological agents to prevent disturbances in calcium and phosphorus homeostasis and to correct them as well as agents to stabilize bone tissue mineral saturation might proceed through efforts at both synthesis and resorption. Diphosphonates belong to those substances that are can accumulate in metabolically active regions of bone tissue and inhibit resorption. Intensified study is now being carried out on the efficacy of these substances on animals and in humans. In particular, studies are being made of monopotassium oxyethylidene diphosphonic acid (xydiphon), synthesized in the laboratory of Professor N. M. Dyatlova, and oxydimethylaminopropylidene diphosphonic acid, synthesized in the laboratory of Academician M. I. Kabachnik. Encouraging results have been obtained from tests of these substances to prevent disturbances of calcium and phosphorus metabolism, particularly when those substances are combined with the active metabolite of vitamin D-24,25-dioxycholecalciferol [1 - 3].

The functional status of blood circulation is one of the central problems of space medicine. In addition to the general characteristics that make the control of this system an essential objective of affecting psycho-emotional strain and stress and a number of other non-specific factors, there are other features that impart a specific special character to this problem. The chief among them is the fact that in space flights the cardiovascular system functions in a background of successive

impacts resulting from elevated and acutely reduced gravitation whose physiological effects are defined as the status of overload and weightlessness, respectively. A characteristic manifestation of these states is the redistribution of the body's fluids, principally, circulating blood. When overloading occurs, the blood shifts towards the vector of the active force, and during weightlessness the blood shifts in accord with the initial non-uniformity of blood vessel tone in the various regions of the circulatory bed. These effects are passive-mechanical processes and are primarily compensated for by vasomotor responses that control local blood flow and systemic hemodynamics, and therefore provide for circulatory homeostasis as a whole.

The well known circulatory postural responses in orthoclinostatic tests constitute a special example of this kind of phenomenon for stable gravitational conditions. However, whereas this kind of test is sometimes accompanied by the development of a pre-collaptoid state in persons with reduced hemodynamic compensation for the gravitational factor, in the event of widely varying degrees of gravitation from overload to weightlessness, circulatory disturbances are quite characteristic even in persons with a high degree of compensation. Such disturbances should be considered the result of the relative insufficiency of compensatory responses, and as the experience of space medicine has shown, they are observed in all cosmonauts to a greater and lesser degree of clinical manifestations.

Thus, the pharmacological problems as they apply to this problem of space medicine might be formulated as a search for medicinal agents that elevate the responsiveness and compensatory potentials of the cardiovascular system, thereby optimizing the very process of this system's adaptation to new conditions. The mechanism underlying compensatory reactions to the redistribution of circulating blood might be considered in the first instance as the ability of vessels to limit blood flow in areas with elevated content and to facilitate flow in hypovolemic regions. This is achieved by controlling the lumen of the vessels and altering their resistance to local blood flow. This kind of control is employed in accordance with the principles of autonomic and central reflex responses in which synaptic transfer processes are involved. The absence of preparations capable of selectively acting upon various vascular zones has necessitated a search for medicinal corrective and prophylactic agents primarily among the synaptotropic compounds that have a permissive effect on synaptic transfer processes.

Thus, compounds that induce a sympathomimetic effect indirectly, rather than natural catecholamines, were found to exhibit the greatest prophylactic activity with regard to hemodynamic disturbances caused by overloads. Moreover, epinephrine and norepinephrine were found to have a lesser prophylactic activity than ephedrine and phenamine. This is not difficult to explain if one considers that the first two compounds, when exogenically introduced into systemic circulation will

induce a pressor effect whether or not the reflex tone of the vessels has been elevated. On the other hand, the effect of indirectly acting sympathomimetics primarily takes place in those vascular regions where the gravitational factor creates the prerequisites for the pressor response.

The following example demonstrates the importance of the dynamic correspondence of the vasoactive pharmacological effect to the nature of functional shifts brought about by blood redistribution. The peripheral sympathomimetic effects of sydnocarb are of a posture-dependent nature and are largely manifested in an upright posture. The clinical-physiological criteria of the indicated effects are manifested by a more pronounced vascular response to orthostasis and by a less significant cardiac response which, in accord with existing concepts, reflects a more effective path of hemodynamic compensation [5].

No convincing evidence has as yet been obtained on the involvement of venomotor responses in the overall response of the cardiovascular system to blood redistribution. Most investigators tend to believe that the venous section in this situation plays a passive role, and this is in agreement with contemporary concepts on the asynergism, asynchronism, and reciprocal nature of the arterial and venous beds. The highly variable magnitude of venous return under these conditions produces significant changes in circulatory minute volume whose fluctuations are primarily compensated by the above-noted responses of resistive vessels. However, pharmacological adjustment of the latter may not achieve the necessary degree of effectiveness if the reduced venous flow causes a significant decrease in total blood flow. As a rule, this kind of situation is observed in the final stages of a flight and upon landing, and is marked by worsened tolerance of overloads and reduced orthostatic stability. This is enhanced by dehydration of the body and deconditioning of the cardiovascular system and the antigravitational complex of the muscles that carry out venous pumping functions. All of this suggests the advisability of utilizing venotropic compounds capable of altering the storage function of the venous reservoir. Experimental investigations have shown that a single administration of 6 mg of dihydroergotamine can bring about a marked change in lower extremity venous reservoir function which is manifested by a shift of circulating blood toward the brain. The relative blood content in the cardio-pulmonary region increases in this case. However, similar changes are observed not only in the orthograde static position but also in the horizontal, and particularly in the antiorthostatic position. Under conditions of antiorthostasis which simulates the hemodynamic effect of weightlessness, this kind of blood redistribution is undesirable and is accompanied by additional dehydration whose mechanism has become known under the name of the Henry-Hower reflex. Thus, the hemodynamic effects of the tested venous tonicity also were of a posture-dependent nature. However, because those effects are primarily manifested

during increased venous return, those effects should be considered a contraindication to the use of dihydroergotamine under conditions of weightlessness, and our suggested effectiveness of increasing resistance to orthostasis and overloads with a positive sign toward vector G_z requires further confirmation.

Phenomenology, the nature, and the extent of hemodynamic changes and its regulation in weightlessness and in model investigations determine the importance and possible use of drugs for the prevention and treatment of hemodynamic disturbances of a functional nature. These problems can be formulated as the design and study of the effectiveness of substances from various pharmacological categories that are capable of normalizing blood redistribution and reducing the mass of circulating blood, as well as eliminating static phenomena in the lesser and cranial blood basin circuits, the prevention of cardiovascular functional disturbances, the increase of orthostatic stability, and the prevention of cardiovascular system deconditioning at various functional physiological levels of regulation.

Special importance is ascribed to the development of pharmacological agents for the prevention and arrest of motion sickness (motion syndrome) and a greater understanding of its pathogenesis in the course of defining the place of space pharmacology in the space flight support system. One must emphasize that the importance of developing such agents is not limited to the interests of space medicine. The development of aviation and sea navigation has made the control of motion sickness one of the pressing problems of preventive medicine and preventive pharmacology. Also under investigation is the clinical aspect of utilizing these substances for treating illnesses associated with kinetoses. Of the eight principal problems included in the biomedical research program at NASA, motion sickness at the stage under discussion has been singled out as the number one problem.

Among the approaches to studying methods for the prevention of motion sickness one might mention the use of drugs, preflight training to develop vestibular adaptation, the withdrawal of sensitive and resistant individuals, and autogenic training with biofeedback. Not one of the enumerated efforts, with the exception of medicinal substances, has found practical application in actual space flights. American specialists have primarily depended upon the development and practical utilization of drugs which in a number of cases have proven to be effective for both the prevention and treatment of motion sickness.

The presence of convincing evidence about the fact that motion sickness can develop as early as two to three hours after a launch and can prevail for the first five days of a space flight is of particular importance for shuttle flights inasmuch as such periods constitute one-third to one-half of the entire flight. The symptoms of motion

sickness are so pronounced that they result in a reduction or loss of operating efficiency and limit the execution of flight programs. One might recall the case where American astronauts could not take a walk into open space because of motion sickness. Symptoms of this illness can become manifest at later times of the flight, as well as after landing.

Among the sensor systems that might be implicated in the onset of motion sickness one might mention first of all the vestibular system. The vestibular nuclei have been found to contain muscarine and histamine receptors. However, the amount of available information about the biochemistry of receptors and neuromediators in the vestibular nuclei as well as in other parts of the vestibular system is very limited.

Locating the action sites of medicinal substances is the best method of deciphering the pathogenesis and working out methods for the prevention and treatment of motion sickness, including pharmacological substances. The high density of muscarine receptors in the medial vestibular nuclei (optical microscopy with ^3H -quinuclididylbenzylate) and H_1 -histamine receptors is well recognized.

These investigations are of particular importance since drugs such as scopolamine and promethazine might exhibit a protective effect by blocking these receptors. Moreover, different kinds of muscarine receptors have been identified (i.e. their subpopulations). Therefore, a precise pharmacological testing of receptor types in the vestibular nuclei might be the basis for making new drugs for the prevention and treatment of motion sickness.

In that connection, the principal problem requiring physiological and pharmacological analysis is related to the question as to where and how the nervous system processes motion-induced signals from the vestibular, visual, proprioceptive, and other receptors. Presumably, the vestibular nuclei and structures of the vestibular region of the cerebellum play a marked role in the processing of such information. Other structures of the brain stem that are involved in conducting responses to the motion-induced signals include the *nucleus prepositus*, the *nucleus intercalatus*, and the *nucleus Roller*. All of them have possible direct and indirect connections with the vestibular nuclei, with the *nucleus tractus solitarius*, as well as with the cerebellum.

Certain preliminary data allow us to presume that the emetic center is the main link of the reflex arch responsible for the onset of emesis in motion sickness. If that is so, then we must show that the latter afferent link that is responsible for emesis induction is either chemical or neuronal in nature.

The effect of the brain stem's reticular formation on responses to motion as a stimulant at the vestibular nuclei level has not yet been precisely established. It is not clear whether or not proprioception, vision, or stress intensifies efferent pulsation associated with motion

sickness. Special attention must be given to investigations concerned with an analysis of neuronal activity patterns in the vestibular nuclei and vestibular centers of the cerebellum and their connection to the mechanisms underlying the regulation of emesis and their role in the onset of motion sickness. Many of these questions will remain unanswered until we have some concepts about the neuronal formations of the brain that primarily react to motion sickness stimuli and a description of the neuromediators, neuromodulators, and receptors placed on the circuit of transmission paths and connections.

As regards the hypothesis that the basis of motion sickness is a redistribution of the body's fluid media during weightlessness, research is required on hemodynamic and endolymph changes in various regions of the brain.

We know that anticholinergic and antihistamine drugs impair human psychomotor and cognitive abilities and their electrophysiological correlates. At the same time it has been established that sympathomimetic substances stabilize a broad range of psychoneurological behavioral disturbances. Therefore, the stabilization of psychomotor and behavioral responses that are disturbed in motion sickness (symptoms of early disturbances, drowsiness, lassitude) is perceived as a mechanism of sympathomimetic substance action in motion sickness by means of stabilizing noradrenergic mechanisms. To be more precise, during motion sickness there is a discord between the central cholinergic and adrenergic mechanisms of regulation. That is, one can delineate the levels at which drugs take their effect: the cholinergic level—the choline blockers; the histamine level—the antihistamines; the adrenergic level—the sympathomimetics [6].

Naturally, this knowledge about the mechanisms underlying motion sickness will be the basis for developing effective agents for its prevention and treatment. The key question for pharmacological intervention is where and with which agents can the reflex arches responsible for the onset of motion sickness be inhibited or blocked. Although some success has been achieved in this area, for example, the discovery of the brain stem receptor site for some motion sickness prevention drugs, in fact even the action site of scopolamine remains unknown.

And as long as there is not sufficient information about the specific zones of neurohumoral regulation in motion sickness, the testing of drug preventive and therapeutic activity in model investigations will be aimed at finding effective substances among the available preparations with the least number of side effects on work efficiency and operator activity.

Conclusions

The development and improvement of agents to maintain the safety of piloted space flights first of all presupposes a comprehensive utilization of engineering and biomedical methods of prophylaxis and operational support, including the development and application of medicinal substances. On-board pharmacies containing

a selection of preventive and therapeutic drugs that have undergone laboratory tests in model experiments are being formed depending on the length of the flight as determined by the program. During short-term flights principal attention is given to drugs to prevent motion sickness that when indicated might be taken in the early period of adaptation to weightlessness and during prolonged flights.

During extensive flights on orbiting stations, from the pharmacological viewpoint, preference is given to cardiovascular preparations, stimulants for work efficiency and operator activity, and to preparations that affect mineral saturation of bone tissue, etc.

Special attention should be given to the development of preventive and therapeutic drugs designed for use in interplanetary flights. This requires synthesis, experimental substantiation, and the manufacture of new drug forms with assigned properties and their simultaneous introduction into practical public health.

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Effect of Graded Physical Stress on Cerebral Hemodynamics in Pilots*907C0168D Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 6, Jun 89 pp 45-49*

[Article by L.I. Starikov, Candidate of Medical Sciences, Colonel, Medical Corps]

[Abstract] An analysis was conducted on the effects of graded physical stress on cerebral hemodynamics in order to refine occupational fitness parameters for pilots. The study was conducted on 27 pilots and trainees aged 20-39 determined to be in good health or with cardiovascular problems that did not affect job performance. Hemodynamic monitoring showed that in a sitting position the mean rate of cerebral blood flow in the healthy individuals was 765.6 ml/min (17 percent of cardiac output). Bicycle stress testing with a 108 W load led to an increase in the cerebral blood flow to 1615.6 ml/min

within 3 min despite some decrease in the cardiac output due to adjustments in other hemodynamic parameters. With a load of 158 W the cerebral blood flow increased to 2029.5 ml/min despite a further reduction in the cardiac output. After 5 min of rest lying down the cerebral blood flow had diminished to 1332.5 ml/min, although other hemodynamic parameters (heart rate, stroke volume, diastolic index, arterial blood pressure, vertebral pulse gradient, etc.) had returned to essentially baseline levels. The relatively greater stability of the rate of cerebral blood flow in healthy subjects was attributed to autoregulatory mechanisms. In general, individuals with cardiovascular problems generally presented with hypo- or hyperperfusion of the brain and much greater recovery periods. These are factors that have to be considered in assessing job fitness and in planning flight assignments to avoid undue physical stress. In addition, a program of exercise therapy is recommended for pilots with hypo- or hyperdynamic extrasystoles. Tables 1; references 20 (Russian).

Hyperparasite Fungus Infection of *Ustilago Vaillantii* Tul.

907C0042A Leningrad MIKOLOGIYA I
FITOPATOLOGIYA in Russian Vol 23 No 2,
Mar-Apr 89 (manuscript received 16 Dec 87) pp 122-124

[Article by M. A. Protsenko, Institute of Biochemistry
imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] During a study of *Scilla sibirica* Andrews flowers infected with *Ustilago vaillantii* smut, infection of its spores by a hyperparasite fungus was noted. Only in 10-20 percent of these infections was the hyperparasite found inside the spores when it filled them with its hyphae, replacing the natural cytoplasm. This process seemed to be very rapid since no partial occupancy of the

spores were noted. The hyperparasite possessed enzymes capable of breaking down the cell walls. Because this process was local, the host fungus did not die on the plant. The described hyperparasite is thought to be a biotrophic parasite. The hyphae of *U. vaillantii* are tightly bound to the surface of the spore even when no penetration into its space has occurred. The material available was inadequate for a definite identification. These parasitic fungi are of interest since they could be used to control plant diseases. The newly observed smut parasite does not destroy the host, so it probably does not possess specific toxins nor highly effective enzymes. With additional studies it may be possible to identify specific enzymes which attack the cell walls of the smut spores preferentially. Figures 6; references 10: 1 Russian, 9 Western.

UDC 577.175.85'17:547.964.4.057

Amphibian Bombesin and its Congener Alytesin*907C0117A Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 15 No 6, Jun 89 (manuscript received 16 Feb 88; in final form 21 Dec 88) pp 748-762*

[Article by I. L. Kuranova, S. I. Churkina, V. L. Lyudmirova, Ye. B. Filonova, F. K. Mutulis*, E. E. Liyepinsh*, I. P. Sekatsis*, Yu. B. Saulitis* and V. D. Grigoryeva*, Leningrad State University; *Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Mixed anhydride and carbodiimide methods were employed for the synthesis of bombesin and alytesin, two 14-amino acid peptide congeners originally isolated from the skins of the frogs *Bombina bombina* and *Alytes obstetricans*, respectively. The two differ at positions 2 (bombesin = Gln, alytesin = Gly) and 6 (bombesin = Asn, alytesin = Thr). Testing on rabbits demonstrated that bombesin and bombesin (6-14)-peptide induced a 2°C drop in rectal temperature for 1 h after administration of 1 µg/kg of either compound into a lateral brain ventricle. Essentially similar findings applied to alytesin and its (6-14)-peptide. Intravenous administration of 1 µg/kg of bombesin to dogs stimulated pancreatic secretion for 2 h, whereas bombesin (6-14)-peptide stimulated secretion for only 1 h. The N^α-Boc protected (6-14)-peptide, however, was effective for 3 h. Infusion of 1 µg/kg alytesin induced a 5-fold lower level of pancreatic secretion for 1 h. Accordingly, the N-terminal sequence of both peptides was not related to their hypothermic or secretory activities. Figures 5; references 27: 5 Russian, 22 Western.

UDC 577.112

Role of Carbohydrate-Binding Site on Staphylococcal aureus Enterotoxin A in its Interaction with Lymphoid Cells and the Effect of Hydrophobic Modification of the Toxin on its Biological Activity

907C0177B Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 6 No 6, Jun 89 (manuscript received 23 Sep 88) pp 582-586

[Article by V. Yu. Alakhov, A. V. Kabanov*, T. N. Kravtsova, A. V. Levashov* and Ye. S. Severin, Institute of Applied Molecular Biology, USSR Ministry of Health, Moscow; *Chair of Chemical Enzymology, Chemical Faculty, Moscow State University imeni M. V. Lomonosov]

[Abstract] Binding studies conducted with *Staphylococcus aureus* enterotoxin A (EA) and human lymphocytes demonstrated that low doses of EA (0.01-0.1 nM) had a mitogenic effect, whereas higher concentrations inhibited proliferation and were cytotoxic on the basis of trypan blue staining. Addition of 1 mM D-galactosamine or 10 mM N-acetylglucosamine inhibited binding of EA

to the cells and precluded lymphoblastic transformation while potentiating cytotoxicity. These observations indicated the presence of a carbohydrate component in the cell receptor for EA responsible for high-affinity binding, but not in the receptor for lower-affinity binding. Hydrophobization of EA by treatment with stearoyl chloride reduced to a marked degree the mitogenic potential of EA, whereas cytotoxic properties remained unaffected. Furthermore, studies with Jurkat T-lymphoma cells that are not susceptible to the mitogenic effects of EA because of, presumably, absence of the high-affinity receptors showed that hydrophobization reduced by two orders of magnitude the concentration of EA required for inhibition of proliferation and cytotoxicity. Since hydrophobization of proteins has been shown to favor their translocation into cells, the increased toxicity of the modified EA was attributed to its failure to react with the high-affinity receptors responsible for mitogenicity. Consequently, the concentration of EA available for the low-affinity receptors that lead to translocation of EA into the cells was increased. Figures 3; references 13: 4 Russian, 9 Western.

UDC 577.151.042

Effect of Ionic Strength on Reversible Inhibition of Acetylcholinesterase by Thionphosphonates

907C0117C Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 61 No 4, Jul-Aug 89 (manuscript received 22 Apr 88) pp 107-110

[Article by G. M. Vayzburg, D. N. Dalimov, M. B. Gafurov, A. A. Abduvakhabov and Ye. V. Rozengart, Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent; Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] Analysis of thionphosphonic acid esters led to the identification of a novel series of competitive acetylcholinesterase (AChE) inhibitors. In order to determine optimal structure-activity parameters a study was made of the effect of ionic strength on inhibition shown by 3 alkoxymethylthionphosphonates, using 0.01, 0.11, and 0.55 M NaCl, KCl, or MgCl₂. Highest degree of hydrophobic interaction was obtained with the n-butyl derivative (I). Replacement of piperidine (II) residue by morpholine (III) reduced the inhibition constant by an order of magnitude as a result of an increase in hydrophilicity. An increase in the concentration of MgCl₂ to 0.55 M resulted in a shift from mixed to noncompetitive inhibition in the case of compound III. The data indicated that noncompetitive inhibition was due to predominance of ion-ion interactions at the anionic site of the AChE molecule. In interaction with AChE the hydrophobicity of the phosphoryl moiety of compound I is maintained through hydrophobic interaction of the heterocyclic "cationic head" of the inhibitor with the

anionic site on the enzyme. Perturbation of this interaction evidently enhances allosteric mechanisms and diminishes the efficiency of the inhibitor. References 6: 5 Russian, 1 Western.

UDC 577.352.32

Membrane Vehicles of Sendai Virus Envelopes and Erythrocyte Ghosts for Insertion of Reactive Oligonucleotide Derivatives Into Cells

907C0143A Kiev BIOPOLIMERY I KLETKA
in Russian Vol 5 No 4, Jul-Aug 89 (manuscript received 1 Mar 88) pp 52-58

[Article by V. V. Vlasov, Ye. M. Ivanova, Yu. D. Krendelev, I. V. Kutyavin, M. N. Ovander, A. S. Rayt, F. P. Svinarchuk, and L. A. Yakubov, Institute of Bioorganic Chemistry, Siberian Division, USSR Academy of Sciences, Novosibirsk; Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Conventional technologies were employed in the preparation of vesicles based on reconstructed Sendai virus envelopes and erythrocyte ghosts for the delivery of (4[(N-2-chloroethyl-N-methyl)amino]benzyl-5'-phosphamide hexadecathymidylate into mammalian cells. The loaded vesicles were then incubated with ascitic carcinoma Krebs-2 cells maintained in CC57BR mice, with the degree of adhesion and alkylation of poly(A)+RNA monitored and compared with the results obtained with the soluble oligonucleotide. The resultant data demonstrated that in the vesicular form approximately 25-30 percent of the alkylating agent entered the cells, versus 0.3 percent of the soluble agent. The net intracellular concentrations of the oligonucleotide attained with the free agent and with loaded viral and erythrocyte vesicles were, respectively, 0.12, 0.41-1.7, and 2.1-2.7 μM . As a result, the rate of RNA alkylation in the latter two cases was 10- to 100-fold higher than with the free alkylating oligonucleotide. Figures 3; tables 1; references 13: 6 Russian, 7 Western.

UDC 577.352.42:577.113.6

Effects of Transfection Promoters on Cellular Uptake of Alkylating Oligonucleotide Derivatives

907C0143B Kiev BIOPOLIMERY I KLETKA
in Russian Vol 5 No 4, Jul-Aug 89 (manuscript received 15 Feb 88) pp 71-75

[Article by A. S. Butorin, V. V. Vlasov, Ye. M. Ivanova, A. S. Rayt, I. G. Shishkina, L. V. Yurchenko, and L. A. Yakubov, Institute of Bioorganic Chemistry, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] Several agents that are effective in enhancing the degree of transfection were tested for their effects on mammalian cell uptake of [4-(N-2-chloroethyl)-N-methylaminobenzyl]-5'-phosphamide derivatives of oligonucleotides labeled with P-32. Studies with mouse fibroblast line L-929 and ascitic carcinoma Krebs-2 cells

showed that dimethylsulfoxide, DEAE-dextran, and polylysine were ineffective or of very limited effectiveness. Best ingress was obtained with a system in which the cells were pretreated with calcium chloride in phosphate buffer. In the latter case the rate of specific alkylation of mRNA increased six- to ten-fold over the rate obtained with the other approaches. Tables 4; references 15: 7 Russian, 8 Western.

UDC 615.919:598.12].015.4:612.115].07

Blood Coagulation by Agkistrodon Halys Halys Pit Viper Venom and Its Thrombin-Like Fraction

907C0695A Moscow VOPROSY MEDITSINSKOY
KHIMII in Russian Vol 36 No 2, Mar-Apr 90
(manuscript received 29 Aug 89) pp 12-14

[Article by I. B. Kalmykova, O. B. Zaychenko, E. S. Sadykov, N. A. Barabanshchikova, and L. Ya. Yukelson, Scientific Research Institute of Hematology and Blood Transfusion, Uzbek SSR Ministry of Health; Institute of Biochemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Comparative analysis was conducted on blood coagulation induced by the venom of the poisonous pit viper *Agkistrodon halys halys* and the thrombin-like fraction (TLF)—agikhal [sic]—derived from the venom. Studies with donor plasma showed definite differences between the behavior of the venom and TLF, demonstrating that the venom contains a number of components affecting blood coagulation. For example, in recalcification studies blood coagulation was accelerated 12-fold by TLF and five-fold by the venom. In addition, removal of blood coagulation factors II, VII, and X had virtually no effect on the action of TLF, but decreased two-fold the efficiency of venom. Finally, clots formed by the action of venom were entirely soluble in 5 M urea, whereas clots resulting from the action of TLF were far more refractory. Tables 1; references 6: 4 Russian, 2 Western.

UDC 615.276.3.015.2:615.919:579.843.1]
.015.4:616.344-018.73- 008.94:577.175.859.075.9

Indomethacin Modification of Cholera Exotoxin Effects on Na⁺, K⁺- and HCO₃⁻-ATPase Activity and Prostaglandin Content in Rat Ileal Mucosa

907C0695B Moscow VOPROSY MEDITSINSKOY
KHIMII in Russian Vol 36 No 2, Mar-Apr 90
(manuscript received 16 May 89) pp 18-19

[Article by L. S. Dolmatova, Alpine Taiga Station, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] The demonstration that indomethacin reduced cholera toxin-induced intestinal loss of water and electrolytes by 80 percent led to animal studies to

assess the possible mechanism of indomethacin action. Studies on 180-220 g outbred male rats demonstrated that intraintestinal administration of 100 μ g of cholera toxin resulted in a 29 percent and a 57 percent decrease in Na^+ , K^+ - and HCO_3^- -ATPase activities, respectively, in the ileal mucosa. Pretreatment of the animals with 10 mg/kg of indomethacin before cholera toxin administration completely prevented the decrease in Na^+ , K^+ -ATPase activity, and attenuated the decrease in HCO_3^- -ATPase activity to 23 percent. Analysis of ileal mucosa showed that cholera toxin induced an eight-fold increase in $\text{PGF}_{2\alpha}$, a 4-fold decrease in PGE, a slight elevation in 6-keto- $\text{PGF}_{1\alpha}$, and a 1.5-fold reduction in thromboxane- B_2 . Pretreatment with indomethacin attenuated the rise in $\text{PGF}_{2\alpha}$ to three-fold above the control level, had no effect on cholera toxin-induced depression of PGE, led to a four-fold reduction in 6-keto- $\text{PGF}_{1\alpha}$ and a six-fold reduction in thromboxane- B_2 in comparison with baseline values. In summary, the data were interpreted to show that in cholera toxin intoxication, indomethacin acts via prostaglandin mechanisms. Figures 1; tables 1; references 15: 3 Russian, 12 Western.

UDC 615.31:547.96].03.07

Clinical and Experimental Applications of Magnetized Granular Form of Immobilized G-Actin

907C0695D Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 36 No 2, Mar-Apr 90 (manuscript received 13 Jun 89) pp 28-29

[Article by I. P. Gontar, G. F. Sycheva, and O. I. Yemelyanova, Institute of Rheumatology, Volgograd Branch, USSR Academy of Medical Sciences]

[Abstract] G-actin preparations isolated from the myocardium and skeletal muscles of a healthy male cadaver within 8-10 h of accidental death were used for the preparation of a granular form of G-actin following

immobilization in polyacrylamide. The granules were subsequently magnetized by infiltration with hydrophilic Fe_2O_3 and used for immunization of rabbits and in affinity columns for isolation of anti-actin antibodies. Immunofluorescent, radioimmunoassay, and enzyme-linked techniques were employed in demonstrating the utility of the magnetized granules of G-actin as reagents in experimental and clinical trials. In particular, immunofluorescent techniques revealed that anti-actin antibodies were present in 40.6 percent of the sera obtained from rheumatism patients, whereas all control samples were negative. Figures 1; tables 1; references 11: 7 Russian, 4 Western.

UDC 577.1

Effects of Physiologically Active Peptides on Transcription in Cerebral Cell Nuclei

907C0734A Tbilisi SOOBShCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 137 No 1, Jan 90 (manuscript received 14 Sep 89) pp 165-168

[Article by R. K. Papelishvili, Institute of Plant Biochemistry, Georgian SSR Academy of Sciences]

[Abstract] Substance P and C-peptide were tested for their effects on transcription in nuclei isolated from the brains of 150 g albino male rats in order to derive additional data on transcription control factors in the brain. In vivo studies with intraperitoneal administration of the neuropeptides demonstrated that both peptides diminish the level of nucleolar and karyoplasmic transcription, with nucleolar transcription affected more than karyoplasmic. In *in vitro* incubation studies, however, both peptides exerted a bell-shaped effect on transcription, enhancing transcription at lower concentrations and attenuating it at higher concentrations. In general, enhancement of karyoplasmic transcription exceeded enhancement of nucleolar transcription. Figures 4; references 6: 5 Russian, 1 Western.

Oxytocin Inhibits Potential Dependent Calcium Channels in Cells of Pheochromocytoma PC12

907C0045B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 1, Sep 89 (manuscript received 5 Jan 89) pp 222-225

[Article by L. I. Kolchinskaya, N. I. Kononenko, L. M. Nikolayenko and N. Kh. Pogorelaya, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev]

[Abstract] Cultured pheochromocytoma PC12 cells represent a good model system for studying biochemical and pharmacological properties of potential-depending calcium channels. Effect of the neurohypophyseal hormone the oxytocin, resembling closely vasopressin was investigated as it affected the functions of calcium channels in pheochromocytoma PC12 cells. The cells were grown in the optimal growth medium and incubated for 2-3 days at 37°C in a 5 percent CO₂ atmosphere. To

identify calcium channels in the pheochromocytoma cells, the effect of Bay K 8644 and nitrendipine on the penetration of ⁴⁵Ca into the cells under condition of membrane depolarization was studied. It was shown that replacement of the medium with normal potassium ion content by a medium with a ten-fold higher potassium level increases slightly the penetration of ⁴⁵Ca into the cells. Considerable increase of the radioactive tag was observed in presence of Bay K 8644. Nitrendipine reversed this effect at 10⁻⁶ M concentration. Thus, increased penetration of ⁴⁵Ca into pheochromocytoma due to depolarization of the membrane in presence of Bay K 8644 is caused by the activation of potential dependent calcium channels localized on the surface of the cell membrane. Oxytocin also exhibited the inhibitory effect on the potential dependent calcium channels in pheochromocytoma cells possibly with co-participation of a protein, the kinase C. Figure 1; references: 12 (Western).

UDC 577.21

Cloning and Expression of Chymosin in Mammalian Cells

907C0045C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 1, Sep 89 (manuscript received 19 Jan 89) pp 234-237

[Article by M. I. Kolmer, T. A. Erd and I. Ulmanen, Institute of Chemical and Biological Physics, ESSR Academy of Sciences, Tallinn; Estonian Biocenter for Gene and Cellular Engineering, ESSR Academy of Sciences, Tartu; Laboratory of Gene Engineering, Orion Company, Helsinki, Finland]

[Abstract] Chymosin, a rennin enzyme, belongs to the class of aspartic protease and is synthesized in the cells of the calf's gastric mucosa between the week 10 of gestation and the weeks 4-6 of life; then it is replaced by pepsin. One of the projects pursued at the Institute of Chemical and Biological Physics, ESSR Academy of Sciences, to study the physicochemical properties of chymosin and the regulation of the gene activity of chymosin is the production of genetically engineered mutants of chymosin. The goal of this effort was to clone and express the complementary DNA of pre-chymosin in mammalian cells using an extrachromosomal expression vector pKTH 539. Starting chymosin cDNA was cloned in the laboratory and subjected to oligonucleotide-directed mutagenesis using Tag polymerase in the polymerase chain reaction. The synthetic product was restricted with Hind III and Xba I restrictases and cloned in the expression vector pKTH 539. HeLa cells were transformed with the construct obtained and selected on hygromycin B. All characterized clones synthesized two transcripts of mRNA of 1.8 and 2.2 kbp. Three isolated clones synthesized and secreted a protein with a molecular weight of 41,000, corresponding to prochymosin which, upon treatment at pH 2 for 30 min, yielded a 36,000 MW protein corresponding to chymosin. All supernatants tested positive for milk curdling. By means of immuno-blotting, it was shown that HeLa cells secrete 10-20 µg of prochymosin per milliliter of the growth medium in 20 hrs. Figures 4; references: 9 (Western).

UDC 577.21

Transformation of Tobacco Cells by Ti Plasmid Vector Derived From *Agrobacterium Tumefaciens*

907C0678A Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA BIOLOGICHESKAYA in Russian No 2, Mar-Apr 90 pp 42-47

[Article by A. B. Kaliyev, G. Ye. Norova, V. M. Andrianov, S. Z. Zairov, E. S. Piruzyan, and M. A. Aytkhozhin, Institute of Molecular Biology and Biochemistry imeni M. A. Aytkhozhin, Kazakh SSR Academy of Sciences; Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] Genetic engineering studies were conducted on the introduction of foreign genes into the tobacco plant, employing an *Agrobacterium tumefaciens* bireplicon miniplasmid pTiC58. pTiC58 was constructed to bear the barley B1-gordein gene at a unique restriction site. *A. tumefaciens* carrying the recombinant plasmid was then used for infection of tobacco leaf fragments, which were subsequently cultured on a selective medium. In the end, transformed plants exhibiting resistance to a marker antibiotic were obtained, indicating successful transformation. Figures 3; references 10: 5 Russian, 5 Western.

UDC 577.21:633.16

Barley Plants With Kanamycin Resistance Gene

907C0678B Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 34 No 3, Mar 90 (manuscript received 25 Oct 89) pp 261-263

[Article by N. A. Kartel, K. I. Zabenkova, T. V. Maneshina, and S. Ye. Ablov, Institute of Genetics and Cytology, Belorussian SSR Academy of Sciences]

[Abstract] The pollen tube method was employed for the introduction of plasmid pABDI, bearing a kanamycin resistance gene, into barley Min 90-5 in experiments designed to further expand studies on transgenic plants. pABDI was constructed from *Escherichia coli* plasmid pUC8 by the insertion of the kanamycin resistance marker from transposon Tn5. The rate of control germination was approximately 93.5 percent, while introduction of exogenous DNA reduced germination to 40.4 percent. Southern blot hybridization revealed the presence of intact kanamycin resistance gene in the barley genome, as well as gene fragments. Only three resistant plants (0.21 percent) were obtained, although none of their progeny proved to be resistant. Lack of kanamycin resistance may either have been due to elimination of the gene during meiosis, or disruption of its integrity during recombination. Figures 1; references 13: 1 Russian, 12 Western.

UDC 616.98:578.828.6]-022.363:618.63

Transmission of HIV From Child to Mother Via Breast-Feeding

907C0768A ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 90 (manuscript received 12 Jun 89) pp 23-26

[Article by V. V. Pokrovskiy, I. Yu. Yeramova, I. I. Kuznetsova, L. A. Slyusareva, and V. V. Lipetikov, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow, under the rubric "Acquired Immunodeficiency Syndrome"]

[Text]At present it has been reliably established that HIV is transmitted via sexual intercourse, parenteral infusion of infected blood, from mother to fetus, during parturition and via breast-feeding^{2, 5}. We shall describe here the first cases found of infection of seven women from infected infants via breast-feeding.

Material and methods. HIV antibodies were isolated in November 1988 in Elista from an infant examined for clinical indications and in a woman who had come to donate blood for the first time. An epidemiological investigation revealed that the mother of this infant, seven donors from whom it received blood and four of the sexual partners of the woman donor had no HIV antibodies. It was subsequently learned that on two occasions this infant and its mother had been in the same two hospitals in Elista as the woman donor and her infant who subsequently expired. Further investigation revealed that there was a nosocomial focus of HIV infection at these hospitals, which had persisted due to the re-use of syringes for injections, primarily given directly through a catheter in the subclavian vein without use of a needle. A total of 56 infants with HIV antibodies were found, one of whose mother and father were positive for these antibodies. The father had spent all of 1981 in Africa. The hospitalization of this infant coincided with the start of the outbreak, since there had been no cases of infection among infants in the hospital prior to this case. Details about this outbreak are being published in a special report.

While HIV transmission is a common phenomenon when the same syringe is used for intravenous injections, and it has been described in drug addicts, an unexpected finding in our study was cases of HIV antibodies in mothers, four of whose infants had expired at one of the hospitals where an outbreak had been reported. All of the infected women were interrogated in order to determine their sexual history, parenteral interventions, how the infected infants who had died were breast-fed. As a control group, we tested seronegative mothers of seropositive infants who had been weaned at least 3 months prior to the test for HIV antibodies (the conventional term of possible appearance of antibodies). HIV antibodies were tested in at least three immunoenzyme systems with confirmation by the immune blotting [test] manufactured by the Dupont Co.

Results and Discussion. In order to assess the probability of sexual infection of the women we tested 10 sexual partners, none of whom was infected with HIV (a woman who was infected by her husband was excluded from the group, since the source of her infection was quite obvious). It is quite plausible that there might have been sexual partners whom the woman failed to report; however, a screening of more than 80,000 residents of Kalmyk ASSR (30 percent of this republic's population) having no association with the hospital in Elista failed to reveal anyone with HIV antibodies. Considering the fact that the HIV-infected women live in different cities and regions of this republic, it is impossible to assume that all of them were infected via sexual intercourse by unknown partners in the absence of the virus in the population, and that they then happened to be in the same hospital at expressly the time of the intramural outbreak. Thus, we can virtually rule out their infection via sexual intercourse.

The second known route of infection could have been via blood transfusions and use of medical instrumentarium. None of the women with HIV antibodies had received blood transfusions. Blood had been drawn from the finger from all of them for the Wasserman test at the hospital where there was an outbreak. However, this procedure had been carried out in the hospital laboratory for all mothers on different days. Only one woman had received an intramuscular injection in the department with infected infants. The control group of women had been given the same number of injections. Consequently, infection via parenteral intervention was also unlikely, and it is absolutely unlikely for seven people to be infected in this way, since the published data⁶ indicate that the risk of transdermal infection of the skin even with a needle known to be contaminated (which is itself unlikely in our case) does not exceed 1 case per 200 punctures and, according to other data⁵ 1 per 500-700 injections. The probability of transmission in the course of everyday life or via the airborne-droplet route was ruled out due to the absence of cases of infection among hospital personnel, relatives of infected cases and absence of indications in the literature of such a possibility.

Considering the fact that maternal infection remains unexplainable from the standpoint of epidemiology, we decided to explore the possibility of HIV transmission from their infants via breast feeding, since this involves prolonged contact of the mucous membrane of the infant's mouth with the mother's nipple, which has a dense system of blood and lymphatic vessels, and the lymphoid channel expands dramatically during pregnancy and lactation⁴. Nursing time even exceeds the duration of the sex act which, as it is well-known³, readily leads to infection of a male by a woman (particularly in the presence of inflammatory processes).

We were able to interrogate comprehensively 41 mothers hospitalized at the clinic of TsNIIE [Central Scientific Research Institute of Epidemiology]. The data for the 41 mother-infant pairs are listed in the table, and it shows

that all infected mothers of infected and expired infants (pairs 1-3 and 30-33) had breast-fed their infants after the assumed time of infection of the latter, and either cracked nipples in the mother or stomatitis in the infant had been noted.

Table of breast-feeding as a risk factor for mothers whose infants demonstrated HIV antibodies in a nosocomial focus in Elista

Mother-infant pair number	Duration of breast-feeding after date of possible infant infection, months	Presence of following when breast-feeding			Detection of antibodies	
		cracked nipples	stomatitis in infant	teeth in infant	infant	mother
1	5.5	+	-	+	+	+
2	7.5	-	+	+	+	+
3	5.0	+	+	+	+	+
4	3.5	-	-	-	+	-
5	5.0	-	-	+	+	-
6	3.0	-	-	-	+	-
7-29	0	0	0	0	+	-
30	4.0	+	+	+	?	+
31	5.0	+	+	+	?	+
32	4.0	+	+	+	?	+
33	3.0	+	+	-	?	+
34	4.0	-	-	+	+	?
35	6.0	-	-	+	+	?
36	5.0	-	-	+	+	?
37	6.0	+	+	+	+	?
38	8.5	+	+	+	+	?
39	8.0	+	+	+	+	?
40	11.0	-	+	+	+	?
41	5.0	-	-	-	+	?

In order to assess the reliability of differences between the compared groups, we excluded the mothers of infants who had died, since infant infection had not been proven (pairs 30-33), as well as mothers in cases where adequate time had not elapsed from the moment of possible infection in order to demonstrate antibodies (less than 3 months)—pairs 34-41.

As a result it was found that only 3 (Nos 4-6) of the 26 mothers who were reliably uninfected at the time of testing had breast-fed their infants after the earliest date

of possible infant infection, and all three of the infected mothers had done so (Nos 1-3). The difference was reliable ($p < 0.01$).

Moreover, the medical histories of the uninfected, breastfeeding women contained no mention of fissures of either nipple or areola or of stomatitis in their infants. On the other hand, after the period of assumed infant infection such fissures were noted for two infected mothers, the infants with demonstrated HIV antibodies and for all four mothers of expired infants, and stomatitis was found in two infected infants and all 4 infants who expired. It should be noted that all of the mothers whose infants expired had reported bleeding from their infants' mouths in association with ulcerative stomatitis, whereas one of them, when originally questioned before she learned of the source of her infection, had assumed that she could have been infected by blood from the infant's mouth entering the nipple cracks. Most of the stomatitis cases among infants who died were, of course, caused by the great severity of the fatal illness. According to data in the literature, when nipples fissures occur in combination with diminished maternal specific immunological defenses, the neonate may be a source of infection during breast-feeding¹.

The fact that the dead infants were infected could not be proven by laboratory methods; it was proven later on epidemiologically: one of these infants who expired in another city was unambiguously identified as the source of another nosocomial outbreak.

Consequently, transmission of the virus from infant to mother during breast-feeding seems quite probable and, considering the absence of other conceivable routes of transmission in this study, can be considered proven. The absence of descriptions of such cases is attributable to the rarity of infection of any infant breast-fed by a noninfected woman, so that such cases remain unrecognized or are automatically interpreted as transmission in the reverse direction.

Because of identification of the new route of infection, it was recommended that all women located in the focus of infection stop breast-feeding, give their infants expressed milk. However, eight other women (Nos 34-41) who breast-fed their infants prior to this investigation are still under observation, and their infection cannot be ruled out. Retesting of all those involved in the outbreak will probably reveal more cases of infection.

Thus, our investigation revealed that HIV can be transmitted to a woman while breast-feeding her infected infant, and the probability of infection is higher if the mother has injured nipples or the infant has inflammatory processes in the mouth.

Conclusion

HIV can be transmitted from infant to mother via breast-feeding.

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UDC 616.98:579.852.111]-036.22-02:615.371:
579.852.11]-07

Epidemiologic and Immunologic Outcome of Long-Term Mass Tetanus Vaccinations

907C0131C Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 22 Mar 88) pp 38-43

[Article by I. V. Gil, A. A. Sokhin, L. I. Slyusar, V. Ya. Vereshchagina and F. S. Radomskaya, Donetsk Medical Institute imeni M. Gorkiy]

[Abstract] An analysis was conducted on tetanus morbidity in the Donetsk Oblast, Ukraine, for 1950-1985 to assess the efficacy of mass vaccinations. The results demonstrated that as a result of a concerted effort at preventive inoculation, commencing in 1961, overall morbidity decreased 5.2-fold. Approximately 88.8 percent of the population has been immunized since 1961.

Determinations of antitoxin titers showed that the percentage of individuals with an adequate antitoxin level diminishes from 82.1 percent in the 31-40 age bracket to 22.1 percent for those in the 60+ range. The latter group, as well as housewives, form a particular risk group and account for the actual increase in mortality from 36.5 percent in 1950-1960 to 66.7 percent of the cases in 1980-1985. These facts emphasize the need for ongoing monitoring of the immune status of individuals and provisions for reimmunization. Figures 2; tables 3; references 6 (Russian).

UDC 616.927.3-036.22(470.23-25)

Brill's Disease (Recrudescence Typhus Fever) in Major City

907C0131D Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 13 Apr 88) pp 43-47

[A. B. Dayter, N. K. Tokarevich, G. V. Udalova, and K. I. Yepifanova, Leningrad Scientific Research Institute of Epidemiology and Microbiology imeni Pasteur; Leningrad Municipal Infectious Hospital No 30 imeni S. P. Botkin; Leningrad Sanitary Epidemiologic Station]

[Abstract] An epidemiologic study was conducted on 675 cases of Brill's disease in Leningrad diagnosed from 1974 to 1986. The data showed that 60 percent of the patients were 50-60 years or more and that the majority of the patients were women (71.7 percent). In 1974 all of the patients were at least 30 years old, while in 1984 the breakoff point was 39 years. The majority of the cases (87.46 percent) were neither mild nor severe; in 95.34 percent of the cases the primary infection was sustained 30-50 years ago. There were no discernable seasonal variations in the occurrence of Brill's disease in Leningrad in the timeframe in question. Figures 4; references 4: 3 Russian, 1 Western.

UDC 575.23:579.25

Mapping of Functional Origin of Replication on *Staphylococcus Aureus* pE194 Plasmid in *Bacillus Subtilis* Cells*907C0045A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 1, Sep 89 (manuscript received 27 Dec 88) pp 208-211*

[Article by F. K. Khasanov, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] One of the unique characteristics of plasmids isolated from natural strains of *Staphylococcus aureus* is their ability to replicate in many host cells. Study of the mechanism of this replication and the determination of the sites of their functional replication point is of interest because of the ability of such plasmids to replicate in gram-positive and gram-negative bacteria, as well as in yeasts, and because of their wide use as vectors in the production of recombinant DNA. In this study, the researchers pinpointed a functional origin (ori) used in DNA synthesis initiation on the plasmid *S. aureus* pE194 cop6. Comparison of the nucleotide sequence of this fragment with other initiators showed an extensive region of homology with *Streptococcus* pLS1, in which the DNA synthesis of such replicon is initiated. It was shown further that plasmid p39 exists in *Bac. subtilis* cells as an independent replicon, and the principal condition for its replication is the concurrent presence of the plasmid pE194. Both the p39 and the pE194 replications are temperature-sensitive; this presumes participation of the pE194 plasmid helper in the replication process of the protein repF. The origin of replication of p39 was found to be on the HpaII/AluI segment of the

DNA between coordinates 1130 and 738 of pE194 nucleotide sequence. Nucleotide sequences of the potential secondary structure in the HpaII/AluI fragment containing the *S. aureus* pE194 plasmid ori and the potential secondary structure of the proposed initiation site for the synthesis of DNA of *St. agalactiae* pLSi plasmid were superimposable. Hence, it could be assumed that they have similar functions. Figures 2; references: 13 (Western, 1 by Russian authors).

UDC 577.113+123.5

DNA Synthesis in Intact Maize Mitochondria Treated with pBR Bacterial Vector Plasmids*907C0143E Kiev BIOPOLIMERY I KLETKA in Russian Vol 5 No 4, Jul-Aug 89 (manuscript received 8 Feb 88) pp 98-102*

[Article by Yu. M. Konstantinov, V. A. Podsoznyy, G. N. Lutsenko, and M. I. Rivkin, Siberian Institute of Plant Physiology and Biochemistry (Irkutsk) and Institute of Cytology and Genetics (Novosibirsk), Siberian Division, USSR Academy of Sciences]

[Abstract] Incubation studies with isolated maize mitochondria resulted in the demonstration that bacterial plasmids pBR322 and pBR327 were translocated into the mitochondria. In addition, autoradiographic and electrophoretic studies demonstrated the synthesis of a high molecular weight DNA analogous to the circular DNA of pBR322 as a result of the action of mitochondrial DNA polymerase. These findings suggest that maize mitochondria may serve as a model system in studies on replication and transcription of recombinant plasmids in plant mitochondria, and on plant genetic engineering based on protoplast fusion. Figures 3; references 18: 5 Russian, 13 Western.

**Psychological Assessment of Horizon Indicators
in Planes**

907C0694A Moscow *PSIKHOLOGICHESKIY
ZHURNAL in Russian Vol 11 No 2, Mar-Apr 90*
pp 37-46

[Article by V. A. Ponomarenko, V. V. Lapa, and N. A.
Lemeshchenko, Moscow]

[Abstract] Psychological studies were conducted on
optimum horizon indicators in view of recent findings
demonstrating that more than 20 percent of airplane

accidents are attributed to spatial disorientation, and
that this number is increasing. Trials conducted with
flight simulators demonstrated that a display depicting
an aircraft in flight against a stationary horizon, i.e.,
depiction of spatial relationships in a geocentric system
of coordinates, facilitates spatial perception and reduces
the error rate in spatial perception in comparison with a
moving-horizon display. The key disadvantage of the
latter method lies in the requirement for additional
information processing necessary for reorientation of the
information into geocentric coordinates. Figures 3;
tables 1; references 20: 18 Russian, 2 Western.

UDC 579.841.11:[579.61:616-092].083.1

Protective Properties of Toxoid Obtained From Homogenous Preparation of *Pseudomonas Aeruginosa* Exotoxin A

907C0131A Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 8 Jun 88) pp 3-8

[Article by N. S. Brodinova, V. A. Vovk, A. D. Aleksandrov, and A. F. Moroz, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Outbred albino mice were employed in testing the immunogenic potential of a toxoid prepared by formalin treatment of a homogenous preparation of exotoxin A from *Pseudomonas aeruginosa*. Subcutaneous immunization with 15 µg of the toxoid with an adjuvant yielded various levels of protection on intraperitoneal challenge with *Ps. aeruginosa*. With one or two toxoid injections 40-60 percent of the animals were protected against toxigenic but not against nontoxigenic *Ps. aeruginosa*. With three to four immunizations at 14-day intervals the survival rate rose to 54-100 percent against both toxigenic and nontoxigenic strains, with immunity persisting for 28-42 days. The levels of neutralizing antibodies that were generated enabled the animals to withstand injections of 75-150 LD₅₀ doses of exotoxin A. Consequently, these findings demonstrated that while exotoxin A is an important factor in *Ps. aeruginosa* pathogenesis, it is not the sole factor determining the outcome of *Ps. aeruginosa* infection. Figures 3; tables 4; references 9: 1 Russian, 8 Western.

UDC 612.112.3.063:612.438.017.1].08

Interaction of T-Activin With Peritoneal Macrophages

907C0131E Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 8 Jun 88) pp 52-57

[M. N. Korotkova, V. A. Taranov, V. Ya. Arion, and L. N. Padyukov, Scientific Research Institute of Physicochemical Medicine, RSFSR Ministry of Health; Central Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, USSR Academy of Medical Sciences, Moscow]

[Abstract] CBA mice 16-18 g in weight were employed in experiments designed to assess the effects of T-activin on peritoneal macrophages vis-a-vis phagocytosis of *Salmonella typhimurium* and the cytopathologic effect. Pretreatment of the mice with T-activin (0.1, 1 µg, subcutaneously) had no effect on in vitro phagocytosis and resistance to the *S. typhimurium*-dependent cytopathologic effect in a macrophage:bacteria ratio of 1:10. However, pretreatment with 10 µg T-activin mitigated to some extent the *S. typhimurium*-induced cytopathologic

effect. Concomitant administration of live cellular pertussis vaccine (10¹⁰ cells, intraperitoneally) with T-activin diminished the protection offered by 10µg T-activin against macrophage damage by *S. typhimurium*, yet increased macrophage resistance to the cytopathologic effect to baseline levels with low doses of T-activin. In in vitro studies preincubation of the macrophages with T-activin for 18 h enhanced their resistance to damage by *S. typhimurium*, while addition of T-activin at commencement of phagocytosis potentiated the cytopathologic effect. The variable effects seen with the different T-activin dosage schedules and other conditions suggest that T-activin preparations contain various components with different physiologic potentials. Figures 3; tables 2; references 15: 10 Russian, 5 Western.

UDC 579.842:579.262.55].08

Effects of Inducers and Inhibitors of Mixed Function Oxidases on Resistance to Gram-Negative Bacteria Endotoxins

907C0131F Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 8 Feb 88) pp 91-94

[Article by M. N. Linyuchev, T. M. Zubik, A. Yu. Kovelonov, V. I. Bulyko, and V. V. Sergejev, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Albino male mice (18-20 g) were employed in a series of studies designed to assess the role of mixed function oxidases (MFO) in susceptibility to typhoid endotoxin (ET). The basic studies demonstrated that treatment of the animals with phenobarbital, an inducer of MFO, increases their tolerance more than two-fold as measured by determination of LD₅₀ values. Subsequent trials with benzonal (MFO inducer) and levomycetin (chemotherapeutic for typhoid-paratyphoid infections; MFO inhibitor) demonstrated that under proper conditions and concentrations the former overcame the adverse effects of levomycetin on MFO. These findings indicate that clinical trials should be undertaken on this form of combination chemotherapy in the management of typhoid-paratyphoid infections as a means of enhancing ET detoxication. Tables 2; references 11: 5 Russian, 6 Western.

UDC 615.919:579.852.11].015.4:612.112.3].076.7

Immunosuppressive Effects of Bacillus Anthracis Lethal Factor in Mice

907C0131G Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 9 mar 88) pp 94-99

[Article by V. A. Abalakin, Central Scientific Research Institute of Epidemiology. USSR Ministry of Health, Moscow]

[Abstract] A number of inbred strains of mice differing in susceptibility to anthrax were used to assess the

immunosuppressive potential of *B. anthracis* lethal factor. The experimental approach involved subcutaneous administration of protective, lethal, or edematous factor alone or in combination in conjunction with anthrax spores and determination of survival rates and phagocytic activity of peritoneal macrophages. On balance, the data demonstrated that the lethal factor enhanced the infectious process and inhibited *in vitro* phagocytosis to a greater extent than the edematous factor. Furthermore, the effects of the lethal factor in potentiating the infectious process were more pronounced in animals that were inherently more susceptible to anthrax. However, an inverse situation prevailed with respect to peritoneal macrophages: macrophages from the inherently more susceptible mice were more refractory to the adverse effect of the lethal factor. Figures 3; tables 2; references 13: 5 Russian, 8 Western.

UDC 616.98:578.828.6].092:612.017.1]-085.246.2

Plasmapheresis in Immunodeficiency States

907C0161A Moscow IMMUNOLOGIYA in Russian
No 3, May-Jun 89 (manuscript received 13 Oct 88)
pp 17-19

[Article by R. M. Khaitov, A. M. Borisova, Ye. S. Fedenko, B. V. Pinegin, L. A. Snetkova, V. D. Prokopenko, O. F. Yeremina and A. V. Simonova, Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] Therapeutic trials with plasmapheresis were undertaken in 4 male patients and 1 female patient with AIDS-related complex. The patients were 27-31 years old, with a 2- to 3-year history of symptomatology. Immunologic workups revealed depression of T lymphocytes in E-RFC test, elevation of circulating immune complexes and of IgA, IgG, and IgM, and perturbations in other immune parameters indicative of immune deficiency. The patients were treated with 2-3 procedures of plasmapheresis, which were well tolerated by four of the patients, with one case complicated by an intercurrent infection. After the procedures four patients responded

with clinical improvement, including abatement of lymphadenopathy, for 2-3 months. Repetition of the clinical workups showed generalized improvement in immune status indicators, including elevation of E-RFC, suggesting that plasmapheresis may be an important therapeutic adjunct in the management of AIDS-related pathology. Figures 4; references 14: 5 Russian, 9 Western.

UDC 612.017.1.014.46:[615.384:547.745+615.31:547.391.3

Vinylpyrrolidone Copolymers with Crotonic Acid or Vinylamine: Immunomodulation and Toxicity

907C0161B Moscow IMMUNOLOGIYA in Russian
No 3, May-Jun 89 (manuscript received 24 Mar 88)
pp 63-65

[Article by V. Yu. Skvortsov, T. B. Masternak, B. D. Sviridov, Ye. F. Panarin, A. D. Dasayeva, L. D. Gorbacheva, A. S. Larin, Ye. A. Zhigadlo, O. N. Gorbunova and I. S. Kochetkova, Institute of Immunology, USSR Ministry of Health, Moscow; Institute of Macromolecular Compounds, USSR Academy of Sciences, Leningrad]

[Abstract] Several copolymers of vinylpyrrolidone with crotonic acid (VP-CA) or vinylamine (VP-VA) of approximately equivalent MW were tested for immunomodulation and toxicity in (CBA x C57BL/6)_{F1} mice weighing 18-22 g. The animals were injected intraperitoneally with the copolymer followed immediately by 5×10^6 SRBC, with the results assessed on the basis of splenic antibody forming cells. The VP-VA copolymers behaved as immunostimulants, while VP-CA lacked immunostimulant activity and, in low doses, suppressed the antibody response. Greatest enhancement of antibody forming cells was obtained with 81 kD VP-VA containing 53.8 percent VA when injected in a 5 mg/kg dose, which insured an 8-fold increase in antibody forming cells. Toxicity studies demonstrated that immunostimulation was directly related to toxicity, with the VP-VA copolymers shown to be much more toxic than the VP-CA copolymers. References 20: 17 Western, 3 Western.

UDC 614.7-07:681.31

Computerized Biokinetics in Hygienic Assessment

907C0134A Moscow GIGIYENA I SANITARIYA
in Russian No 6, Jun 89 (manuscript received 20 May
88) pp 18-20

[Article by V. N. Pavlov and V. B. Karavayev, Scientific Research Institute of General and Communal Hygiene imeni A. N. Sysin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Conventional pharmacokinetics were applied to toxicologic assessment of xenobiotics and their metabolites. A differential equation was derived to relate the concentration of a given xenobiotic and its major metabolite to receptor concentration in a critical organ, rate constants of ligand-receptor interactions, xenobiotic concentration in the environment, and standard metabolic kinetics. The approach was found to readily lend itself to computer simulation. The study provided confirmation of the fact that the critical parameter in the concentration-time-effect relationship defining LC_{50} values consists of xenobiotic-receptor interaction in a critical target organ. Figures 3; tables 1; references 6 (Russian).

UDC 615.917:547.212].036.11.085

Search for Specific Therapy for Dichloroethane Poisoning

907C0166A GIGIYENA TRUDA I
PROFESSIONALNYYE ZABOLEVANIYA in Russian
No 6, Jun 89 (manuscript received 4 May 88) pp 37-38

[Article by Ye. A. Luzhnikov, T. V. Novikovskaya, and Zh. A. Lisovik, Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy; Central Order of Lenin Institute of Advanced Training of Physicians, Moscow]

[Abstract] Acetylcysteine was assessed for its efficacy in the management of 75 cases of acute dichloroethane poisoning (5-150 $\mu\text{g}/\text{ml}$ blood levels). Selection of acetylcysteine was based on its chemical reaction with 2-chloroethanol, the most toxic metabolite of dichloroethane. In the final analysis, inclusion of intravenous infusions of acetylcysteine over a two-day period in conjunction with conventional supportive therapy and detoxification was judged to be without any additional benefit on the outcome. Despite the best therapeutic efforts, 15 patients with blood levels of dichloroethane in the 25-150 $\mu\text{g}/\text{ml}$ range succumbed. Marked elevation of the rate of lipid peroxidation indicated the need for treatment with antioxidants. On balance, the clinical impression was that a comprehensive therapeutic approach based on support of metabolic functions and detoxication represented the best therapeutic options in dichloroethane poisoning. References 16: 13 Russian, 3 Western.

UDC 612.115.08

Effects of Intermediate Molecular Weight Molecules on Hemostasis

907C0118A Moscow *GEMATOLOGIYA I TRANSFUZIOLOGIYA* in Russian No 6, Jun 89 (manuscript received 20 Jul 88) pp 45-49

[Article by V. A. Syatkovskiy, V. A. Zmachinskiy, L. P. Vasilenko, and O. I. Kim, Scientific Research Institute of Hematology and Blood Transfusion, Belorussian SSR Ministry of Health, Minsk]

[Abstract] In view of the fact that elevation of intermediate molecular weight molecules (IMWM) in the blood is regularly encountered in chronic renal insufficiency, an investigation was made of the putative effects of IMWM on hemostasis. In vitro and in vivo studies on chinchilla rabbits demonstrated that IMWM derived by ultrafiltration and gel filtration consisted of fractions with marked anti- and procoagulant activities. In general, thrombocyte function was depressed and antithrombin and antifibrinolytic activities were enhanced, with one fraction promoting the formation of a prothrombin transforming complex free of calcium ions. The concentration of IMWM was observed to increase progressively in stored whole blood and plasma in the presence of sodium citrate over a four week period (1.6- and 1.3-fold, respectively), with the rate of increase in whole blood two-fold that in plasma. These findings suggest that IMWM may be responsible for the formation of microclots in stored blood and indicate the need for a more detailed study of this phenomenon in blood banking. Figures 1; tables 2; references 17: 12 Russian, 5 Western.

UDC 615.387:612.111.014.43

Preparation and Cryopreservation of Placental Erythrocytes for Transfusion

907C0118B Kiev *KRIOBIOLOGIYA* in Russian No 2, Apr-Jun 89 (manuscript received 29 Feb 88) pp 31-33

[Article by V. I. Grishchenko, O. S. Prokopyuk, M. I. Shrago, L. P. Bredikhina, and O. V. Lipina, Kharkov Medical Institute; Institute of Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] In order to expand the supply of erythrocytes available for transfusions, studies were conducted to evaluate the suitability of erythrocytes derived from placental blood. Placental blood harvested under sterile conditions was preserved initially with glucicir-type preservative in a blood:preservative ratio of 4:1. Subsequently, the erythrocyte fraction was preserved at -196°C in liquid nitrogen and 30 percent glycerol. Determinations of ATP and 2,3-diphosphoglycerate levels showed no deterioration after 3 years of storage. Although the erythrocytes retained their capacity for tissue oxygenation, the potassium concentration was at the lower end

of the normal scale, indicating greater deformability. Tables 1; references 8: 5 Russian, 3 Western.

UDC 577.15.152:615.357

Effects of Isolated Hepatocyte Implants From Neonatal Donors on Nonspecific Immunity of Recipient Dogs With Acute Hepatic Insufficiency

907C0118C Tbilisi *SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR* in Russian No 2, May 89 (manuscript received 15 Apr 88) pp 421-424

[Article by M. V. Akhvlediani, Ts. I. Abakeliya, D. I. Dugladze, I. S. Tsomaya, and M. A. Bekauri, Scientific Research Institute of Experimental and Clinical Surgery imeni K. D. Eristava, Georgian SSR Ministry of Health]

[Abstract] Therapeutic trials were conducted with isolated hepatocytes derived from neonatal dogs as a means of correcting suppression of nonspecific immunity consequent to acute hepatic insufficiency (AHI) in adult dogs. Monitoring of a number of functional indicators (phagocytosis, osmotic resistance of leukocytes, enzyme cytochemistry of lymphocytes, etc.) before and after induction of ischemic AHI showed marked depression of the parameters of interest following the onset of AHI. Implantation of 10⁶ hepatocytes/kg into the peritoneal cavity of dogs with AHI led to gradual recovery of nonspecific immunity over a one month period of observation. The data also revealed that α -glycerophosphate dehydrogenase and succinate dehydrogenase activities of lymphocytes constituted the most sensitive indicators of nonspecific immunity and may be used to monitor therapeutic efficacy. Figures 3; references 5 (Russian).

Immunoabsorbents for Treatment of Schizophrenia and Alcoholic Psychosis

907C0118D Moscow *NAUKA I ZHIZN* in Russian No 9, Sep 89 pp 156-157

[Article by I. Gubarev]

[Abstract] Pathophysiologic studies at the Institute of General and Forensic Psychiatry imeni V. P. Serbskiy have implicated failure of the blood-brain barrier as a key mechanism underlying the fundamental manifestations of schizophrenia and alcoholic psychosis. The resultant release of neurospecific proteins and peptides into systemic circulation has been shown to induce the formation of autoantibodies, while the ingress of the latter into the central nervous system leads to the establishment of an active autoimmune process directed against the neural and glial elements. Accordingly, immunoaffinity columns bearing neuroproteins were designed and used for removal of the specific antibodies from the blood stream. This has both therapeutic and diagnostic ramifications. The immunoabsorbents are currently undergoing clinical trials in patients with schizophrenia and alcoholic psychosis, and the results have been reported at a number of international symposia.

UDC 612.111.014.462.5-08

Effects of Erythropifaden on Morphofunctional Characteristics of Donor Blood Stored for a Lengthy Period*907C0124A Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 35 No 4, Jul-Aug 89 (manuscript received 11 Apr 88) pp 15-19*

[Article by A. L. Belkin, K. A. Pendrak, M. S. Povzhikova, A. S. Petrenko, Ya. F. Kovalishin, T. A. Tsiarenko, P. V. Osadchiy, O. A. Savitskaya and T. N. Oleynik, Institute of Oncological Problems imeni R. Ye. Kavetskiy, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the effects of erythropifaden on the morphological and physiological status of erythrocytes in donor blood after prolonged storage in citroglucophosphate supplemented with 0.5 mM/l of adenine. Erythropifaden, a formulation of adenine, riboxine, pyruvate and sodium phosphate prepared at the All-Union Hematological Center, was added to the blood after 35, 42, and 49 days of storage to an erythropifaden: blood ratio of 3:1, and incubation for 2 h at 37°C (4 h for 49-day blood.) Subsequent metabolic and morphological studies demonstrated that erythropifaden enhanced ATP synthesis and improved the membrane characteristics of erythrocytes. Osmotic resistance of the erythrocytes increased by 11-16 percent, while the reduction in filtration time indicated a 13-20.7 percent increase in membrane elasticity. Incubation with erythropifaden also led to a 20-30 percent reduction in the concentration of irreversibly echinocytic forms and reduced the concentration of soluble hemoglobin. In general, erythropifaden was shown to improve the morphological and physiological status of erythrocytes after long-term storage. Intermediate MW substances in the blood that may adversely affect membranes and capillaries may be eliminated by hemosorption. Figures 1; references 8: 4 Russian, 4 Western.

UDC 615.471:681.31].03:616-072.7

Computerized Measurement Complex for Monitoring State of Operators*907C0133A Moscow MEDITSINSKAYA TEKHNKA in Russian No 3, May-Jun 89 (manuscript received 7 Jun 88) pp 8-12*

[Article by V. M. Atukhin, N. N. Yermilov, L. V. Larionov, A. I. Monakhova, I. A. Neroslavskiy, A. V. Sverchinskiy and I. I. Sysoyev, Experimental Design Bureau for Biological and Medical Cybernetics, Leningrad]

[Abstract] Cursory details are presented of an automated system for physiological monitoring suitable for functional testing in the clinical diagnostic setting. The software was designed to work with an Elektronika-60M microcomputer and is capable of simultaneous analysis of data derived from six subjects. The system is designed

to process the the following types of information: EKG, phonocardiograms, sphygmograms, rheograms (rheoencephalograms), photoplethysmograms, pneumograms, O₂ and CO₂ levels in inhaled air, and tachyoscillograms. In real time, as many as 200 readings can be processed with an inflow of information equal to 5 Kbytes/sec. The entire sysem has received State Standard approval for generation and processing of electric signals at infralow frequencies. References 4 (Russian).

UDC 615.47:[616-073.756.8:681.31]

Software for Computerized X-ray Tomography*907C0133B Moscow MEDITSINSKAYA TEKHNKA in Russian No 3, May-Jun 89 (manuscript received 3 Oct 88) pp 12-18*

[Article by E. I. Rader and I. V. Osobov, All-Union Scientific Research, Engineering and Technological Institute of the Cable Industry, Moscow]

[Abstract] Description is provided of applications programs for computerized tomography, developed in response to the construction of the first Soviet whole-body SRT-500 tomographic apparatus. The programs, subprograms, routines and procedure follow those developed in the Western countries for analogous purposes, and are designed to accommodate improvements as the technology advances. Current endeavors are directed at optimization of the entire system, retention of operational flexibility, and the creation of intelligible documentation. Figures 2; references 6 (Russian).

UDC 615.471:681.31].03:616.9-036.22-07

Expert System for Epidemiologists*907C0133C Moscow MEDITSINSKAYA TEKHNKA in Russian No 3, May-Jun 89 (manuscript received 10 Nov 88) pp 24-29*

[Article by E. K. Amirova, Azerbaijan Republic Computer and Data Processing Center, Azerbaijan SSR Ministry of Health]

[Abstract] Description is provided of the application of an ESPLAN epidemiologic expert system designed to focus on the cause of an outbreak of infectious diseases in situations with low morbidity and mild and nonspecific symptomatology. The system is designed to facilitate decision making on the basis of a large volume of qualitative data by providing one or more hypotheses. It operates in a stepwise structured mode relating the results at various stages to one another to formulate a comprehensive solution and is especially useful when dealing with conditions such as enteric infections. The system utilizes dialogue boxes to guide epidemiological decision making intended to resolve the problem at hand. References 6 (Russian).

UDC 615.91-036.11-08:616.15-08:66.067+615.91-036.11-085.835.3

Hemosorption and Hyperbaric Oxygenation in Management of Acute Poisoning With Sodium Nitrite and Acetone-Methanol Combination

907C0168B Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 6, Jun 89 pp 26-28

[Article by V. N. Kovalev, Lt. Colonel (res.), Medical Corps, and I. V. Naletov]

[Abstract] Several case studies are presented in a summary manner on the incorporation of hemosorption and hyperbaric oxygenation in the management of acute poisoning with sodium nitrite and acetone-methanol combinations. Three of the four cases involving enteral sodium nitrite poisoning were successfully treated with forced diuresis and hemosorption relying on UAG-1 apparatus and activated carbon SKN-2K (150-160 ml/min perfusion rate). These measures were combined with hyperbaric oxygenation (1.5 h at +1.2 atm, Irtysh-MT pressure chamber). In addition, four cases of poisoning with acetone-methanol combination were managed successfully by conventional means supplemented with hyperbaric oxygenation, enteric adsorbent (activated carbon SKN-2K), and hemosorption. These observations demonstrated that inclusion of hemosorption and hyperbaric oxygenation are valuable adjuncts in the management of acute sodium nitrite and acetone-methanol poisoning through acceleration of elimination and enhancement of tissue oxygenation. References 12 (Russian).

UDC 615.246.2.07

Evaluation of Soviet Lavsan Membrane in Plasmapheresis

907C0209A Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 34 No 7, Jul 89 (manuscript received 2 Jun 88) pp 54-58

[Article by M. I. Gromov, V. A. Voinov (doctor of medical sciences), K. Ya. Gurevich, Yu. N. Tsibin (doctor of medical sciences), and B. M. Zelikov, Leningrad Scientific Research Institute of Emergency Medicine imeni D. I. Dzhanelidze; All-Union Scientific Research Institute of Pulmonology, USSR Ministry of Health; Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Trials were conducted with the Soviet lavsan membrane (polyethyleneterephthalate) to determine its performance characteristics and suitability for plasmapheresis. The membrane was modified by irradiation with nonionizing heavy ions to impart porosity, hence the designation "nuclear membrane." The studies with membrane samples with low porosity (approx. 10 percent), 10 µm thickness, and 0.5 µm diameter pores were conducted at 22-23°C, using a Gambro dialyzer for

testing. Determination of clogging, filtration, and flow-rate parameters demonstrated that the membrane performed as well as membranes of foreign manufacture in terms of these factors. However, its rigidity and low strength predisposed the membrane to damage when fixed in the dialyzer, precluding its use in plasmapheresis without further improvements. Figures 4; references 11: 3 Russian, 8 Western.

UDC 616.381-002.1-092:612.017.1]-07

Immunological Reactivity and Hemosorption in Acute Peritonitis

907C0209B Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, Jul 89 (manuscript received 16 Feb 89) pp 40-49

[Article by L. V. Poluektov, B. A. Reys and Yu. V. Redkin, Omsk Medical Institute]

[Abstract] Case analysis was conducted on the pathogenic course of 233 postsurgical cases of acute peritonitis. The patients involved were 17-73 years old. Primary focus on the immune status of the patients demonstrated suppression of the humoral and cellular components of immunity. However, concomitantly the study revealed that phagocytosis per se, representing a degree of natural immunity, was enhanced. The latter was interpreted to represent an adaptive mechanism responding to a systemic insult. Finally, hemosorption was found to be a highly effective therapeutic modality for alleviating endogenous toxemia due to release of intermediate MW peptides by the liver, peptides implicated in immunosuppression in such clinical states. Figures 2; references 25: 24 Russian, 1 Western.

UDC 617-001.17-07:616.153.915-39]-02:615.355

Effects of Superoxide Dismutase on Endogenous Superoxide Dismutase Content and Lipid Peroxidation in Burns

907C0210A Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 35 No 4, Jul-Aug 89 (manuscript received 9 Sep 88) pp 28-30

[Article by M. I. Agadzhanov, M. A. Simonyan, and Sh. A. Kazaryan, Chair of Biochemistry, Medical Institute, Yerevan]

[Abstract] Animal therapeutic trials were conducted with superoxide dismutase in female rats, 120-160 g, subjected to third degree burns over 12-15 percent of the body. Experimental animals were treated intraperitoneally with 2 mg/kg (2200-2500 U/mg protein) of superoxide dismutase 1 h before the lesion, followed by injection every 10 h for the next 50 h, then every day for 3 days, and finally every 2 days for 10 days. The survival rates for the untreated control animals on days 1, 3, and 5 were 11/20, 5/20, and 3/20, respectively. The corresponding survival figures for the experimental animals were 17/20, 9/20, and 7/20. The improved survival rates

in the superoxide dismutase-treated animals were attributed attenuation of burn-induced lipid peroxidation (LPO). On day 2 hepatic superoxide dismutase activities in control and experimental animals were, respectively, 160 and 330 U/g, versus 400 U/g in intact rats. Electron paramagnetic resonance spectra of hepatic superoxide dismutase were unaffected. The therapeutic benefit of exogenous superoxide dismutase was, therefore, attributed to limitation of LPO, suggesting the need for further investigations on the use of superoxide dismutase in burn management. Figures 1; tables 3; references 20: 9 Russian, 11 Western.

UDC 615.47

Carbon Fiber Sutures

907C0217A Yerevan ZHURNAL
EKSPERIMENTALNOY I KLINICHESKOY
MEDITSINY in Russian Vol 29 No 2, Mar-Apr 89
(manuscript received 5 Jul 87) pp 131-133

[Article by A. K. Zaratsyan, M. Ye. Kazakov, V. V. Prokimmov, N. G. Bizyakina and V. S. Lebedev, Chair of Traumatology, Orthopedics and Military Field Surgery, Yerevan Medical Institute]

[Abstract] Clinical trials were conducted on 189 patients to test carbon sutures prepared from carbon fibers Ural-N-24 and Ural-NSh-24. The sutures were prepared from individual fibers 4-5 μ m in diameter, consisting of 99.5 percent carbon and 0.5 percent ash and having a tensile strength of 100-150 ng/mm². Five-year trials showed the sutures to be suitable for cutaneous and deep use, including osteosynthesis. The carbon sutures did not evoke an inflammatory response and were gradually resorbed.

UDC 616-001.4-009.7

Morphological Features of Experimental Purulent Wounds Treated with Terrilithin Immobilized on Algin Sponge

907C0217B Yerevan ZHURNAL
EKSPERIMENTALNOY I KHLINICHESKOY
MEDITSINY in Russian Vol 29 No 2, Mar-Apr 89
(manuscript received 19 Jun 87) pp 173-178

[Article by G. N. Berchenko, A. V. Nikolayev, B. N. Arutyunyan and A. K. Shamilov, Laboratory of Pathomorphology, Central Scientific Research Laboratory, 1st Moscow Medical Institute imeni I. M. Sechenov]

[Abstract] Outbred male rats weighing 190 g with purulent wounds were employed for evaluation of surgical dressing incorporating terrilithin (enzyme preparation derived from *Aspergillus terricola*) immobilized on algin sponge (lyophilized gel of Na and Ca alginates.) Comparison of the gross and histological observations on several experimental groups of animals managed with different dressings showed that complete healing with dressing utilizing terrilithin immobilized on algin was obtained in 18.1 days. The time required for complete

wound healing in animals treated with other forms of dressing, including soluble terrelithin, ranged from 21.4 to 29.4 days. The combination of terrelithin and algin facilitated earlier removal of detritus, alleviated edema and inflammation, and promoted earlier migration of macrophages into the wound, granulation and epithelialization. Figures 1; references 9: 6 Russian, 3 Western.

UDC 616.12-005.4-036.12-085.849.19-036.8-07:616.153.915-39

Lipid Peroxidation as Index of Therapeutic Efficacy of Helium-Neon Laser in Chronic Ischemic Heart Disease

907c0223A Moscow KLINICHESKAYA MEDITSINA
in Russian Vol 67 No 7, Jul 89 (manuscript received
24 Nov 88) pp 37-39

[Article by L. I. Katelnitskaya, N. K. Khodareva and A. B. Glushko, Therapy Chair No 4, Faculty of Postgraduate Medicine, Rostov Medical Institute, Rostov-on-Don]

[Abstract] Therapeutic trials were conducted with helium-neon laser (HNL) management of chronic ischemic heart disease (IHD) in combination with antianginals. The study group consisted of 150 male and female patients ranging in age from 40 to 65 years, with anamnestic data indicating that 72 percent had previously sustained a myocardial infarction. Treatment with the conventional LG-75 laser (0.632 μ m, 0.5 mW/cm², defocused 5 cm diameter beam) involved coverage of the 3 standard projections (upper and mid-third chest area and left interscapular region.) Each plane was irradiated for 60 sec for a total of 12-15 sessions. Evaluation of the results in terms of subjective and objective criteria showed marked improvement in the majority of cases, especially in patients in early stages of the disease. The key factors were pain abatement, reduction in nitroglycerin intake, improved performance on stress tests, and attenuation of lipid peroxidation on the basis of blood chemistries. In particular, the level of lipid peroxidation was felt to constitute an objective and reliable criterion for monitoring the efficacy of HNL treatment of IHD. The beneficial effects were evident after 3-4 treatments; in addition, the procedure was free of side effects. Figures 3; references 14 (Russian).

UDC 616.718.5/.6-001.59-06:626.71-018.46.-002]-08,036.868

Ultrasound and Hyperbaric Oxygenation in Management of Purulent Wounds

907C0223B Moscow ORTOPEDIYA,
TRAVMATOLOGIYA I PROTEZIROVANIYE
in Russian No 7, Jul 89 (manuscript received 1 Nov 88)
pp 55-56

[Article by V. A. Kopysova, V. V. Kotenko, G. G. Zaprudina, S. G. Rudakov and A. L. Moiseyev, Chair of

Traumatology and Orthopedics, Novokuznetsk Institute of Postgraduate Medicine; No 1 Clinical Hospital, Novokuznetsk; Chair of Metallurgy and Welding Technology, Siberian Metallurgical Institute imeni S. Ordzhonikidze, Novokuznetsk]

[Abstract] An assessment was conducted on the efficacy of ultrasound alone and in combination with hyperbaric oxygenation in the treatment of purulent wounds in the case of 157 patients divided into various experimental and control groups. For the ultrasound modality, a URSK-7N apparatus was employed (80 W power output, 26.5 Hz operation, 30 μ m amplitude, 5-7 min treatment with 3 percent hydrogen peroxide + antibiotic + sulfanilamide lavage.) In the case of patients on combined therapy the ultrasound procedure was followed in 4 h by hyperbaric oxygenation (2 atm for 1 h). Depending on the clinical picture, the course of therapy consisted of 6 to 12 procedures. Best therapeutic results were obtained in patients treated by the combination of both modalities, with healing accelerated by 5-6 days and hospitalization reduced to 29 days. This was a 1.5- to 2-fold improvement over the duration of hospitalization seen with patients treated only with the ultrasound. References 9 (Russian).

UDC 616.341-089.844

Microsurgical Techniques in Orthotopic Autotransplantation of Small Intestine

907C0734C Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 137 No 1, Jan 90 (manuscript received 7 Sep 89) pp 193-195

[Article by M. A. Kiladze and N. Hakim, Scientific Research Institute of Experimental and Clinical Surgery imeni K. D. Eristava, Georgian SSR Ministry of Health]

[Abstract] Microsurgical techniques were employed in orthotopic autotransplantation of the small intestine in eight dogs in which the intestinal segment was never removed from the abdominal cavity after complete surgical isolation. End-to-end venous and arterial anastomoses were performed to limit the period of ischemia to 40-45 min, with no attempts at reinnervation or restoration of lymphatic circulation. Six of the animals survived, demonstrating that this approach constitutes a valid model for studies on intestinal transplantation. In addition, this model avoids the problem of immune incompatibility and obviates the use of immunosuppressants. References 9: 5 Russian, 4 Western.

Trichotecenes Content in Heads and in Straw of Fusarium Infected Obriy Brand Wheat

907C0042C Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89 (manuscript received 20 Jun 88) pp 147-151

[Article by A. N. Leonov, G. P. Kononenko and N. A. Soboleva, All Union Scientific Research Institute of Veterinary Sanitation, Moscow]

[Abstract] *Fusarium graminearum* Schwabe is the principal pathogen of grain fusariosis in many countries.

These fungi produce trichotecene metabolites: nivalenol, 4-acetylnivalenol (fusarenone-x), desoxynivalenol, 3-acetyldesoxynivalenol and 15-acetyldesoxynivalenol, all of which are toxic to animals. Because detailed analysis of *F. graminearum* products in various parts of the plants were absent, determination of trichotecenes was carried out in spikes scales, in grain, ear stems and in straw of the Obriy wheat brand. Analysis of the extracts of these specimens showed that desoxynivalenol, its 3-acetyl and 15-acetyl derivatives were found at various levels in all materials studied. The highest levels were found in the grains and spike scales, followed by straw content and ear stems. The plant infection could have occurred through the soil or at a later stage of development through the transfer of spores from ear to ear. References 9: 2 Russian, 7 Western.

UDC 620.193.8:582.288.45:621.315.5

Mycodestruction of Vitreous Chalcogenide Semiconductors

907C0042B Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89 (manuscript received 18 Jul 88) pp 135-140

[Article by N. M. Vakiv, E. Z. Koval, T. N. Pavlovych and O. I. Shpotyuk]

[Abstract] Fungi have become common components of industrial ecosystems; they contaminate the starting crude materials, and they destroy finished products (especially fungi of the Deuteromycetes class); more than 360 fungi are capable of destroying polymeric materials such as the vitreous chalcogenide semiconductors (VCS) used widely in fiber optics. The goal of this work was to evaluate the resistance of arsenic-containing chalcogenide glasses to such fungi growing in thin layer films and in monolithic samples. Routine mycological methods were used to isolate two fungi from the surface of thin layer As_2Se_3 and K-8 glass: *Aspergillus flavus* and *Aspergillus niger*. Conidia of other fungi lost their viability in 2-3 months. None of the evaluated thin layer VCS films were resistant to fungi, the segments in direct contact with mycelium were substantially destroyed, their optical transparency was altered considerably, and the adhesion of VCS samples to the glass support was diminished, showing cracks and separation from the surface. It was not possible to reverse these changes even by heating this material to the softening point. The K-8 glass support was also subject to the destructive action of fungi; only monolithic As_2S_3 appeared to be resistant to fungal attack. It was concluded that the growth of fungi depended on the surface structure of the materials studied and on the metabolites produced by the fungi: various organic acids. Therefore, physical-chemical characteristics of the film surface must be used in predicting resistance of VCS to fungal damage. Figures 2; references 19: 17 Russian, 2 Western.

UDC 582.288.45:576.8.097.29:581.14

Effect of Environmental Factors on T-2 Toxin Biosynthesis by *Fusarium Sporotrichiella Bilai* Fungus*907C0042D Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89 (manuscript received 5 Oct 87) pp 151-156*

[Article by V. V. Rukhlyada, Ukrainian Scientific Research Institute of Experimental Veterinary Medicine, Kirovograd]

[Abstract] T-2 toxin [3 α -hydroxy-4 β ,15-diacetoxy-8 α , (3-methylbutyryloxy)-12,13-epoxy-8 $^{\beta}$ -trichotecene] is the principal etiologic factor of fusariotoxicoses. The goal of this work was to investigate the effect of moisture of grain substrates and of the temperature and duration of incubation on the biosynthesis of the T-2 toxin. The 421/1 strain of *Fusarium sporotrichiella* Bilai isolated from post-harvest barley residues was used. This strain caused fusario-T-2-toxicosis of animals in 1976. Grains of barley, wheat, oats, rye, corn and millet were studied along with polished rice, buckwheat and soy beans. The growth of *F. sporotrichiella* was directly related to the moisture content; it was the highest at 50 percent moisture content and decreased with the moisture content. The optimal temperature for the formation of T-2 toxin was 4°C, except for rice and corn, whose optimal temperature was 11-14°C. Preliminary incubation of the grain for two weeks at room temperature followed by low-temperature maintenance results in lower formation of the toxin as compared to low-temperature cultivation alone. Figures 2; references 23: 10 Russian, 13 Western.

An Express Method for Assessment of Polycaprylamide Fibers Resistance to Fungi*907C0042E Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89 (manuscript received 29 Jul 88) pp 178- 181*

[Article by Ye. P. Veretennikova and I. A. Yermilova, Leningrad Institute of Soviet Trade]

[Abstract] Data on structural changes of synthetic fibers attacked by microorganisms are limited. The goal of this study was to investigate the chemical aspects of microbiological destruction of polycaprylamide (PCA) fibers. The kinetics of this process was followed by determination of the accumulation of caprone formed. The biological agent studied was *Aspergillus niger*, an adaptable destructive microorganism. Sterile PCA fibers were placed in Petri dishes and seeded with conidia suspension in sterilized water. Destruction of PCA was determined after 10, 30 and 60 days by the static exchange capacity (determination of terminal amino and carboxyl groups). Analysis of the experimental data showed that the destructive action of the microorganisms resulted in a hydrolysis of the amine bonds, leading to a break in the

polymer chains and an increase in the number of carboxyl and amino groups (3 and 4 fold increase respectively), i.e., an increase in static exchange capacity of the damaged PCA fibers. This method was recommended as an express method for the investigation of biodegradation dynamics. Figure 1; references 10: 6 Russian, 4 Western.

UDC 541.18:576.8:577.15

Bacterial Recrystallization of Gold*907C0115A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 2, Sep 89 (manuscript received 27 Dec 88) pp 482-485*

[Article by S. A. Makarushev, A. N. Kovalevskaya, P. P. Safronov, O. N. Borodavkina and USSR Academy of Sciences Corresponding Member V. G. Moiseyenko, Amur Comprehensive Scientific Research Institute, Far Eastern Department, USSR Academy of Sciences, Blagoveshchensk, Amur Oblast]

[Abstract] In order to better appreciate the mechanisms underlying bacterial recrystallization of gold, 2- to 3-month incubation studies were conducted in which gold hydrosol was added to cultures isolated from gold deposits in the Soviet Far East. Studies with mixed *Bacillus cereus* 17/20 and *Pseudomonas alkaligenes* 22C cultures in meat-peptone broth + 1 percent glucose and 0.1 ml gold hydrosol at 22°C led to identification of needle-like gold crystals by scanning electron microscopy. Formation of the gold crystals was related to a multiplicity of crystallization sites on the bacterial surface. Pure cultures of *Micrococcus luteus* 1T were observed to actively adsorb colloidal gold which eventually led to the appearance of multifaceted 10 μ m gold crystals. The size difference was attributed to the presence of fewer crystallization sites on *M. luteus* than on *B. cereus* and *Ps. alkaligenes*. The bacteria appear to catalyze the process of crystallization and recrystallization through approximation and orientation of the colloidal gold particles via oxidative complex formation and other mechanisms. Figures 1; references 15: 7 Russian, 8 Western.

UDC 579.887.9:579.252.5].08

Plasmid Profile of Various Strains of Legionella Species*907C0131B Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 6 Jun 88) pp 18-23*

[Article by B. I. Marakusha, I. S. Tartakovskiy, and S. V. Prozorovskiy, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] In order to better define the genetics of Legionella species, an analysis was conducted on the

plasmid profiles of clinical and nonclinical isolates representing 32 species. Evaluation of the Soviet and foreign isolates showed that 15 carried one or two plasmids, while one isolate (*L. feelei*) carried six plasmids. The molecular weights of the plasmids ranged from 1.4 to 82.4 MD. Analysis with restriction enzymes showed an identical 82.4 MD plasmid in *L. pneumophila* serogroup 1 Flint 1, Albuquerque 1, and serogroup 9 No 35282. Figures 1; tables 1; references 16: 5 Russian, 11 Western.

UDC 541.183.24:576.8

Metal Leaching from Ores by Silicate Bacteria

907C0735A Kiev DOKLADY AKADEMII NAUK
UKRAINSKOY SSR: SERIYA
B—GEOLOGICHESKIYE, KHIMICHESKIYE I
BIOLOGICHESKIYE NAUKI in Russian No 5,
May 90 (manuscript received 28 Sep 89) pp 80-83

[Article by Z. R. Ulberg, N. V. Pertsov, S. V. Garbara, S. V. Nechayev, V. G. Stepanenko, and V. P. Kiselev,

Department of Natural Dispersed Systems, Physico-chemical Institute, USSR Academy of Sciences, Kiev]

[Abstract] Trials were conducted on the efficiency of *Bacillus mucilaginosus* in leaching metals from granulated rock containing 90 percent quartz. Data derived after incubation periods of 20-40 days showed that the action of *B. mucilaginosus* led to profound changes in the structure of the mineral due to degradation, leaching and solubilization of silicon. In addition, a number of metals were also selectively extracted in the ionic and colloidal states and formation of previously unreported phases was noted. The most commonly encountered phases were represented by Ag+Cu, Fe+Ni, Ag+Zr and Mg+Mn. Since Ag+Zr and Mg+Mn have not been reported in nature, it appears their formation occurs in solution in the course of *B. mucilaginosus* action. Optimum leaching conditions consisted of an incubation time of 20 days in the batch mode, with the mineral salts serving as the nutrient medium. Figures 1; tables 1; references 7 (Russian).

Adaptation to Weak Electromagnetic Fields Causes "Immunity" to Strong Fields

907C0738A Moscow NTR TRIBUNA in Russian
No 22-12, 24 Jun 90 p 10

[Article by O. Pobedeva: "Microstress Against Death"]

[Text] Modern man lives in a sea of electromagnetic waves. Rivers and streams of radiation from radio and television stations, electrical household appliances, and high voltage lines flow into it. This electrical smog negatively affects living nature. Bees, for example, fly away from zones of an electromagnetic field having a frequency of 50 Hz. Rats placed near a high-voltage line lose weight and experience hormonal disturbances. Dogs begin to have fibrillar arrhythmia. And the chromosomes of human embryos are damaged by the effect of microwaves. Cases of serious illnesses as the result of the effect of electrical smog have also been recorded.

The number of broadcasting stations, radar stations, electronic control centers, and high-voltage electrical transmission lines continues to grow precipitously. The total intensity of their fields exceeds many-fold the natural radiation level of living substances. This cannot not disturb scientists. That, for example, is how Prof E. Kastrubin, doctor of medical sciences, one of the prominent specialists in the field of the study of the effect of electromagnetic radiation on the human organism, evaluates the problem (NTR TRIBUNA in No 11, 1989 described his Lenar instrument, which substitutes harmless electrical impulses for chemical tranquilizers).

"It has been known for a long time," says Eduard Mikhaylovich, "that the human organism reacts sensitively to a change in electromagnetic fields. Thus, as early as 15 years ago, Prof V. Manoylov reported the results of a survey of people working near sources of a strong magnetic field: absolutely all complained of a worsening of their state of health. Foreign specialists also obtained analogous results. Meanwhile, modern physical therapy uses very different kinds of electromagnetic energy. Very recently, for example, a group of scientists was awarded the State Prize for a method for treating diseases of the cardiovascular system by means of a laser. Is there an alternative to the action electromagnetic effects?"

"It appears that if the animals being tested are subjected several times to the action of weak currents and then also are subjected painlessly to strong electrical shocks, those groups of their cohorts which are 'untrained' die. Thus, weak electromagnetic stress effects produce immunity to stronger effects.

"For instance, according to the data of the American researchers Zigmund and Harvey, stress effects in the form of painful electrical shocks with a force of 10 mA for 30 minutes leads to a lowering of catecholamines in the brain, and to the development of stomach ulcers and the death of animals. However, animals preliminarily

treated for 30 minutes daily for 9 days with an unimpaired current of the magnitude of 4.5 mA remained healthy after being subjected to the action of a 10 mA current. The protective effect then gradually decreased over a period of 36 days.

"How are these experimental facts explained?"

"The animal or human organism can be considered as a cybernetic system. By obtaining a signal, it, to put it simply, releases part of its energy in order to analyze and compensate for it. Simultaneously, the organism directs a large part of this energy to the support of its systems in the optimal state—taking into account the information introduced by the external signal. This takes place independently of what kind of a signal it is—electromagnetic or mechanical painful, which is obtained by means of the effect of music, light, Kashpirov chess play, or showering with cold water. Therefore, frequently improbable methods of treatment themselves, it would seem, are successful.

"However, as in any other cybernetic system, the organism can also react strongly to very weak signals. Thus, in homeopathic treatment, after a minimal signal is obtained, it gives back the basic energy to help the sick organ, responding to external excitement only with a significant part of it. For this reason it has proved to be effective. The Pasteur principle of vaccinations—purposely transmitting to the organism of a weakened stress signal, which produces immunity to strong effects of the same nature.

"Experiments with animals and the logic of theoretical arguments suggest that for protection of the organism from electrical smog, it is necessary to produce a unique immunity. And adaptation by means of insignificantly weak effects of electromagnetic radiation helps most of all in this. And instruments of the Lenar type, which V. Nozhnikov and we developed over a period of twenty years, are completely suitable for this. By beginning with impulses with a voltage of 50 V, we have sought as much as possible to retain the effect of the action and to lower its energy. And now instruments operate at 4-5 V, moreover with a 'humanized' frequency of 100 Hz, which is close to the sound range and is more natural for the organism.

"Such a 'homeopathic' dose of electrical action indeed must prevent the organism from encountering more serious danger. And if you remember that instruments of the Lenar type are light and compact, and they can be used by anyone, it becomes clear: the possibility of adapting to electrical smog is already here today.

"For example, anyone who has to work in a zone strongly 'contaminated' by electromagnetic waves can preliminarily go through a course of adaptation by means of the Lenar. And people who feel poorly during magnetic storms will be able to use this instrument healthfully the day before oppressive days."

Cytogenetic and Endocrinologic Changes in Experimental Animals Exposed to High-Frequency Electromagnetic Fields

907C0043C Moscow GIGIYENA I SANITARIYA
in Russian No 5, May 89 (manuscript received
9 Apr 87) pp 85-86

[Article by V. N. Nikitina, O. A. Matskevych, V. V. Dubrovina, N. A. Minkina and G. N. Kuzminskaya, Leningrad Scientific Research Institute of Industrial Hygiene and Occupational Diseases; Leningrad State University]

[Abstract] Hygienic studies have shown that deckhands may be exposed to high-frequency electromagnetic fields. With an eye to developing safety standards for such exposure, the researchers exposed a total of 25 male Wistar rats to a code-modulated 500 W/m hf electromagnetic field at 13 MHz for 10 days. Analysis of the data showed that exposure to EMF results in increased frequency of chromosomal aberrations in the bone marrow cells, the activity of ACTH was lowered, the activity of the thyroid gland was diminished, and spermatogenesis was affected significantly. It was concluded that these cytogenetic changes in somatic cells were due to a large degree to disturbance in the endocrinological system. References: 11 (Russian).

UDC 614.73-07

Assessment of Health Effects of Low Levels of Nonionizing Radiation in Populated Areas

907C0134B Moscow GIGIYENA I SANITARIYA
in Russian No 6, Jun 89 (manuscript received
11 Apr 88) pp 30-31

[Article by Ye. F. Stoyan, M. I. Rudnev, and Yu. D. Dumanskiy, Kiev Scientific Research Institute of General and Communal Hygiene imeni A. N. Marzeyev]

[Abstract] Recent hygienic studies have shown that individuals in populated areas may be exposed to low level radiofrequency emissions for 12-20 hours per day. These observations point to the need for standardized and comprehensive procedures for the assessment of health effects of such environmental conditions. To meet the challenge, scientists at the Kiev Scientific Research Institute of General and Communal Hygiene have developed an assessment scheme that encompasses clinical, physiological, neuropsychological, dermatographic, and epidemiologic observations to evaluate the potential health effects of such exposure. The screening methodology includes questionnaires that have been formulated to derive subjective health data based on self-assessment of the at-risk population. It is hoped that with a concentrated effort it will be possible to derive definitive data on the health aspects of low level nonionizing radiation on the basis of which health policy recommendations can be made.

UDC 577.3.04

Motile Microorganisms as Sensors of High Frequency Electromagnetic and Biological Fields

907C0143C Kiev BIOPOLIMERY I KLETKA
in Russian Vol 5 No 4, Jul-Aug 89 (manuscript received
3 Aug 88) pp 76-83

[Article by A. I. Karachentseva and Yu. N. Levchuk, "Otklik" Provisional Scientific Collective, Ukrainian SSR Ministry of Higher and Intermediate Special Education, Kiev; Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Trials were conducted to determine the susceptibility of algae and bacteria to high frequency electromagnetic and biological fields in order to assess their potential role as biosensors. The basic approach consisted of employing quasi-elastic light scattering instrumentation to measure the responsiveness of *Dunaliella viridis* and *Escherichia coli* to the millimeter wave (37.5 GHz) emissions of generator G4-141 and the bioelectric field of a human palm (7 mW/cm² electromagnetic energy emission). In the case of both objects negative radiotaxis was obtained under conditions that corrected for thermal effects. The putative receptor is expected to be a protein molecule oscillating at the same frequency as the electromagnetic fields. Figures 7; tables 1; references 15: 11 Russian, 4 Western.

UDC 613.647-07:615.844.4.03

Electroacupuncture Assessment of Health Status of Subjects Exposed to Electromagnetic Fields

907C0166B GIGIYENA TRUDA I
PROFESSIONALNYYE ZABOLEVANIYA in Russian
No 6, Jun 89 (manuscript received 26 May 88) pp 39-40

[Article by V. N. Nikitin, Yu. V. Markov, and N. D. Chistyakov, Scientific Research Institute of Labor Hygiene and Occupational Diseases; Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] A study was conducted on 62 controllers at a radio station to evaluate the value of electroacupuncture in assessing the health status of individuals regularly exposed to electromagnetic fields (EMF; short-term exposures to 120-140 V/m, less than 7200 W·h/m²/shift). The study was based on measuring the electrical conductance (R parameter) of representative acupuncture points covering 12 functional systems. Despite age-related changes, the data were also consistent with presumably EMF-related cardiac, gastrointestinal, hepatic, and pulmonary hypofunction. The impression of systemic functional deterioration was confirmed by clinical workups and subsequent onset of frank pathology in some cases. These observations demonstrated that electroacupuncture offers a reliable, simple, and rapid option for health evaluation in the occupational setting. References 8 (Russian).

UDC 613.648+613.68]-07

Dosimetry of Superhigh Frequency Emissions of Ship Radar

907C0166C GIGIYENA TRUDA I
PROFESSIONALNYYE ZABOLEVANIYA in Russian
No 6, Jun 89 (manuscript received 16 May 88) pp 43-45

[Article by A. V. Grigorenko, A. V. Diyev and A. A. Vasilyev, Institute of Hygiene of Water Transport, Moscow]

[Abstract] Difficulties encountered in shipboard monitoring of radar emission and human exposure are largely predicated on field distortions and reflections that are inherent to ship construction. In addition, Soviet wattmeters and other dosimeters currently available are suitable only for operation in the Fraunhofer region, whereas aboard ships, dosimetry has to be performed within the Frenel region. Consequently, the best Soviet studies are merely indicative in nature of the potential health aspects of shipboard radar installations. More definitive information must await the development and availability of Soviet dosimeters capable of operation within the Frenel region and sensitive to 1.5-10 kHz impulsations emitted by antennas rotating at 16-24 rpm. References 8: 6 Russian, 2 Western.

UDC 612.89.426.612.143

Effects of 50 Hz, 6 mT Electromagnetic Field on Cardiac Cycle and Hemodynamics in Rabbits

907C0682A Tbilisi IZVESTIYA AKADEMII NAUK
GRUZINSKOY SSR: SERIYA BIOLOGICHESKAYA
in Russian Vol 16 No 2, Mar-Apr 90 (manuscript
received 10 May 88) pp 77-82

[Article by T. P. Chitaya, Institute of Physiology imeni I. S. Beritashvili, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] In order to assess the effects of conventional electromagnetic fields (EMF) on cardiovascular performance and hemodynamics, experiments were performed in which 2.5-3.0 kg chinchilla rabbits were exposed for 1

h to a 50 Hz, 6 mT EMF with subsequent monitoring. Exposure of the animals to the EMF with the field vector following a craniocaudal orientation induced the following basic changes: prolongation of diastole and increased ventricular filling time. In conjunction with diminished peripheral vascular resistance and an increase in the systolic index, blood inflow into the ventricles was increased and, in accordance with the Frank-Starling law, the force of systolic contraction was enhanced. The study also showed that the heart rate was unaffected. The EMF-induced alterations in the cardiac cycle were most pronounced 3 h after exposure, and differ in some details from changes reported by others working with 3 mT EMFs. Tables 4; references 11: 5 Russian, 6 Western.

UDC 577.6P.122

Effects of Permanent Magnetic Field on Guinea Pig Gonads

907C0734B Tbilisi SOOBSHCHENIYA AKADEMII
NAUK GRUZINSKOY SSR in Russian Vol 137 No 1,
Jan 90 (manuscript received 6 Oct 89) pp 169-172

[Article by M. A. Bregadze, Institute of Physiology imeni I. S. Beritashvili, Georgian SSR Academy of Sciences]

[Abstract] Male and female guinea pigs, 300-600 g, were exposed to 100-300 erg permanent magnetic fields for 10 min with histologic monitoring of the gonads for the subsequent 40 days. The results demonstrated 100-150 erg fields had minimal, transient effects. More pronounced sequelae lasting for 5-10 days were observed with the 200 erg field, consisting of isolated cells with pycnosis and vacuolization. However, exposure to a 300 erg field induced changes evident during the entire period of observation, with more pronounced alterations in the testicles than in the ovaries. In general, the latter modality involved edema, destruction of the more mature cells, and changes in cellular composition with compensatory changes evident toward the end. These findings indicated both direct physical effects of the magnetic field as well as involvement of the hypothalamic-hypophyseal control mechanisms. Figures 1; references 8 (Russian).

UDC 616.006.182-003.93

UDC 615.015.25.03:615.917.036.11].076.9

Promotion of Tissue Regeneration by Enhancement of Cellular Element Differentiation

907C0143D Kiev BIOPOLIMERY I KLETKA
in Russian Vol 5 No 4, Jul-Aug 89 (manuscript received 4 Jul 88) pp 84-90

[Article by N. A. Galatenko, G. A. Pkhakadze, Ye. S. Savitskaya, and N. N. Bufius, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Trials were conducted with levamisole immobilized on biodegradable polyurethane foams to assess the role of levamisole in tissue regeneration. Histologic studies on outbred rats demonstrated that subcutaneous implants of sponges containing various levels of levamisole accelerated formation of granular tissue and its subsequent replacement by tissue with the morphofunctional features of normal tissue. Observations over two months showed that the initial steps involved accelerated transformation of monocytes into macrophages. The latter secreted factor(s) promoting fibroblast growth and synthesis of collagen by fibroblasts, leading in turn to the more rapid onset of granulation and morphologic normalization. Similar studies on chinchilla rabbits with 4 cm² skull defects filled with sponges containing 10 percent levamisole and autologous bone chips showed that levamisole promoted osteogenesis and filling of the defect. In the case of both tissues levamisole acted to enhance differentiation and synthesis of the intercellular matrix. Figures 4; tables 2; references 14: 12 Russian, 2 Western.

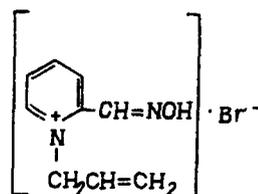
Comparative Study of Therapeutic and Reactivating Activity of Alloxime and Dipyroxime in Acute Poisoning of Animals by Organophosphoric Pesticides

907C0655B Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 53 No 1 (manuscript received 24 Feb 89) pp 64-65

[Article by Yu. I. Loboda, Kiev Scientific Research Institute of Pharmacology and Toxicology, Kiev]

[Text] Experiments on albino rats have demonstrated that at an oral LD₅₀ toxic dose of Trichlorfon and Malathion, a new antidote alloxime (10 mg/kg intramuscularly) exhibits a more pronounced therapeutic and reactivating effect (particularly on the central nervous system) than dipyroxime (TMB-4).

Introduction. Alloxime was developed at the Kiev Scientific Research Institute of Pharmacology and Toxicology. It is a monoquaternary ammonium salt and is formulated as N-allyl-2-pyridinaldoxime bromide:



It is used clinically to treat acute organophosphoric compound poisonings.

The object of the present work is to make a comparative study of the activity of alloxime and dipyroxime that are widely used [1, 3] in Trichlorfon and Malathion poisonings of animals.

Table 1. Therapeutic Effectiveness of Alloxime and Dipyroxime in Trichlorfon and Malathion Poisoning

Pesticide	LD ₅₀ , mg/kg			Therapeutic index	
	control	alloxime	dipyroxime	alloxime	dipyroxime
Trichlorfon	882.7+79.87	3442.5+78.5	2886.4+85.2	3.9	3.2
Malathion	644.0+40.8	1764.5+82.59	1340.3+85.2	2.74	2.07

Method. Experiments were conducted on 240 albino rats of both sexes weighing 150-200 g. Alloxime and dipyroxime were administered intramuscularly in the form aqueous solutions at a dose of 10 mg/kg in combination with atropine (5 mg/kg), in three to five minutes, and again 1 day after the oral administration of Trichlorfon and Malathion. The therapeutic effectiveness of the preparations was judged by the value of the therapeutic index, i.e. the LD₅₀ of the organophosphoric compounds with and without treatment. The Litchfield and Wilcoxon method was employed to find the acute toxicity parameters of the pesticides.

Cholinesterase activity in the whole blood and brain of the treated animals (after decapitation) was assayed by the Hestrin method as modified by A. N. Panyukov [3] at intervals of 30 min, 1 h, and 1, 3, and 5 days after poisoning. During those periods studies were made of enzyme activity in the blood and brain of control group rats (administration of Trichlorfon and Malathion at a LD₅₀ dose without treatment).

Results and Discussion. Both investigated organophosphoric compounds were found to be acutely toxic (Table 1). Poisoning symptoms were similar in character and

were manifested as in the case of most organophosphoric compound poisonings, by excitation of the M- and N-cholinergic systems. However, those symptoms were manifested earlier (after 20 to 30 minutes) in Trichlorfon poisoning than they were in Malathion poisoning (after 1-2 h).

As can be seen from Table 1, alloxime induced a more pronounced therapeutic effect than dipyroxime both in Trichlorfon and Malathion poisoning and arrested the intoxication process more rapidly.

A study of the effect that the employed pesticides have on blood and brain cholinesterase activity of animals showed (Table 2) that Trichlorfon reaches a maximum suppression both in the blood and brain 0.5 to 1 h after its administration (suppression in blood was 85.5 percent and 80.6 percent, and 78.8 percent and 67.9 percent in the brain, respectively). Enzyme activity was significantly reduced by the end of the observation period (fifth day). The suppressant effect of blood Malathion reached a maximum on the first and third days (80 and 78 percent, respectively), and in the brain after 1 h and 1 day (77.7 and 77.6 percent). The effect remained higher than that for Trichlorfon in the subsequent periods as well.

Table 2. Cholinesterase Activity (in percent of the original level) in Albino Rat Blood and Brain During Trichlorfon and Malathion Intoxication and Treatment with Alloxime and Dipyroxime in Combination With Atropine

Antidote	Blood					Brain				
	Time after administration of pesticide									
	30 min	1 h	1 day	3 days	5 days	30 minutes	1 h	1 day	3 days	5 days
Trichlorfon poisoning										
Control (without treatment)	14.6±0.8	19.4±3.4	24.5±6.3	42.2±3.2	54.2±4.7	21.2±1.5	32.1±4.4	49.4±1.1	49.5±1.3	53.4±3.6
Alloxime + atropine	59.0±5.4	48.9±2.5	56.7±4.3	82.9±1.7	85.0±2.1	49.7±4.6	33.3±2.4	66.3±2.6	80.3±3	77.8±1.8
Dipyroxime + atropine	29.9±4.5	39.7±3.9	54.9±7.2	59.3±5.7	64.6±4.8	25.4±1.4	53.5±5.2	60.4±5.8	67.0±5.7	67.7±4.9
Malathion poisoning										
Control (without treatment)	52.0±4.5	35.7±6.7	19.4±4.0	22.2±8.4	36.0±9.1	32.1±3.8	22.4±0.8	22.4±1.2	31.6±1.8	52.9±2.8
Alloxime + atropine	70.9±7.08	58.0±5.7	51.7±2.6	49.8±4.9	75.0±4.0	83.0±2.29	72.8±6.3	48.0±1.3	52.1±1.7	71.4±2.4
Dipyroxime + atropine	67.7±3.8	50.6±5.3	37.2±3.08	55.3±5.7	54.7±4.9	31.6±1.83	21.2±1.01	37.2±0.53	49.6±1.01	67.0±1.7

Cholinesterase reactivators alloxime and dipyroxime in combination with atropine significantly elevated blood and brain enzyme activity. In Trichlorfon poisoning alloxime elevated that activity 30 minutes after intoxication and the maximum effect was observed toward the end of the experimental period. One should note that throughout all of the observation periods alloxime's reactivating effect on blood and brain cholinesterase was more pronounced than that of dipyroxime. In Malathion intoxication alloxime also markedly elevated blood and brain cholinesterase catalytic activity which was more perceptible in the early period of intoxication (30 min to 1 h). Moreover, it exceeded dipyroxime's efficacy throughout all periods of observation.

Thus, in cases of acute animal poisoning by Trichlorfon and Malathion the new cholinesterase reactivator

alloxime exhibits a more pronounced therapeutic activity than dipyroxime. Its principal feature in comparison to dipyroxime is its ability to restore more fully cholinesterase activity in the blood, and what is even more important, in the central nervous system.

Conclusions

1. Alloxime exceeds the therapeutic effect of dipyroxime in the oral poisoning of laboratory animals by Trichlorfon and Malathion.

2. The normalizing effect of alloxime on cholinesterase activity suppressed by organophosphoric pesticides is manifested to a greater extent than dipyroxime in the blood and central nervous system.

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UDC 616.13-004-007.271-085.2 Dalargin

Anti-Ischemic Effect of Novel Soviet Drug Dalargin

907C0168A Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 6, Jun 89 pp 20-22

[Article by G. Ye. Sokolovich, Professor, Colonel, Medical Corps; V. D. Slepushkin, Doctor of Medical Sciences; G. G. Savitskiy, Docent, Col., Med. Corps; G. K. Zoloyev, Candidate of Medical Sciences; V. D. Poyarkov, Docent; V. I. Ponurovskiy, Lt. Col., Med. Corps; A. A. Polyakov, Captain, Med. Corps; A. I. Korzun, Captain, Med. Corps.; and A. V. Smirnov, First Lt., Med. Corps]

[Abstract] Clinical trials were conducted on 65 men, 37-59 years old, to assess the therapeutic benefits of dalargin in obliterating endarteritis and atherosclerosis in the lower extremities. Patients in the experimental group were treated with dalargin (2 mg/day, intravenously) for 5 days in addition to conventional therapy. The rheographic index improved immediately from 0.24 to 0.35 (p >rose by 3-4°C. In ten minute ischemic tests dalargin was also shown to be effective in attenuating an increase in the blood lactate level. On balance, the data were interpreted to indicate that dalargin has potential therapeutic applications in managing lower limb ischemia. The mechanism of action of dalargin appears to be bimodal: it affects both peripheral hemodynamics and metabolism of ischemic tissues.

UDC 615.243:547.558.5].015.4:616.33-002.44-003.9

1-Ethoxysilatrane: Ulcerostatic Effects and Its Possible Mechanisms

907C0695C Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 36 No 2, Mar-Apr 90 (manuscript received 8 Aug 88) pp 24-27

[Article by I. G. Kuznetsov, M. M. Rasulov, A. A. Akabirov, S. K. Suslova and M. G. Voronkov, Institute of Organic Chemistry, Siberian Division, USSR Academy of Sciences, Irkutsk]

[Abstract] A comprehensive assessment of the pharmacodynamics of 1-ethoxysilatrane (ES), an antiulcer agent,

demonstrated that its therapeutic efficacy appears to depend on activation of endogenous antioxidant systems and maintenance of essential tissue oxidation in the face of oxygen depletion. Specifically, intraperitoneal administration of 5 mg/kg of ES for 10 days led to healing of experimental gastric ulcers within 10 days in 160-180 g outbred rats, whereas frank lesions remained in untreated control rats. Clinical chemistries revealed that ES-treated animals presented with a much lower level of plasma lipid peroxidation than control animals. In addition, ES attenuated a rise in lipid peroxidation in the pathologic gastric tissue, as well as in vitro in liposomes prepared from egg yolk. ES was also shown to adsorb to bilayer lipid membranes prepared from azolectin, to increase the negative surface charge and to increase the modulus of elasticity of the bilayer. In addition, ES diminished mitochondrial respiration, while studies with a submitochondrial fraction of heart cells revealed the ES was without effect on proton transport. Finally, ES did not affect reticulocyte cAMP levels. Consequently, the basic mechanism of action of ES appears to involve a transition of membrane lipids to a new quasiequilibrium state. Figures 3; tables 2; references 23: 18 Russian, 5 Western.

UDC 612.8.015+612.82/.83

Selective CNS Effects of Intranasally Administered Tetr peptide Tufts in

907C0240A Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOVA in Russian Vol 39 No 4, Jul-Aug 89 (manuscript received 7 Jun 88; in final form 21 Oct 88) pp 767-769

[Article by A. A. Kamenskiy, N. Yu. Sarycheva, N. B. Voroshilina, V. N. Kalikhevich and I. P. Ashmarin, Moscow State University imeni M. V. Lomonosov]

[Abstract] Outbred male rats, 150-200 g, were employed in assessing the CNS effects of tufts in administered intranasally and intraperitoneally. Evaluation of motor activity and lymphocyte succinate dehydrogenase activity demonstrated that behavioral alterations were obtained with intranasal doses (0.03-0.10 mg/kg) that were an order of magnitude lower than the doses required on intraperitoneal administration for an equivalent effect. Furthermore, the dosages used in intranasal administration did not affect lymphocyte function. These observations demonstrated that a selective effect on the CNS was exerted by low doses of tufts in given intranasally, suggesting that other bioactive peptides should be tested in a similar manner to exclude non-neurotropic sequelae. Figures 1; references 5 (Russian).

Specificity of Occupational Processes of Sailors on Arctic Fleet Ships in "Ice Moorings" and Their Effect on Some Body Systems

907C0043A Moscow GIGIYENA I SANITARIYA in Russian No 5, May 89 (manuscript received 12 Dec 86) pp 22-24

[Article by N. P. Bychikhin and T. V. Vasilyeva, Arkhangelsk Medical Institute; Scientific Research Institute of Water Transport Hygiene, Moscow]

[Abstract] Many of the operational sites on the extreme northern shores require importation of various materials; since there are no docking facilities, the unloading is done on "ice moorings", in cold weather, windy, open air conditions, in total darkness illuminated only by powerful spot lights, with extreme icing of the working surfaces, all of which results in excessive morbidity among the sailors involved in such operations. A complex clinical and physiological evaluation of their functional state was carried out during winter operations at high latitudes, evaluating crane operators, signallers and loaders. Intensive morbidity index (IMI) per 1,000 individuals was on the average 7618.5; among the loaders it was 8401.5 and among the controls not involved in above operations, it was 5357.6. The loaders accounted for 91.8 percent of all initial medical examinations. The most affected were their respiratory organs followed by microtraumas, aggravation of chronic radiculitis, myositis and various skin infections. More than 50 percent of the sailors had recurrent problems. 95.5 percent of the entire crew complained of some problems during the cruise. It was concluded that individuals exposed to outside activities exhibited diminished immunity and general resistance of their organisms. Along with the climatic factors, working conditions affected the functional state of cardio-vascular, respiratory, CNS, immune, muscular and thermoregulatory systems. These results served as guidelines in development of special measures aimed at optimizing working conditions during arctic trips. References: 7 (Russian).

UDC 612.815+612.823

Interrelationship Between Amplitude of Kinesthetic Evoked Potentials and Rate and Acceleration of Arm Movement in Monkeys

907C0115B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 2, Sep 89 (manuscript received 12 Jan 89) pp 494-496

[Article by Ye. Yu. Golov and V. A. Fedan, Scientific Research Laboratory of Biologically Active Substances of Hydrobionts, Moscow]

[Abstract] An analysis was conducted on the interrelationship between the amplitude of the first positive component (AP₁) of the kinesthetic evoked potential (KEP) in the somatosensory cortex of rhesus monkeys and the angular velocity and acceleration of elbow joint rotation. The study was performed with four rhesus males 4-6 years old. In one series of experiments the average

angular velocity was varied from 100°/sec to 633°/sec, representing a 6.3-fold change. The corresponding AP₁ increased to 47.0 μV from 38.5, i.e., a mere 1.2-fold increase. In another experiment an almost rectilinear relationship was obtained between changes in angular acceleration and AP₁, e.g., 3.8-fold and 3.6-fold, respectively. These findings show that the angular acceleration is a key determinant of AP₁. This observation, in conjunction with a previous demonstration that the duration of AP₁ is directly related to the angle of rotation, indicates that central coding of kinesthetic information is based on time-amplitude features of KEP. Figures 4; references 10: 4 Russian, 6 Western.

UDC 612.273.2.014.49.1.612.821

Interrelationship Between Respiratory System Response, Mental and Physical Efficiency, and Metabolic Features in An Individual After a Yearlong Stay in Alpine Conditions

907C0124B Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 35 No 4, Jul-Aug 89 (manuscript received 1 Mar 88) pp 61-69

[Article by T. V. Serebrovskaya, A. A. Ivashkevich and Yu. L. Maydikov, Institute of Physiology imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A comparative analysis was conducted on the effects of high-altitude conditioning on respiratory, mental and physical performance, and metabolic interrelationships in two groups of young men. One group (I) of 24 men with a mean age of 19.5 years remained at an altitude of 1,680 m above sea level for one year, and the other group (II) of 22 men with an average age of 20.8 years remained for an equivalent period of time at 3,650 m, with occasional ascents to 4,200 m. Group I subjects scoring higher in information processing exhibited less reactivity to moderate hypoxia and a more pronounced ventilatory response to maximum tolerable hypoxia. In addition, those individuals also exhibited superior physical performance and had higher blood glucose levels. In the case of many of these parameters an inverse relationship was obtained in Group II individuals. Against a general background of deterioration in mental and physical performance, Group II subjects scoring higher in terms of information processing possessed a less reactive respiratory system, greater tolerance of extreme hypoxia, lower blood glucose, and a 45 percent increase in blood lactic acid:pyruvic acid ratio indicative of intensified anaerobic glycolysis. The above observations indicate that under alpine conditions subjects with low scores on psychomotor tests and relatively high blood glucose demonstrate a more pronounced shift in metabolism to the glutamate shunt. The latter leads to an increase in the rate of GABA synthesis, an inhibitory neurotransmitter in the CNS. However, since in the final analysis GABA serves to potentiate energy metabolism and, hence, improve physical performance, the inverse relationship

between physical performance and information processing at high altitudes becomes understandable. Figures 3; references 34: 23 Russian, 11 Western.

UDC 612.89.03+613.11

High Temperature Tolerance in Relation to Cardiac Performance

907C0168C Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 6, Jun 89 pp 43-44

[Article by A. L. Maksimov, Candidate of Medical Sciences; T. B. Chernook, Cand. Biol. Sciences; and V. N. Nosov, Cand. Med. Sci., Colonel, Med. Corps]

[Abstract] An analysis was conducted on the relationship between cardiovascular tolerance of hypoxia and tolerance of high temperature/humidity combinations. Accordingly, cardiac performance was evaluated in 46 men, 18-23 years old, under the following conditions: +60°C, greater than 80 percent relative humidity, and 61 m³ environmental chamber. Group I individuals (high tolerance of hypoxia) responded with a 49 beat/min increase in the heart rate after a 6 min stay in the chamber, while Group II individuals (low tolerance of hypoxia) displayed a 62 beat/min increase. In addition, the increase in systolic blood pressure in Group I and II subjects was 27 and 17 mm Hg, respectively, while diastolic blood pressure decreased by 6 mm Hg in Group I individuals but remained unaffected in Group II. Finally, while body weight loss in Group I was 1.5-fold greater than in Group II, the stroke volume in the former group remained higher than in the latter group (p >) with CO₂ monitoring demonstrated that the heart rate in Group I individuals was predominantly under the control of parasympathetic mechanisms and that central nervous system mechanisms were secondary to intracardiac control mechanisms. In the final analysis these observations demonstrated that subjects with inherent high tolerance of hypoxia are also highly tolerant of high temperatures. The latter may be predicted on the basis of cardiovascular stress testing in conjunction with CO₂ monitoring. Tables 1; references 3 (Russian).

UDC 613.6:656.6]-07:612.766.1

Tremometry in Assessment of Intensity, Difficulty, and Reliability of Sailor Performance

907C0168E Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 6, Jun 89 pp 49-51

[Article by V. G. Kravets, O. Yu. Netudykhatka, Candidate of Medical Sciences, and G. V. Duganov, professor]

[Abstract] A Soviet tremometer (Authors' Certificate Nos. 1052218 and 1173984) was tested under shipboard conditions to ascertain its effectiveness in evaluating sailor fatigue. Data obtained with the tremometer on tremor frequency (F) and coordination index (K) were correlated with information on the heart rate, flicker fusion, and visual-motor reaction. The results demonstrated that the tremometer was suitable for assessing

fatigue in sailors, with F providing valid indication of job difficulty, and K of the stress factor. Tables 1; references 7 (Russian).

UDC 612.821.6+612.826+577.15/.17

Conditioned Avoidance Reflex in Rats with Long-Term Neostriatal Administration of Leu-Enkephalin or Its Tetrapeptide Analog

907C0207A Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 6, Jun 89 (manuscript received 12 Jul 88) pp 745-751

[Article by N. F. Suvorov, A. F. Yakimovskiy, A. V. Yeremeyev and I. V. Bobrova, Laboratory of Physiology of Higher Nervous Activity, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad; Laboratory of Nitrogenous Heterocyclic Compounds, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Daily neostriatal administration of either 5 or 15 µg of leu-enkephalin (LE) or its tetrapeptide analog (TPA; Tyr-D-Arg-Gly-Phe-OEt) for 3 weeks in male Wistar rats weighing 250-300 g was observed to inhibit conditioned avoidance reflexes. However, whereas the degree of inhibition with LE was on the order of 50 percent, complete inhibition was observed with TPA. Slow recovery of the avoidance behavior was then seen over a 4- to 5-day period. Furthermore, while LE was without effect on general behavior patterns, after 5-7 days spontaneous motor activity increased in conjunction with elements of stereotypic searching behavior, becoming particularly noticeable after 11 days. These latter changes in behavior were much more pronounced with TPA. There was no evidence of withdrawal symptoms. The differences in the behavioral effects elicited by exogenous LE and TPA were attributed to the fact that the latter agent is less susceptible to enzymatic degradation and exerts a cumulative effect to some extent. These observations support the view of an inhibitory function of the neostriatum on avoidance behavior. Prolonged activation of the enkephalonergic system in the neostriatum evidently leads to activation of dopaminergic mechanisms, as suggested by the onset of stereotypic behavior. Figures 2; references 14: 8 Russian, 6 Western.

UDC 612.821.2+612.822.1+577.15/.17

Role of Monoaminergic Systems of the Brain in Effects of Tuftsin and Tuftsin Analog on Emotional Behavior of Animals

907C0207B Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 6, Jun 89 (manuscript received 20 Jun 88) pp 759-765

[Article by G. P. Semenova, Ye. V. Gurevich, M. M. Kozlovskaya and Ye. A. Gromova, Laboratory of Neurotransmitter Systems, Institute of Biological Physics,

USSR Academy of Sciences, Pushchino; Laboratory of Emotional Stress Pharmacology, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Abstract] The effects of intraperitoneal administration of 300 µg/kg of tuftsin or of its TP-1 analog to male Wistar rats weighing 200-350 g were analyzed on the basis of changes in cortical, hypothalamic, and caudal brain stem levels of biogenic amines and in adaptive behavior in the face of various forms of emotional stress. Observations over a 6-hour period showed that both peptides enhanced food-seeking behavior under adverse circumstances, with the TP-1 observed to be the more efficacious agent. In addition, the behavioral changes were correlated with the changes in the levels of biogenic amines and their metabolites observed over a 2-hour period. In particular, TP-1 led to a statistically significant reduction in the levels of norepinephrine in the brain stem and the hypothalamus, with a significant increase in the concentration of 5-hydroxyindoleacetic acid. Accordingly, the more significant behavioral effects of TP-1 may be attributable to the more profound alterations in the biogenic amines induced by this agent in comparison with the effects obtained with tuftsin. Figures 3; references 14: 10 Russian, 4 Western.

UDC 612.327:577.15/17

Effects of Neurotensin and Substance P on Active State of Smooth Gastric Muscles

907c0207C Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 6, Jun 89 (manuscript received 17 Feb 88) pp 829-836

[Article by A. V. Shmigal and V. S. Demyanenko, Chair of Normal Physiology, State Medical Institute imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev; Laboratory of Digestive Physiology, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] Antral and fundal muscle strips obtained from guinea pig stomach were used in assessing the mechanism of action of neurotensin (NT) and substance P (SP). Monitoring of the electrical and contractile changes obtained with 5×10^{-8} to 3×10^{-6} M NT and 7.4×10^{-8} to 1.5×10^{-6} M SP demonstrated that the effects of NT were due to membrane depolarization and activation of electrically-controlled calcium channels. Changes with SP were evidently due to activation of chemically-controlled calcium channels since contraction took place in the absence of telling changes in the membrane potential, and the amplitude of potassium-mediated tonic contraction was enhanced. It appears, then, that SP promotes an increase in the tonus of the smooth muscles via an increase in intracellular calcium ions and the resultant increase in functional cross bridges. Figures 4; references 10: 4 Russian, 6 Western.

UDC 612.352.3.015.36:547.963.32].06:613.863].014.49

Inhibition of Stress-Induced DNA Replication and Activation of Repair by Adaptation to Stress

907C0210B Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 35 No 4, Jul-Aug 89 (manuscript received 29 Jan 88) pp 48-51

[Article by F. Z. Meyerson, M. P. Yavich, I. I. Rozhitskaya, V. P. Tverdokhlib, Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow; Orenburiy Medical Institute

[Abstract] An analysis was conducted on the effects of adaptation of animals to short-term emotional stress (fear episodes) or hypoxia on DNA replications and repair in hepatic and cardiac tissue. The trials, conducted on 300-350 g male Wistar rats, showed that emotional stress leads to a burst of repair activity that persists for 12 h after stress is discontinued (87 percent increase in myocardial nuclei and 77 percent increase in hepatic nuclei). In stress-adapted animals both processes were attenuated: by 47 percent in myocardial nuclei and by 44 percent in hepatic nuclei. Adaptation to hypoxia was accompanied by a decrease in the burst of DNA repair in the heart and liver by 33 and 26 percent, respectively. Adaptation to stress resulted in activation of DNA replication in the heart by 60 percent; on repeated adaption to short-term stress activation was limited to 35 percent, while adaptation to hypoxia completely abolished activation. Prolonged emotional stress was seen to depress DNA replication in hepatic nuclei and mitochondria, while adaptation to hypoxia was without effect on the nuclei but enhanced mitochondrial replication by 40 percent. These observations indicate that adaptation to hypoxia protects the heart and, especially, the liver from stress-induced damage in part by activation of enzymes involved in antioxidant mechanisms. Tables 2; references 9: 5 Russian, 4 Western.

UDC 591.513+612.8.015

Cholecystokinin Octapeptide and β-Endorphin in Neurochemical Mechanisms of Interspecies and Intraspecies Aggression in Rats

907C0240B Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOVA in Russian Vol 39 No 4, Jul-Aug 89 (manuscript received 30 Sep 88; in final form 14 Dec 88) pp 770-773

[Article by M. V. Pletnikov, Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Trials were conducted with the effects of cholecystokinin octapeptide (CO) and β-endorphin (BE) on interspecies and intraspecies aggression in outbred male rats (250-300 g). Interspecies aggression against mice was induced by two days of isolation and food deprivation, and intraspecies aggression by two months

of isolation. In the various experiments the peptides were introduced into the lateral ventricles in doses of 2-200 ng and 2 μ g. The results demonstrated that CO inhibited muricidal behavior in rats exhibiting only interspecies aggression, a form of aggression not influenced by exogenous BE. However, BE inhibited intraspe-

cies aggression in rats displaying both forms of aggression, while CO was without effect. These observations indicate that different neurochemical mechanisms underlie interspecies and intraspecies aggression induced by different motivating factors. References 5: 1 Russian, 4 Western.

Health Care in Kirghizia: Problems and Prospects

907C0229 *Frunze ZDRAVOOKHRANENIYE KIRGIZII* in Russian No 4, Jul-Aug 89, pp 3-8

[Article by B. I. Ismailov, Kirghiz Minister of Health]

[Text] The protection and strengthening of the health of the Soviet people is rightly considered a matter of paramount importance. After all, good health is not only a question of well-being and happiness for each individual, but also a mandatory prerequisite for growth in labor productivity, the economic power of the country, and the prosperity of the people.

At the same time, it is no secret that for many years, the social sphere, including health care, remained in the background and was financed and developed in accordance with the "leftover principle."

The "Basic Guidelines for the Development of Public Health Protection and the Restructuring of USSR Health Care Under the 12th Five-Year Plan and for the Period up to the year 2000"—a document of the CPSU Central Committee and USSR Council of Ministers which contains the most important directions for the restructuring and future development and improvement of health care on all levels—was a promising program for radical improvement of the protection of public health.

Concern for the health of people has indeed become a national problem, rather than merely an agency problem or a purely medical problem.

We are now in a period of great political and labor upheaval, development of socialist democracy, and deepening of glasnost.

Perestroika is confidently entering all sectors of the national economy. This process is also going on in the health care sector, and it is identifying ever newer problems and, of course, the enormous scale of work to be done.

Almost simultaneously, perestroika must deal with problems to strengthen the material-and-technical base of health care, train highly skilled specialists, and ideologically educate and psychologically prepare them to work in a new way to meet the stringent requirements of our times.

In recent years, there have been some changes in this republic's health care. Steps have been taken to restructure management style and methods. The management apparatus of this republic's ministry of health has been reduced to almost one-half, and the management structure of the pharmacy service and the Medtekhnika system is being restructured in accordance with the new economic methods of administration and management.

Meetings of traveling boards have been instituted, and the issues they examine involve an analysis of performance of local health care agencies and institutions, a search for introduction of new forms of work, the

strengthening of work discipline, and the enhancement of personal responsibility and professional skills.

One of the main issues was and still is that of training, educating, and placing medical personnel. In addition to the traditional ways of raising their skills, successful use is being made of continuous independent study with subsequent certification pertaining to important problems among pediatricians, surgeons, and cardiologists. In cases in which a low level of knowledge is found, the physicians are temporarily placed on probation or are even transferred to the position of physician's assistant.

One can administer and manage properly only with a profound knowledge about organization of health care and a familiarity of management methods and reliable indicators of performance of subordinate institutions. For this reason, the manner in which managers are trained has been changed, their resources are being upgraded, the requirements made of personnel have been increased, and the managers are being elected.

In order to improve the quality of the medical care being rendered to the public, new organizational forms are being adopted, such as departments of preventive medicine and rehabilitation therapy at polyclinics; standardized obstetric/internal medicine/pediatric complexes; in-home infirmaries; and day in-patient infirmaries at polyclinics and hospitals (in, for example, the cities of Frunze, Tokmak, and Osh and in Kantskiy Rayon). The team method of organization and remuneration of work is being used (in the Alamedinskiy and Uzgenskiy rayons).

To increase the accessibility of qualified medical care to the public, cooperatives have been set up and fee-based services are being adopted for patient care in the home (Frunze).

Perestroika is also taking place in medical science: science institutions are moving in top-priority directions and toward the prevention and control of diseases that account for most of the social and production loss and that are the cause of overall and child mortality.

A trend has been observed in this republic toward improvement of indicators characterizing the health status of the population.

According to the preliminary data of this republic's Central Statistical Administration, the child mortality rate was 36.6 in 1988, versus 37.8 in 1987; the morbidity due to measles has decreased to one-fifteenth the former level, and that of diphtheria and poliomyelitis, to between two-fifths and one-half; and typhoid fever has decreased by 35 percent. Morbidity involving temporary disability has declined (759.7 in 1987, 730.4 in 1988); initial disability here is two-thirds the all-Union average.

Several government documents approved in this republic constitute a long-range program and the foundation for further development and improvement of the health care service:

- "On the work of the Kirghiz Councils of People's Deputies in organizing medical services for the public"
- "On measures for the further improvement of the protection of public health and the strengthening the material-and-technical base of health care"
- "On the priority measures that need to be taken for improving the equipment base, increasing the manufacture of medical equipment, and improving their supply to health care institutions in 1988-1995 and in the period up to the year 2000"
- "On additional measures for improving stomatological care of the republic's population"
- "On additional measures for improving tuberculosis care in the republic," and others.

They all call for the implementation of major social programs, the radical improvement of the material-and-technical base of health care, the meeting of the needs of treatment-and-prevention facilities and the public for drugs, and the further development of science.

The problems of the health care sector reach far beyond the limits of purely medical problems. For this reason, all ministries and agencies and public organizations must take an active part in carrying out the tasks spelled out in directive documents, while medical workers and health care organizers must carefully monitor that activity in an exacting and principled manner.

In health care, as in any other sector, success depends on the potential of the personnel.

Most medical workers perform their civic and professional duties honestly and conscientiously, and they have well-deserved authority and trust. Yet, perestroika in health care signifies, first of all, improvement of professional skills of medical workers on all levels, from paramedic-obstetrics centers to research institutes.

At the present time, there are more than 14,000 physicians and about 39,000 mid-level medical personnel in this republic, i.e., there are 33.3 physicians and 90.0 mid-level medical workers per 10,000 people (32.6 and 88.6, respectively, in 1987). However, these indicators are considerably lower in rural areas. There are many reasons for this: shortcomings in vocational guidance among rural young people and in the distribution of young specialists, the lack of housing, preschool institutions, etc.

In spite of the year-to-year increase in the the numbers of personnel, the quality of health care is improving slowly. There are still many unsolved problems in the screening, education, and postgraduate training of medical workers.

The material-and-technical base of educational institutions is expanding and becoming stronger at a slow pace, which has a substantial effect on the quality of medical

training. The level of education and training must be further improved at medical schools.

Work and production discipline must be reinforced everywhere in order to prevent infractions of laws, abuse, and other negative phenomena among health care workers. Initiative and creativity must be encouraged, and the latest advances and new forms of work should be adopted more boldly.

One should not forget the words of A. P. Chekhov, who said that "the physician's profession is a feat of heroism; it requires selflessness, purity of spirit, and purity of enterprise, and not everyone is capable of that." In medicine, there should not be people who merely strayed into it.

For this reason, there is much work to be done in terms of providing the proper vocational guidance for school children and graduates of medical schools and screening those enrolling in the medical educational institutions of this republic.

Mid-level and junior medical workers play an important part in the radical improvement of the protection of public health. The physician's assistant, nurse, pharmacist and hospital attendant are not simply the primary assistants of the physician—they are a key element in health care.

In order to put an end to the crisis of confidence in medicine and in the physician, those standing guard over the health of the people—physicians and mid-level workers—must be humane and noble, selfless and compassionate, capable of giving themselves over entirely to the interests of the patient, and constantly advancing their knowledge.

We also need to consider the social protection of medical workers; at present, about 6,000 people are without housing. In 1988, only 328 apartments were allocated for them; each year more than 3,000 specialists change jobs because of the lack of housing. Morbidity is high among medical workers, and working conditions are poor at many treatment-and-prevention institutions.

In order to further improve the protection of public health, it is imperative to develop and strengthen health institutions and to open outpatient polyclinic institutions that meet modern-day needs and large, general hospitals, in rayon centers as well as in other areas. During the current five-year plan, capital investments for construction of health care institutions have already been increased to 85.2 million rubles (61.7 million under the 11th Five-Year Plan), and they are expected to be raised to 608 million under the 13th Five-Year Plan. In the main, the funds will not be used to augment number of visits that can be handled or hospital beds, but to replace polyclinics and hospitals located in makeshift or emergency buildings and to renovate and re-equip existing institutions in order to improve the quality and level of work done in them.

The 12th Five-Year Plan calls for the construction of hospitals that will provide a total of 3,020 beds and polyclinic facilities that will handle a total of 7,820 visits per shift.

The material-and-technical base of the republic's treatment-and-prevention institutions cannot meet the health care needs. It is imperative to continue to draw upon noncentralized financing sources for construction of treatment-and-prevention institutions and to transfer high-quality administrative and other buildings over for use as such institutions. In 1988 alone, hospitals with a total of 535 beds and outpatient polyclinic institutions capable of handling a total of 1,050 visits per shift were built at the expense of farms and industrial enterprises of the republic. A total of 29 buildings were handed over for use as treatment facilities, which made it possible to open five hospitals with 645 beds and 25 outpatient polyclinic institutions capable of handling 3,020 visits per shift.

At the present time, there are 50,400 hospital beds in this republic, and outpatient polyclinics are capable of handling more than 49,000 visits per shift. In the future, it will also be necessary to abandon entirely the extensive methods of assessing the performance of health care institutions.

The following should be the main indicators in assessing the performance of treatment-and-prevention institutions: decline in overall and child mortality, temporary disability, and infectious morbidity; and the development of the network of health care institutions.

There are many shortcomings in the outpatient polyclinic care rendered to the public. Overstatement of a number of indicators, including those for preventive work, is particularly alarming. The incidence of cardiovascular and oncological diseases remains high, and there is also a high incidence of grade IV neoplasms. The number of patients with lung and gastrointestinal pathology is not decreasing.

The diagnostic center, which is designed to accommodate 1,000 visits per day and will begin operation this year, should play a significant part in early detection of disease. This center will be outfitted with modern imported equipment and apparatus and will be staffed by trained specialists.

There must be a radical change in our attitude toward universal health screening; today, the main task for medical workers is to improve the quality and efficacy of preventive work—as the general focus of health care.

To gain a true idea of the quality of the medical care that is being rendered, it is necessary to make broad use locally of the experience that has been gained in the management of treatment and preventive care of children and mothers and of the experience of the Kirghiz Scientific Research Institute of Obstetrics and Pediatrics to make expert evaluations by means of inspections, house-to-house rounds, conversations with the public,

and study of their opinions and suggestions. This is a labor-intensive job, but it is necessary in order to increase the personal responsibility of each medical worker and to determine the level of his occupational knowledge and his business and human qualities.

The time has come to aggressively raise the question of the health of those in good health, to change radically the attitude toward prevention on all levels (from the district physician to administrators of health-care agencies), and to change the attitude of party, soviet, and management organizations and society as a whole, toward prevention.

Preventive work should be based on affirmation of a healthy lifestyle, including matters of diet, physical development, harmonious development of the personality and control of harmful habits—alcoholism and smoking. It is important for citizens to develop an awareness of their own health and of the health of those around them.

It is necessary to implement integrated measures for the protection of the environment, to enhance the effectiveness of the sanitary inspections, and to refine the forms and methods of educating the public in hygiene.

The special-purpose, integrated Zdorovye [health] program has been assigned a major role in the further intensification of prevention and in the strengthening the health of the people, since it is a program that makes it mandatory that measures be performed to protect the environment, provide workers with healthy and safe working conditions, optimize the diet, develop exercise and sports, and provide for harmonious education of the public and formation of a healthy lifestyle. The task of medical workers is to keep strict watch and see that the program is implemented to the letter.

Better protection of the health of mothers and children is rightly considered a high priority in the development of Soviet health care. It is particularly important to our republic, where children constitute about 40 percent of the population and the birthrate is 1.7 times higher than the Union average. The density of births is high, with 46 percent of the women giving birth at 1.5-year intervals. However, local work on family planning is ineffective. The number of abortions is not dropping in this republic (65,000-70,000 per year). A proper coherence has not been established in the work of obstetrician-gynecologists, internists, surgeons, stomatologists and other specialists. Adolescent girls and women are not recovering quickly.

Spot checks of the quality of medical care rendered to women and children revealed serious flaws in the work being done with pregnant women and very young children. More than two-thirds of the pregnant women are anemic, but do not receive adequate treatment. The percentages of premature births (5.1) and stillbirths (8.6) are not declining.

In 16 out of 40 rayons, child mortality is 40.0 per 1000 children born alive.

Every third or fourth child among those who died before reaching the age of one year had an unfavorable pre-morbid background (rickets, hypotrophy, anemia). Health education work with parents on rearing infants and feeding them is done perfunctorily. Not infrequently, parents wait too long to seek medical care, which is one of the causes of the high mortality rate (30.0 percent) among infants less than 24 hours old. There has been no decline in percentage of infants one year old or younger who die at home (17.2 percent in 1987; 18.9 percent in 1988). Expert analysis has shown that infant deaths were preventable in 50-70 percent of the cases.

A specially targeted, integrated program has been developed in the republic to reduce infant mortality, and its implementation should play a beneficial role.

This republic continues to occupy the worst place in the nation in morbidity due to typhoid-paratyphoids and viral hepatitis; the indicator for morbidity due to typhoid-paratyphoids is attributable to the Kirovskiy, Toktogulskiy, Suzakskiy, and Kara-Suyskiy rayons and the cities of Osh, Sulyukta and Kara-Kul.

Children accounted for 75.1 percent of all cases of acute intestinal infection (AII); that figure was 80.8 percent for Osh Oblast and 85 percent and 75 percent for the Naryn and Talas regions, respectively.

Bacteriological confirmation of AII is very low, with figures of 67.2 percent for dysentery and 34.1 percent for enteritis.

As a result of gross infractions of sanitary and epidemiological rules, there were cases of nosocomial salmonellosis in the Issyk-Kul Oblast Pediatric Hospital and pediatric departments of the central rayon hospitals of the Leninpolskiy, Batkenskii, and Sovetskiy rayons.

Such a situation with infectious morbidity is attributable primarily to unsatisfactory conditions with regard to water supply, sewerage, and city sanitation, as well as to the unprincipled attitude of employees of sanitary and epidemiological stations with regard to effective sanitary inspections. At the same time, there is running water in only 70 percent of the rural population centers, and according to the estimates of specialists, it will take to the year 2005 before all of the republic's inhabitants have good, potable water.

There are shortcomings in preventive immunization for the public. In many parts of Osh Oblast, an appropriate stratum of immunity to diphtheria, measles, pertussis and poliomyelitis has not been formed.

Some serious flaws have also been found in the matter of preventive immunization against and early detection of tuberculosis.

The performance of this republic's health care agencies and institutions in 1988 was discussed at an expanded board meeting of the Kirghiz Ministry of Health in February of this year.

In April 1989, there was a republic-level conference on how to improve the State Sanitary Inspectorate and on the prevention of communicable diseases.

Participants of the board meeting and the republic conference included representatives of the Kirghiz Council of Ministers; administrators of research institutes, the Kirghiz State Medical Institute, and Kirghiz institutions; administrators of oblast health care agencies and institutions; and chief physicians of cities, rayons, and sanitary and epidemiological stations.

Tasks were outlined for further improvement of the protection of health. Means were determined for lowering infectious morbidity, raising the level of health awareness among the public, and forming a healthy lifestyle.

The success of perestroika in health care depends on each medical worker, his attitude toward his work, his awareness of his role in the big picture, and a high degree of civic responsibility. We medical workers still have much work to do, and the main thing is that, without delay, we must eliminate existing flaws, make use of resources, and boldly adopt new, progressive forms and methods of work, so that the public in every corner of our republic can receive highly skilled medical care.

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Medical Cooperatives in Latvian SSR

907C0231 Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY in Russian No 4, Jul-Aug 89 p 50

[Article by R. M. Shevyreva, Yurmala]

[Text] In Latvia, in addition to the separate medical cooperatives established at hospitals, research institutes, polyclinics (including those in resorts), and physiotherapy centers, 14 medical cooperatives have been consolidated into the Medasko organization (Medical Association of Cooperatives of the Latvian Ministry of Health), which has a council of delegates (one representative from each cooperative). The association is a commercial organization, and its board has a chairman, an accountant, a commercial director, and an administrator of the scientific-production affiliate—all of whom receive salaries. The rest of the members—managers—receive honoraria deducted from contracted work.

The association does its work in the following areas:

- economic-agreement work by the scientific-production affiliate
- production work (individual teams of workers make, for example, medical instruments and equipment)

- combined, integrated programs for improving the health of enterprise employees (the health care program includes, in particular, analysis of morbidity, study of the sanitary and hygienic conditions at the enterprise, preventive checkups for enterprise workers, analysis of findings and recommendations to improve the health of blue- and white-collar enterprise workers); for example, Medasko has signed a contract with Medtehnika to produce small, nonstandard medical instruments and equipment for the sum of 120,000 rubles.

All the work of the cooperatives is set up mainly for the time available to physicians away from their main job.

Physiotherapeutic care is rendered along treatment-and-preventive and educational (training of specialists) lines both for cash (to the public) and by contract (institutions).

The Stimul cooperative, which is based at the 7th Municipal Hospital in Riga, services residents of the city and enterprise employees (from the Riga collective farm, the Alfa and Avtoelektropribor plants, and the Plodoo-voshchorg association). Various specialists (cardiologists, gastroenterologists, physiotherapists, surgeons, ophthalmologists, neuropathologists) are consulted in the cooperative, which helps pinpoint a diagnosis and determines the amount of physiotherapy needed. In addition, the specialists at Stimul are involved in instruction: they conduct fee-based seminars on special, individual physiotherapy for Latvian paramedics.

The range of services rendered at the Stimul cooperative is rather broad. It includes reflexotherapy and osteoreflexotherapy, as well as physiotherapeutic procedures (barotherapy, laser treatment, electrosleep, ultrasound, d'arsonvalization, SMT [sinusoidal modulated current (harmonic)], magnetotherapy, thermotherapy, and hydrotherapy).

A course of TPC [therapeutic physical culture] lasts two weeks (70 class hours) and costs 230 rubles. Classes are given by TPC and medical supervision instructors of the Riga Medical Institute. The educational cooperatives train personnel for physical culture and health-improving cooperatives, and they offer advanced training for TPC specialists and general physicians in the use of the physical culture equipment for preventive purposes, acupuncture, and massage.

Treatment-and-preventive care is rendered to the inhabitants of Riga, as well as to enterprise employees, by the Veseliba cooperative at the Municipal Physiotherapy Polyclinic.

Medasko has an ongoing seminar, "Physical culture and medical supervision," to provide advanced training for physicians in all specialties, TPC specialists, physical education teachers at schools, kindergarten educators, and methods specialist/instructors of industrial enterprises.

The Gippokrat cooperative, set up at the city's health department offers 3-month courses (costing 395 rubles) for nurses and athletes with higher education on "Classical therapeutic massage," as well as 4.5-month special courses for physicians (jointly with the Leningrad State Institute for Advanced Training of Physicians) on the subject of "Reflexo-acupuncture therapy" (cost, 1200 rubles).

Thus, development of the medical cooperative movement in Latvian SSR is proceeding in the mainstream of perestroika, since it is expanding the scope of highly skilled, narrowly specialized medical care to those who need it and is raising its level. Further development of medical cooperatives requires the support of this republic's Ministry of Health and all its subdivisions.

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Health Status of the Population and Prospects for Development of Health Care in Moscow

907C0233A Moscow SOVETSKOYE

ZDRAVOOKHRANENIYE in Russian No 8, Aug 89
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[Article by O. P. Shchepin and N. A. Kravchenko, All-Union Scientific Research Institute of Social Hygiene, Economics and Health Care Management imeni N. A. Semashko, Moscow]

[Text] The comprehensive territorial and sectorial program for intensifying the socioeconomic development of health care institutions in Moscow, which was prepared by the All-Union Scientific Research Institute of Social Hygiene, Economics and Health Care Management imeni N. A. Semashko upon the instructions of the Moscow City Party Committee as a component part of the Progress-95 program, set as its principal goal the coalition within medical care and medical science of the achievements of the scientific-technical revolution and the advantages of socialism.

The Progress-95 comprehensive territorial and sectorial program for intensifying socioeconomic development of Moscow represents an effort to introduce scientific methods into the management of the system of life-support for a city with millions of inhabitants. The introduction of those methods is based on integrated and comprehensive approaches, with allowances made for the interaction among all the elements of the entire territorial system of this extremely large city.

In the course of the development of the health care section, an in-depth, scientific analysis was made of the processes associated with health and pathology among the inhabitants of Moscow, and that analysis reflected the effects of and interrelationship among ecological, socioeconomic, demographic, and administrative mechanisms and factors.

The purpose of that section of the Progress-95 program was to meet as fully as possible the needs of the residents of Moscow with respect to highly skilled medical care by comprehensively retooling the sector, modernizing and renovating existing treatment-and-prevention facilities, increasing the capital-labor ratio among medical personnel, and intensifying the use of modern diagnostic and treatment equipment, as well as introducing the latest medical technologies and efficient forms and methods of organizing the treatment and diagnostic process. This sectorial program is an aggregate of organizational, technological and social tasks for the development of the health care facilities in Moscow, and the fulfillment of those tasks will enhance the role and significance of the health care sector in achieving social goals of society such as prolonging average life expectancy, lowering general and child mortality (as well as mortality among young individuals and those of employable age), and extending the period of the active work life for the population and its longevity.

The program is based on a summarization and analysis of suggestions for socioeconomic development from 72 scientific research institutes, 1,411 treatment-and-prevention facilities, and 465 pharmacy facilities

located in Moscow under the jurisdiction of the USSR Ministry of Health, USSR Academy of Medical Sciences, RSFSR Ministry of Health, Main Administration of Mosgorispolkom [Moscow Executive Committee of the City Soviet of Workers' Deputies], the Moscow Pharmaceutical Administration, and 27 other various ministries and agencies.

In addition, data from 44 organizations, enterprises, and associations in other sectors of the national economy associated with the work in the health care area were generalized and submitted.

Official statistical materials and the data of various scientific investigations were also used in preparing the program.

The current demographic situation in Moscow (Table 1) is characterized by stable population growth rates, a low birthrate, a consistently high mortality rate, a low natural population growth, a progressive structure of causes of death (namely, a predominance of the leading non-epidemic diseases), a high level of child mortality, an anomalous disproportion between sexes, a high rate of divorce and marital migration, and a high level of mechanical population growth.

Table 1. Indicators of natural movement of Moscow population (per 1,000 population)

Year	Birthrate*	Overall mortality	Natural growth	Infant mortality per 1,000 live births**	Sex	Average life expectancy***
1970	11.9	9.5	2.4	—	M	64.2
					F	73.8
1975	12.5	10.4	2.1	23.7	M	—
					F	—
1980	13.6	11.7	1.9	23.7	M	63.8
					F	73.3
1985	13.8	12.1	1.7	21.5	M	65.2
					F	73.7
1986	14.3	11.6	2.7	20.8	M	66.4
					F	74.5
1987	14.2	11.9	2.3	19.9	M	—
					F	—

Footnotes

*"Moskva v tsifrakh" [Moscow in Figures], 1987.

**Data of the USSR State Committee for Statistics (DSP).

***Estimated data of the First Moscow Medical Institute imeni Sechenov.

The rapid growth in urban population became somewhat stabilized in the most recent period. For example, the average growth rate stabilized at 1 percent, which constitutes about 80,000-88,000 people per year. That gives reason to expect that in the year 2000, the population of Moscow will be about 10 million. The rapid population growth in the past was attributable to systematic migrational influx. For example, during the 9th Five-Year

Plan, the mechanical population growth constituted 406,000 people, or an average of 81,000 per year. In the most recent period, starting with the 11th Five-Year Plan, an increase of 65,000-70,000 people was recorded. Migrational influx consists of both organized and independent forms of movement. In addition, there is an annual increase of 3,000-4,000 inhabitants in Moscow as a result of elderly parents moving to live with their

children. The decline in migrational growth in the most recent period is related to something of a decline in the production limits of the city.

Natural population growth, which was one-fifth the mechanical growth, contributed only negligibly to the city's population growth, and natural growth is one of the lowest figures among large cities of our country. Some of the increase in 1986 to 2.7 people per 1,000 population is related to the annexation to Moscow of new territories with a younger sex and age population structure. The low natural population growth is related to the low birthrate, which was 14.2 per 1,000 in 1987 and is one of the lowest indicators in the country, and to the high mortality rate (11.9/1000 in 1987). That is one of the highest indicators among the cities in the country.

Analysis of the stable population indicates that there is still an unfavorable reproduction of the population and that demographic policies in terms of regulating the birthrate are ineffective. That population is characterized by a negative indicator of natural growth (-6/1000, which means that there are 16 deaths/1000 per year and only 10 births). This confirms once more the impact of migration on demographic processes. It would seem that migration helps maintain and rejuvenate the age and sex structure of the population and has a positive effect, but that is not so. The crux of the matter lies also in the deep processes of the phenomena that are taking place, and not just in the quantitative correlation between age and sex groups. Migration to Moscow has a destabilizing effect on the achievement of an optimum level of population reproduction. Moscow has an anomalous ratio between the sexes, with a clear disproportion in favor of a larger percentage of female population starting as early as the age group of 16-19 years and then increasing even more. That fact in itself requires attention, particularly since the average trend throughout the USSR and in the republics appears at level of 30 years of age or higher. Analysis of the demographic situation on the basis of the stable population reveals that, without migration, even if existing adverse conditions for the vital activity of the city were to be maintained, the disproportion between the sexes in favor of the female population would shift to the 50-54-year group, which would, no doubt, have a beneficial effect on the reproduction of the population of Moscow. Thus, only by normalizing migration can a substantial contribution be made toward improving the demographic situation in the capital. The existing disproportion between the sexes has the potential for lowering the birthrate and raising the mortality rate and marital migration; for that reason, migration should be viewed as a factor having a destabilizing effect on the reproductive and vital behavior of the city's population. Migration fluxes can obscure only very superficially and artificially the developing deep processes in the city's population.

As early as the late 1950s and early 1960s, Moscow changed to the one-child family, which is the reason for depopulating type of reproduction. According to the 1979 census, the average family size was 3.1 people,

versus 3.3 in 1959. Some of the rise in birthrate in recent years is attributable largely to structural changes in the population—sex-age-related and marital. In addition, it could be also attributed to a compensatory birthrate wave (which is already on the decline) related to the entry of the 1950s generation into the reproductive process. All this being so, it is indubitable that further improvement of positive trends can be expected, primarily because of measures associated with sociodemographic policies, since the population does not have the potential at the present time for raising the birthrate.

In Moscow, as in most cities, there is a stable trend toward a rise in births from unmarried mothers. If in 1973 such births constituted 5.3 percent of all births, they represented as much as 10.1 percent in 1984, i.e., the percentage had almost doubled. The highest number of births in this group of women belongs to minors 18 years of age or under (more than 50 percent of the births are in that group). There is a second rise in birthrate at the age of maximum fertility (30-40 years)—35 percent of all births.

The trend in mortality rate is also unfavorable in Moscow. The negligible decline to 11.6/1000 in 1986 and then the rise to 11.9/1000 in 1987 should be interpreted as something of a stabilization of a process that had long been gaining strength in the period of 1960-1985. In many respects, the increase in mortality is an unavoidable phenomenon due to aging of the population.

The structure of causes of death among the population of Moscow is progressive and is typical of all economically developed parts of the country and the world. Diseases of the cardiovascular system are in first place in the structure of mortality (58.1 percent), malignant neoplasms are second (21.4), injuries and poisoning are third (13.6 percent), respiratory disease is fourth (3.6 percent), and digestive organ disease is fifth. The dynamics of the mortality indicators for the category of malignant neoplasms is indicative of their constant rise in both men and women. We are particularly concerned about the fact that the build up of chronic pathology is moving more and more toward a younger age, particularly among women. In 1985-1986, there was some decline in mortality associated with infectious and parasitic diseases, as well as with injury and poisoning, both in the population as a whole and in individual sex-and-age groups.

Analysis of morbidity and causes of death indicates that there is a change in types of pathology, in the direction of an increase in the incidence of chronic noninfectious diseases caused by social factors. The pathology among today's population is characterized by complexity, severity, and a combination of various pathological manifestations. There is an increase in the statistical significance of neuroses and vegetovascular dystonia, circulatory and digestive-organ diseases, hypertension, and diseases of the musculoskeletal system and connective tissues. An increase in morbidity associated with

this category of pathologies has been noted in virtually all age and sex groups. The current levels of age-sex indicators of morbidity speak of the possibility of diseases such as hypertension and diabetes mellitus appearing increasingly among younger individuals. There is also a rise in incidence of some extremely rare or previously unknown diseases—ulcerative colitis, chronic intestinal ischemia, gout, drug-related injury of the intestine and kidneys, adhesions, pathology of organs on which surgery has been performed, nosocomial infection, allergosis, and, among others, AIDS.

The adverse effect on the health of Moscow residents, who make up the nation's largest urbanized agglomeration, comes about primarily through the generating influence of such stress factors as alienation and psychological discomfort, the intensity of life in Moscow and fatigue due to commuting (a 10-12 workday, counting travel time), social heterogeneity, ecological crisis (including adverse working conditions and poor, unbalanced diet—particularly among children), unhealthy lifestyle, disregard of Moscow residents for their own health, hypodynamia, and the low level of physical, health-improving exercise and health education among the public. Nor can one fail to consider the unique demographic composition of the Moscow population, one-third of which consists of first- and second-generation migrants for whom urban living conditions are harmful in themselves, since their ancestors had lived for many centuries under conditions that are dramatically different from today's. A lengthy process of social and biological adaptation of large numbers of people is taking place—the change in types of housing, the adjustment to new biorhythms, the change in diet, and new types of stress to which responses have yet to be developed. Moreover, Moscow has 1,900,000 pensioners, 1,600,000 children 16 or under, and 350,000 students. The work force migration to Moscow could not help but complicate the housing problem in this city.

The poor state of the environment has a negative effect on the health of Moscow residents. In the opinion of a number of specialists, Moscow is, in terms of general medical and hygienic parameters, close to a critical state which is no longer compensated for by mere growth of capital investments and implementation of banal countermeasures to protect the health and welfare of the population. Among Muscovites, the indicators for the immune response of the body have undergone a 50 percent or greater change; functional changes in the cardiovascular system and respiratory organs occur 6-35 percent more often; there has been a 6-27 percent rise in overall morbidity among children and a 9-60 percent increase in morbidity associated with respiratory organs; and female reproductive function is impaired in 2-10 percent. The role of air pollution in altering the health of Muscovites is rather large, accounting for 5-25 percent of overall morbidity among children, 10-40 percent of morbidity associated with respiratory diseases, and 2-9 percent of the impaired reproductive function. The results of analysis of data in the literature indicate that

the morbidity rate is higher in Moscow than in other cities and capitals of the Union republics. This applies in particular to neoplasms, circulatory diseases, mental disorders, diseases of the nervous system, endocrine diseases, and diseases of sense organs, as well as accidents, poisonings, and injuries.

A comparison of the dynamics of morbidity indicators enables us to note an increase mainly in chronic diseases and a decrease in the incidence of acute diseases. However, identification and detection of pathology at early stages of disease development constitute a yet unsolved problem. It should be stressed that the able-bodied population group deserves the attention of medical workers as the one most threatened by onset and development of chronic diseases. In this regard, we are puzzled by the fact that, in a city where virtually every 100th resident is a physician, the incidence of chronic pathology constitutes 2.4 illnesses per resident, and only 2.3 of them are found during a preventive examination. This is indicative of a serious situation in the city, the poor state of health education among the public, and the ineffectiveness of medical care.

In the structure of occupational morbidity in Moscow, which differs somewhat from the national data, pathology related to the effects of chemicals is in the lead (primarily, dermatosis—38 percent), followed by diseases related to the effects of physical factors (mainly vibration sickness and hypoacusis—26.4 percent), which, finally, are followed by diseases related to biological factors (parasitic and infectious—9.5 percent). The highest occupational morbidity rates are recorded at enterprises of the ministries of the aviation industry, construction materials industry, light industry, chemical and petroleum machine building, and petroleum and chemical industry.

Proper attention is not being given in Moscow enterprises to labor protection for women, particularly those who are pregnant or are nursing mothers; the standard is not being adhered to for the maximum permissible weights that are to be manually lifted or moved by women.

At the present time, there is a powerful network of hospitals and outpatient-polyclinic facilities in Moscow. In 1986, there were 146 beds per 10,000 Moscow residents, of which 116/10,000 were in the territorial network open to everyone. However, the material-and-technical base of most medical facilities does not meet current requirements. Hospitals are overloaded with ward units that are whose auxiliary and diagnostic services do not have the proper capacities or equipment levels, which leads to inefficient use of hospital beds.

Outpatient-polyclinic facilities need diagnostic equipment and manpower.

The Progress-95 program projects that in clinics and hospitals under Union jurisdiction, the capital-equipment ratio per bed will reach a high level and will constitute 88,000 rubles per bed by 1995, of which

47,800 rubles will represent the cost of apparatus and medical equipment. As for the hospitals under the Main Health Care Administration of Mosgorispolkom, their capital-equipment ratio will increase negligibly. And, although under the 13th Five-Year Plan, a 44 percent increase is planned, the capital-equipment ratio for beds will not even reach the standards for relative capital investments stipulated in the draft of the Comprehensive Program for Scientific-Technical Progress for the Period up to the Year 2000. At the present time, most of the beds in Moscow hospitals (more than 60 percent) are in units used for expansion, about 10 percent are in old, converted buildings that are often architectural monuments, and only a negligible proportion of the beds are in hospitals built according to relatively modern designs. In 1985, the depreciation for newly built hospital buildings constituted up to 10 percent, whereas for old buildings it was 30-50 percent or higher.

Health care facilities have about 60 percent of the norm in terms of medical equipment, and more than one-third of the medical equipment is obsolete, having been in service for 10-30 years. In Moscow hospitals, an average of 7,000-8,000 beds are closed down for repairs, which is almost 8 percent of the total number of beds of the Main Health Care Administration. That means that the entire increase in number of beds called for in the Progress-95 program will not actually increase the bed supply (but merely compensate for the ones that have been written off as unserviceable) or improve the quality of the hospitals' main bed fund.

Table 2 graphically illustrates the lack of planning and the absence of a systematic approach to meeting the needs of Muscovites in terms of number of hospital beds and, particularly, their use.

Table 2. Correlation and reserves of actual supply of hospital beds for Moscow residents (1986) as compared to estimated standards for 1990 (beds per 1,000 residents)

Bed use	Standard for beds per 10,000 residents	Number of hospital beds (1986) per 10,000 residents*	Shortage in relation to standard		Number of unserviceable beds over the course of a year (1986)		Actual number of hospital beds, with allowance for unused beds
			Per 10,000 residents	Percentage of standard	Absolute	Per 10,000 residents	
Medical	43.3	26.2	17.1	39.5	479	0.55	25.65
Pediatric	4.1	3.6	0.5	12.2	999	0.14	3.46
Surgical	27.3	24.8	2.5	9.2	1,623	0.86	23.94
Oncological	5.4	4.6	0.8	14.8	158	0.18	4.42
Gynecological	10.4	7.3	3.1	29.8	—	—	7.3
Phthisiological	9.5	6.5	3.0	31.6	1,138	1.30	5.2
Infectious	19.2	8.5	10.7	55.7	2,846	3.26	5.24
Ophthalmological	5.6	2.2	3.4	60.7	30	0.04	2.16
Otorhinolaryngological	4.6	2.0	2.6	50.5	167	0.19	1.81
Dermatovenereological	4.4	1.8	2.6	59.1	190	0.36	1.44
Psychiatric**	21.1	32.8	-11.7	-55.5	336	0.38	32.42
Obstetric	6.6	6.8	-0.2	-3.0	665	0.76	6.04
Neurological	11.0	6.1	4.9	44.5	2,954	0.34	5.76
Totals	172.5	133.2	39.3	22.8	9,046	10.36	122.84

*All agencies. **Including substance abuse.

For example, the percentage of beds in relation to the standard ranges from a 60.7 percent shortage in ophthalmology to a 55.5 percent surplus in psychiatry. Beds that were not used for the entire year constituted an average of 0.77 percent of the number of beds available, the figures being 20 percent and 38.0 percent for the phthisiological and infectious departments, respectively. All this is indicative of lack of flexibility and timeliness in

respecializing beds, and inconsistency between the structure of the network and medical needs of the public.

The uneven distribution of physicians and other medical personnel among different components of the health care sector in Moscow is a serious problem. It is the primary clinical level that suffers the main detriment. According to 1985 data, there were 68 physicians (actual people)

per 1,000 Moscow residents, counting all agencies. The actual picture in rayon polyclinics, however, indicates that the large number of physicians is not corroborated by availability of medical care, especially on the level of the territorial rayon polyclinic. It is on that very level that there is a shortage of personnel in the Moscow health care sector.

Departmental health care is an unresolved problem in Moscow, which leads to inefficient use of equipment and particularly manpower.

In reviewing the prospects of the development of health care in Moscow, it seems advisable to us that health care management in Moscow be reorganized by the establishment of eight medical zones in the city, each consisting of 5-6 rayons accounting for 1.5 million residents. The zones would be set up on the principle of medical zoning, with due consideration for factors such as the features and composition of the population in areas with new housing, in the center city, and in the suburbs and the presence of industrial enterprises. Zonal medical associations with the rights of an administrative body could unite hospitals, attached and territorial polyclinics, dispensaries, first-aid stations, and medical and paramedic health stations. The zonal association could also be set up at one of the large city hospitals or at one of the medical units [in industry], and it would take full responsibility for arranging prompt, high-quality medical care for the public in a specific service zone.

All zonal and urban specialized medical associations should be financed centrally in accordance with the

standards of budgeted financing on an annual per-resident basis, as well as with additional funds from the rayon budget and enterprises based on the proportion of residents serviced in those regions. The chief physicians of medical associations would be the chief physicians of the corresponding territories, and their deputies would be the chief specialists of a given territory.

It would be advisable to organize the principal types of out-patient polyclinic care provided to the residents of the various rayons in the territorial polyclinics of the medical associations on the principles of family services, team forms of work, and free choice of physician.

As for organization of specialized care, it should be structured, as with hospital care, according to the hierarchy (stages) of medical care, based on the provision of prompt, high-quality care that is available to the entire population (without exception), which can be achieved with a unified territorial approach (rather than a departmental approach) to organizing all forms of medical service; in addition to the above criteria, the approach would take into consideration the criteria of optimality and efficiency in the use of the material base, equipment, apparatus, and medical personnel.

In order to assure efficient use of the material-and-technical base of hospitals and timeliness and flexibility in the hospitalization of various groups of patients, we have proposed in the Progress-95 program, on the basis of a study of our own country's experience and that of other countries, the following differentiation of the beds of Moscow hospital facilities and social security institutions (Table 3).

Table 3. Requirements and structure of beds in different types of health care and social security facilities of Moscow

Structure of bed resources	Estimated needs (to the year 2010) of beds in Moscow	
	Number of beds (spaces) per 10,000 Moscow residents	Percentage of total
Total beds for hospitalization of Moscow residents and people from out of town	174.1	87.7
for people from out of town	16.1	8.0
for Moscow residents	158.0	79.7
Of those:		
in general hospitals and specialized short-stay centers	95.6	48.2
in long-stay hospitals	35.3	17.8
in medical (nursing) care hospitals for chronic cases and the aged	27.1	13.7
Number of places (beds) in social security institutions	24.0	12.3
Total beds in health care and social security system	198.1	100.0

Such differentiation of the beds will permit more meaningful use of a considerable percentage of the capital investments (3.4 billion rubles) called for in the Progress-95 program for new construction, renovation, and comprehensive reoutfitting of the network of health care clinics and medical research institutes in Moscow.

In addition to the suggested distribution of beds among the three above-mentioned groups of hospitals, it is

necessary to further differentiate beds by treatment-and-diagnostic stage, depending on the specialty of departments: beds for active, intensive care in the acute period of illness (60-70 percent); departments for after-care and convalescents (20-25 percent); rehabilitation therapy (10-15 percent). Such differentiation makes it possible to settle questions of distribution of medical equipment and apparatus and placement and use of

medical personnel. It is known that the capital-equipment ratio needed for beds in intensive care departments amounts to 80,000-100,000 rubles, and more than 50 percent of this cost pertains to medical equipment and apparatus. At the same time, those expenses are considerably lower in departments of rehabilitation, aftercare and medical care.

It should be stressed that implementation of the Progress-95 program will make it possible to increase considerably (by 35.0 percent) the capital-equipment ratio of health care facilities, mainly at the expense of fixed capital assets (47.9 percent).

In addition, sociomedical institutions of a new type, health centers, must be established in the city's micro-districts in order to carry out the necessary broad set of measures of primary social prevention as a state system of steps to prevent morbidity and to safeguard and strengthen the health of the public.

Health centers may consist of exercise and health complexes that not only operate with the rights to offer services by subscription (swimming pools, stadiums, aerobics halls, saunas), but also offer free services to the public, for example, therapeutic exercise for individuals who have been seriously ill and require social and occupational rehabilitation. The health centers would be used to carry out on a broad scale health education for inculcating good hygiene habits in the public, to set up consultations with lawyers and psychologists and credit and social-aid home-based services for the elderly, and to teach special classes on proper nutrition and on the introduction of exercise and other beneficial habits into one's daily routine. At the centers, it would be wise to open pharmacy centers that sell agents for nonspecific disease prevention and hygienic items, as well as dispensary offices for medical monitoring of health, audio-visual education on healthy lifestyle, etc.

Thus, establishment of a unified system of treatment-and-prevention institutions in the city, with a hierarchically distributed, organizationally and functionally inter-related network of facilities operating on the basis of self-management, cost accounting and targeted orientation on the end result of their work would not only enable proper placement of medical personnel and optimum redistribution of apparatus, equipment, hospital beds and capacities, polyclinics, laboratories, etc., but also provide for sociomedical and economic efficiency of the system's performance as a whole.

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Distinctive Features of Morbidity Among Children of Large Families in Rural Kazakhstan

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[Text] The new version of the CPSU Program approved by the 27th Party Congress notes that the CPSU attaches enormous national importance to the intensification of concern about the family, since "it plays an important role in strengthening health and rearing the growing generations, in ensuring the economic and social progress of society, and in improving demographic processes."¹

Yet, in the country as a whole, the birthrate has been rising rather slowly in recent years (18.3 births per 1,000 population in 1980, and 19.8 in 1987), and it has been characterized by stability primarily in the Tajik, Uzbek, Turkmen, Azerbaijan, and Kazakh republics and the RSFSR.²

In such a demographic situation, equally pointed is the question of preserving the health and vitality of children, particularly infants.

In the period of 1980-1987, child mortality in the USSR also dropped negligibly, from 27.3 to 25.4/1000 births. This indicator was extremely high in Turkmenia (56.4 percent), Tajikistan (48.9 percent), and Uzbekistan (45.9 percent). It is not by chance that, even with the high birthrate, the natural population growth in Uzbekistan and Turkmenia is slower.

It is also known that, with the high birthrate, there are a considerable number of large families in the republics of Central Asia and the rural regions of Kazakhstan. We made an attempt to study the health of children in such families. For this purpose, we studied 408 families with a total of 1,634 children, of whom 1,233 (75.5 percent) were 14 years of age or under and 401 were older than 14 (24.5 percent). Of the 408 families, 146 (35.8 percent) had three children each, 90 (22.0 percent) had four children, 76 (3.9 percent) [sic] had five children, 38 (9.3 percent) had six children, 20 (4.9 percent) had seven children, seven (1.7 percent) had eight children, one (0.2 percent) had nine children, 22 (5.4 percent) had 10 children, six (1.5 percent) had 11 children, and two (0.5 percent) had 12 children.

All of the families studied had people from older generations. For example, 13.2 percent of such families lived with their grandfathers, 64.2 percent lived with grandmothers, and 27.9 percent had other relatives in addition to the parents.

Single-parent families constituted 7.6 percent—2.7 percent with only a father, 4.9 percent with only a mother.

We also studied the educational level and occupation of the parents of large families. The fathers had a higher education in 13.3 percent of the families, general secondary education in 30.0 percent, and secondary specialized education in 11.1 percent. A total of 36.7 percent of the fathers had less than secondary education. The occupational distribution of fathers was as follows: 38.7 percent were livestock breeders, 25.8 percent were machine operators, 19.3 percent were blue-collar workers, 12.9 percent were white-collar workers, and 3.2 percent worked in other specialties.

Among the mothers, 11.1 percent had higher education; 48.1 percent, general secondary; 11.1 percent, specialized secondary education; and 23.6 percent, less than secondary education. Almost one-third (30.8 percent) of the mothers of large families were housewives, 23.1

percent were white-collar workers and an equal percentage were blue-collar workers, 19.2 percent were livestock farmers, and 3.8 percent had other occupations.

All of the large families studied lived in populated areas where there were rural outpatient medical offices. There were two physicians in the main specialties in most such offices, while some offices had three or more.

In order to gain information about the health of children up to 14 years of age inclusive, we copied data pertaining to frequency of medical visits from all medical records of rural medical offices in 1982-1984. In addition, a comprehensive, thorough physical examination of all children in the same families was performed by specialists of central rayon hospitals. The result enabled us to determine the "exhaustive," or true, morbidity of children in large families.

Based on the data of visits to rural medical outpatient clinics, the morbidity rate over the three-year period averaged 965.94 cases/1000 children aged 0-14 (Table 1). According to other investigators, in 1978 this index was 971.00/1000 in Kazakhstan for visits by children to all rural treatment-and-prevention facilities.^{3, 4}

Table 1. True, or exhaustive, child morbidity in large rural families of Kazakhstan (per 1,000 children of the same sex and age)

Age, in years	Sex	Morbidity according to number of medical visits				Morbidity (new cases) according to data of thorough medical examinations (1984)	True, or exhaustive, morbidity rate
		1982	1983	1984	3-year average		
Under 1	M	1666.67	1242.42	1363.64	1424.24	545.45	1969.69
	F	1222.22	1333.33	1111.11	1222.22	555.56	1777.78
	Both sexes	1509.80	1274.51	1274.51	1352.94	549.02	1901.96
1-4	M	2077.84	2089.82	2065.87	2077.84	287.43	2365.27
	F	1852.94	1770.59	1776.47	1800.00	235.29	2035.29
	Both sexes	1964.39	1928.78	1919.88	1937.68	261.13	2198.81
5-6	M	808.51	702.13	681.49	734.04	351.06	1085.10
	F	590.36	530.12	578.31	566.27	409.63	975.90
	Both sexes	706.21	621.47	638.42	655.37	378.53	1033.90
7-9	M	591.84	605.44	578.23	591.84	312.92	904.76
	F	575.76	500.00	492.42	522.73	416.66	939.39
	Both sexes	584.23	555.56	537.63	559.14	362.14	921.15
10-14	M	500.00	509.80	460.78	490.20	264.70	754.90
	F	545.95	497.30	529.73	524.32	383.79	907.11
	Both sexes	521.85	503.86	493.57	506.43	321.33	827.76
All ages	M	1034.11	1006.20	982.95	1007.75	308.53	1316.28
	F	957.48	896.26	906.45	920.07	357.14	1277.31
	Both sexes	997.57	953.77	946.47	965.94	331.71	1297.65

The morbidity rate based on medical visits was higher for boys (1007.75/1000) than for girls (920.06/1000). When we examined the morbidity rate based on medical visits for different age groups, we determined that it was highest for children 1-4 years old (1937.68/1000), the rate being significantly higher for boys (2077.84/1000) than for girls (1800.00/1000).

The figure for medical visits for children under 1 year of age was 1352.94/1000, the rate being higher for boys (1424.24/1000) than for girls (1222.22/1000).

It should be noted that in all of the first four groups (under 1 year, 1-4 years, 5-6 years, and 7-9 years), the average morbidity indicators based on medical visits over the three-year period was higher in boys than in girls, and it is only in the 10-14 group that the opposite prevailed.

Diseases of the respiratory organs held first place in the structure of morbidity based on medical visits, and diseases of the nervous system and sense organs were in second place. They were followed by infectious and parasitic diseases; skin and subcutaneous fatty tissue diseases; injuries and poisonings; and diseases of the endocrine system, nutritional disorders, and metabolic and immune disorders.

Based on the findings of the thorough medical examinations of the large-family children, an additional 331.71 cases of previously unknown chronic diseases per 1,000 children were found (see Table 1). The figure for boys (357.14/1000) [*sic*] was lower than that for girls (308.53/1000) [*sic*]. T. K. Kalzhekov *et al.* found an indicator of 297.9/1000.³ The highest morbidity indicators, based on the results of special examinations, were found among infants under 1 year of age (549.02/1000), with no large difference between boys and girls; in second place is the

group of children 5-6 years old (378.53/1000), with a higher figure for girls (409.66/1000) than for boys (351.06/1000). The 7-9 group was in third place. Here, additionally detected illnesses constituted 362.01/1000, with 312.92/1000 for boys and 416.66/1000 for girls. The age groups of 10-14 and 1-4 years were came next.

Among the additionally detected chronic diseases among children of large families, respiratory diseases were in first place—161.39/1000, with 137.98/1000 for boys and 170.07/1000 for girls. Diseases of the nervous system and sense organs were in second place—34.87/1000 (with not large difference between boys and girls). Diseases in the category "Diseases of the endocrine system, nutritional disorders, and metabolic and immune disorders" were in third place—28.39/1000. This category of diseases was found more often among girls (34.01/1000) than among boys—23.62/1000. The next two places were held by diseases of the digestive organs and infectious and parasitic diseases.

The high level of additionally detected chronic diseases—primarily those such as diseases of the respiratory organs, diseases of the digestive organs, skin and subcutaneous fatty tissue diseases, and infectious and parasitic diseases—provides some basis for the notion that there are some shortcomings in the performance of medical offices with respect to the treatment of and, especially, the preventive medical care for children of large families, as well as that parents are slow to seek medical attention for their children at these institutions.

Exhaustive morbidity rates for children are listed in Tables 1 and 2. The overall level was 1297.65/1000, the figures being 1316.28/1000 for boys and 1277.21 for girls. Our figures are higher than those of T. K. Kalzhekov *et al.*—1268.9/1000—as well as those of T. K. Kalzhekov, N. Zh. Zhakashev [*sic*] *et al.*—1262.4/1000.^{3, 4}

Table 2. Morbidity rates for children in large families of rural Kazakhstan, according to category of disease (per 1,000 children of the same sex)

	Disease category	Sex	Morbidity rate according to		True, or exhaustive, morbidity
			Number of medical visits (3-year average)	Results of thorough physicals (new cases)	
I	Infectious and parasitic diseases	M	125.58	34.11	159.69
		F	88.44	23.81	121.24
		Both sexes	107.87	21.09	137.06
II	Neoplasms	M	3.10	1.55	4.65
		F	1.70	—	0.81
		Both sexes	2.43	0.81	3.24
III	Endocrine system diseases, nutritional, metabolic and immune disorders	M	38.76	23.26	62.02
		F	66.33	34.01	100.34
		Both sexes	51.91	28.39	80.29
IV	Blood and hemopoietic organ diseases	M	7.75	3.10	10.85

Table 2. Morbidity rates for children in large families of rural Kazakhstan, according to category of disease (per 1,000 children of the same sex) (Continued)

	Disease category	Sex	Morbidity rate according to		True, or exhaustive, morbidity
			Number of medical visits (3-year average)	Results of thorough physicals (new cases)	
		F	8.50	11.90	20.41
		Both sexes	8.11	7.30	15.41
V	Mental disorders	M	6.20	4.65	10.85
		F	1.70	1.70	3.40
		Both sexes	4.06	3.24	7.30
VI	Diseases of nervous system and sense organs	M	106.98	35.66	142.64
		F	132.65	34.01	166.67
		Both sexes	119.22	34.87	154.10
VII	Circulatory system diseases	M	4.65	1.55	6.20
		F	1.70	3.40	5.10
		Both sexes	3.24	2.43	5.68
VIII	Respiratory organ diseases	M	496.12	137.98	634.11
		F	437.07	170.07	607.14
		Both sexes	467.96	161.39	629.36
IX	Digestive organ diseases	M	21.71	20.16	44.86
		F	42.52	34.01	76.53
		Both sexes	31.63	26.76	58.39
X	Urogenital system diseases	M	10.85	7.75	18.60
		F	17.01	18.71	35.71
		Both sexes	13.79	12.98	26.76
XII*	Diseases of the skin and subcutaneous fatty tissue	M	93.02	23.26	116.28
		F	64.63	10.20	74.83
		Both sexes	79.48	17.03	96.51
XIII	Diseases of musculoskeletal system and connective tissue	M	7.75	10.85	18.60
		F	6.80	8.50	15.30
		Both sexes	7.30	9.73	17.03
XIV	Congenital anomalies	M	1.55	3.10	4.65
		F	—	5.10	5.10
		Both sexes	0.81	4.06	4.87
XV	Perinatal conditions	M	1.55	—	1.55
		F	1.70	—	1.70
		Both sexes	1.62	—	1.62
XVI	Symptoms, signs and inexactly described states	M	4.65	1.55	6.20
		F	5.10	1.70	6.80
		Both sexes	4.87	1.62	6.49
XVII	Injuries and poisonings	M	77.52	—	77.52

Table 2. Morbidity rates for children in large families of rural Kazakhstan, according to category of disease (per 1,000 children of the same sex) (Continued)

Disease category	Sex	Morbidity rate according to		True, or exhaustive, morbidity
		Number of medical visits (3-year average)	Results of thorough physicals (new cases)	
	F	44.22	—	44.22
	Both sexes	61.64	—	61.64
All diseases	M	1007.75	308.53	1316.28
	F	920.07	357.14	1277.21
	Both sexes	965.94	331.71	1297.65

*Translator's note: XI omitted in source.

The 1-4 age group is in first place for true, or exhaustive, morbidity—2198.81/1000, with the rate for boys (2365.77/1000) being considerably higher than that for girls (2035.29/1000). In second place are infants under 1 year of age—1901.96/1000, where the true, or exhaustive, morbidity level is, as in the preceding age group, higher for boys than for girls (1969.96/1000 versus 1777.78/1000). The 5-6 group is in third place, with an indicator of 1033.90/1000, the level being higher for boys (1085.10/1000) than for girls (975.90/1000). The 7-9 group—with a rate of 921.15/1000 (boys, 904.76/1000; girls, 939.39/1000)—and the 10-14 group—with a rate of 827.76/1000 (boys, 754.90/1000; girls, 908.11/1000)—were in the fourth and fifth places.

The category of "Diseases of the digestive organs" is in first place at 629.36/1000 in the structure of exhaustive morbidity among children of large families. There is an insignificant difference between the figures for boys and girls (634.11 and 607.14/1000). Diseases of the nervous system and sense organs are in second place (154.10/1000), with a somewhat higher figure for the girls. In third place is the category "Infectious and parasitic diseases"—137.06/1000. Here, the morbidity rate was higher for boys (159.69/1000) than for girls (112.24/1000). In fourth place are diseases of the skin and subcutaneous fatty tissue (96.51/1000), with a significantly higher figure for boys (116.28/1000) than for girls (74.83/1000). Diseases of the endocrine system, nutritional disorders, and metabolic and immune disorders are in fifth place (both sexes 80.29/1000, boys 62.02/1000, girls 100.34/1000), and injuries and poisonings are in sixth (both sexes 61.64/1000, boys 77.52/1000, girls 44.22/1000) place. As can be seen in Table 2, the categories of "Diseases of the respiratory organs," "Diseases of the nervous system and sense organs," "Infectious and parasitic diseases," and "Diseases of the skin and subcutaneous fatty tissue," which held first to fourth places, respectively, in morbidity on the basis of medical visits, retained those places in terms of the true, or exhaustive, morbidity rate. Only the "Injuries and poisonings" category, which was in fifth place on the basis of medical visits, holds sixth place according in terms of true, or exhaustive, morbidity. The category of "Diseases of the endocrine system, nutritional disorders, and

metabolic and immune disorders," however, shifted in the opposite direction, from sixth to fifth place.

In terms of health group, the children were distributed as follows: 25.2 percent belonged to group I (healthy), 57.8 percent to II (high-risk group), 14.0 percent to III (children with chronic diseases at compensation stage), 2.6 percent to IV (chronic diseases at subcompensation stage) and 0.4 percent to V (chronic diseases at decompensation stage, invalids).

At the same time, according to the results of this study, we found a direct correlation between the state of health of the children in large families, on the one hand, and several sociohygienic and biological factors, on the other: housing conditions ($r = 0.344$), diet and nutrition ($r = 0.369$), and breast feeding ($r = 0.865$).

There is a correlation between state of health of children of large families and parental education (particularly that of mothers), parents' age at the time of birth of the child, harmful habits (smoking, alcohol abuse), and outcome of previous pregnancy.

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Some Aspects of Morbidity Involving Temporary Disability Among Farm Workers

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[Article by I. V. Lebedeva and V. V. Droshnev, Orenburg Medical Institute]

[Text] Analysis was made of morbidity involving temporary disability (MITD) of farm workers in 35 rayons of Orenburg Oblast in 1985, as well as in the Sharlykский Rayon of that oblast in 1983. The data on MITD were copied from statistics form 16-VN "Report on temporary disability" for 1985 for 540 farms, and from the doctor's certificates for 1983 for 19 farms in Sharlykский Rayon. The data on number of workers were taken from the annual farm reports and form 16-VN.

The workers consisted of 60.5 percent men and 39.5 percent women. The occupational structure of farm workers was as follows: 19.5 percent machine and combine operators, 6.9 percent drivers, 37.7 percent live-stock breeders, 35.9 percent others, including white-collar workers.

Analysis of MITD among farm workers was performed for each rayon and for all 35 rayons as a whole. The disability indicators for all 35 rayons constituted 39.9 cases and 637.3 days of disability per 100 workers, with an average duration of disability of 16 days. The first figure is lower than the oblast average for number of cases by a factor of 1.7, the second is lower than the oblast average for number of days of disability by a factor of 1.4, and the figure for average duration of disability per case exceeded the oblast average by a factor of 1.2.

It must be noted that the level of MITD among farm workers fluctuated over a considerable range among the oblast rayons. For that reason, we selected for analysis three rayons with the lowest level of morbidity (first group) and three rayons with the highest levels of morbidity (second group). The first group consisted of the Severnyy, Ilekskiy, and Akbulakskiy rayons, and the second group consisted of the Novoorskiy, Kvarkenskiy and Dombarovskiy rayons.

It was established that MITD indicators for each of the three rayons in the first group were considerably lower than the average rayon indicators. The opposite was observed in the second group of rayons (Table 1). The average temporary disability indicators in the first group were lower than the average rayon indicators by factors of 1.5 and 1.4, and those indicators in the second group were higher than average rayon indicators by factors of 1.5 and 1.4. The average duration per case in the first group was shorter than the average oblast figure by a factor of 1.1.

Table 1. MITD indicators for 1985

Group	Rayon	Number of cases of temporary disability	Number of days of disability	Average duration per case, in days
		Per 100 workers		
1	Severnyy	20.8	361.1	17.3
	Ilekskiy	28.7	501.2	17.4
	Akbulakskiy	29.5	453.6	15.4
Averages for first group		26.5	445.4	16.8
2	Novoorskiy	77.7	1071.0	13.1
	Kvarkenskiy	55.8	876.1	15.7
	Dombarovskiy	50.4	793.0	15.8
Averages for second group		61.2	901.4	14.7
Averages for 35 rayons		39.9	637.3	16.0
Totals for oblast		69.8	914.2	13.1

In several rayons, although the MITD level is high, the average duration per case of disability is low. The method of rank correlation was used to determine the inversely proportional correlational dependence of mean strength ($r = -0.67$) between number of disability cases and mean duration per case.

Analysis of MITD by nosological group revealed a similar pattern of high morbidity for a number of nosological groups, both for all rayons taken as a whole and for each of them. We singled out nine groups of diseases, for which temporary disability indicators were high: pulmonary tuberculosis (line 2 of form 16-VN); hypertension

and ischemic heart disease (lines 8, 9); acute respiratory diseases (lines 11-13, 15); exacerbation of chronic respiratory diseases (lines 14, 16); gastritis and duodenitis (line 18); infection of the skin and subcutaneous fatty tissue (line 23); diseases of the musculoskeletal system and connective tissue (line 25); job-related injury and poisoning (line 27); non-job-related injury and poisoning (line 29).

Those groups of diseases constitute a substantial percentage of all MITD. They account for 62 percent of the cases and 58.2 percent of days on disability in all rayons of the oblast, the figures being 61.9 percent and 59.6 percent, respectively, for the first group of rayons, and 64.6 percent and 63.6 percent for the second. These nosological groups of diseases are the chief causes of temporary disability both in rayons with high levels of MITD and in rayons with low levels. A large percentage of the cases and days of disability are associated with five nosological groups: hypertension and ischemic heart disease; acute respiratory disease; exacerbation of chronic respiratory disease; diseases of the musculoskeletal system and connective tissue; job-related injury and poisoning.

In the first group of rayons, the 9 nosological groups accounted for 79.8 percent of the cases and 69.4 percent of the days, and in the second group, 83.2 percent and 70.8 percent, respectively.

Analysis of MITD by rayon revealed that fluctuations of indicators of temporary disability in these rayons parallel the changes in rayon averages. The indicators for the first group of rayons are considerably lower than the rayon average, whereas those for the second group are considerably higher (Table 2). For example, with regard to diseases of the musculoskeletal system and connective tissues, the indicators of temporary disability for the first group are lower than the rayon averages by factors of 1.8 and 1.6, respectively, whereas the indicators for the second group are higher by factors of 2 and 1.5. It was noteworthy that the average duration per case of disability in the first group was longer than the rayon average; in the second group, it was shorter than the rayon average. The differences in temporary disability indicators between the first and second groups of rayons with regard to the five nosological groups we singled out and with regard to all the diseases as a whole were statistically reliable. Consequently, it can be stated with complete certainty that there is a predominance of morbidity in the second group of rayons. We must add that the second group is situated in the eastern zone of Orenburg Oblast, where there is greater development of industry than in the first group of rayons. This factor has a dual effect on MITD: in the first place, medical care is more accessible to farm workers because urban treatment-and-prevention facilities are reinforced by the medical-health units at industrial enterprises; in the second place, there is greater environmental pollution, which leads to an absolute rise in morbidity.

Table 2. Incidence of MITD in leading nosological groups among farm workers (1985)

Rayon group	Acute respiratory disease			Musculoskeletal disease			Job-related injury			Exacerbation of chronic respiratory disease		
	A	B	C	A	B	C	A	B	C	A	B	C
1	6.6	43.8	6.6	2.0	34.8	17.7	1.4	31.4	22.5	2.2	44.2	19.9
2	17.5	113.6	6.5	7.1	82.6	11.6	2.8	68.4	24.9	4.2	80.7	19.1
Averages for 35 rayons	10.4	70.7	6.8	3.6	55.3	15.3	2.4	53.2	22.4	2.7	52.1	19.0

Table 2. Incidence of MITD in leading nosological groups among farm workers (1985) (Continued)

Rayon group	Hypertension and ischemic heart disease			Other illnesses			Totals		
	A	B	C	A	B	C	A	B	C
1	1.5	30.2	19.7	13.4	261.0	26.5	26.5	445.4	16.8
2	3.3	60.8	18.7	28.4	495.3	17.1	61.2	901.4	14.7
Averages for 35 rayons	2.2	43.0	19.3	19.6	374.6	19.1	39.9	637.3	16.0

Note: A—number of cases, B—days of disability per 100 workers, C—duration per case

Inadequate accessibility of medical care leads to a

Inadequate accessibility of medical care leads to a decrease in the frequency with which people seek medical care for a number of acute, chronic or latent diseases. This results in the constant accumulation of chronic diseases, longer average duration per case of disability, which is confirmed by the data on morbidity for the first group of rayons.

Investigation of seasonal dynamics of MITD among farm workers of Sharlykский Rayon of Orenburg Oblast point to the need to study the monthly dynamics in number of workers. For example, while there were 850-950 machine operators at the farms in January-March, they numbered more than 2,000 in July-September. In livestock breeding, the largest number of workers is found in November-March, and the lowest, in July-October. This pattern was distinctly evident in virtually all farms of the rayon, and for that reason, analysis of seasonal dynamics of MITD was performed with consideration of change in number of workers each month and number of calendar days in each month.

In the machine-operator group, the indicators of temporary disability rose considerably starting in October and held at their highest level until May. Thus, during the period of intensive farm work, loss of time due to illness was smallest. In the group of livestock breeders, the highest indicators of temporary disability were noted in November-February, and the lowest indicators, in May-June. In the group of other farm workers, there was a rise in temporary disability from November through February, with the lowest level in May-September.

Thus, it can be noted that the largest number of MITD cases are found in January-February and November-December. In those same months, we also observed

maximum loss of work time as a result of disability. This pattern is particularly pronounced in the machine-operator group. For example, the indicators of temporary disability were more than 3 times higher in January than in August. These data indicate that during the period of seasonal work, farm workers seek medical attention mainly just for acute diseases, whereas they postpone treatment of chronic diseases and illness with a sluggish course to the between-season period.

Analysis of MITD on different farms of Sharlykский Rayon in Orenburg Oblast revealed high indicators of temporary disability on the smallest farms (those with an average of 226 people, as opposed to an average on other farms of 448). For this reason, we decided to divide the farms into four groups, according to number of workers: those with up to 300 workers, those with 301 to 400, those with 501 to 600 (there were no farms with 401 to 500 workers), and those with more than 600 workers.

As the number of workers increased, there was a considerable decline in MITD indicators and loss of work time due to diseases of digestive organs, the musculoskeletal system and job-related injuries. For example, the figures for diseases of respiratory organs and the musculoskeletal system were twice as high on small farms as on large ones. On the small farms, the level of job-related injuries was 1.5 times higher. On the whole, the same pattern was observed for all diseases (line 30 of form 16-VN): the smaller the farms, the higher were the disability indicators in terms of both cases and days. As was to be expected, there were no such patterns for injuries unrelated to work.

For statistical evaluation of the closeness of relationship between number of workers and level of morbidity and injury, we calculated the correlation coefficients for all of the above-mentioned groups of indicators (Table 3).

Table 3. Correlation between number of workers and indicators of temporary disability on Sharlykский Rayon farms

Disease group	Cases of disability		Days of disability	
	r_{xy}	m_r	r_{xy}	m_r
Respiratory organ diseases	-0.93	+/-0.25	-0.91	+/-0.28
Musculoskeletal system diseases	-0.94	+/-0.24	-0.94	+/-0.24
Job-related injury	-0.90	+/-0.30	-0.90	+/-0.29
Non-job-related injury	-0.20	+/-0.69	-0.53	+/-0.6
Other illnesses	-0.99	+/-0.1	-0.70	+/-0.5
All illnesses	-0.98	+/-0.12	-0.96	+/-0.18

Table 3 shows that for all groups of illness, with the exception of non-job-related injury, there was a strong inverse relationship between number of workers and indicators of temporary disability. The insufficient reliability of some coefficients is apparently attributable to the small number of conjugate pairs.

work with the rural population (both primary and secondary), by explaining accessibility of medical care, by promptly detecting and treating acute conditions and diseases, by lowering the level of accumulation of chronic diseases, and by improving living and working conditions in rural areas.

In conclusion, it should be noted that MITD can be lowered among farm workers by improving preventive

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UDC 618.19-006.6:313.13(574)

Breast Cancer in Kazakhstan

907C0767A Leningrad VOPROSY ONKOLOGII
in Russian Vol 36 No 3, Mar 90 (manuscript received
11 Mar 88) pp 291-295

[Article by N. N. Serova, N. I. Kolycheva, A. P. Pozdnyakova, and B. Ye. Abdrakhimov, Kazakh Scientific Research Institute of Oncology and Radiology, Kazakh Ministry of Health, Alma Ata, under the rubric "Statistics": "Cancer of the Mammary Gland in Kazakhstan"]

[Text] Breast cancer (BC) is one of the most common tumors in women. The incidence of BC in this country increased by 51 percent in the period from 1970 to 1980; in 1978, this type of cancer shifted from fourth to second place in the structure of oncological morbidity in the female population [2-5]. Kazakhstan and Central Asian republics have always been regions with low incidence of BC, but while it constituted 11.5 per 100,000 women in 1970, it rose to 18.2 per 100,000 in 1980 [1, 3].

There is sparse information about the incidence of BC in Kazakhstan, and for this reason it was decided to investigate its distribution among the urban and rural population of this republic.

Material and methods. Reports of newly diagnosed cases of malignant neoplasms (record form No 281) from the centralized card file of the Kazakh Scientific Research Institute of Oncology and Radiology over a 10-year period (1971-1980) with information about 10,250 patients served as our material. Calculation was made of intensive and standardized indicators per 100,000 women. Cartograms were compiled of the incidence of BC among the urban and rural population of this republic on the basis of mean annual standardized indicators (1978-1980, M. Segi standard). Possibility of a correlation between morbidity of the urban and rural population [incomplete sentence in source]. Possibility of correlation between morbidity of urban and rural population of different oblasts was assessed using Spearman's coefficient of rank correlation.

Results and discussion. A total of 10,250 cases of breast cancer were recorded in Kazakhstan over the 10-year period (1971-1980): 735 cases in 1971 and 1419 in 1980. The average incidence of BC in this republic is 14 per 100,000 women: 18 per 100,000 among urban women and 10 per 100,000 among rural women (Table).

Dynamics of incidence of breast cancer in women in 1971-1980 (intensive indicators per 100,000)

Place	Year									
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Republic as a whole	10.6	12.2	12.1	13.2	13.9	14.4	13.9	15.5	15.2	18.2
Urban areas	13.6	15.3	15.1	16.1	18.0	17.7	17.3	16.8	20.4	24.5
Rural areas	7.5	8.8	8.7	10.0	9.2	11.0	9.8	12.6	9.7	12.0

Within this period there was a reliable rise in incidence of breast cancer in all population groups ($p < 0.05$).

Cartograms were mapped to get an idea about the incidence of BC among the rural and urban population of this republic. In most oblasts of Kazakhstan the incidence of breast cancer was within the range of mean republic levels (16.8 per 100,000, M. Segi standard); it was reliably lower only in Kzyl-Orda, Guryev, Turgay, Tselinograd and Chimkent oblasts, whereas it was reliably higher in Karaganda Oblast and the city of Alma-Ata (Figure 1).

A comparison of the cartograms to the cartogram furnished in the "Atlas of Morbidity in Different CEMA Member Nations Based on 1969-1973 Data" revealed that there was a substantial change in number of oblasts with low and higher morbidity. In 1969-1973, there were five oblasts in Kazakhstan (Guryev, which also included Mangyshlak, Kzyl-Orda, Chimkent and Taldy-Kurgan oblasts) with cancer incidence of up to 10 per 100,000,

whereas higher levels were noted in the rest of the republic. The Atlas cartogram clearly shows two zones differing in incidence of BC: a southern one comprising oblasts with low (under 10.0 per 100,000) incidence and a northern one, comprising oblasts with higher incidence (from 10.0 to 15.0 per 100,000). The population of the southern oblasts consists primarily of indigenous nationalities with their inherent lifestyle, dietary habits, status of reproductive function, etc. It appeared that the ethnic composition of the population and environmental features of the southern zone were the reason for the difference in incidence of BC in these regions. But in the same years, Dzhabul and Alma-Ata oblasts, which are in the republic's southern zone, had a higher incidence of this type of cancer, as compared to their neighbors, Chimkent and Taldy-Kurda oblasts.

In 1979, there were only 2 oblasts (Guryev and Kzyl-Orda) with low (under 10.0/100,000) morbidity indicators. The figures were higher (10.0 to 15.0/100,000) in Turgay, Tselinograd, Chimkent, Taldy-Kurgan, Ural and

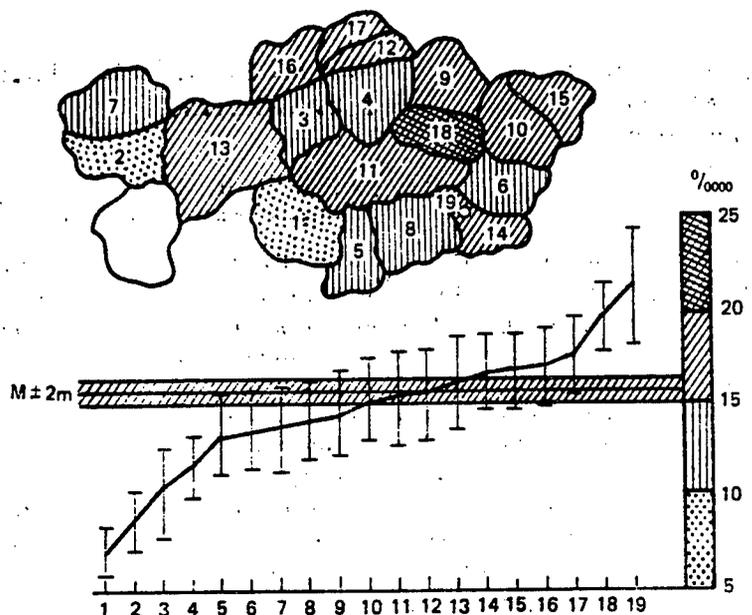


Figure 1. Incidence of breast cancer in Kazakhstan in 1978-1980. Standardized indicators per 100,000 female population (M. Segi standard). $M \pm 2m$ is mean republic incidence within 95 percent confidence range

Key:[oblasts]—1. Kzyl-Orda—2. Guryev—3. Turgay—4. Tselinograd—5. Chimkent—6. Taldy-Kurgan—7. Ural—8. Dzhambul—9. Pavlodar—10. Semipalatinsk—11. Dzhzhkazgan—12. Kokchetav—13. Aktyubinsk—14. Alma-Ata—15. East Kazakhstan—16. Kustanay—17. North Kazakhstan—18. Karaganda—19. Alma-Ata [city] (indicators for Mangyshlak Oblast are unreliable)

Dzhambul oblasts; morbidity was even higher (15.0 to 20.0/100,000) in Pavlodar, Semipalatinsk, Dzhzhkazgan, Kokchetav, Aktyubinsk, Alma-Ata, East Kazakhstan, North Kazakhstan and Kustanay oblasts. Highest levels (20.0 to 25.0/100,000) were observed in Karaganda Oblast and in the city of Alma-Ata. Thus, in this 10-year period there was a rise in incidence of breast cancer over virtually the entire territory of Kazakhstan, with the exception of two oblasts where its incidence remained at the former level.

The mean republic indicator of morbidity for the urban population was found to be higher than in the republic as a whole, and the cartogram of distribution of BC among the urban population has a different appearance. In most cities of Kazakhstan the morbidity coefficients were on the level of the republic means (20.1/100,000). They were reliably lower only in cities of four oblasts (Kzyl-Orda, Guryev, Turgay and Tselinograd); they were reliably higher in the city of Alma-Ata, cities of Karaganda and particularly North Kazakhstan Oblast. We were impressed by the high incidence of breast cancer in cities of Chimkent and Taldy-Kurgan oblasts situated in the southern part of this republic, which is the same as its incidence in cities of Kustanay, Aktyubinsk, Semipalatinsk and North Kazakhstan oblasts in the northern zone (Figure 2).

The incidence of breast cancer among the rural population of this republic is considerably lower than in cities (12.6/100,000). In virtually all oblasts its incidence was

on the mean republic level and did not exceed 10.0-15.0/100,000, with the exception of villages in Kzyl-Orda, Chimkent, Taldy-Kurgan and Tselinograd oblasts where it was even lower. The cartogram of distribution of breast cancer among the rural population resembles the 1969-1973 cartogram for the entire population of this republic (Figure 3). A comparison of morbidity of urban and rural population of southern oblasts shows that the incidence of breast cancer remained at low levels (under 10.0/100,000) in both population groups only in Kzyl-Orda Oblast; in Guryev Oblast the incidence of BC was somewhat lower for the urban population (under 10.0/100,000) than the rural (10.0 to 15.0); morbidity was very high (20.0 to 25.0/100,000) in cities of Chimkent and Taldy-Kurgan oblasts, the figure being considerably lower for the urban population (under 10.0/100,000); in Dzhambul Oblast the incidence of breast cancer was in the range of 15.0 to 20.0/100,000 in urban women and 10.0 to 15.0/100,000 in the rural population.

In northern oblasts of this republic morbidity of the urban population was high, with the exception of cities in Tselinograd Oblast where the incidence of breast cancer did not exceed 10.0-15.0/100,000. The rural female population of all northern oblasts were affected considerably less often than urban women, and the indicators of their morbidity did not exceed 10.0-15.0/100,000. Only the rural areas of Tselinograd Oblast again differed from surrounding oblasts in that its morbidity indicators were lower (under 10.0/100,000).

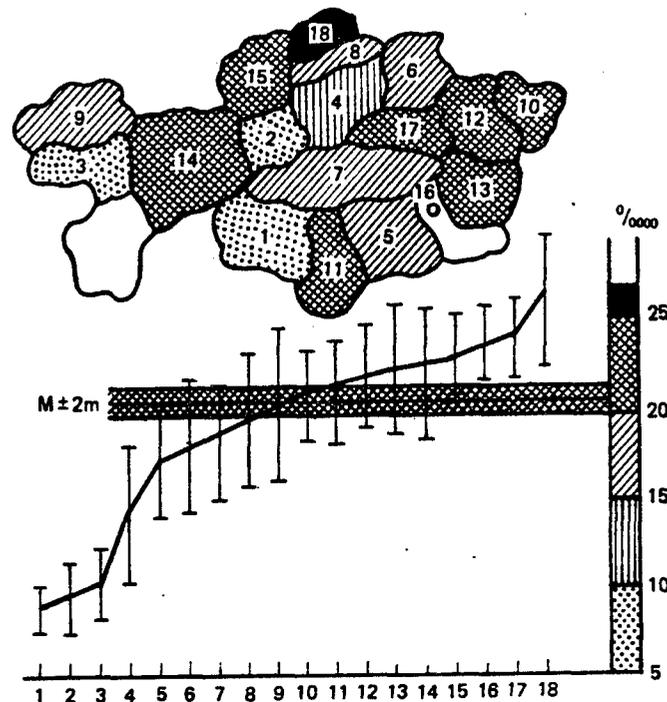


Figure 2. Incidence of breast cancer among urban female population of Kazakhstan in 1978-1980. Standardized indicators per 100,000 female population (M, Segi standard). $M \pm 2m$ is mean republic indicator of morbidity of urban women within a 95 percent confidence range.

Key: [oblasts]—1. Kzyl-Orda—2. Turgay—3. Guryev—4. Tselinograd—5. Dzhambul—6. Pavlodar—7. Dzhezkazgan—8. Kokchetav—9. Ural—10. East Kazakhstan—11. Chimkent—12. Semipalatinsk—13. Taldy-Kurgan—14. Aktyubinsk—15. Kustanay—16. Alma-Ata—17. Karaganda—18. North Kazakhstan (unreliable indicators for Mangyshlak Oblast; population was not divided into urban and rural women in Alma-Ata Oblast)

The existing mean force of relationship ($p=+0.6$) between morbidity of urban and rural population of oblasts of Kazakhstan is apparently indicative of presence of some factors inherent in the environment of specific geographic regions. Perhaps this is the radical change in customary lifestyle everywhere that is related to urbanization, diet, lower birthrate, migration of the population to industrial city zones; development of large agroindustrial complexes with a high degree of mechanization in rural areas influx of population from other parts of the country.

At the present time, when studying the epidemiology of specific oncological diseases one cannot fail to consider the aggregate of concrete living conditions and occupations formed by industrial, social and environmental factors. But thus far there have been virtually no such comprehensive investigations in this republic, and for this reason it is difficult to discuss with certainty the causes of the rise in breast cancer.

The higher incidence of breast cancer in the urban and rural female population of this republic, which had always been considered uneventful with respect to this oncological pathology, should alert not only oncologists but also physicians in the general medical network so

that universal dispensary care of the public would be carried out with due consideration of this established fact.

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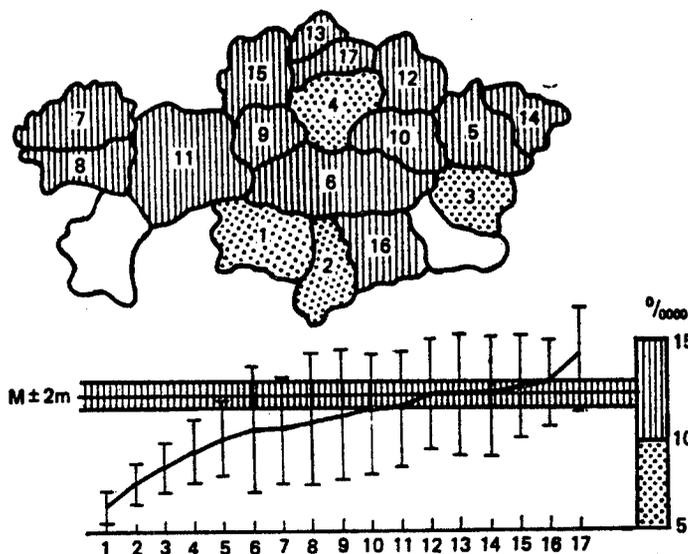


Figure 3. Incidence of breast cancer among rural female population of Kazakhstan in 1978-1980 Standardized indicators per 100,000 female population (M, Segi standard). M+/-2m is the mean republic morbidity indicator for urban women in the 95 percent confidence range.

Key: [oblasts]—1. Kzyl-Orda—2. Chimkent—3. Taldy-Kurgan—4. Tselinograd—5. Semipalatinsk—6. Dzhезkazgan—7. Ural—8. Guryev—9. Turgay—10. Karaganda—11. Aktyubinsk—12. Pavlodar—13. North Kazakhstan—14. East Kazakhstan—15. Kustanay—16. Dzhambul—17. Kokchetav (indicators are unreliable for Mangyshlak Oblast; population was not divided into urban and rural women in Alma-Ata Oblast)

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Public Health in Semipalatinsk Oblast

907C0152A Moscow MEDITSINSKAYA GAZETA in Russian 02 Aug 89 p 1, col 2

[Abstract] A conference was recently held to address public health concerns in Semipalatinsk Oblast and to redress past neglect. The fundamental issues dealt with the health hazard posed by long-term nuclear tests that had been conducted in the oblast, and the attendant coverup of the health aspects. From 1949 to 1963 mushroom clouds were almost a regular part of the scenery in the oblast. Underground testing was instituted in 1963, and was often accompanied by seepage of gas flues to the surface that were described by official sources as "inert and harmless" unless they happened to blow over administrative buildings, at which time an alarm was sounded. Numerous complaints by the citizens and concerned health workers were dismissed out of hand with platitudes or, when necessary, with threats from the KGB. Medical commissions that were established to look into unusual morbidity patterns in the

oblast and expressed concern at seeming symptomatology of radiation sickness were peremptorily disbanded and their findings and recommendations suppressed. The fact that the present three-day conference was held to address such concerns is in itself a unique event, as put by A. F. Tsyb, director of the Institute of Medical Radiology of the USSR Academy of Medical Sciences, and a tribute to glasnost and perestroika in the health care and political sectors.

Physician Shortage in Moscow

907C0152B Moscow MEDITSINSKAYA GAZETA in Russian 04 Aug 89 p 2, col 1

[Article by A. Slavin, MEDITSINSKAYA GAZETA correspondent]

[Abstract] It has been estimated that the current shortage of physicians in Moscow stands at 11,000, and most efforts at alleviating this situation rely on recruitment from other regions. The problem is especially serious at district polyclinics where the working conditions and salaries leave much to be desired. On the other hand, many departments, research institutes, and ministries, such as defense, maintain their own well-staffed health services, offering superior salaries and other professional benefits. Obviously, physicians tend to gravitate to such institutions, leaving the polyclinics and the population at large underserved. Finally, recruitment of medical personnel from other regions in itself is a dubious practice in view of the problems with health care across the

USSR. A more rational approach should be based on supply and demand parameters and a review of administrative practices that favor unrestrained construction of new medical facilities that cannot be properly staffed.

AIDS Risk for Athletes

907C0152D Moscow *MEDITSINSKAYA GAZETA*
in Russian 09 Aug 89 p 4, col 5

[Article by Ye. Kokurina, based on interview with B. A. Yemelyanov, "Sports" Central Scientific Research Institute]

[Abstract] Although to date there have not been any cases of Soviet athletes with AIDS, the problem is one of special concern since many factors enter into the transmission of AIDS. For example, the type of strenuous activity that athletes are commonly engaged in has immunosuppressive characteristics, and athletes often undergo blood transfusions and various injections in the normal course of medical care. Since many athletes are young and impressionable sex education is rigorously enforced, but infection may also occur in various forms of sports that involve skin damage, such as wrestling, boxing, hockey, basketball, and so forth. Discussions are already underway on allowing seemingly healthy AIDS

positive individuals into athletic competitions. However, it has already been determined that participants in the next Olympic Games will be screened for AIDS.

Effects of Perestroyka on Pharmaceutical Industry

907C0152E Moscow *MEDITSINSKAYA GAZETA*
in Russian 13 Aug 89 p 1, col 1

[Article by V. Medina, chairperson, Pharmacy Workers' Collective, et al. (23 signatures)]

[Abstract] Drug shortage continues to remain a serious problem in the USSR because the promised perestroyka in the pharmaceutical industry was transformed into simple administrative rearrangements. Savings, such as they were, went for salary increases of managers and administrators. The fundamental problem lies in the fact that input from pharmacists was ignored and supply and demand factors are not taken into consideration in production planning. The pharmaceutical industry continues to produce and supply the drugs that they can, and not what is needed. Perhaps a referendum should be held among the pharmacists who, after all, are best situated to appreciate consumer needs, to determine the future directions of pharmaceutical services in the USSR to make certain that all viewpoints are considered. In addition, it also appears that an umbrella organization, patterned on the Swedish experience, should be established to determine Soviet pharmaceutical policy.

Brain Potentials During Number Perception and Addition

907C0694A Moscow *PSIKHOLOGICHESKIY ZHURNAL in Russian* Vol 11 No 2, Mar-Apr 90 pp 82-89

[Article by B. A. Marshinin, Institute of Psychology, USSR Academy of Sciences, Moscow]

[Abstract] An analysis was conducted on event-related brain potentials in ten healthy men and women, 19 to 40 years old, involving two forms of activity: number recognition (visual perception) and addition (intellectual

activity). Data on the maximum positive component demonstrated that in the case of visual perception and intellectual effort there was not any interhemispheric or frontoparietal asymmetry. However, evaluation of the late, slow negative component revealed predominant involvement of the right and left parietal cortex vis-a-vis the frontal activity. Evidently, the maximum positive component reflected intellectual operations involving intimate correlation of frontal and parietal operations, whereas late negativity represented largely parietal control mechanisms dealing with accumulation of processing information. Figures 2; tables 1; references 26: 12 Russian, 14 Western.

Percutaneous Resorption of Cesium-137 and Strontium-89 in Alkaline Solution and Deactivation of Burned Surface

907C0043B Moscow GIGIYENA I SANITARIYA in Russian No 5, May 89 (manuscript received 4 Aug 88) pp 26-29

[Article by A. T. Ivannikov, B. A. Popov, I. M. Parfenova and L. A. Ilin]

[Abstract] Radionuclide resorption through the skin depends on the pH of their solutions. When alkaline solutions are used, a serious skin damage results which can lead to considerable resorption of radionuclides; yet no literature data on this topic are available. This subject was studied on white rats exposed to concentrated alkaline solutions of ^{137}Cs and ^{89}Sr dissolved in 10 percent and 40 percent NaOH. Deactivation was performed by washing the wound with 3 and 0.25 percent boric acid, 10 percent sodium metaphosphate (HMP) and 5 percent boric acid with a synthetic detergent "Zolushka". Resorption of cesium was significant, reaching the level of 51.5 percent of the administered dose; strontium resorption was insignificant (0.88 percent). This is evidently due to the fact that cesium, being an alkaline metal, converted to an ionic form in a base and thus could be easily absorbed after penetrating the skin with the alkaline solution. Strontium is an alkaline-earth element and forms an insoluble hydroxide in alkaline solutions, so that its resorption from such solutions is diminished. The most effective deactivation method was the washing of the skin with a 10 percent HMP solution or with a 5 percent boric acid containing a detergent. Early application of these rinses removed 95-99 percent

of cesium from the contaminated surface, lowering 7-11 fold its deposition in the internal organs. Increased concentration of the base and extended contact period decreased the effectiveness of these deactivators. References 8: 7 Russian, 1 Western.

UDC 612.014.4-063.08

Biochemical Mechanisms of Combined Action of Extreme Factors

907C0210C Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 35 No 4, Jul-Aug 89 (manuscript received 24 May 88) pp 111-114

[Article by R. I. Tabukashvili and I. B. Ushakov, Tbilisi Medical Institute]

[Abstract] Outbred male rats, 200-220 g, were used in studies designed to assess the biochemical mechanisms responsible for hypoxia-induced tolerance to ionizing radiation. The 30-day survival data showed that none of control animals subjected to 8.5 Gy gamma-irradiation survived for that period of time, all succumbing by day 11. However, 20-30 percent survival rates were obtained with animals exposed to hypoxia (8 min 5 percent O_2 gas mixture) or pretreated with intraperitoneal injections of liver extracts from animals subjected to hypoxia or electromagnetic radiation (2.45 GHz, 100 mW/cm², 8 min exposure). Biochemical studies indicated that the active radioprotective factor(s) was a peptide or protein, presumably arising from enhanced hepatic proteolysis induced by exposure to hypoxia and electromagnetic radiation. Figures 1; tables 1; references 15: 14 Russian, 1 Western.

Oligonucleotides Complementary to Tick Encephalitis Virus Interfere With Development of Infectious Process in Mice

907C0045D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 308 No 1, Sep 89 (manuscript received 30 Jan 89) pp 237-240

[Article by V. V. Pogodina, T. V. Frolova, M. P. Frolova, T. V. Abramova, V. V. Vlasov, D. G. Knoppe, A. G. Pletnev and L. A. Yakubov, Polio and Viral Encephalitis Institute, USSR Academy of Medical Sciences, Moskovskaya Oblast; Novosibirsk Institute of Bioorganic Chemistry, Siberian Division of USSR Academy of Sciences]

[Abstract] The newest approach to the development of effective antiviral preparations is based on selective damage or blocking of the functional viral genome by means of oligonucleotide derivatives complementary to viral nucleic acid sequence (antisense oligonucleotides). The potential to suppress the development of this disease in mice infected with tick encephalitis virus by means of reactive derivatives of antisense oligonucleotides was investigated. The following reagents were used: oligonucleotides pT(CT)₆ complement to ns5 gene fragment of tick encephalitis virus, pTGACCCTCTTCCCHTC, complement to ms5 gene fragment and pGAGACCGAGA, non-complement oligonucleotide as well as their 4-(N-2-chloroethyl-N-methylamine)-benzyl-5'-phosphamide derivatives. Specific antiviral effect of oligonucleotide derivatives, complement to RNA of tick encephalitis virus was observed. Animals protected with these derivatives formed specific humoral immunity and resistance to reinfection with no morphological changes in CNS characteristic of experimental tick encephalitis. This indicates a potential for chemotherapy of viral infections by selective blocking of the functions of viral nucleic acids using antisense oligonucleotide derivatives. Figure 1; references 15: 7 Russian, 8 Western (2 by Russian authors).

UDC 616.98:578.833.29]:578.224].083.3

Hybridomas Producing Monoclonal Antibodies Against Crimean Hemorrhagic Fever Virus

907C0131H Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 89 (manuscript received 12 Apr 88) pp 102-107

[Article by T. M. Shutkova, Ye. E. Melnikova, S. Ya. Gaydamovich, A. S. Novokhatskiy, A. L. Turchinskaya and Yu. A. Kalyuzhnaya, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Conventional hybridoma technology was employed for the production of monoclonal antibodies against Crimean hemorrhagic fever virus, relying on murine myeloma NS-0 cells and immune splenocytes from BALB/c mice. Six cell clones were derived that showed stable IgG production in vitro over 50 passages with titers ranging from 1:16 to 1:128 on indirect immunofluorescence assay, and retained full antibody producing activity after storage at -10°C for 5-6 months. The various IgG subclasses produced by the six clones were as follows: GEMA-31—IgG2a,

GEMA-9—IgG2a, GEMA-101—IgG1, GEMA-11—IgG2a, GEMA-12—IgG2b, and GEMA-24—IgG2b. Introduction of 5-15·10⁶ of the hybridoma cells into the peritoneal cavities of BALB/c mice primed with 2,6,10,14-tetramethylpentadecane yielded 1-4 ml of ascitic fluid within 7-11 days with titers equivalent to 10⁴ to 10⁵ dilutions. Three hybridomas also induced ascitic fluid formation in outbred unsensitized mice with monoclonal antibody titers of 1:1280 to 1:3200. Figures 1; tables 3; references 15: 5 Russian, 10 Western.

Isolation and Biochemical Analysis of Subviral Fractions of Lassa Virus

907C0216A Bratislava ACTA VIROLOGICA in Russian Vol 33 No 2, Mar 89 (manuscript received 16 May 87; in final form 18 Dec 87) pp 97-101

[Article by N. N. Lemeshko, O. I. Gvelesiani, Yu. G. Ilkevich and I. S. Lukashevich, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk]

[Abstract] Lassa virus, labeled with ¹⁴C-protein hydrolysate of chlorella, was purified by isodensity ultracentrifugation (35,000 rpm; 4°C). Following treatment with detergents NP-40 or octyl-β-D-glucopyranoside and ultracentrifugation in Urografin density gradient, two subviral fractions were obtained with buoyant densities of 1.24-1.26 and 1.08-1.10 g/cm³. Immunoprecipitation analysis of both fractions demonstrated that the first fraction consisted of a 60 kD protein and L and S segments of the genomic RNA, and the second fraction consisted of 48 kD surface glycoprotein GP1. Figures 4; references 10: 3 Russian, 7 Western.

Development of Local Morphological Changes After Intracutaneous Administration of Chemical Q Fever Vaccine

907C0216B Bratislava ACTA VIROLOGICA in Russian Vol 33 No 2, Mar 89 (manuscript received 5 Oct 87) pp 167-171

[Article by A. Resl*, S. V. Sidorenko and Ye. I. Zhulyabin, *J. E. Purkyne Medical Scientific Research Institute, Hradec Kralove, Czechoslovakia; Military Medical Academy imeni Kirov, Leningrad]

[Abstract] Histologic examinations were conducted on the local changes in guinea pigs following intracutaneous injection of 0.2 or 1 mg of a Q fever vaccine prepared by TCA extraction of Coxiella burnetii (phase I Nine Mile strain). Study of the injection sites for 60 days showed that a severe reaction was elicited by the 1 mg dose, consisting of a sequence of hemorrhages (with the appearance of Kurloff cells), abscesses, and necrosis encompassing the underlying muscle layer. Healing was slow and consisted of gradual replacement of the normal cutaneous and muscular tissues by connective tissue. The 0.2 mg dose evoked minimal histopathology, the musculature was not affected, and healing was evident within 48 h. After 60 days there were no histologic abnormalities. Figures 2; references 10: 5 Czech, 5 Western.

Snake Venom Production in Belorussia

907C0152C Moscow *MEDITSINSKAYA GAZETA*
in Russian 06 Aug 89 p 4, col 1

[Article by V. Sharpilo, TASS correspondent, Minsk]

[Abstract] In the village of Shchitovka in Belorussia two young zoologists, Sergey Kosov and Andrey Maksimov, have undertaken the harvesting of snake venom for

medical and research purposes. Their hope is to establish a serpentarium with over two thousand snakes producing a product that exceeds gold and platinum in value. The average cost of a gram of snake venom is currently around \$1500, and the demand is far from satisfied on the international market. Unfortunately, bureaucratism is slowing down Kosov and Maksimov's program, and the USSR is losing valuable foreign currency because of administrative inertia.

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