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# JPRS Report

# Science & Technology

## USSR: Life Sciences

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# Science & Technology
## USSR: Life Sciences

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## Assessment of Paired Activity of Otolithic Apparatus of Healthy Men by Study on Parallel Swings

*18400332 Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 2, Mar-Apr 88 (manuscript received 16 Sep 87) pp 28-33*

[Article by E. I. Matsnev, Doctor of Medical Sciences, V. K. Gavrilin, and I. Ya. Yakovleva, Doctor of Medical Sciences, Institute of Biomedical Problems (director—O.G. Gazenko, academician, USSR Academy of Sciences), USSR Ministry of Health, Moscow]

[Abstract] Subjects (51 healthy males, ranging in age from 24-41 years) were positioned on a swing so that the longitudinal axis of the body coincided with the plane of rocking of parallel swings. They swung sequentially in three positions (on the back, on the right side and on the left side) and compensatory eye movements were recorded. Compensatory eye movements of the right eye and left eye were measured separately. Otolithic assymetry was recorded in 38 percent of the subjects. Physiological variance of values of assymetry of compensatory eye movements of the subjects was 7.21 + or - 0.86 degrees. The assymetry coefficient was 26.2 + or - 2.8 percent. The amplitude of compensatory eye movements of the right eye with the subject on his right side was 9.69 + or - 0.60 degrees and that of the left eye with the subjects on the left side was 14.32 + or - 0.94 degrees. The amplitude of movements of the lower eye when the subject was on his side did not always exceed the amplitude of movements of the other eye. In some cases compensatory eye movements began several minutes (3-4) after swinging began. Figures 4; references 17: 2 Russian; 15 Western.

02791

## Bacteria Producing Plant Hormones

*18400402 Moscow TASS in Russian 8 Apr 88*

[Text] (Riga)—An unusual source of plant hormones—cytokinins—has been discovered by scientists of the Microbiololgy Institute of the Latvian Academy of Sciences. It has been established that they can be synthesized not only by plants, but also by some types of bacteria. One such strain has been isolated from the surface of a wood fungus. This has made it possible to start the production of substances accelerating cell division. Using a unique preparation, specialists began cultivating decorative plants, vegetables and field crops from tiny isolated pieces of tissue in test tubes. This way it is possible to obtain in one year alone up to 70,000 seedlings and sharply reduce the time for the selection of plants.

So far it is not fully clear what role is played by the typical plant hormones in the metabolism of bacteria, but experts believe that this phenomenon is of great practical interest for agriculture. Research has shown that such hormones not only accelerate cell division but also stimulate the germination of seeds, participate in the formation of buds, branches and tubers of plants, delay the aging of cells, and also stimulate the sprouting capacity of the seeds. The crops cultivated with them become resistant to drought and various diseases.

Good results have also been achieved in experiments for the regulation of the sex of the plants. By working towards the prevalence of the fruiting of female flowers it is quite simple, for example, to increase the harvest of cucumbers, hemp and maize.

/12223

UDC 633.11"324":631.524.86

## Effectiveness of Triple and Intensive Crossings in Breeding Winter Wheat for Resistance to Powdery Mildew and Brown Rust

*18400360 Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 2, Mar-Apr 88 pp 11-14*

[Article by A. V. Abakumenko, candidate of agricultural sciences, All-Union Breeding and Genetics Center]

[Abstract] Extensive studies have been conducted on intraspecies hybridization of winter wheat varieties from distant ecologic and geographic zones in order to overcome problems with powdery mildew and brown rust in Southern Ukraine. The triple and intensive crossing efforts initially involved the identification of highly resistant varieties for crossing with local wheat varieties. The second phase concentrated on the development of methodology for retention and even enhancement of disease resistance and other desirable traits, including high yields. The approach outlined here was generally found to be highly effective, with best results obtained with the use of stable forms in incomplete saturation crossings of semidwarf or tall varieties with one stable form. In addition, equally effective have been triple crossings involving dwarf and tall varieties and F1 plants with stable forms or dwarf varieties with two different stable forms. Tabulated data are presented on superior winter wheat varieties meeting the needs for cultivation in Southern Ukraine as of 1985. Tables 1.

12172/7310

## Synthesis of Endorphins

*18400238a Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13 No 11, Nov 87 (manuscript received 16 Dec 86, after revision 31 Mar 87) pp 1481-1495*

[Article by Zh. D. Bespalova, A. A. Azmuko, K. Forner, A. S. Molokoyedov, N. F. Sepetov, O. L. Isakova, E. K. Ruuge and M. I. Titov, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] A general scheme for the synthesis of human α-, γ-, des-Tyr$^1$-γ- and β-endorphins was developed. β-Endorphin was produced as fragments 1-17 (γ-endorphin) and 18-31. Fragments 2-17 (des-Tyr$^1$-γ-endorphin) and 1-16 (α-endorphin) were also formed. Synthesis began from the C terminus. t-Butyl groups were used to protect glutamic acid and lysine. Synthesis of fragments 11-13, 18-21 and 24-26 was conducted by condensation in a nonaqueous medium, using Triton B as the base. Residues 6 and 7 were attached as the Z-Thr-Ser-OMe dipeptide, residues 22 and 23 as the Z-Ile-Ile-OH dipeptide. Residues 27-31 were obtained by first synthesizing the tripeptide 27-30 with a free carboxyl group at glycine-30, to which the di-t-butyl ester of glutamic acid was then added. The mixed anhydride, azide and carbodiimide methods were used to connect fragments. The peptides synthesized had the correct amino acid composition and were homogeneous as determined by TLC and HPLC. Optical purity was confirmed by GC on a chiral stationary phase. NMR spectroscopy of synthesized fragments containing D- or L-methionine or serine also demonstrated the absence of racemization during synthesis. The opiate activity of the endorphins synthesized was measured in rat brain homogenate, using a competitive binding assay with tritiated alanine and leucine, enkephalin and beta-endorphin. Results corresponded with literature values. Figures 3; references 18 (Western).

12126

## Synthesis and Biological Activity of Alpha-A Interferon Region 125-131 Peptides

*18400238b Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13 No 11, Nov 87 (manuscript received 6 May 86, after revision 20 Feb 87) pp 1496-1500*

[Article by I. R. Rituma, R. E. Vegner, G. A. Afanasyeva, E. M. Kukayn and G. I. Chipens, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Previous work by the authors on the primary structure of interferons revealed about 20 active centers which are potential regulators of the activity of macrophages and lymphocytes. Sequence 125-130 is highly conserved in α-interferon and similar to immunoactivating sequences in β-interferon, immunoglobulin M, splenin and thymopoetin II. Using solid-phase procedures, sequence 125-129 (I) and [Arg$^{131}$]125-131 (II) were synthesized. Both peptides elicited a dose-dependent inhibitory effect on delayed type hypersensitivity reactions measured in vivo in mice. Peptide I exhibited a weak suppression of mice antibody formation to sheep erythrocytes. At doses of 0.01-0.1 mg/kg, peptide II also suppressed antibody formation, while at 1 mg/kg antibody formation was stimulated. The results indicate that interferons may serve as precursors to low-molecular-weight, biologically active peptides. Figures 4, references 19: 6 Russian, 13 Western.

12126

## Specific Binding of Muramyl Peptides to Rat Brain Membranes

*18400238d Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13 No 11, Nov 87 (manuscript received 1 Jun 87) pp 1523-1529*

[Article by A. A. Kaydalov, Yu. N. Utkin, T. M. Amdronova, V. I. Tsetlin and V. T. Ivanov, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Muramyl peptide and its analogues have immunostimulatory, somnogenic and pyrogenic activity. The latter two properties suggest the presence of specific brain binding sites or receptors. In order to characterize this binding, an analogue of N-acetylglucosaminyl-β-1,4-N-acetylmuramyl-L-alanyl-D-isoglutamine, containing a C-terminal lysine and labeled with $^{125}$I, was prepared. The lysine analogue was obtained by condensing N-acetylglucosaminyl-β-1,4-N-acetylmuramic acid with L-Ala-D-Glu-(L-Lys)-$NH_2$. Reversed phase HPLC of the product gave two peaks, representing the two glycosyl hydroxyl anomers. The product was then treated with the N-hydroxysuccinimidyl ester of 3-(4-hydroxyphenyl-)propionic acid, purified by HPLC, and then iodinated with chloramine T and Na$^{125}$I. The iodinated analogue exhibited specific binding to rat brain membranes, as measured by binding with and without a 10,000-fold excess of the lysine analogue product of the first reaction. Saturation occurred after two hours. The dissociation constant of the ligand-receptor complex, determined from a Scatchard plot, was 3.1 plus or minus 0.9 nM, while binding capacity was 11.0 plus or minus 1.2 fmole/mg. The parent peptide and intermediate reaction products inhibited binding equally, indicating that modification does not alter binding. Serotonin did not decrease binding. The very low level of receptor found is due to the use of whole brain homogenate rather than the specific frontal sections probably involved. Figures 5, references 20: 3 Russian, 17 Western.

12126

## Cyclic Analogues of Substance P. I. Cyclo(11-5-epsilon)-[Lys$^5$] Substance P-(5-11)

*18400239 Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13 No 12, Dec 87 (manuscript received 21 Oct 86, after revision 27 Jan 87) pp 1619-1628*

[Article by G. Kh. Maurops, F. K. Mutulis, S. Kh. Rozite, N. V. Myshlyakova, Sh. V. Svirskis, V. Ye. Klusha and G. I. Chipens, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] As part of the search for selective and long-acting analogues of the undecapeptide substance P, two methods for synthesizing the cyclo (11 to 5$^{epsilon}$) [Lys$^5$] substance P-(5-11) analogue (CLP) were developed. This analogue mimics the conformation of the active center revealed by NMR studies of substance P. In the first method, amino acid residues were added to the t-butyl ester of glycine using pentafluorophenyl esters of Z-amino acids. Boc groups used to protect lysine and methionine were removed with toluenesulfonic acid. Boron in acetic acid was used to deprotect tryptophan, causing t-butylation of methionine. Heating in acetic acid restored the thioether. Cyclization of the trifluoroacetate-activated ester was conducted in dilute dioxane with N,N-diisopropylethylamine to produce the protected cyclic peptide Z-CLP. The Z group was removed by transfer hydrogenation in the presence of formic acid. In the second method, a tetrapeptide was added to a tripeptide, increasing the yield from 24% to 43%. In vitro experiments in isolated guinea pig ileum showed that Z-CLP has myotropic activity but CLP does not. CLP elicited a dose-dependent hypotensive effect in 40% of narcotized rats. The biphasic effect lasted 1-2 minutes, and at its maximum was half the similar effect elicited by substance P. CLP shortened immobilization time in the mouse swimming test, with a 5 mg/kg dose eliciting a 63.4% shorter immobilization time. The data indicate that CLP and Z-CLP have weak myotropic and pressor properties, while CLP also has a more marked antidepressant effect. The similarity of the effects to those of the natural hormone substance P suggests a common mechanism. Figures 2, references 26: 6 Russian, 20 Western.

12126

## Molecular Nature of Selectivity of Antibiotic X 537A

*18400341b Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 1, Jan 88 (manuscript received 2 Feb 87) pp 38-43*

[Article by V. Ye. Khutorskiy, A. A. Kamenchuk, I. Ye. Shchechkin and I. N. Aliyeva, Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev; Azerbaijan State University imeni S.M. Kirov, Baku]

[Abstract] A theoretical method of calculating the free energy of molecules in a membrane-water system was used to analyze structural and energy characteristics of transfer of catecholamines through membranes. Reduction of membrane permeability induced by ionophore X 537A in the series serotonin, dopamine, noradrenaline and adrenaline was determined by increase of the energy barrier of amine transport through the inner zone of the membrane and by decrease of the stability of amine-ionophore complexes in the membrane-water system. Increase of the energy barrier of transport through the membrane was attributed to the different hydration of the complexes at the membrane-water interface. The charged groups were not hydrated in the case of serotonin. Ammonium groups were hydrated in dopamine and noradrenaline complexes but both charged groups were hydrated in the adrenaline complex. The decrease of stability of complexes in the membrane-water system was determined by intermolecular interaction of the cations and the ionophore. Figures 3; references 7: 2 Russian; 5 Western.

02791

## Effect of Toxin From Radianthus Macrodactylus on Membrane Permeability as a Function of pH, Surface Potential and Bivalent Cations

*18400341a Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 1, Jan 88 (manuscript received 25 Jun 87) pp 33-37*

[Article by A. S. Ivanov, A. A. Molnar, M. M. Monastyrnaya, E. P. Kozlovskaya, E. M. Khalilov and G. B. Yelyakov, Scientific Research Institute of Physicochemical Medicine, RSFSR Ministry of Health, Moscow; Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Science Center, USSR Academy of Sciences, Vladivostok]

[Abstract] A study of the effect of hemolysin RTX on the permeability of erythrocyte and liposome membranes as a function of the pH of the medium, surface potential of the membranes and presence of bivalent cations confirmed the fact that hemolysin from the sea anemone Radianthus macrodactylus increases permeability of biological and model membranes. The effect of hemolysin RTX depended upon the pH, being maximal in the alkaline pH range, and depended on the sign of the membrane surface potential. Calcium and magnesium ions increased the membrane lytic action of hemolysin but EDTA decreased it. The dependence of RTX activity on the membrane surface potential and the presence of bivalent cations in the medium confirmed findings by other authors. Figures 5; references 17: 5 Russian; 12 Western.

02791

UDC 577.354.3

## Identification of Tachykinin-Binding Polypeptide in Rat Brain Membranes

*18400369a Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 3, Mar 88 (manuscript received 1 Dec 87) pp 233-239*

[Article by Ye. M. Lazakovich, Yu. N. Utkin, F. K. Mutulis*, V. I. Tsetlin and V. T. Ivanov, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; *Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Lack of definitive information on substance P (SP) receptors led to the use of $^{125}$I-radiolabeled derivatives of SP for studies on membranes derived from rat brains. A photoactivated derivative was prepared by the reaction of $^{125}$I-labeled SP with p-azidobenzaldehyde catalyzed by sodium borohydride, showing a specific radioactivity of ca. 2000 Ci/mM after HPLC separation. Analysis of Scatchard binding plots yielded a $K_d$ of ca. 0.4 nM and maximum binding of ca. 20 fmoles/mg protein for the derivative. These values were similar to those of $K_d$ 0.7 nM and $B_{max}$ 60 fmole/mg for SP. Displacement studies with three classes of receptors led to the observation that the derivative bound to a NK3-type of SP receptor, more specifically to a 59,000 dalton polypeptide component of the NK3 receptor. Figures 4; references 17: 2 Russian, 15 Western.

12172/7310

UDC 541.64:541.183:577.352.2

## Stable Polymeric Monolayer Films and Liposomes Prepared From Derivatized Lipids

*18400369c Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 3, Mar 88 (manuscript received 2 Oct 87) pp 252-257*

[Article by S. Yu. Zaytsev and V. P. Zubov, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] The need for monolayer polymeric films and liposomes with enhanced stability led to acylation of synthetic and natural lipids with a view toward preparation of monolayer films and liposomes with certain desirable physicochemical characteristics. Specifically, acylation of aminated lipids with acryloyl chloride resulted in N-acryloyloctadecylamide, N-acryloylphosphatidylethanolamide, and N-acryloyldipalmitoylphosphatidylethanolamide monomers. Subsequent polymerization, usually under a mercury lamp, provided polymeric monolayer films and liposomes. Evaluation of stability was conducted to assess the effects of ethanol or sodium dodecyl sulfate, utilizing data on light scattering at 280 nm. In addition, tabulated data are also provided on UV, IR, and PMR spectroscopies. The monomers synthesized in the manner described formed stable, insoluble monolayers at the water-air interphase, as well as liposomes on ultrasonication or mechanical perturbation. Liposomes prepared from natural lipids were more stable than their synthetic analogs and, as expected, polymeric liposomes were more stable than monomeric liposomes. Figures 4; tables 3; references 10: 5 Russian, 5 Western.

12172/7310

UDC 547.827:577.352.465:577.354.9

## Tritiated Molecular Probes for Research on Receptors of 1,4-Dihydropyridine Class of Calcium Channel Blockers

*18400369d Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 3, Mar 88 (manuscript received 30 Apr 87) pp 323-326*

[Article by G. Ya. Dubur, V. V. Kastron, I. Skrastinsh, N. F. Myasoyedov*, V. P. Shevchenko*, N. M. Soldatov** and N. N. Chernyuk*, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga; *Institute of Molecular Genetics, USSR Academy of Sciences, Moscow; ** Scientific Research Institute of Biomedical Technology, USSR Ministry of Health, Moscow]

[Abstract] Two tritiated probes were devised for studying the nature of receptors for the 1,4-dihydropyridine class of calcium channel blockers, particularly because this class of antagonist has been characterized as possessing very high binding affinities. Specifically, 2,6-dimethyl- 3- methoxycarbonyl- 5 ([2,3-$^3H_2$] propoxycarbonyl)-4-(2'-difluoromethoxyphenyl)-1,4-dihydro pyridine (I) and 2,6-dimethyl -3,5-di ([2,3-$^3H_2$] propoxycarbonyl) -4-(2'-difluoromethoxyphenyl)-1,4- dihydropyridine (II) were employed in binding studies with membrane preparations derived from the skeletal muscles of rabbits. Scatchard plots of experiments conducted at room temperature in 20 mM tris-HCl buffer, pH 7.4, showed that the specificity of binding for I was 85%, with a $K_d$ of 3.5 nM. The corresponding parameters for II were 37% and 1.7 nM. The decrease in the binding specificity and $K_d$ were attributed to the elongation of the aliphatic substituent in II. Thus, on the basis of the Scatchard data, I was shown to be the probe of choice in studies on 1,4-dihydropyridine receptors. Figures 2; references 8: 1 Russian, 7 Western.

12172/7310

## Effect of N-Substituted Diamino-dibenzo-18-crown-6 Ethers on Mitochondria Membrane Permeability

*18400333b Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 1, Jan-Feb 88 (manuscript received 10 Dec 86) pp 13-17*

[Article by U. Z. Mirkhodzhayev, A. I. Gagelgans, V. A. Popova and B. A. Tashmukhamedov, Tashkent Order of the Labor Red Banner State University imeni V.I. Lenin]

[Abstract] A study of the effect of N-substituted diamino-dibenzo-18-crown-6 ethers (diamino-DB18C6) on the permeability of mitochondrial and planar lipid membranes described their effect on the passive permeability

of mitochondria for hydrogen ions and on the permeability of mitochondria for potassium and sodium ions and the nature of the dependence of ionophoric activity for potassium on the type of substituents in N-substituted diamino-DB18C6 ethers. The most effective crown ether for potassium and sodium with high selectivity was 4'5"-bis(acetamide)-DB18C6 and the most effective for hydrogen was 4'5" -bis(nitrofurfurolidenamide)-DB18C6. In addition to the size of the macrocycle, the symmetry, the length and number of the substituents and the type of ligand atoms in the macrocycle, the nature of the substituents in the crown ether molecule is an important parameter in determination of the ionophoric activity. Figures 3; references 7: 5 Russian; 2 Western.

02791

UDC 577.352:632:95

## NMR Studies on Interaction of Organophosphorus Insecticides (OPI) With Liposomes

*18400352 Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 1, Jan-Feb 88 (manuscript received 16 Feb 87; in final form 13 Aug 87) pp 107-111*

[Article by I. I. Abdrashitova, T. F. Aripov, F. G. Kamayev, B. A. Salakhutdinov and A. A. Abduvakhabov, Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] The importance of phospholipid components of biological membranes in the metabolism and transformation of OPI led to NMR investigation on the interaction of chlorofos, GA-41 (O-isopropyl-S-n-butyl-methylthiophosphonate), and OKh-30 (O-β-methoxyethyl-S-n-alkyl-methylethylthiophosphonate) with liposomes. Comparison of the spin lattice relaxation times of the protons of selected functional groups of the OPI on reaction with lecithin liposomes and multilamellar dispersions of lecithin and cardiolipin mixtures demonstrated that chlorofos and OKh-30 did not interact with neutral or negatively charged lipid bilayers. However, GA-41 was found to be intercalated into the regions of the acyl chains of the phospholipid bilayers. $^{31}$P-NMR studies confirmed the lack of specific interaction of chlorofos with the liposomes. Under certain conditions GA-41 was found to induce defects in the bilayer structure leading to permeability for $Pr^{3+}$ ions. Figures 2; tables 1; references 13: 8 Russian, 5 Western.

12172/7310

## Adsorption of Antibodies to Cytoplasmic Tetrodotoxin-Sensitive Proteins by Mouse Neuroblastoma Cells

*18400329 Kiev NEYROFIZIOLOGIYA in Russian Vol 20 No 1, Jan-Feb 88 (manuscript received 11 Feb 87) pp 98-105*

[Article by G. V. Pinchuk, L. N. Pinchuk and O. V. Gerasimenko, Institute of Physiology iemni A.A. Bogomolets, UkSSR Academy of Sciences, Kiev]

[Abstract] A study of properties of polyclonal antibodies obtained after immunization by a fraction of cytoplasmic glycoproteins which form sodium channels in liposomes showed that intact mouse neuroblastoma cells can absorb these antibodies. Results of a test which makes it possible to judge the identity or differences of antigenic determinants [AD] bound by antibodies to cytoplasmic tetrodotoxin-sensitive proteins [CTSP] and mouse neuroblastoma cells, cultivated in vitro, were presented and discussed. Adsorption of antibodies to CTSP by neuroblastoma cells indicated that antibodies of one and the same specificity participate in the reaction of the antiserum with CTSP and with the cells, that is, the mouse neuroblastoma cells have determinants identical to CTSP or so close to it that they can bind antibodies of one and the same specificity. The form of the adsorption curves may change with a change of parameters which characterize the neuroblastoma cells as a cell line cultivated in vitro, that is, a change of some cultivation parameters may change the capacity of the cells to adsorb antibodies to CTSP. It is proposed that the changes of form of adsorption curves are associated with changes of membrane expression of CTSP in the process of neuroblastoma cell cultivation. Figures 4; references 11: 9 Russian; 2 Western.

02791

## Transfer and Photoimmobilization of DNA Fragments Onto P-Azidobenzoylcellulose

*18400330 Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIYE NAUKI in Russian No 2, Issue 1, Jan 88 (manuscript received 20 Jan 86) pp 81-87*

[L. A. Frumgarts, S. M. Kalachikov, G. M. Dymshits, M. I. Dobrikov and G. V. Shishkin, Novosibirsk Institute of Bioorganic Chemistry, USSR Academy of Sciences, Siberian Department; Institute of Cytology and Genetics, USSR Academy of Sciences, Siberian Department, Novosibirsk]

[Abstract] Light-sensitive carriers based on cellulose containing covalently attached aromatic azide groups were developed previously and used for photoimmobilization of enzymes and antibodies. The pH of the medium and the temperature have little effect on the effectiveness of photoimmobilization, which is very

important for work with labile biopolymers. Light-sensitive carriers have good mechanical strength and may be stored for long periods. These properties justified the use of one such carrier, p-azidobenzoylcellulose [p-ABC], as a replacement for nitrocellulose during blotting and immobilization of nucleic acids. This article described a study of the possibility of transfer, immobilization and hybridization of nucleic acids on p-ABC fragments. The p-ABC carrier was synthesized from chromatographic paper by a method illustrated and described. Introduction of p-ABC residues into cellulose gradually increased the hydrophobicity of the paper, and the degree of hydrophobicitiy of the paper can be regulated by changing the degree of cellulose modification. Photoimmobilization involved the use of p-ABC with degree of modification from 5 x $10^{-7}$ up to 12 x $10^{-7}$ mole x $cm^{-2}$, which is more hydrophobic than nitrocellulose. The capacity of p-ABC to bind DNA covalently by photoimmobilization was 0.5 mg/$cm^2$. Restriction fragments of T7, lambda and M13 phage DNAs were tranferred in quantity to p-ABC and immobilized by ultraviolet irradiation with an optimal time of 10 minutes. The mechanical strength, simplicity and shorter time of immobilization of DNA in comparison with that of nitrocellulose and the high capacity of p-ABC justify its use as a new material for transfer of nucleic acids and hybridization with probes carrying a radioactive or enzymic marker. Figures 5; references 10: 3 Russian; 7 Western.

02791

## Determining Effect of Biologically Active Substances on Lymphocyte Energetics With Aid of Simple Luminometer, ATP-meter

*18400334 Moscow BIOLOGICHESKIYE NAUKI in Russian No 2, Feb 88 (manuscript received 28 Jul 87) pp 105-109*

[Article by V. N. Larionov, Ye. N. Mokhova, N. I. Priorova and A. N. Tarakanova, recommended by the Interdepartmental Problem Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow State University imeni M.V. Lomonosov]

[Abstract] A method of examining lymphocyte energetics by the ATP concentration removed obstacles encountered in the use of other methods. A simple, easily reproducible luminometer, an ATP-meter, measured the ATP concentration by the luminescence of a luciferin-luciferase system. Conditions of cell incubation at which changes in the metabolic state of the mitochondria were reflected by the ATP concentration in the cell suspension were found. Examples demonstrated the possibility and specific features of use of this method in studies of the effect of biologically active substances on cell energetics. Rotonone (5 nM) reduced the ATP concentration more strongly than it inhibited the oxygen consumption rate. Ecto-ATPases hydrolyzed low concentrations of exogenous ATP quickly. The method can be used to study the effects of external factors on cell energetics, especially to detect biologically active substances by their effect on thymus lymphocyte energetics. Figure 1; references 10: 4 Russian; 6 Western.

02791

## Inhibition of $Na^+$-$Ca^{2+}$-Metabolism and Superoxide Dismutase Activity of Copper-Containing Complexes of Cryptands

*18400333aKiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 60 No 2, Mar-Apr 88 (manuscript received 27 Feb 87) pp 52-56*

[Article by V. G. Vongay, Ye. I. Nazarov, I. P. Tsymbal and T. A. Savenko, Odessa University imeni I.I. Mechikov]

[Abstract] Superoxide dismutase is an effective antioxidizing agent but its clinical use is limited because of its low permeability through hemato-organ barriers and its high cost. A study of the capacity of four structural analogs of cyclic polyamines and complexes of them with $Cu^{2+}$ assessed the possibility of using them to produce the effects produced by superoxide dismutase. The copper-containing complexes of cryptands inhibited sodium-calcium exchange in sarcolemma of cardiomycytes and displayed pronounced superoxide dismutase activity. Binding of copper ions by cryptands prevented development of cardiotoxic effects of the copper ions. The low toxicity and the combined superoxide dismutase activity and sodium-calcium exchange inhibitory activity of complexes of cryptands and Cu(II) ions confirm the advisability of continuing the search for cardioprotective compounds among the series of cryptand copper complexes. Figures 4; references 15: 3 Russian; 12 Western.

02791

UDC 577.345

## Effects of Cryoprotectors on Circular Dichoism Spectra of Bacterial Photosynthetic Sites

*18400358b Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 1, Jan-Feb 88 (manuscript received 2 Mar 87) pp 63-67*

[Article by P. P. Noks, A. M. Arutyunyan, N. I. Zakharova and A. A. Kononenko, Biological Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] An analysis was conducted on the effects of conventional cryoprotective agents (glycerol, ethylene glycol, propylene glycol, dimethyl sulfoxide) on the circular dichroism (CD) of chromatophores isolated from Rhodopseudomonas sphaeroides. The spectra were taken in a phosphate buffer, pH 7.0-7.2, and 0.05% by vol. detergent at 200-300 and 700-900 nm. Every agent was found to affect protein structure in the photosynthetic sites, as well as the immediate surroundings of the porphyrin rings. In conjunction with previous studies, the changes in the spectra were attributed to diminished mobility of the tryptophanyl moieties, reflecting reduced intramolecular mobility of the protein components under the influence of the cryoprotectors in the $10^8$ to $10^9$ $sec^{-1}$ frequency band. Figures 2; references 16: 13 Russian, 3 Western.

12172/7310

UDC 541.144

## Removal of Retinal Oxime From Bacterioopsin-Containing Apomembranes of Halobacterium halobium by Beta-Cyclodextrin Extraction

*18400391a Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 2, Feb 88 (manuscript received 9 Jul 87) pp 135-138*

[Article by B. I. Mitsner, M. Varga, V. I. Shvets, L. V. Khitrina*, L.A. Drachev*, V. P. Skulachev*, S. V. Danshina** and L. N. Chekulayeva**, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; *Interfaculty Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov; **Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] One of the key steps in research on the topography of bacteriorhodopsin sites in Halobacterium halobium involves removal of the apomembranes (chromophore) by hydroxylamine treatment of the purple membranes. The formation of retinal oxime in the process represents a complication that requires its removal in a number of protocols. An extraction method was devised for the removal of retinal oxime which involves treatment of the apomembranes with 2 volumes of a β-cyclodextrin solution (2.5 g β-cyclodextrin + 100 ml 5 mM morpholinoethane sulfonic acid/KOH, pH 6.0), and centrifugation for 2 h at 50,000 g. Absorption spectra demonstrated that saturated solutions of β-cyclodextrin, after 4 extractions, removed the bulk of retinal oxime. Furthermore, methylated β-cyclodextrin (heptakis(2,6-di-0-methyl)-β-cyclodextrin) was found to be more efficient. Spectral studies also showed that bacteriorhodopsin reconstituted from nonextracted apomembranes and, therefore, containing retinal oxime after light adaptation had maximum absorption at 568.1-568.8 nm. A single treatment of the apomembranes with β-cyclodextrin led to a 0.3 nm hypsochromic shift of the maximum, while 4 extractions caused a 3.5 nm shift. A single extraction with methylcyclodextrin at an equivalent concentration (1.8 mg/ml) elicited a ca. 6 nm shift. With both agents the membranes retained sufficient resistance to make possible kinetic studies on their electric responsiveness. Figures 1; references 11: 6 Russian, 5 Western.

12172/7310

UDC 577.352.465

## Molecular Model of Ionic Permeability and Selectivity of Amphotericin Channels

*18400391b Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 2, Feb 88 (manuscript received 2 Feb 87) pp 173-180*

[Article by V. Ye. Khutorskiy and A. A. Kamenchuk, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Mathematical analysis and computer simulation were employed to create a molecular model describing the properties of ionic permeability and selectivity of amphotericin B channels. The concrete studies were conducted with models formed by 16 pairs of amphotericin B and cholesterol molecules, showing that the resultant complex may exist in two stable structural forms. One state, energetically favored, is stabilized by electrostatic interactions and has a larger radius: 5-7 angstroms at the opening and 8-10 angstroms in the central region. The second complex has a smaller radius and is stabilized primarily by van der Waals forces; it has a 4-5 angstrom opening and a 6-7 angstrom mid-zone. The total energy of the amphotericin-cholesterol pore in the former case (large diameter) when calculated on the basis of the structural elements (amphotericin-cholesterol pair) is 23.3 kcal/mole lower than in the second type of channel. The electrostatic component of the first type of channel is negative and in terms of absolute values exceeds by 28.2 kcal/mole the positive value of the electrostatic component of the second type of channel. Use of the Monte Carlo approach in studies on the channel-water and channel-water-$Cl^-$ systems demonstrated that interaction of the anion with the channel facilitates permeability. The anionic specificity of the channels rests on the orientation of the dipole moments of the ester carbonyl groups and the hydroxyl groups

lining the channel wall. The orientation of the dipole moments is such that transfer of anions is favored, but that of cations is precluded. Figures 2; tables 2; references 11: 2 Russian, 9 Western.

12172/7310

UDC 577.352.465

## Current-Ampere Characteristics of Bacteriorhodopsin

*18400391c Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 2, Feb 88 (manuscript received 7 Aug 87) pp 198-216*

[Article by V. I. Portnov, V. M. Mirskiy and V. S. Markin, Institute of Electrochemistry imeni A. N. Frumkin, USSR Academy of Sciences, Moscow]

[Abstract] Experimental studies were combined with a mathematical analysis of current-ampere characteristics of bacteriorhodopsin isolated from Halobacterium halobium incorporated into phosphatidylcholine bilayer lipid membranes. Measurement over a potential range of -60 to +60 mV in 100 mM KCl + 5 mM MES buffer, pH 6.2, with illumination intensities of ca. 40 mW/cm$^2$, yielded a linear current-ampere relationship. Active proton transport was shown to be dependent on the carrier efficiency of rhodopsin. Discrete fluctuations in the conductivity of the bilayer lipid membrane + bacteriorhodopsin were attributed to defects in the lipid bilayer attributed to the incorporated protein. Theoretical analysis of the data assumed applicability of the Lauger model of active transport, in which the ionic pump is considered as a channel with multiple conformational configurations. The data indicated that the best correlation between experimental and theoretical data was obtained when passive transport of protons in bacteriorhodopsin involves multiple binding sites. In addition, the binding sites are located at 10 angstrom intervals, with the potential energy of a proton diminishing linearly with the direction of the active transport. Linear current-ampere plots were obtained with strong electrostatic repulsion. In the case of high channel occupancy and absence of electrostatic repulsion, single-file effects prevailed with deviation of the current-ampere plots from linearity. Finally, occupancy of an outer binding site by a proton affects the photocyclic transformation and results in transformation of linear current-ampere relationships into an intermittently linear form. Figures 8; references 42: 11 Russian, 31 Western.

12172/7310

UDC 579.873.71:579.252.5].083.18

## Identification and Description of Plasmids in Erythromycin-Producing Strains of Streptomyces erythreus

*18400356 Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 33 No 2, Feb 88 (manuscript received 15 Jul 86) pp 87-93*

[Article by L. S. Ukhabotina, T. S. Belova, V. G. Zhukov and V. N. Danilenko, All-Union Scientific Research Institute of Antibiotics, Moscow]

[Abstract] Four type culture strains of Streptomyces erythreus were selected for studies on the presence of plasmids, in view of the unresolved question as to whether in some cases plasmids are responsible for erythromycin synthesis. Isolation of the DNA, Southern blotting, electron microscopy, and electrophoretic analyses after digestion with a variety of restriction enzymes revealed multiple copies of a series of plasmids in S. erythreus 1, 3, and 4 (erythromycin producers), but not in strain 2 (nonproducer). In addition, S. erythreus 2 gave negative results in hybridization tests with the ermE gene (gene for erythromycin resistance), pointing to the lack of the genetic material in strain 2 needed for erythromycin synthesis. The plasmids (pSE) ranged from 5.3 to 86.9 thousand nucleotide pairs; however, they were not implicated in erythromycin production. E. erythreus 3 and 4 also contained actinophages φE3 and φE4, with spontaneous induction frequencies of $10^{-7}$. Plans have been made to utilize the plasmids in question for vector purposes and to conduct Southern hybridization studies between the plasmids and the actinophages to assess possible relationships. Figures 1; tables 2; references 34: 8 Russian, 26 Western.

12172/7310

UDC 616.61-002.151-085.375

## Preparation of Human Immunoglobulin Against Hemorrhagic Fever-Renal Syndrome Virus

*18400363 Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 69 No 1, Jan-Feb 88 (manuscript received 21 Apr 87) pp 22-23*

[Article by I. N. Gavrilovskaya, S. B. Bogdanova, Ye. A. Gorbachkova, M. P. Chumakov, N. S. Apekina, M. B. Linev, Yu. A. Myasnikov, I. Z. Mukhutdinov, V. S. Potapov, V. A. Boyko, R. G. Mukhutdinova, L. V. Yagnova and F. Z. Kamalov, Kazan Scientific Research Institute of Epidemiology and Microbiology, RSFSR Ministry of Health; Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study was conducted that was specifically designed to prepare human immunoglobulin directed against the hemorrhagic fever-renal syndrome virus (HFRSV). Sera were harvested from 146 donors in the Tatar ASSR that had previously been infected with HFRSV and shown to possess specific antibodies in the indirect fluorescent antibody test. The titers ranged from 1:40 to 1:2560. Ethanol precipitation in the cold by the Cohn method led to a preparation containing 10.5 +/- 1.0% protein, 97% of which was represented by the immunoglobulin fraction. The antibody titer in the various preparations ranged from 1:640 to 1:10240, with the specific activities retained for the 24 month period of observation. Intramuscular injections of 0.3 ml of 1:10 and 1:100 dilutions of the immunoglobulin of field voles infected with 10 to 10,000 $ID_{50}$/ml of the "Krov B" strain of HFRSV led to 100% survival if the treatment was given within 1 h of infection. Administration of the immunoglobulin 24 h after infection reduced the survival rate to 50%. These findings demonstrate the value of convalescent sera as a source of protective antibodies against HFRSV with potential clinical and epidemiologic applications. References 6: 4 Russian, 2 Western.

12172/7310

## Pathogenic Mechanism in Formation of Inflamatory Destructive and Fibrous Processes in Dust-Induced Lung Diseases

*18400240a Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 1, Jan 88 (manuscript received 4 Oct 86) pp 5-8*

[Article by V. V. Milishnikova, M. N. Filimonova and Yu. A. Loshchilov, Institute of Industrial Hygiene and Professional Diseases, USSR Academy of Medical Sciences, Moscow]

[Abstract] Determining the biochemical composition of native bronchial secretions in people subjected to the effects of quartz-containing dust is important for monitoring the inflamatory and fibrous changes which occur at various stages of disease. To demonstrate this, total protein, hexuronic and sialic acids, and protein-bound and peptide-bound oxyproline were measured in the bronchial secretions of 50 patients with dust-induced bronchitis and 37 with uncomplicated silicosis. Eight patients with chronic nonspecific lung disease, who had never worked in contact with industrial dust, were used as controls. Disease severity was monitored by bronchial and transbronchial biopsy. Higher bronchial total protein, lower sialic acid and higher protein- and peptide-bound oxyproline correlated with more advanced bronchitis disease state. In stage I-II silicosis lowered hexuronic and sialic acids and total protein levels, with elevated oxyproline, were seen. Increased total protein, hexuronic acid and bound oxyproline may be connected with compensatory hypersecretion, caused by atrophy, hyperplasia and hypertrophy. The elevated bound oxyproline in silicosis may be a result of the increased functional activity of fibroblasts and macrophages. Decreased sialic acid reflects depletion of cellular protective factors in bronchial epithelium and lung tissue. References 6: 3 Russian, 3 Western.

12126

## How Does Polyvinylpyridine-N-oxide Decrease Cytotoxic Effect of Silica Particles?

*18400240b Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 1, Jan 88 (manuscript received 5 Dec 86) pp 8-13*

[Article by L. G. Korkina, I. B. Deyeva and B. T. Velichkovskiy, Second Medical Institute imeni N. I. Pirogov, Moscow]

[Abstract] Polyvinylpyridine-N-oxide (PVNO) is the most effective pharmacological agent in the prevention of quartz dust-induced fibrosis. The mechanism of this effect was studied particularly as it related to interaction with oxygen free radicals. Highly fibrogenic DQ-12 quartz dust lysed 92

of the erythrocytes present in vitro. Chryzotyl asbestos fibers lysed 77%, while Lyuberetskiy quartz particles less than 5 μm in diameter lysed 7%. PVNO decreased DQ-12 lysis to about 10% and asbestos lysis to about 60%, with no effect on the quartz particles. On interaction with quartz the preparations changed their total electrical charge. Fluorescent probes indicated that PVNO is bound to the cytoplasmic membrane, changing its negative surface charge. It was also observed that quartz dust can elicit intense generation of oxygen free radicals by phagocytes. As indicated by luminol chemiluminescence, PVMO inhibited this response, but not the similar response caused by asbestos. Measurement of the interaction of PVNO with chemically generated oxygen free radicals demonstrated that PVNO is a scavenger of superoxide radicals, singlet oxygen and hydrogen peroxide peroxidase products. PVNO did not react with hydroxyl radicals, which are elicited by asbestos on interaction with biological tissues. The data indicate that the protective effect of PVNO is associated with its lowering of both free radical concentrations and membrane and particle surface charges. Figures 4, references 24: 9 Russian, 15 Western.

12126

## Correlation Between Toxicity and Physicochemical Properties of Multicomponent Metallurgical Dusts

*18400240c Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 1, Jan 88 (manuscript received 6 Apr 87) pp 14-16*

[Article by V. A. Kostyuchenko, N. V. Dubinina and V. I. Lapchenkov, All-Union Scientific Research Institute for Labor Protection and Safety Techniques in Ferrous Metallurgy, Chelyabinsk]

[Abstract] Due to their complexity, the toxicity of metallurgical dusts is difficult to predict. In this regard, the intraperitoneal $LD_{50}$ in rats was measured for 24 metallurgical dusts and correlated with conductivity, pH, redox potential and membrane potential in solution. Empirical second order multiple regression analysis was used to reveal correlations. It was found that pH makes the greatest contribution to the correlation, while electrical conductivity makes the smallest. However, the two parameters are related, so that the dusts could be divided into two groups. The first group exhibited $LD_{50}$ values between 980 and 3500, the second between 220 and 1250. The first group had pH's below 10 and low conductivity while the second group displayed higher pH and conductivity. The results obtained demonstrate that there is a statistical correlation between the toxicity of inorganic multicomponent dusts and the physicochemical properties of their solutions. The equations derived may be used to determine the hazard class of metallurgical dusts. Figures 1, references 4 (Russian).

12126

**Protection of Eye Structures from Injury by Light and Optimization of Visual Functions. Physiological, Medicinal and Hygienic Aspects.**

*18400331 Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 2, Feb 88 pp 63-73*

[Article by M. A. Ostrovskiy, Doctor of Biological Sciences, P. P. Zak, Candidate of Biological Sciences, I. B. Fedorovich, Candidate of Biological Sciences and A. Ye. Dontsov, Candidate of Biological Sciences]

[Abstract] Results of studies of photopathological processes in eye structures, performed at the Institute of Chemical Physics, USSR Academy of Sciences, were presented and discussed and some practical applications of the findings were described. Major topics discussed included: mechanisms of light injury to visual cells, the spectrum of effect of photo-oxidation of the photoreceptor membrane, screening pigments in the system of protection of eye structures from light injury, the crystalline lens as an optical filter and a light injury substrate, dependence of the resolution of the visual system on the spectral composition of light, and hygienic light-filtering materials. While performing the function of a "living" light filter, the crystalline lens itself requires protection from light injury. This protection can come from development of sound light hygienic measures and determination of optimal spectral characteristics of light filters for lenses, masks and other eye protection devices. The Institute of Chemical Physics, USSR Academy of Sciences and the Scientific Research Institute of Polymers imeni V.A. Kargin have developed polymer compositions with physiologically sound spectral characteristics. The compositions have been used to produce lenses for use under extreme natural lighting conditions. The lenses include dark lenses for protection from sunlight while working under high solar radiation and bright yellow lenses for use while working under poor visibility. The lenses are made from plasticized polymethylmethacrylate with additions of light-resistant dyes and ultraviolet absorbers. The Institute of Chemical Physics and associates of MNTK "Eye Microsurgery" and the Scientific Research Institute of Polymers imeni V.A. Kargan have developed an ultraviolet-absorbing artificial crystalline lens "Spectrum" which is equivalent to the crystalline lenses of adults and elderly persons. MNTK associates have implanted nearly 800 of these crystalline lenses with good results.

02791

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## Laser Therapy in Combined Treatment of Pyogenic Diseases of Lungs and Pleura

*18400361b Moscow KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 14 Sep 87) pp 88-94*

[Article by Yu. A. Muromskiy, professor, E. A. Gukasyan, A. V. Dovbishchuk, Zh. G. Peshina, D. A. Yegorkina and V. N. Shendalev, Moscow Oblast Scientific Clinical Institute imeni M. F. Vladimirskiy]

[Abstract] Both ultraviolet (337 nm) and He-Ne (633 nm) laser therapies were used in combination with more conventional antibiotic and surgical modalities in the treatment of hard-to-manage pyogenic lung and pleural conditions. Light delivery was effected via fiber optics using drainage puncture channels, with the intensities and number of treatments adjusted to individual demands. Generally, UV laser was used with intensities of 5-7 J/cm$^2$ once a day at 3 day intervals for 2-3 treatments to control antibiotic resistant flora. He-Ne lasers were used to deliver 0.38-0.39 J/cm$^2$ intensities once a day at daily intervals for 7 to 15 treatments, intended to enhance specific and nonspecific resistance and promote tissue regeneration. A total of 104 patients, male and female ranging in age from 17 to 62 years, were treated in this manner. He-Ne therapy was employed in all 104 cases, and UV laser therapy in 68 subjects of that group. The cure rate with combined therapy including the laser modalities was 74% (77 patients), confirmed by radiological follow-up. The clinical impression was that the relatively high cure rate was definitely due to the inclusion of laser therapy in the treatment of these cases. Tables 2; references 29: 19 Russian, 10 Western.

12172/7310

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## Laser Effects: Drug Distribution in Ocular Tissues (Experimental Studies). Part 2

*18400374b Moscow VESTNIK OFTALMOLOGII in Russian Vol 104 No 2, Mar-Apr 88 (manuscript received 19 Dec 87) pp 40-43*

[Article by G. A. Kiselev, professor, O. I. Lebedev, and V. S. Pospelov, candidates of medical sciences, and A. V. Lukoshkin, Department of Eye Diseases and Central Scientific Research Laboratory, Omsk Medical Institute]

[Abstract] The demonstration that helium-neon laser (HNL) irradiation alters the pattern of drug distribution in ocular tissues led to an assessment of the possible mechanism of action of HNL responsible for this phenomenon. Experimental studies were conducted on 3 kg chinchilla rabbits under hexenal anesthesia (10-15 mg/kg) to evaluate the effects of low-intensity HNL on corneal and scleral permeability of $^{35}$S-streptomycin and $^{3}$H-deoxyuridine applied in solution and as 1% agar gels. The cornea or sclera was exposed to a scanning 2 mW HNL beam for 10 min. In quantitative terms the sclera was found to be less permeable to the radiopharmaceuticals than the cornea; nevertheless, in both cases permeability was enhanced by HNL treatment. Furthermore, the dosage form of the drug had no material impact on the results. The data showed that HNL enhanced the radiopharmaceutical levels in the anterior chamber by 76%, in the cornea by 67%, and in the sclera by 205% in comparison with control results. HNL was also observed to enhance the activities of superoxide dismutase and catalase in the ocular tissues, and to impel a shift of Na and K ions from the cornea to the vitrous body. Thus, the effects of HNL were due to enhanced diffusion and increased permeability, a fact that suggests the use of HNL in chemotherapy of ocular problems. Tables 2; references 12: 11 Russian, 1 Western.

12172/7310

## Ultrasonic Cavitation and Laser Therapy in Acute Purulent Diseases of Some Tissues and Glandular Organs

*18400387b Moscow KHIRURGIYA in Russian No 4, Apr 88 (manuscript received 1 Oct 86) pp 39-41*

[Article by Ya. N. Shoykhet, professor, V. I. Ovchinnikov, V. D. Platunov, I. N. Zolotov, L. Z. Zolotkovskaya and M. G. Redikultseva, Department of Surgical Diseases (head—professor Ya. N. Shoykhet), Pediatric Faculty, Altai Medical Institute; Medical and Sanitation Unit of Textile Industry Workers, Barnaul]

[Abstract] Results of the use of ultrasonic cavitation and laser therapy in complex treatment of purulent surgical diseases in 467 patients ranging in age from 8-82 years were described and discussed. Patients included 467 persons with abscesses, 97 with phlegmon, 69 with purulent wounds, 64 with carbuncles, 61 with mastitis and 57 with panaris. Some patients (33) had concomitant disease, which aggravated the course of the purulent process: diabetes mellitus—17, obesity—14, bronchial asthma—2. They were given prednisolone. Ultrasonic cavitation began on the 1st or 2d day after opening the abscess. A solution prepared immediately before the cavitation session was poured into the purulent wound according to the sensitivity of microflora of the purulent focus to antibiotics and nonbiological antiseptics and the nature and stage of the purulent process. Solutions of dioxydine, canamycin, streptomycin, oletetrin, tetracycline, ristomycin, gentamycin and penicillin were used, depending upon the sensitivity of the microflora for ultrasonic cavitation. Low frequency (26.5 + or - 0.5 kHz) ultrasonic treatment with vibration amplitudes of 0.055-0.060 nm were conducted daily until complete cleansing of the necrotic mass and removal of pus from the wound focus was achieved, after which laser irradiation was applied. Granulations appeared within 3.6 days, on the average, after use of this method to treat abscesses, phlegmons and purulent wounds and within 5.2 days after beginning of treatment of mastitis, panaris and carbuncles in comparison to 5.8 days and 7.8 days,

respectively, after treatment by surgery alone. Hospital stays were shorter after use of ultrasonic cavitation and laser therapy. References 7 (Russian).

02791

**Effect of Low-Power Laser Light on Hemostasis**
*18400387d Moscow KHIRURGIYA in Russian No 4, Apr 88 (manuscript received 29 Apr 85) pp 88-91*

[Article by N. K. Voytenok, professor, V. V. Bolshov, docent, Khadra Zeyn and M. N. Mankevich, Third Department of Surgical Diseases (head—professor N. K. Voytenok), Minsk Medical Institute; Department of Hematology and Tranfusion Technology (head—professor Ye. P. Ivanov), Belorussian Institute for the Advanced Training of Physicians]

[Abstract] The effect of low-intensity red and blue laser light on the blood of persons with trophic ulcers of the lower extremities and varicose veins was studied by thromboelastographic and coagulographic examination of blood from the ulnar vein of fasting patients and healthy donors. Thromboelastograms revealed hypocoagulation in the third phase of blood coagulation after irradiation of donors' blood by low-intensity laser light. This was attributed to changes of the quantity and quality of fibrinogen and other blood proteins due to irradiation. Hemostasis indicators of the patients showed increased intravascular coagulation of the blood because of chronic tissue and microbial intoxication. Laser irradiation produced a tendency toward hypocoagulation which increased regional blood flow and may accelerate regeneration of trophic ulcers when used with other methods of treatment. References 13 (Russian).

02791

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**Pathogenetic Aspects of Management of Acute Pneumonia With Low-Energy Helium-Neon Laser**
*18400374a Moscow SOVETSKAYA MEDITSINA in Russian No 3, Mar 88 (manuscript received 17 Apr 87) pp 18-22*

[Article by I. M. Korochkin, G. M. Kapustina, V. L. Naminov, Ye. Ye. Rubtsova and I. A. Solovyeva, No 4 Department of Internal Diseases, Second Moscow Medical Institute imeni N.I. Pirogov]

[Abstract] Clinical trials were conducted with low-energy helium-neon laser (HNL) in the management of cases of acute pneumonia, the incidence of which in recent years has been on the increase, accompanied by a concomitant increase in mortality. The patient contingent encompassed 104 males and females ranging in age from 18 to 81 years afflicted with various forms of acute pneumonia. The experimental group was treated with HNL in addition to conventional therapeutic measures, whereas management of the control patients was limited to conventional measures. HNL therapy, utilizing a ULF-01 "Yagoda" source emitting at 0.63 μm at 25MW, was conducted with a defocused beam giving 0.4-0.5 $MW/cm^2$ and adjusted individually to cover areas of lesions and focal projections of inflammation. In addition, laser acupuncture was employed using a flexible quartz fiber conductor (4-5 $MW/cm^2$). On the average the patients were treated with HNL once per day for 15-20 days with 1 min exposure per zone, not to exceed 10 min per day. Patients managed with HNL showed clinical subjective and objective improvements within 5 days in 67.9% of the cases, versus an improvement rate of 35.3% in the control patients. The efficacy of HNL was further attested by shortened periods of hospitalization. In the HNL group patients with focal pneumonia had an average hospital stay of 15.4 days and those with croupous pneumonia 23.7 days, while the corresponding figures for the control patients were 18.7 and 29.4 days, respectively. Follow-up studies conducted for 6 to 13 months confirmed the impression that HNL facilitated recovery by enhancing resolution of the inflammatory process, improvements in capillary circulation, enhancement of T-cell-based immunity, and normalization of pulmonary ventilation. Consideration of the clinical outcome and the pathogenetic mechanisms of HNL action point to the viability of HNL as an important adjunct in the treatment of acute pneumonia. Figures 4; references 15: 8 Russian, 7 Western.

12172/7310

UDC 616.127-005.8-036.11-08:616.15-085.849.19-032:611.14

**Treatment of Acute Myocardial Infarction by Intravenous Blood Irradiation by Helium-Neon Laser**
*18400374c Moscow SOVETSKAYA MEDITSINA in Russian No 4, Apr 88 (manuscript received 28 Dec 87) pp 34-38*

[Article by I. M. Korochkin, D. G. Ioseliani, S. F. Berkinbayev, G. M. Kapustina, Ye. I Yarlykova, V. L. Grishin, N. V. Smolina, O. L. Barbarash and A. N. Koval, No 4 Department of Internal Diseases, Second Moscow Medical Institute imeni N. I. Pirogov; Department of Intensive Therapy of Acute Coronary Diseases and Their Complications, Institute of Cardiovascular Surgery imeni A. N. Bakulev, USSR Academy of Medical Sciences, Moscow]

[Abstract] Therapeutic trials were conducted with intravenous blood irradiation with helium-neon laser (HNL) in patients with acute myocardial infarction, based on previous reports that HNL facilitated the healing process in such cases. The cohort consisted of 61 male and female patients managed by conventional approaches in conjunction with the intravenous HNL. A control group of 31 patients with acute myocardial infarction was not subjected to the HNL modality. Catheters were inserted into the ulnar vein with the fiber optic extended 2-3 cm

beyond the tip of the catheter for blood irradiation with 0.63 μm HNL emitting 1-2 or 10-12 mW for 30-40 min. Depending on the clinical status, the patients were treated once per day for 5-6 days for relatively uncomplicated cases, to 2-3 treatments per day at 6-8 h intervals for the more serious cases. The data showed that patients treated with HNL within 6 h of infarction fared better than patients in whom HNL was delayed, and much better than the control group. The HNL group as a whole evidenced statistically less complications: the incidence of anginal attacks, arrhythmia and conduction disturbances, and circulatory insufficiency was reduced two-fold. Furthermore, the mortality rate in the HNL group was 6.56% versus a rate of 16.12% for the control patients. The positive effects of HNL were felt to be largely attributable to diminished aggregation of erythrocytes and thrombocytes and elevated antifibrinolytic activity of the blood. Figures 1; tables 1; references 17: 12 Russian, 5 Western.

12172/7310

## Effects of Laser Irradiation on Bone Regeneration

*18400361a Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 1, Jan 88 pp 48-50*

[Article by L. P. Strigina, Kazakh Scientific Research Dermatological-Venereological Institute, Alma-Ata]

[Abstract] The effects of irradiation with a helium-neon laser on bone regeneration were studied in albino rabbits (5 months to 1 year old) following 1 x 0.4 cm homoplasty in the femur. Following the surgical procedure and wound closure, the area of operation was irradiated for a month at a distance of 70-80 cm by an LG-75 laser every day for 5 to 10 min. Histologic studies revealed that the helium-neon laser stimulated regeneration and blood supply to the new tissue. Almost complete replacement of the transplant was evident within a month of homoplasty with a dense collagenous matrix, whereas in the untreated control animals replacement of the transplant was far less advanced. After 2-3 months the bone showed virtually complete regeneration in the experimental animals, but not in the controls. Thus, the experimental clinical trials showed the utility of the helium-neon laser in accelerating bone regeneration.

12172/7310

## Use of Liposome Suspension in Experimental Purulent Process

*18400387a Moscow KHIRURGIYA in Russian No 4, Apr 88 (manuscript received 22 Oct 86) pp 30-34*

[Article by T. I. Shrayer, professor, V. M. Kreynes, candidate of medical sciences, N. A. Golubchikova, V. V. Buynyy, I. M. Vamburg, A. S. Khromov and K. V. Krikunovskiy, Kemerovskiy Medical Institute]

[Abstract] A study of the possibility of supplying liposomes to pathologically changed tissues of a purulent wound of an extremity and to regional lymph nodes by subcutaneous injection of them into the distal section of the extremity involved experiments on 60 chinchilla rabbits (weight 1.65 + or - 0.45 kg). An infected postsurgical wound, inflicted in the upper third of the left thigh, produced edema, hyperemia and intense purulent-necrotic discharge in the region of the wound in experimental rabbits (30) after 5 days. The other 30 rabbits were the control group. Liposomes were prepared from egg phosphatidylcholine and cholesterol in a molar ration of 7:5. The membrane marker was $^{125}$I-phosphatidylcholine. After injection of liposomes into both groups of animals, they were decapitated in groups of 5 animals after 1, 2, 6, 12 and 24 hours. Radioactivity of tissues from the kidneys, spleen, lungs and wound (tissues from the upper third of the thigh in control animals), the left popliteal and lumbar lymph nodes and the pooled blood was determined. After subcutaneous injection, the liposomes were eliminated from the depot via the lymphogenic pathway while maximum accumulation of the preparation occurred in the regional lymph nodes. Liposomes injected subcutaneously accumulated in tissues of the purulent wound situated nearest the injection site and a considerable quantity entered the zone of wound necrosis. A single subcutaneous injection of liposomes provided a significant concentration in the purulent wound tissues and the regional and remote tissues within 24 hours. No accumulation of the preparation occurred in the liver, spleen or lung tissue. Figures 3; references 16: 8 Russian; 8 Western.

02791

## Sorption Microfilters Used in Transfusing Stored Blood

*18400387c Moscow KHIRURGIYA in Russian No 4, Apr 88 (manuscript received 13 Nov 84) pp 80-84*

[Article by N. A. Belyakov, K. Ya. Gurevich, V. B. Serikov, A. V. Seltser, A. V. Solomennikov and N. S. Nemchenko, Leningrad Institute for Advanced Training of Physicians; Military Medical Academy imeni S. M. Kirov]

[Abstract] A study of the effectiveness of use of sorption microfilters in experiment and in the clinic included experiments performed on 18 mongrel dogs (weight 15-20 kg) and clinical studies of 31 patients with mechanical injuries related to severe trauma and accompanied by loss of more than 25 percent of the blood. Patients underwent intense infusion-transfusion therapy, including transfusion of 1 liter or more of stored blood and 1.5-4 liters of blood substitute fluids. After placing patients in one of two groups, 21 received transfusion of blood stored up to 10 days through a standard PK-11-01 blood transfusion system. The other 10 patients received donor stored blood with a maximum length of storage of 15-20 days using a system with a sorption microfilter. Sorption of the stored blood produced no noticeable rise of arterial pressure nor rise of a pulmonary barrier. Pulmonary edema did not develop, which indicated the absence of effects on the vascular permeability of the lungs. The positive effect of the use of sorption was attributed to the interaction of activated charcoal and biologically active substances of the blood. The hemodynamic and substitution effects were identical in both groups. The studies confirmed the effectiveness of the use of sorption microfilters during transfusion of large amounts of stored blood. Figure 1; references 17: 13 Russian; 4 Western.

02791

## Hyperbaric Oxygenation in Complex Treatment of Burn Victims

*18400387e Moscow KHIRURGIYA in Russian No 4, Apr 88 (manuscript received 10 Jul 85) pp 100-102*

[Article by S. D. Orlov, V. G. Sidorenko and S. Ye. Puzanov]

[Abstract] Results of treatment of 35 males with burns covering different amounts of the body surface by hyperbaric oxygenation in an OKA-MT oxygen pressure chamber at oxygen pressures of 1.5-2 atm with 40-60 minute exposure were compared with results of treatment of 35 burn victims in the same age range with analogous burn lesions who did not receive hyperbaric oxygenation. Use of hyperbaric oxygenation in treatment of patients with burn shock with skin lesions combined with burns of the upper respiratory tract improved respiratory function and blood circulation and accelerated periods of epithelization of surface burns. Use of hyperbaric oxygenation in complex therapy of burn diseases in the first phase of burn septic toxemia reduced the length of time required to prepare burn wounds for autodermoplasty. Hyperbaric oxygenation decreased oxygen starvation of transplanted free skin grafts in the phase of plasmatic nutrition and promoted taking of the skin grafts, which reduced the length of hospitalization of the burn victims. References 5 (Russian).

02791

## Plasmid Vector for Gene Expression Under Control of Temperature-Regulated Lambda Bacteriophage Late Promotor P'R

*18400238e Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13 No 11, Nov 87 (manuscript received 4 Feb 87) pp 1561-1569*

[Article by L. A. Petrenko, I. I. Gileva and V. V. Kravchenko, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] A plasmid vector which does not lead to host cell instability was constructed. Promotor $P'_R$ was used to regulate transcription, since it is the most powerful lambda bacteriophage promotor. The strong termination signal $t'_R$, the gene for protein Q antiterminator under the direct control of promotor $P_R$ and the thermolabile repressor cI were included. Thus the pCEQ3 plasmid constructed consisted of two regulatory blocks: cI-$P_R$ and Q-$P'_R$. The lacA, bla and tet genes completed the plasmid. Expression of lacA, as β-galactosidase synthesis, was absent at 30°C and reached a maximum after two hours at 42°C, while at 37°C synthesis increased steadily, passing that at 42° by the third hour. This was confirmed by electrophoresis. β-Lactamase synthesis showed a similar pattern. Induction of promotor $P'_R$ at 37° may be explained by the fact that, even though promotor $P_R$ is only partially deblocked, the resulting level of protein Q synthesis gives full antitermination and maximal activity of $P'_R$. This was confirmed by producing a plasmid variant with a defective Q gene. Cells transformed with the variant plasmid do not synthesize β-galactosidase at any of the temperatures used. This confirmed the predominant role of protein Q in plasmid pCEQ3. The artificial gene for human leukocyte α-2-interferon was introduced into pCEQ3, giving two plasmids, one of which gave transformed cells which produced interferon at 37° but not at 30°. Use of promotor $P'_R$ permits induction at 37°, avoiding the unfavorable heat shock effects of 42° induction. Figures 5, references 27: 7 Russian, 20 Western.

12126

UDC 577.152.314

## Rapid Screening of Bacterial Colonies for Restriction Enzymes

*18400357 Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGII in Russian Vol 24 No 1, Jan-Feb 88 (manuscript received 28 Aug 86) pp 121-124*

[Article by P. A. Belavin, V. S. Dedkov and S. Kh. Degtyarev, All-Union Scientific Research Institute of Molecular Biology]

[Abstract] A rapid screening method has been developed for the screening of bacterial colonies for production of restriction enzymes, that precludes cultivation in liquid medium and allows examination of 100 colonies in 3-4 h. Bacteria under study are cultivated on 1.5% agar nutrient medium with 35 g/liter sprat hydrolysate. When 2 mm colonies are formed the cells are transferred to 250 ml of incubation mixture consisting of 100 mM tris-HCl buffer, pH 8.0, 50 mM NaCl, 5 mM EDTA, 0.1% Triton X-100, and 0.1 g/liter freshly prepared lysozyme. After incubation for 15 min with occasional shaking the extract is clarified by centrifugation for 1 min at 10,000 g. One to four ml of the lysate is then incubated with 0.5 μg DNA of phage lambda for 1-2 h at 37°C in pH 7.5 tris-HCl buffer, followed by electrophoretic analysis on 1% agarose gel. DNA patterns are then developed with ethidium bromide and examined under UV light. This approach revealed restriction enzyme activities in the following genera: Bacillus, Kurtia, Paracoccus, Vibrio, Pseudomonas, Rhodopseudomonas, Proteus, and Providencia. Streptomyces and Nocardia were negative, presumably due to the refractory nature of their cell walls with respect to the lytic agents employed. Figures 3; references 9: 3 Russian, 6 Western.

12172/7310

UDC 577.21

## In Vivo Identification of Promoter Activity in Left Segment of att Region of Phage Lambda

*18400358a Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 1, Jan-Feb 88 (manuscript received 21 Jan 87; in final form 8 Apr 87) pp 44-54*

[Article by I. P. Gileva, Ye. A. Karginova, N. N. Mikryukov, O. I. Serpinskiy and V. V. Kravchenko, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] Plasmid pSK was employed as a vector in studies on the promoter activity of DNA fragments of the lambda phages cI857s7 and b2, both of which contain different segments of the att region fused to the tetracycline (Tc) resistance gene tet. The promoter activity was evaluated from Tc resistance of E. coli transformed by the recombinant plasmids. Studies with 4 recombinant DNAs revealed that only plasmids designated as pSK-PP' (HindIII + BamHI fragment: -252 to +242 base pairs) and as pSK-P (AluI fragment: -249 to -7 base pairs) imparted Tc resistance to E. coli. These findings demonstrated that region P (-249 to -7 base pairs) of the att fragment of the lambda phage DNA contains a rectidirected promoter active in vitro. The promoter in question is believed to be identical to the previously described $p_{att}$ promoter. Figures 8; references 30: 8 Russian, 22 Western.

12172/7310

UDC 577.219.175.3

## Genetic Engineering of Peptide Hormones. Part 3. Cloning of Porcine Somatotropin cDNA and Gene Construction for Bacterial Expression

*18400358c Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 1, Jan-Feb 88 (manuscript received 6 May 87) pp 145-150*

[Article by G. S. Zhvirblis, V. G. Gorbulev, P. M. Rubtsov, B. K. Chernov, Yu. B. Golova, G. Ye. Pozmogova, K. G. Skryabin and A. A. Bayev, Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] With a view toward the eventual development of genetically engineered somatotropin, studies were undertaken on the cloning of porcine somatotropin (PS) cDNA. The PS cDNA was synthesized by conventional methodology, starting with poly(A)RNA separated chromatographically from the template RNA fraction isolated from porcine pituitary glands. Subsequently, 500-900 base pair fragments of the double-stranded cDNA were inserted into plasmid pBR322, with that vector then used for the transformation of E. coli HB101. Isolation of clones and analysis of the cDNA preparations demonstrated that in the case of the PS system polymorphism is evident at both the mRNA level and at that of the protein molecule. Expression of the PS cDNA in the E. coli cells was enhanced by replacement of the 5'-end, which codes for the first 15 amino acids in the peptide, by a synthetic nucleotide sequence. Figures 6; tables 1; references 11: 2 Russian, 9 Western.

12172/7310

UDC 579.252.5

## Alleviation of Type I Restriction by Group incI Plasmids. Part 1. General Description and Cloning of ard Gene

*18400358d Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 1, Jan-Feb 88 (manuscript received 11 Mar 87; in final form 3 Jun 87) pp 270-276*

[Article by V. Yu. Kotova, G. B. Zavigelskiy and A. A. Belogurov*, All-Union Scientific Research Institute of Biotechnology, Minmedmikrobioprom, Moscow; *Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study was conducted to determine the efficiency of alleviation of type I restriction in E. coli by group incI and incN plasmids. The observations demonstrated that the most active ard function (alleviation of restriction of DNA) was exhibited by the group incIα plasmids R144 and $ColI_b$-P9. Both plasmids showed 50- to 100-fold alleviation of restriction of unmodified phage λ.0 DNA, with the ard locus of $ColI_b$-P9 located on the SalGI-C fragment. The ard locus was cloned in plasmid pBR322 which was then used for transformation of E. coli K12 AB1157. The ard gene was shown to specifically alleviate type I restriction enzymes (EcoK, EcoB, EcoD) without affecting type II (EcoRI) and type III (EcoPI) systems. Furthermore, the activity of ard was independent of the bacterial genes recA, lexA, recBC, recF, and lon. The product of the ard gene has no effect on methylation of DNA by type I enzymes and may be a topoisomerase I. Figures 1; tables 6; references 17: 5 Russian, 12 Western.

12172/7310

UDC 577.2

## Electrostimulated Transformation of Escherichia Coli

*18400369b Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 3, Mar 88 (manuscript received 22 Oct 87) pp 240-245*

[Article by Ye. S. Tsymbalyuk, L. V. Chernomordik, N. Ye. Broude* and Yu. A. Chizmadzhev, Institute of Electrochemistry imeni A. N. Frumkin and *Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted on the efficiency of electrically stimulated transformation of several strains of E. coli by plasmid pBR322 DNA. Under optimum conditions EDTA-pretreated cell suspensions subjected to a single exponential impulse (10 kV/cm, 1.5 msec) reached an efficiency approaching 4 x $10^6$ transformed colonies/μg DNA. The maximum frequency of transformation was 0.4% transformed cells per total viable cells with 15 μg/ml DNA. EDTA alone did not promote transformation; maximum transformation required 10 mM EDTA in the tris-HCl buffer, pH 7.5-8.0. Although the mechanism of action by which electric stimulation facilitates transformation remains enigmatic, an attractive hypothesis postulates pore formation in the cell membranes. Figures 5; references 24: 4 Russian, 20 Western.

12172/7310

## Effect of Constant Magnetic Field on Guinea Pig Brain

*18400336 Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian*
*Vol 129 No 1, Jan 88 (manuscript received 26 Sep 86) pp 169-172*

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

[Abstract] A study of the degree and nature of changes in cells of different sections of guinea pig brain after brief exposure to a constant magnetic field of 300 oersted for 5 minutes used male guinea pigs (140, weight 200-500 g) subjected to single and multiple exposure to a constant magnetic field and observed for 30 days. Animals were decapitated after 1, 24 and 48 hours and after 3, 5, 7, 10, 15, 20, 25 and 30 days. Control animals were not exposed to a magnetic field. Comparative study of the state of elements of different sections of the central nervous system revealed reversible and irreversible changes, with cells of the hypothalamus, cerebral cortex and cerebellum being affected most strongly. The greatest effect on brain structures occurred in the early periods (2-10 days) after exposure. The maximum increase in number of modified nerves and astrocytal cells (30-40 percent) after effect of the magnetic field occurred on the 7th-10th day and the changes smoothed out after 25 days. Changes of nerve and glial cells were less prolonged after a single exposure than after multiple exposure to the magnetic field. The close interassociation of the hypothalamus and hypophysis suggests that changes in the hypothalamus disturb neurosecretory functions of the hypothalamus-hypophysis system and affect the neuroendocrinal and hematopoietic organs, producing a reverse effect on the central nervous system and causing more noticeable changes in the brain. It was assumed that the changes in guinea pig brain are caused by both direct effect of the constant magnetic field and by the effect of neurosecretory organs and the blood subjected to the effect of the magnetic field. Figure 1; references 8: 6 Russian; 2 Western.

02791

## Adaptogen Research in USSR

*18400337 Moscow KHIMIYA I ZHIZN in Russian No 1, Jan 88 pp 54-59*

[Article by M. G. Voronkov, corresponding member, USSR Academy of Sciences, Ye. Ya. Kaplan, Doctor of Medical Sciences, L. M. Raykhman, candidate of chemical sciences]

[Abstract] Some aspects of the role of adaptogens in increasing the resistance of the human body to harmful factors in the external environment are described and discussed, and some specific studies of adaptogens now underway in the Soviet Union are mentioned. Domestic adaptogens of plant origin are being studied in the laboratories of I. I. Brekhman (Vladivostok), A. S. Saratikov (Tomsk) and N. K. Fruyentov (Khabarovsk). Polysaccharides isolated from microorganisms such as predigiosan and zimosan are being studied at the schools of academicians of the USSR Academy of Medical Sciences Z. V. Yermolyevaya and A. A. Shmidt. V. P. Filatov, an eminent ophthalmologist, has introduced the use of biostimulators in medicine. Some biostimulators now in use are mentioned and the mechanism of their effect is discussed briefly. A special group of adaptogens, synthetic chemical compounds, are being studied. The first such compound, dibasol, discovered by Leningrad professor N. V. Lazarev, has proven effective in the treatment of influenza. Derivatives of silicon and germanium (silitranes and germatranes) and heteroaraliphatic acids have been synthesized at the Irkutsk Institute of Organic Chemistry, USSR Academy of Sciences, Siberian Department. Principles of action of adaptogens on the body are discussed and their benefits in physical training are emphasized. Synthesis of analogs of natural adaptogens are being studied. A preparation with a broad spectrum of effect, an analog of one of the natural phytohormones, has been synthesized at the Irkutsk Institute of Organic Chemistry, USSR Academy of Sciences, Siberian Department. A method of industrial cultivation of ginseng has been introduced under the supervision of R. G. Butenko, corresponding member of the USSR Academy of Sciences. Introduction of adaptogens into non-alcoholic beverages and confections has been achieved by the Moscow plants Rot Front and Udarnits.

02791

## Biological Effects of Leacadin

*18400338a Leningrad VOPROSY ONKOLOGII in Russian Vol 34 No 2, Feb 88 (manuscript received 11 Nov 86) 192-195*

[Article by A. M. Garin, M. R. Lichinitser, N. V. Dmitriyeva, B. I. Rubtsov, N. V. Leneva, Ye. G. Slavina, A. P. Budko, Ye. Yu. Levinskaya and I. Ya. Kalvinsh, All-Union Oncological Scientific Research Center, USSR Academy of Medical Sciences, Moscow; Institute of Organic Synthesis, LaSSR Academy of Sciences, Riga]

[Abstract] Preclinical data suggest that leacadin, 2-carbamoylazaridine, produced at the Institute of Organic Synthesis, LaSSR Academy of Sciences, combines immunomodulating and antitumor activity. A study of biological effects of leacadin used in treatment of 57 patients with different disseminated malignant tumors (melanoma—13, cancer of the kidney—11, stomach cancer—6, cancer of the large intestine—6, lung cancer—5, soft tissue sarcomas—4, other tumors-9) is described. Leacadin was injected intravenously in a 600 mg/m$^2$ dose daily for 10 days. Some patients received 6 courses with 3 weeks between courses. Direct side effects of the drug and effects on hemopoiesis, liver function, kidney function and heart action were determined. Leacadin was used in 4 experiments on CBA/C57B1 mice, Akatol strain, with subcutaneously transplanted tumors at the large intestine, in order to determine the drug's effect on tumor growth as a function of the course of treatment and the dose size, and the role of supplemental splenectomy and cyclophosphane injection. Leacadin in a 600 mg/m$^2$ dose produced an immunostimulating effect on the patients, which was shown by an increase of the T-helper/T-suppressor ratio after an initially low or normal level. In some cases, leacadin activated natural killer cells after an initial low level. The drug was well tolerated by the patients. Use of a single 600 mg/kg dose of the drug on mice did not affect tumor growth nor did supplementary splenectomy, but a 20 mg/kg dose on the 9th, 11th, 13th and 15th day after tumor transplant retarded tumor growth by 45 percent. Leacadin has been approved for medical use on oncological patients as an immunocorrecting agent. Figure 1; references 8: 3 Russian; 5 Western.

02791

UDC 615.2/.3.015.5/.8.07

## Automatic Evaluation of Individual Drug Sensitivity

*18400362 Moscow LABORATORNOYE DELO in Russian No 3, Mar 88 (manuscript received 16 Sep 86) pp 41-43*

[Article by S. M. Demyanenko, Ternopol Medical Institute]

[Abstract] A rapid method has been developed for evaluating individual drug susceptibility, based on the extent to which acid hemolysis is accelerated by incubation with the drug in question. The in vitro colorimetric test rests on preincubation of the patient's red cells with the drug in question for 10 min at 24°C, addition of 2 x $10^{-3}$ M HCl, and colorimetry. An index of drug sensitivity (IDS) was determined for 27 patients with various pulmonary inflammatory conditions and 43 healthy control subjects. The data showed that for control individuals the IDS was 0.95 or better. In the case of individuals with clearly established drug sensitivity lower values were obtained, with IDS below 0.65 indicating that a drug should not be employed, whereas IDS values in the 0.65 to 0.95 range indicate that the drug may be used after desensitization. In 11 patients (40.7%) with IDS values of 0.6 or lower the IDS rose after the drug therapy was discontinued. The efficiency of the test in indicating drug sensitivity was found applicable to penicillin, sulfanilamide, novocain, dimedrol, vitamin B1, aloe vera extract,

etc. An algorithm was developed for computerized assessment of drug sensitivity based on the results of the test. Figures 1; Tables 2; references 6: 2 Russian, 4 Western.

12172/7310

## Use of New Psychotropic Drug, Bemitil, for Treatment of Asthenic Disturbances (Clinical and Pharmacological Study)

*18400338b Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian Vol 88 No 3, Mar 88 (manuscript received 28 Apr 86) pp 109-115*

[Article by Yu. A. Aleksandrovskiy, Yu. G. Bobkov, G. G. Neznamov, T. V. Serebryakova and S. S. Boiko, All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V.P. Serbskiy (director—G.V. Morozov, member of the USSR Academy of Medical Sciences), USSR Ministry of Health; Scientific Research Institute of Pharmacology (director—A.V. Valdman, member of the USSR Academy of Medical Sciences), USSR Academy of Medical Sciences, Moscow]

[Abstract] Clinical and pharmacological effects of bemitil on patients with asthenic disturbances during borderline forms of psychoneurotic distress were compared with the effects of preparations containing the nootropic drugs pyracetam and pyridol. The study included 130 patients. Special selection singled out patients with neurasthenia (61) and patients with neurosis-like disturbances after exogenous organic brain lesions of traumatic or infectious genesis (69). Most patients were young or middle-aged. The therapeutic daily dose of bemitil was 500-700 mg and the drug was used continuously or intermittently according to results of the ongoing treatment. Bemitil was more effective than pyracetum or pyriditol in alleviating manifestations of the asthenic syndrome in general. Advantages gained from its use included a faster appearance of therapeutic effect and a unique, mild psychostimulating effect, manifested primarily in its effect on obligate manifestations of the asthenic disorders. The dosage used alone or in combination with other drugs can be changed according to the degree of psychostimulating effect produced. The drug can be used to treat many neurotic and neurosis-like conditions. Figures 3; references 15: 14 Russian; 1 Western.

02791

UDC 612.821.6+612.822.1

## Effects of Hippocampal Microinjections of Oxytocin and Its Antagonist on Intravenous Self-Administration of Heroin in Rats

*18400376b Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I.P. PAVLOVA in Russian Vol 38 No 1, Jan-Feb 88 (manuscript received 4 Oct 86) pp 129-134*

[Article by G. G. Gasanov, R. Sh. Ibragimov, G. Kovacs, G. Sabo and G. Telegdy, "Brain and Behavior" Department, Institute of Physiology imeni A. I. Karayev, Azerbaijan SSR Academy of Sciences, Baku; Department of Pathophysiology, Szeged Medical University, Hungary]

[Abstract] The reports that oxytocin diminishes learning efficiency, has an adverse impact on memory, and modulates adaptation to narcotics led to an investigation to the effects of oxytocin and its antiserum (OAS) on conditioned intravenous self-administration of heroin in rats. Studies on CFY male rats, 200-240 g in weight, demonstrated that microinjection of oxytocin into the ventral hippocampus reduced heroin intake in both control and heroin-tolerant rats to a statistically significant extent (P less than 0.05). However, administration of OAS into the ventral hippocampus led to a statistically significant increase in the intake of heroin in both groups of animals. These findings indicate that endogenous oxytocin is involved in the neural mechanism predisposing to heroin addiction, with the hippocampal component of the limbic system being particularly important in this form of behavior. Figures 3; references 21: 3 Russian, 18 Western.

12172/7310

UDC 616.12-008.318-092.9-092:612.822.1:547.95

## Involvement of Delta Sleep Peptide (DSP) in Electrical Stability of Heart

*18400375b Moscow KARDIOLOGIYA in Russian Vol 28 No 3, Mar 88 (manuscript received 1 Apr 87) pp 89-91*

[Article by M. A. Zvyagintseva, Laboratory of Experimental Cardiology, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] The demonstration that DSP may be involved in alleviation of the physiological effect of stress led to an assessment of DSP on the electrical activity of the heart. The basic approach consisted of the determination of the effects of an excess or deficit of DSP on the threshold susceptibility of chinchilla rabbit ventricles to fibrillation and its antecedents (ventricular extrasystoles and paroxysmal ventricular tachysystoles) in response to challenge with right angle impulses. Administration of 60 nmoles/kg DSP intravenously to the rabbits raised the thresholds for fibrillation and its antecedent manifestations. Intravenous administration of an amino acid mixture had no effect, demonstrating that the effects were indeed due to DSP and not to its component amino acids. Physiological deficiency was induced by intravenous treatment of the animals with anti-DSP serum (25 μl/kg; 1:2000 to 1:3000). In the latter animals the thresholds were significantly lowered, rendering the rabbits much more susceptible to ventricular fibrillation. These findings provided and demonstrated that DSP may exert a cardiosparing effect in emotional stress through both indirect and direct mechanisms. Figures 2; references 10: 8 Russian, 2 Western.

12172/7310

UDC 616.127-005.8-092.9-085.31:[547.95:547.943]-036.8-07:616.127-076.4

## Effects of Opioid Peptides on Biochemical and Ultrastructural Changes in Ischemic Zone in Experimental Myocardial Infarction

*18400375a Moscow ARKHIV PATOLOGII in Russian Vol 50 No 3, Mar 88 (manuscript received 24 Apr 87) pp 72-76*

[Article by V. V. Khlystov, V. S. Pavlenko, A. F. Usynin and V. D. Slepushkin, Department of Pathology, Scientific Research Institute of Cardiology, Tomsk Scientific Center, USSR Academy of Sciences]

[Abstract] Endogenous opioids and synthetic analogs of enkephalins were tested for their effects in experimental myocardial infarctions, to further expand the scope of knowledge about the functional role of these biomolecules. The studies were conducted on outbred (140-180 g) rats in which the left coronary artery was ligated, followed in 1 h by intraperitoneal administration of the agent in question. Ultrastructural and blood levels of LDH1 and CPK were determined in 24 h. Two synthetic tetrapeptide analogs of enkephalin had no effect on enzyme levels or the ultrastructure of the ischemic zone. The endogenous opioids were effective in diminishing the rise in LDH1 and CPK, as well as in decreasing the dimensions of the ischemic zone around the infarct site. In terms of sparing effects β-endorphin and dalargin were more effective than leu- and met-enkephalin. Electron microscopy revealed that cardiomyocytes in the ischemic zone surrounding the infarct in the control animals and those treated with the synthetic analogs were poor in glycogen and showed fatty infiltration. The ischemic zone in animals treated with endogenous opioids were richer in glycogen and showed far less lipid infiltration, demonstrating improved energy metabolism and adequate β-oxidation. These observations demonstrated that administration of the neuropeptides early in the course of a myocardial infarct limits the area of myocardial necrosis and enhances the viability of the surrounding tissue. Figures 2; references 10: 7 Russian, 3 Western.

12172/7310

UDC 591.1

## Effects of Intravenously Administered Arginine-Vasopressin (AVP) on Body Temperature in Rabbits

*18400376a Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 2, Mar-Apr 88 (manuscript received 22 Jan 87) pp 246-250*

[Article by A. A. Romanovskiy, Institute of Biophysics, Belorussian SSR Academy of Sciences, Minsk]

[Abstract] To further define the role of the AVP pool in thermoregulatory processes, male chinchilla rabbits (2.5-3.0 kg) were employed in an assessment of the effects of intravenously administered AVP on the heart rate and skin and rectal temperatures. AVP was administered in a dose range from 100 pg to 10 g. Within minutes of administration bradycardia was noted with 10-100 ng, and became more pronounced with pharmacologic doses in the 1 to 10 μg range. The latter dosage levels exceeded by more than three orders of magnitude the plasma levels of endogenous vasopressin in the rabbit. In addition, in a number of experiments administration of 1 to 10 μg AVP also induced short-term changes in body temperature: rectal temperature was increased by 0.1-0.2°C, while skin temperature showed an insignificant drop. These effects of AVP were attributed to a generalized vasospasm. Administration of physiological levels of AVP (100 pg to 100 ng) had no effect on the temperature. It appears, then, that under normal conditions variations in the AVP pool have no impact on body temperature regulation. Figures 3; references 15: 1 Russian, 14 Western.

12172/7310

## Restructuring the Operational Mechanism of the Pharmacy Service

*18400394 Moscow FARMATSIYA in Russian*
*Vol 37 No 2, Mar-Apr 88 pp 1-6*

[Article by A. D. Apazov, L. V. Borisenko, and V. V. Mariyevskaya, Main Pharmaceutical Administration, USSR Ministry of Health; All-Union Scientific Research Institute of Pharmacy, Moscow]

[Text] Under the leadership of the Communist Party, the Soviet people have expanded the work of putting restructuring into practice in all sectors of the national economy.

The course steered for restructuring has a direct relationship to the activity of the country's pharmacy service. Successfully treating patients and conducting preventive measures among the population are possible only with an efficiently organized service of drug supply.

In terms of its scope, the size of its network of pharmacies, its workforce, and the volume of drugs sold, the USSR pharmacy system is one of the largest in the world.

A component part of Soviet health care, the pharmacy service, unlike other health-care services, has operated on the principles of cost accounting since the first days of Soviet power (1922). Its revenues come from the difference between the wholesale and retail prices of drugs and medical goods produced by industry. The pharmacy service's revenues have enabled it to function as a self-reimbursing system across the country as a whole.

Restructuring the pharmacy service requires a deeper commitment to cost accounting and a switch-over from self-reimbursing to self-financing.

At the moment, our entire national economy and health care, including the pharmacy system, are undergoing an especially crucial and complex period of initial restructuring, when new principles of operation are being introduced and old principles are still in effect.

Accelerating social and economic development requires not only the restructuring of the operational mechanism in certain directions, but also the development of an integrated system of control and management methods. Such a system is impossible without coordination among planning, economic incentives, the establishment of mutual relations with industry, and the finance and credit mechanism.

The centerpiece of this restructuring is planning. The justification of the strategic goals of economic and social development, the determination of interregional relationships, the formation of a system of economic norms, the establishment of larger missions for the lower echelons, and the determination of production limits should be left within the realm of centralized planning.

Centralized planning rests on the development of the concept of economic and social growth on the basis of scientifically substantiated, long-term forecasts and 15-year long-range and current plans with expanded substantiation for every five-year plan. The role of five-year plans based on stable norms for the growth of economic indicators expands in this setting. Thus, with the new economic mechanism, it is necessary to attach an entirely new condition to the centralized administration of the economics of the pharmacy system. It must examine those issues that can and must be solved only in the center. At the same time, it must see to it that the conditions needed for efficient local management of pharmacy institutions and enterprises are created. Based on these ideas, the restructuring of the pharmacy system is, above all, the optimal combination of the centrally planned administration of economic activity and the independence of its individual components.

For that reason, one of the chief elements of the restructuring of the pharmacy service also includes expansion of the independence of pharmacy institutions and enterprises and the switch-over to full cost accounting. This is not an end in itself, but a means of strengthening the economic responsibility and interest that pharmacy institutions and enterprises have in the provision of high-quality care and in all the preventive measures taken by health-care units. Two conditions are necessary for doing this at the level of the institution and the enterprise: self-reimbursement and self-financing. But there is also a third condition: independence in formulating their own plans aimed at improving drug service considerably and broad authority in working out those plans. The plans must be based on standard figures, long-term stable limits, and economic norms. Only all three conditions, along with those given, will enable full cost accounting to be realized. Unlike the first two conditions—self-reimbursement and self-financing—the third condition causes complications, because it affects the management methods in the pharmacy service: funding and assiggning consumers (pharmacy boards) to plant-suppliers, which does not guarantee regular deliveries or, consequently, the stable financial condition of the pharmacy institution and uninterrupted drug supply.

At the same time, one of the chief aims of the restructuring of the operational mechanism of the pharmacy service is to change over from centralized supply to direct, long-term associations with the enterprises that are the suppliers of medical products. This will make it possible to establish a relationship with enterprise-suppliers of specific groups of medications on the basis of state order and to conclude direct, long-term agreements, by-passing intermediate organizations. Under these conditions, it will be possible to determine more accurately the prospects of the production and supply of drugs and to employ economic methods of management more widely in the relationships with suppliers.

Thus, restructuring the operational mechanism of the pharmacy system will make it possible to create a reliable system of feedback between producers and consumers of

drugs, which will have a positive effect on the substantiation and accuracy of drug requests. In turn, the substantiated order of the pharmacy service is the basis for the development of workable plans for the production of drugs and medical goods by enterprise-manufacturers of medical products.

To change over to the new mechanism of forming contractual relations between consumers and suppliers on the basis of direct, long-term agreements and the curtailment of centrally supplied products, the proper conditions must be created, namely, the efficient establishment of contractual bonds, which will provide a balanced and fuller satisfaction of the need for drugs by the public and the treatment-and-prevention facilities.

The restructuring that is under way in the administration of the pharmacy network has shown that the economics of the pharmacy system is associated with various prohibitions. Overcoming this is very difficult. But if these obstacles are not overcome, the pharmacy system will be unable to independently deal with the revenues it earns, i.e., it will be impossible to introduce self-financing, because the revenues cannot be spent for the needs of an enterprise itself.

In order to assess the possibility of switching the pharmacy network over to self-financing, the USSR Ministry of Health's Main Pharmaceutical Administration [GAPU] and the All-Union Scientific Research Institute of Pharmacy performed an analysis of the activities of the GAPUs of the health ministries of the union republics for the years 1979-1986.

The year 1979 was taken as the base year, because the financial condition of the pharmacy service was the most stable during that year. The results of the analysis showed that, beginning in 1980, with the growth of the overall sale of drugs and medical products, total profits began to steadily decline; in 1986, they were 50 percent of those in 1979, which meant that profitability drops from 10.36 percent to 3.6 percent. A study showed that the situation was caused by a decline in the level of gross applications that was due to higher wholesale prices during those years for domestic drugs of industrial manufacture and a drop in retail prices. As a result, the pharmacy service had a revenue deficit of more than 300 million rubles. The considerable drop in profitability is also explained by the low price reduction to trade organizations for imported drugs, the proportion of which grew during that period to 41.3 percent from 11.8 percent of the total of all drugs sold.

A considerable number of medications (267 descriptions) in our drug assortment have a wholesale price that is higher than the retail price. In selling them, the pharmacy network suffers direct losses annually of more than 60 million rubles. In addition, little used drugs constitute 574 descriptions, and the pharmacy network loses more than 77 million rubles in revenues to industry each year in their sale.

Thus, the revenues of the pharmacy enterprises that operate on a cost accounting basis are not entirely dependent on what pharmacy workers do. To a great extent, they are determined by the deficiencies of the existing order of price formation for drugs of industrial manufacture.

The preservation of relatively low retail prices for most drugs for a number of decades and their continuing drop represent the pursuit of the social party line on improving the provision of drugs and medical goods to the public and to treatment-and-prevention facilities as having first-priority social value. For that reason, we feel that for the pharmacy service, the most important aim of the restructuring of drug pricing involves the refinement and reexamination of wholesale prices with suppliers, specifically because all other prices are based on them.

Drug producers striving to receive higher wholesale prices for their products have not been met with the proper opposition until recently from pharmacy personnel, which has had a negative effect on the financial state of the pharmacy enterprises. The presence of two prices for medications—wholesale and retail—places the revenue production of the pharmacy enterprises in direct dependence on their constant change. If the pharmacy service is to function on the principles of self-financing, single special discounts with retail prices for medications and chemical goods manufactured in our country must be set at no more than 45 percent, with the overall level of gross revenues no more than 33 percent.

The pharmacy network is also not being entirely compensated for financial losses due to overpricing of medications.

Besides selling drugs of industrial manufacture, pharmacies prepare them for individual prescriptions written by physicians. The system in effect for remuneration for individual preparation of drugs is inadequate, because it does not account for use of medications that cost less than one kopeck in the preparation of drugs. Total country-wide losses from the use of such drugs in 1986 were more than 240,000 rubles.

In addition, pay for the labor involved in preparing the drugs for individual prescriptions and for intrapharmacy stocking and packaging is not collected. At the same time, according to the time standards for work performed in pharmacies—confirmed by the Central Bureau of Labor Standards at the Scientific Research Institute of Labor of the USSR State Committee for Labor and Social Problems—the time spent on preparing a given package for the various drugs (powders, pills, salves, mixtures, eye drops, injection solutions) averages 20 minutes or, in monetary terms, 30 kopecks.

If nearly 700 millions units of drugs were prepared in 1986 for outpatient and polyclinic prescriptions and for hospitals, the pharmacy network could receive an estimated additional 210 million rubles. In light of the

change-over to self-financing and the forthcoming salary raise for pharmacy workers, the issues involving restructuring drugs pricing are of extreme importance.

In providing drug services to the public and supplying treatment-and-prevention facilities with medications and medical products, the pharmacy enterprises are, first of all, solving a social problem in public health care. At the same time, operating on the principles of cost accounting, they must constantly measure their income against their expenditures and use to a greater extent economic methods of management in which pricing fulfills a principal role.

In the course of restructuring, a complex theoretical and practical problem must be solved: how, by what means, in what forms to effectively combine centrally planned management with the operational independence of labor collectives. Centralized management must switch from command administrative methods to democratic methods and to the development of self-administration. The new concept of democratic centralism in the economic sphere confirms the leading position of the association and the enterprise in the modern management system, sharply expanding the limits of the independence of enterprises. Primarily, economic methods of administration are the principal means of affecting the interests of the collective and the individual. On an economic track are the relations of enterprises and facilities with higher management. Management organs in any form must perform the role not of an additional bureaucratic unit, but of a coordinator-intermediary that fosters the best forms of interregional bonds.

Solving new problems associated with putting the strategy for accelerating social and economic development into practice requires a profound restructuring of the operational mechanism and the creation of an integral, efficient, flexible system administering the pharmacy service.

The USSR Ministry of Health GAPU and the All-Union Scientific Research Institute of Pharmacy have developed proposals for refining the organizational structure of the management of drug service to the public.

In developing the proposals, they started from the need for a fundamental restructuring of the work done by management organs and pharmacy enterprises, for a better distribution of functions, and for the creation of better opportunities for focusing the activity of central management organs on the solution of key problems and refining the drug service to the public, all the while transferring the burden of the current work to the level of the local organ and the pharmacy enterprise.

The pharmacy service is unlike others in function and comprises various enterprises.

The activity of all these enterprises must be directed, in the final analysis, at providing drugs and medical products to the public and to treatment-and-prevention facilities in the most thorough fashion possible.

At the moment, however, day-to-day coordination of their work is virtually nonexistent, because of differences in operational conditions and in the analysis of the results of their activity. This leads to certain disproportions in their development, to additional expenses, and to unproductive losses.

In preparing for the transition to the new operational mechanism, pharmacy workers must realize that success will depend, by and large, on the organizational preparation of work. That involves, primarily, the creation of a mobile, flexible system for managing the production and supply of drugs and medical products for treatment-and-prevention facilities.

This can be done by creating a Farmatsiya production association at the oblast, kray, and autonomous-republic levels. The association is being formed by reorganizing the structures of the pharmacy administration and the pharmacy warehouse. The primary enterprise in the association is the pharmacy warehouse (base), the basic component in the ASSR, kray, and oblast pharmacy services, establishing at present direct ties with, on the one hand, the suppliers of drugs and medical products and, on the other, the pharmacy and treatment system. It operates on full cost accounting and self-financing, in accordance with the tenets of socialist self-government and the conditions of the USSR Law "On the State Enterprise and State Association." Structural units in the association function on both full and partial cost accounting. The purpose of the creation of the association is to improve the level of drug service to the public by simplifying the organizational structure of the management apparatus, eliminating redundant subdivisions and small units, and substantially paring down the number of administrative and managerial personnel.

The creation of a Farmatsiya association will make it possible to raise the efficiency of the work of the pharmacy service in providing treatment-and-prevention facilities and the public with drugs, because merging the supply and marketing services of the wholesale component and the enterprise will enable workers to bear more responsibility for quality in filling orders and for monitoring the distribution of medications.

Moreover, this will make it possible to create conditions that foster a considerably higher level of scheduled operations and a higher level of economic responsibility for the effectiveness of planned solutions and the results of their being carried out. Under the new conditions it will be possible to provide maximum independence to structural subdivisions on the basis of systematic management, while increasing the personal responsibility of administrators for the drug service provided to the

public and to treatment-and-prevention facilities, intensifying the interest of each association worker in the final outcome of his efforts, improving the working conditions and the quality associated with providing drug service to the public by means of a wider introduction of collective forms of organization and stimulation of labor based on the ratios of labor contribution and labor participation.

Farmatsiya rayon production enterprises (RPEs), which will include all the pharmacy enterprises in a rayon as production units, must be created at the rayon level on the basis of large, central rayon systems.

At the union level, in the USSR Ministry of Health, a state Farmatsiya production association must be created to include organizations, institutions, and enterprises under union jurisdiction.

State pharmaceutical associations that include organizations, institutions, and enterprises under republic jurisdiction must be set up at the republic level. The creation of production pharmaceutical associations and enterprises at all levels of management will make it possible to restructure the management of the drug service provided to the public and the treatment-and-prevention facilities in the country. They will be linked organizationally by levels of management and, internally, will function as self-governing, cost-accounting enterprises that do their jobs on the basis of self-reimbursement and self-financing.

The restructuring of the operational mechanism of the pharmacy service will require of the pharmacy workers a high level of economic competence and a thorough knowledge of the new operations and of the features of the reform being conducted of the management system. These are indispensable conditions for the high-quality management of the pharmacy system, without which it would be impossible to identify and put into practice the resources for making drug service to the public and treatment-and-prevention facilities more efficient.

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## Sociomedical Screening at Women's Health Clinics

*18400353a Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, Mar 88 (manuscript received 18 Jun 87) pp 10-12*

[Article by P. L. Grigoryev, S. V. Pronin and O. I. Vasilenko, Novosibirsk]

[Abstract] One of the most important and informative means of assessing the health status of women rests on proper use of questionnaires. Experience has demonstrated that the return on 1000 questionnaires is in the 65-70% range, quite sufficient for an evaluative investigation. A statistical analysis has shown that 52% of the respondents are in the 20 to 29 years age bracket, and that some 60% of the women had sustained an abortion. Furthermore, 29% of the women visit a health clinic because of pregnancy, 12% for an abortion, 15% because of an illness, 12% for consultation, and 32% for routine medical examinations. Some 20 to 40% of the women claim familiarity with oncologic symptomatology, and 35-39% practice breast self-examination on a routine basis. Medical literature was reported to be the sole source of information on contraceptive practices by 30% of the respondents, 28% responded that they relied on the health clinics for such information, 16% relied on friends, 13% on mothers, 3% on their partners, and 10% obtained their information from other sources. Approximately 10% of the respondents relied on oral contraceptives. The survey also revealed that 12% of the respondents neglect regular medical care because of their lack of confidence in the clinical competence of the physician; 27% are convinced of their good health, 41% ar too disorganized to visit the clinic regularly, and 19% feel it is too hard to see a physician (e.g., long waiting periods). These findings point to some of the key problems in improving the health status of women through better dissemination of information about health topics, and through making the health services more accessible. References 3 (Russian).

12172/7310

UDC 312.1-058.868(470.61-22)

## Illegitimate Birthrate Statistics in Rostov Oblast

*18400353b Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, Mar 88 (manuscript received 29 Oct 86) pp 12-14*

[Article by S. G. Brusnyak, No 1 Department of Social Hygiene and Public Health Administration, Rostov Medical Institute]

[Abstract] A statistical analysis was conducted on the incidence of illegitimate births in the Rostov Oblast for the period 1971-1985, revealing that the overall incidence increased from 3.2 per 100 births in 1971-1975 to 10.6 in 1976-1980, and to 11.2 in the 1981-1985 phase. The increase in illegitimate births affected all age groups of women, but was most noticeable in the 15-19 years group that showed a 6-fold increase in the 1971-1985 timeframe. The rural illegitimate birthrate was higher than the urban figures, except for the 45-49 years age bracket. The most significant increase was seen in the 25-29 year old women, who accounted for 14.7% of the births in 1971-1975 and for 27.9% in the 1981-1985 period. These findings disclosed that the factors leading to illegitimate birth are numerous and complex and deserve careful analysis and understanding on the part of the social and medical establishments in order to properly deal with single-parent families. Tables 2.

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UDC 615.888

## Contraceptive Practices Among Industrial Female Workers

*18400353c Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, Mar 88 (manuscript received 2 Feb 87) pp 14-15*

[Article by I. V. Uspenskaya, Ryazan Medical Institute, RSFSR Ministry of Health]

[Abstract] A questionnaire study was conducted in Ryazan on unskilled and engineering female industrial workers to assess contraceptive practices. The cohort consisted of 1100 subjects with an average of 37 years for the group, equally divided in terms of occupational responsibilities. Approximately 66% of the women felt that they had already attained their desired family size, and did not contemplate additional children. The results showed that 34% of the women practice coitus interruptus, 18% relied on contraceptive gels, 10% on the rhythm method, 7% on irrigation, 4.5% on intrauterine devices, and 1% utilized other methods. In addition, 25% did not use any contraceptive methods, while 9% indicated that they would rely on abortion. The women in question were shown to be poorly informed about the contraceptive means that are available. The data also revealed that more than 30% felt that intrauterine devices and oral contraceptives to be more of a health hazard that other methods, including abortions. On balance, the questionnaire demonstrated the need for more efficient dissemination of information on contraception and contraceptives by the health and social services.

12172/7310

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## Performance of Departments of Pathology of Pregnant Women

*18400353d Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, Mar 88 (manuscript received 17 Feb 87) pp 30-31*

[Article by L. V. Kalashnikova, A. V. Sudakova and Ye. I. Ivanenko, Sverdlovsk Scientific Research Institute of Mother and Child Health Protection; Medical Sanitary Section, Pipe Plant]

[Abstract] The establishment of departments of pathology of pregnant women at numerous maternity centers in the Sverdlovsk Oblast led to an analysis of the effectiveness of such departments in terms of maternal and neonatal health. An analysis of 650 case histories (380 experimental and 270 control) over the 1977 to 1984 period showed marked improvements in the health status of women and their children. The number of women undergoing psychoprophylactic treatments increased from 75 to 85%, UV treatment rate increased from 72 to 86%, the morbidity of women with industrial employment decreased 1.7-fold, and complications of pregnancy were reduced 2- to 3-fold. The incidence of mastitis fell 4.6-fold, while pyogenic and inflammatory skin conditions in neonates decreased 2-fold. In more recent times (1983-1984) anemia in pregnant women decreased 2- to 3-fold; however, late toxicoses increased by 3-6%. On the whole, the establishment of specialized departments concentrating on pathologic manifestations of pregnancy and their management by medicinal and physical means has had a telling effect in improving maternal and neonatal health. In view of this, further expansion of such services are fully warranted.

12172/7310

**Portable Individual Devices of Combined Action With Halogen-Containing Disinfectant—New Class of Devices for Decontaminating Water**

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[Abstract] Portable, individual devices for decontaminating and purifying drinking water, based on a combined method of decontamination and purification and including reagent-free and reagent methods of action, have increased in usage recently. Portable, individual devices with halogen-containing disinfectants are preferable since, in contrast to silver-containing devices, they ensure a broad antimicrobial and virucidal spectrum of effect and practically instantaneous decontamination of water. Such a device, developed in the USA by Calco Ltd., Solomnik, was compared with an analogous device, Rodnik, produced by the All-Union Scientific Research Institute of Medical Polymers in the USSR. Both devices reduced the coli-count $10^4$-$10^5$-fold in treated water in comparison to the initial count. Both reduced the number of saprophytic organisms $10^5$-$10^6$-fold and improved physicochemical and organoleptic properties of water. Rodnik produced organoleptic properties which were superior to those produced by Solomnik. Rodnik destroyed poliomyelitis virus in river water. Both devices can decontaminate 17-20 liters of water at the rate of nearly 100 ml/minute. Tests of Rodnik in different regions of the USSR showed that it produces drinking water which meets the requirements of All-Union State Standard 2874-82. Figure 1; references 10 (Russian).

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