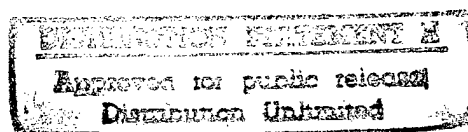




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UDC 58.09:581.162.1:582.542.1

Features of Callus Genesis and Morphogenesis in Culture of Immature Embryos of Different Soft Winter Wheat Genotypes

18400126 Kiev *FIZIOLOGIYA I BIOKHIMIYA KULTURNYKH RASTENIY* in Russian Vol 20 No 4, Jul-Aug 88 (manuscript received 11 Jun 87) pp 349-353

[Article by N. V. Sidorova, V. V. Morgun, and V. F. Logvinenko, Institute of Plant Physiology and Genetics, UkSSR Academy of Sciences]

[Abstract] Eight winter wheat varieties and two selection lines were used as starting material in a study of the conditions for induction of callus tissue and plant regeneration in the cultivation of immature embryos of different winter wheat genotypes, the relationship of processes of callus formation and regeneration to variety genotype, and the identification of genotypes that are

promising in terms of ensuring maximum regeneration. The winter wheat varieties were Polesskaya 70, Skorospelka 3b, Mironovskaya 808, Stepnyak, Karibo, Donskaya polukarlikovaya, Kiyanka, Ilichevka, and the selection lines were UK-7 and UK-8. All 10 genotypes produced callus tissue and regenerant plants. Callus tissue induction varied from 63 percent to 92 percent, depending upon the variety. Frequency of regeneration of callus tissue varied from 2.6 percent to 38.8 percent. The immature winter wheat embryos were found to be the source of a cellular system capable of regenerating fertile plants that differed in terms of a number morphological traits. Polesskaya 70, Skorospelka 3b, Mironovskaya 808 possessed the highest frequency of callus formation and Karibo, UK-8 line and Donskaya polukarlikovaya produced the highest regeneration percentages. There was greater variability among the genotypes in terms of frequency of regeneration than in terms of frequency of callus tissue formation. Figures 2; references 10: 6 Russian; 4 Western.

UDC 547.964.4:577.175.82'17

Synthesis, Biological Activity and Conformational Studies of Enkephalin Analogs Structurally Related to Kytorphin

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[Article by I. V. Bobrova, N. A. Abissova, L. U. Podinsh,
V. G. Vesterman, G. V. Nikiforovich, G. I. Chipens,
Institute of Organic Synthesis, LaSSR Academy of Sci-
ences, Riga]

[Abstract] In central administration, kytorphin and its analog Tyr-D-Arg produce an analgesic effect that is stronger than that induced by enkephalins. It has been shown that the analgesic activity drops sharply when going from the tetrapeptide fragment to the tripeptide fragment. With an eye to studying the structural and functional organization of D-Arg²-containing analogs of opioid peptides in order to increase their pharmacological effects in vivo, the researchers synthesized [D-Arg²,Leu⁵]enkephalin and 2 series of its N-terminal short-chain analogs with a free and modified C-terminal carboxylic group (amides and ethyl esters of tripeptides and tetrapeptides) by classical and solid-phase methods. They compared analgesic activity, determined by the tail-pinch method after intracisternal and intravenous injection into mice, with that of natural enkephalins and morphine. Conformational calculations of the synthesized compounds and fluorescence spectroscopy were used to measure distances between aromatic nuclei of aminoacid residues of tyrosine and phenylalanine in the two tetrapeptides in order to study their spatial structure. Ethyl esters of the tri- and tetrapeptides produced an analgesic effect one order of magnitude greater than corresponding peptides with a free carboxylic group or with a C-terminal amide group. In contrast to the pentapeptide, the tetrapeptide analogs were active after intravenous injection. Conformational features of this series of analogs were discussed in detail. The abrupt increase of activity in going from tripeptides to tetrapeptides was not associated with conformational changes. Figures 4; references 23: 7 Russian; 16 Western.

UDC 577.175.859'17 : 543.422.25

Synthesis and Antiaggregation Activity of Prostacyclin Analogs. II*. Direct Synthesis of 15-fluoro-13,14-didehydrocarbacyclin

18400075b Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 6, Jun 88 (manuscript
received 25 Nov 87) pp 834-838

[Article by M. I. Lopp, M. A. Bergmann, V. V. Bezuglov,
T. K. Vyalimayae, A. Kh. Lopp, Yu. E. Lille, Institute of
Chemistry, ESSR, Tallin; Institute of Bioorganic Chem-
istry imeni M. M. Shemyakin, USSR Academy of Sci-
ences, Moscow; Institute of Chemical and Biological
Physics, ESSR Academy of Sciences, Tallin]

[Abstract] One of the means of modifying prostaglandins involves the introduction of fluorine atoms into different positions of the skeleton or in place of existing functional

groups. Some fluorine-containing prostanoid analogs possess potent, rather selective biological action. This article describes synthesis of E- and Z-isomers of 15-fluoro-13,14-didehydrocarbacyclin from 2,3-epoxy-bicyclo[3.3.0]octane-7-one ethylene ketal with use of 3-fluoro-1-octynylolithium x BF₃ reagent and Wittig condensation. Antiaggregation properties of prostaglandin analogs were determined in vitro on the thrombocyte-enriched plasma of rabbit blood. Intermediate and end products were identified by ¹³C-nuclear magnetic resonance spectroscopy. The antiaggregation activity of 15-fluoro-13,14-didehydrocarbacyclin was 1/2000-th the activity of the corresponding carbacyclin, indicating that the 15-OH group plays a considerable role in the activity. References 21: 5 Russian; 16 Western.

UDC 577.152.314'14

Determination of Substrate Specificity of Restriction Endonuclease SfeI

18400075c Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 6, Jun 88 (manuscript
received 7 Jan 88) pp 848-849

[Article by S. Kh. Degtyarev, G. G. Prikhodko, N. I. Rechkunova, All-Union Scientific Research Institute of
Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] A new restriction endonuclease SfeI was isolated from *Streptococcus faecalis*, and its recognition sequence and cleavage site C-TRYAG were established through use of the technique used by Maxam and Gilbert (METH. ENZYMOL., 1980, Vol 65, pp 499-560). DNA pBR322 was found to contain 4 SfeI sites, while the DNA phage λc I857 was found to have 38. The SfeI enzyme hydrolyzes DNA in the CTGCAG sequence. The restrictase SfeI is not an isoshizomer of any known enzyme and may be used widely in structural studies of DNA. Figure 1; references 5 (Western).

UDC 577.21.6.1.3.1

Mechanism of Action of Shigella Toxin

18400108 Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 302 No 1, Sep 88 (manuscript
received 13 May 88) pp 226-228

[Article by Ye. N. Dubinina, Ye. V. Lukyanov, Yu. V. Kozlov and A. A. Bayev, academician, Institute of
Molecular Biology, USSR Academy of Sciences, Mos-
cow]

[Abstract] A number of bacterial and plant toxins react with the system of protein synthesis in eucaryotic cells. The most common are Shigella toxins and Shigella-like toxins produced by enterobacteria. Shigella toxin consists of a large A-subunit, the active source of the toxin and six small B-subunits which determine specific binding of toxin molecules with cell membrane receptors and, possibly, participate in the penetration of the toxin into a cell. Ricin, a toxin of plant origin, appeared to have

some similarities with Shigella toxin: homology of A-subunit sequence, specific glycosyl activity, etc. An attempt was made to evaluate mechanisms of action of these toxins. The results obtained showed that Shigella toxin, analogously to ricin, is a highly specific N-glycosidase, activating ribosomes of eucaryotic cells both in vivo and in vitro, specifically modifying 28S-RNA. Similarity in the mechanism of action of these toxins was already discovered by others; fine points of the mechanism of this unique enzyme need further study. Figure 1; references 9: 1 Russian, 8 Western.

UDC 577.151.44

Photoelectric Response Phases of 13-CIS-Bacteriorhodopsin

18400103a Moscow BIOKHIMIYA in Russian
Vol 53 No 5, May 88 (manuscript received 26 May 87)
pp 707-713

[Article by A. L. Drachev, L. A. Drachev, A.D. Kaulen, V. P. Skulachev and L. V. Khitrina, Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University]

[Abstract] A study was conducted on the genesis of electric potentials in response to a light flash by 13-cis-bacteriorhodopsin (BR) in a model system of purple membranes and apomembranes incorporated in a colloidal membrane permeated with a decane solution of phospholipids. The test samples were subjected to neodymium laser flashes ($t_{1/2} = 15$ nsec, 532 nm, 50 mJ, ca. 25 mm² spots), with the energy varied from 3 to 30 mJ with neutral light filters. The test samples, light adapted and maintained in the dark for 1 min prior to recording, responded with a two-phase response of essentially equal amplitudes. The first electrical response was represented by a rapid (less than 100 nsec) negative wave followed by a longer (in the millisecond range) positive wave. Although the nature of the negative phase remains enigmatic, in the case of the cis-13-BR it exceeds that of the all-trans-BR. In both cases, the appearance of the negative phase is accompanied by the appearance of an intermediate product absorbing at a longer wavelength. The positive phase of 13-cis-BR is slower than the corresponding phase of the all-trans-BR and appears to reflect non-cyclic changes in the BR involving, presumably, light-induced transition from 13-cis-BR to the trans-form. Figures 3; references 26: 9 Russian, 17 Western.

UDC 577.355.2

Effects of Diethylpyrocarbonate Modification of Histidine Residues in Photosynthetic Reaction Center Protein of Purple Bacteria on Cofactor Binding and Electron Transfer

18400103b Moscow BIOKHIMIYA in Russian
Vol 53 No 5, May 88 (manuscript received 31 Mar 87)
pp 806-815

[Article by N. I. Zakharova, V. P. Shinkarev, N. P. Grishanova and A. A. Kononenko, Chair of Biophysics, Biology Faculty, Moscow State University]

[Abstract] A study was conducted on the effects of chemical modification of histidine residues in photosyn-

thetic reaction center protein by diethylpyrocarbonate (DEPC) on the binding of cofactors and on the efficiency of electron transfer. The system under investigation consisted of reaction centers derived from the nonsulfur purple bacterium Rhodospirillum rubrum (wild type). Assessment of the ultraviolet and visible light absorption spectra following DEPC modification showed some decrease in the absorption maxima at 865 and 800 nm, as well as changes in the 450-500, 350-400, and 200-300 nm bands. These observations confirmed changes in the binding of P-870, P-800, and the carotenoid (spheroidin) components. To assess the effects of histidine modification by DEPC on electron transfer kinetics, an analysis was made of changes in absorption at 430 nm, which reflects redox transformations in the primary electron donor P-870. The resultant data showed that the modification attenuated electron transfer in the quinone acceptor system. Evaluation of the effects of changes in pH revealed that the most likely candidates for modification were represented by HisL230, HisL190, HisL116, or HisL211 residues of the reaction center protein. Figures 5; references 39: 6 Russian, 33 Western.

UDC 577.112.4+541.182.6

Construction of Conjugates Between Natural and Synthetic Macromolecules Using Reversed Micelles as Microreactors

18400117c Moscow DODLADY AKADEMII NAUK
SSSR in Russian Vol 302 No 6, Sep 88 (manuscript received 15 Mar 88) pp 735-738

[Article by A. V. Kabanov, V. Yu. Alakhov, Ye. Yu. Klinskiy, M. M. Khrutskaya, A. A. Rakhnyanskaya, A. S. Polinskiy, A. A. Yaroslavov, Ye. S. Severin, A. V. Levashov and V. A. Kabanov, academician, Moscow State University; Institute of Applied Molecular Biology, Moscow]

[Abstract] Trials were conducted with the use of reserved micelles as microreactors for the synthesis of conjugates involving natural and synthetic macromolecules, in an attempt to devise an efficient and convenient system that was also sparing of reagents. The basic approach used microemulsion in octane to form a system of hydrated reversed micelles of surfactants. Proteins and water-soluble polymers solubilize in such systems, yielding high internal concentrations (10^{-3} to 10^{-4} M) within the micelles. The surfactant OT was employed in preparing conjugates of monoclonal antibodies against with either a triple copolymer (4-vinylpyridine:4-vinyl-N-ethylpyridinium:4-vinyl-N-carboxymethylpyridinium; 10:70:20) or with staphylococcal enterotoxin A. The conjugates were purified either on ion-exchange columns (conjugate with copolymer) or by HPLC (conjugate with enterotoxin) and tested for insulin-binding activities in immunoperoxidase tests. The binding curves with the copolymer conjugate showed cooperative binding characteristics, with specific binding activity also retained by the enterotoxin conjugate. The yield with the copolymer method was 100 percent, and with the enterotoxin

conjugate ca. 85 percent, comparing very favorably with conventional test-tube techniques. In view of the wide variety of organic solvents and synthetic and natural macromolecules that may be employed in conjugations of this type, the reversed micelle method may be expected to have extensive applications in biomedical research. Figures 2; references 12: 8 Russian, 4 Western.

UDC 541.49:577.352.2

Membrane Activity Properties of N-Substituted Diaminodibenzo-18-Crown-6

18400118 Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 3, May-Jun 88 (manuscript received 30 Nov 87) pp 9-12

[Article by U. Z. Mirkhodzyev, M. V. Tarinova, V. A. Popova, I. V. Podgornaya, O. V. Fedorova, and B. A. Tashmukhamedov, Tashkent Order of Labor Red Banner State University imeni V. I. Lenin]

[Abstract] The crown ethers studied had identical polyether rings with different functional substituents in the phenyl rings, which changed their lipophilic properties, the basicity of the oxygen atoms in the polyether ring, and the selectivity in complex formation. Experimental results were reported of the study of these crown compounds on flat lipid membranes: 4',5''-diaminodibenzo-18-crown-6 (I); 4',5''-bis-(acetamido)-dibenzo-18-crown-6 (II); 4',5''-bis-(nitro-furfurylidene amino)-dibenzo-18-crown-6 (III); and 4',5''-bis-(cyanamylidine amino)-dibenzo-18-crown-6 (IV). The highest membrane activity (potassium conductivity through the bilayer) was exhibited by compound (II); (IV) showed no effect. All four compounds formed stable monolayers at the water-air-phase boundary. This aspect was both concentration- and structure-related. Figures 2; references 12: 8 Russian, 4 Western

UDC 577.112.6:577.175.8'17

Synthesis and Evaluation of Hydra 'Head Activator' Peptide

18400122a Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 22 Oct 87; 2 Feb 88) pp 869-877

[Article by A. Yu. Rubina, Zh. D. Beshpalova, N. F. Sepetov, O. L. Isakova, A. S. Molokoyedov, M. I. Titov, D. A. Zaytsev* and Yu. A. Zolotarev*, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; *Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] Discovery of the hydra 'head activator' peptide (morphogen; Glp-Pro-Pro-Gly-Gly Ser-Lys-Val-Ile-Leu-Phe) and the observation that it also occurs in mammals, including humans, led to the synthesis of this peptide using classical techniques of peptide chemistry in order to provide quantities sufficient for research purposes. The wet chemistry utilized the 5+6 approach.

Fragments 1-5 were prepared by successful elongation of the peptide chain using p-nitrophenyl and pentachlorophenyl esters of carbobenzoxyamino acids. The epsilon-amino group of Lys was blocked with tert-butylhydroxycarbonyl group, as was the 2,6-diamino-4-hexenoic acid used in place of Lys for introduction of the tritium label. The resultant unlabeled and labeled peptides were homogenous on TLC, characterized as to specific rotation and ¹H-NMR spectra, and separated HPLC. The peptides were shown to possess physiological activity, in terms of mammalian reproduction, hepatic regeneration, enhancement of wound healing, and in other tests. Figures 5; tables 4; references 15: tables 4; references 15: 4 Russian, 11 Western.

UDC 577.213.7

Chemical and Enzymatic Synthesis and Cloning of Human Angiogenin Gene in Phage M13mp8

18400122d Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 13 Nov 87) pp 910-915

[Article by S. P. Kovalenko, V. V. Gorn*, V. A. Karginov**, I. V. Morozov*, V. F. Zarytova* and N. P. Mervetsov*, Institutes of Therapy and of **Clinical and Experimental Medicine, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk; *Novosibirsk Institute of Bioorganic Chemistry, Siberian Department, USSR Academy of Sciences]

[Abstract] In order to obtain greater quantities of human angiogenin for experimental purposes, chemical and enzymatic synthesis and cloning of the gene in phage M12mp8 were undertaken, relying on published data on the amino acid sequence of angiogenin. The amino acid sequence was transformed into DNA sequence by the use of codons of frequently and intensively expressed genes in E.coli. Proper initiation of translation was assured by introduction of the ATG codon before the first codon of angiogenin and, after the C-terminal triplet CCG, the translation terminating codons TAA and TGA. Cloning of the gene into M13mp8 was attained in fragments, with the DNA sequence broken down into three blocks by the introduction of NcoI and BamHI restriction sites into the coding portion of the gene. In addition, the site XhoI was introduced at the initial coding portion of the gene, and the SalGI site at the end. The entire sequence was flanked by EcoRI and PstI sites. The introduction of the restriction sites was accomplished without affecting the amino acid sequence of angiogenin. For synthesis, the DNA sequence was broken down into 43 oligonucleotides (each 15-22 nucleotides long and synthesized on the Soviet Viktoriya-4M polynucleotide synthesizer) that were then linked into blocks for insertion into the phage. The sequence of the resultant 389 bp gene was confirmed by the Sanger method. Figures 2; references 13: 3 Russian, 10 Western.

UDC 577.112.5:591.145.2-365

Amino Acid Sequence of Neurotoxin-II (RTX—II) of Sea Anemone *Radianthus Macroductylus*

18400122b Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 9 Dec 87; in final form 22 Feb 88) pp 878-882

[Article by T. A. Zykhova, E. P. Kozlovskaya and G. B. Yelyakova, Pacific Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] To further define the mechanism of action of RTX-II on sodium channels in excitable membranes, conventional methods of peptide sequence determination were conducted on the neurotoxin RTX-II isolated from the actinia of the sea anemone *Radianthus macroductylus*. The peptide was found to consist of 48 amino acids, following analysis by methods involving digestion by trypsin and staphylococcal glutamic proteinase. The appropriate sequential arrangement of amino acids for RTX-II is presented, a sequence that incorporates 6 Cys moieties. Comparison with RTX-III revealed a ca. 75 percent homology. In addition, the corresponding positions 11, 20, and 25 in RTX-III were occupied by Tyr residues, presumably accounting for the high toxicity of RTX-III ($LD_{50} = 25 \mu\text{g/kg}$ for mice) vis-a-vis RTX-II ($LD_{50} = 3650 \mu\text{g/kg}$ for mice). Figures 4; tables 2; references 11: 2 Russian, 9 Western.

UDC 547.993.02:595.443.8-114.5.088

Glutamate Receptor Blockers from Spider *Argiope Lobata* Venom

18400122c Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 9 Feb 88) pp 883-892

[Article by Ye. V. Grishin, T. M. Volkova and A. S. Arsenyev, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Ion-exchange chromatography and reverse-phase HPLC were employed in the isolation of a family of low-MW blockers of postsynaptic glutamate receptors from the venom of the spider *Argiope lobata*. NMR and mass spectrometry of the nine isolates led to determination of their structural characteristics, on the basis of which they were classified into three groups: argiopins, argiopins, and pseudoargiopins. Most of these agents included arginine with a free α -amino group and asparagine residues. The MWs of these compounds were in the 630-759 d range for the most part, with one 373 d compound (pseudoargiopinin-III). Every compound in this category contained a 2,4-dihydroxyphenylacetic acid moiety linked via a peptide bond to asparaginylcavaterine. Figures 9; tables 2; references 10: 3 Russian, 7 Western.

UDC 577.152.31*213'14

Novel Cleavage by Restriction Endonuclease Bst 4.41 Obtained From *Bacillus Stearothermophilus* 4.4

18400122e Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 14 Dec 87; in final form 18 Feb 88) pp 916-920

[Article by V. M. Kramarov, A. I. Fomenkov* and N. I. Matviyenko, All-Union Scientific Research Institute of Applied Microbiology, Obolensk, Moscow Oblast; *Protein Institute, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] A novel restriction enzyme, designated Bst 4.41, was isolated from cell-free extracts of *Bacillus stearothermophilus* 4.4 by chromatography of Ultragel AcA-44 and subsequent rechromatography on heparin-Sepharose. Cleavage of bacteriophage lambda and M13 DNAs produced discrete nucleotide fragments similar to the products obtained with type II and III restriction enzymes. However, in distinction to other restriction enzymes, Bst 4.41 hydrolyzes double-stranded DNA at two sites on each strand that are 30-32 nucleotides apart. Unequivocal identification of the restriction sites has not yet been obtained. Figures 3; references 19: 3 Russian, 16 Western.

UDC 577.152.344'17

Affinity Immobilization of Enzymes: Covalent Binding of Chymotrypsin to 6-Aminohexanoyl-L-Phenylalanine-p-Nitroanilide-Modified Maleicanhydride-N-Vinylpyrrolidone Copolymer

18400122g Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 7 Jan 88) pp 973-975

[Article by P. F. Sikk, J. Pato*, R. K. Siniyarv, K. Kh. Valmsen, M. Azori* and A. A. Aaviksaar, Institute of Chemical and Biological Physics, Estonian SSR Academy of Sciences, Tallin; Central Chemical Research Institute, Hungarian Academy of Sciences, Budapest]

[Abstract] A method has been devised for affinity immobilization of enzymes, which relies on the enzyme binding through its active site to the substrate moiety on the carrier and, once in close proximity to the adsorbent, the rest of the enzyme molecule is bound covalently to the carrier itself. The method was applied to the isolation of alpha-chymotrypsin through its affinity immobilization on a maleic anhydride-N-vinylpyrrolidone copolymer bearing 6-aminohexanoyl-L-phenylalanine-p-nitroanilide residues as the specific enzyme target. Under the test conditions employed all of the alpha-chymotrypsin was bound at enzyme:polymer ratios to 1:1, which corresponded to an enzyme:substrate molar ratio of 1:5. Binding of the enzyme to the carrier following its reaction with the substrate moiety involved covalent bond formation between nucleophilic groups on the rest of the

enzyme molecule with the anhydride on the carrier copolymer. Nonspecific binding of trypsin was avoided with the carrier in question through judicious selection of the pH and ionic strength. The optimum conditions for affinity immobilization of alpha-chymotrypsin in this case consisted of 0.1 M Hepes buffer, pH 7.6, 1 M NaCl, and 25 degrees C. Figures 2; references 5: 1 Russian, 4 Western.

UDC 612.89.014.423.014.46:[615.272:547.963.32

Effects of Adenosine-5'-0-(Beta, Gamma-Dichloromethane) Triphosphate on ATP Receptors of Rat Sensory Neurons

18400124c Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 7, Jul 88 (manuscript received 24 Aug 87) pp 29-30

[Article by S. M. Marchenko, A. G. Obukhov and T. M. Volkova, Department of Physicochemical Biology of Cell Membranes, Institutes of Physiology imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Several halogen derivatives of beta, gamma-methylene-ATP were tested for their effects on ATP-mediated inward currents in a tissue culture system employing the rat nodose ganglion. Several agents were identified in Lineweaver-Burke plots as competitive inhibitors ranking in effectiveness as follows: beta,gamma-CBr₂ is less than beta,gamma-CHBr₂-ATP is less than beta,gamma-CCl₂-ATP [C = methane]. The inhibition constant for the most efficient blocker, beta,gamma-CCl₂-ATP, was $k_i = 2 \times 10^{-5}$ M. In addition, beta,gamma-CF₂-ATP and beta,gamma-CH₂-ATP were shown to act as agonists. Among the key advantages of these agents is the fact that they are relatively refractory to enzymatic hydrolysis and offer considerable latitude in experimental design. Figures 1; references 5: 4 Russian, 1 Western.

UDC [615.273.3+615.212]:577.112.6

Immunomodulating and Analgesic Activity of Synthetic Fragments of Different Proteins and Immunopeptides

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 60 No 5, Sep-Oct 88 (manuscript received 25 Jan 88) pp 3-9

[Article by V. P. Ivanova, Ye. I. Sorochinskaya, T. K. Lozhkina, and V. V. Anokhina, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Leningrad University]

[Abstract] In a search for potential immunoregulator proteins, the researchers compared the primary structures of immunologically active peptides and proteins with certain amino acid sequences of various proteins of plant and animal origin. Computer analysis was used to find identical fragments (with 3-5 amino acids) in the pairs of polypeptide molecules that were compared. The

fragments in immune-stimulating compounds were then synthesized via classic peptide synthesis. In a test for potential immunological activity, the synthetic peptides were found to have a pronounced enhancing effect on the E-rosette-forming capacity of human T-lymphocytes. Analgesic effects of the synthesized peptides were evaluated in mice with the "tail pinch" method. Virtually all the peptides in question produced an analgesic effect whose duration was similar to that of enkephalins. Nalaxone consistently antagonized the effect in three of the compounds. The researchers posit that the analgesic and immunological effects that were found in the peptides may be associated with a stimulating effect on expression of opiate receptors and E-receptors. They do not rule out the possibility that the peptides may be mediators that trigger certain reactions that result in the formation of endogenous opioid peptides or lymphokines or other immune response mediators. The researchers suggest that products of the catabolic breakdown of various endogenous proteins and products of incomplete hydrolysis of food proteins in the gastrointestinal tract, in addition to specialized precursors, may serve as a potential source of regulatory peptides in the human body. References 18: 6 Russian; 12 Western.

UDC 577.352.4

Molecular Probes for Calcium Channels: Synthesis and Evaluation of Biological Activity of Novel Derivatives of 4-Aryl-1,4-Dihydropyridine

18400136a Moscow BIOKHIMIYA in Russian

Vol 53 No 7, Jul 88 (manuscript received 29 Sep 88) pp 1059-1068

[Article by N. M. Soldatov, Scientific Research Institute of Biomedical Technology, USSR Ministry of Health, Moscow]

[Abstract] The philosophy and technical details underlying the synthesis and evaluation of novel structural analogs of nifedipine (2,6-dimethyl-3,5-diethoxycarbonyl-4-(3-nitrophenyl)-1,4-dihydropyridine, DHP), a calcium channel blocker, are described. The purpose was to provide novel probes for research on calcium channels, including a ³H-labeled probe suitable for detection of receptors and use in various assay techniques, photoactive probes for covalent labeling of receptors, and congeners for use in immobilization and preparation of affinity adsorbents. Hantzsch pyridine synthesis provided the major approach for the preparation of analogs showing high binding affinities for the DHP receptors, yielding derivatives with the substituents in the meta positions and asymmetrical (R₁ = R₂) ester radicals. The syntheses led to the preparation of one ³H-labeled DHP derivative and two photoactive congeners. A DHP hemisuccinate led to the preparation of DHP-Sepharose for affinity chromatography, and DHP-albumin conjugates. The latter were used for immunization of rabbits and resulted in high affinity antibodies ($K_a = 4.5 \times 10^8$ M⁻¹). The newly prepared DHP derivatives have already found wide application in research on DHP receptors in muscle membranes. Figures 4; references 20 (Western).

UDC 577.150

Purification and Properties of Lysophospholipase Isolated from Venom of Giant Hornet (*Vespa Orientalis*)

18400136b Moscow BIOKHIMIYA in Russian
Vol 53 No 7, Jul 88 (manuscript received 26 Apr 87)
pp 1093-1102

[Article by I. T. Yakubov, M. U. Tuychibayev and M. M. Rakhimov, Tashkent State University imeni V. I. Lenin]

[Abstract] Affinity chromatography or polylysophosphatidylcholine and on Sephadex G-75 were used for the isolation of lysophospholipase from the venom of the giant hornet (*Vespa orientalis*). Polyacrylamide gel electrophoresis led to the determination of MW at 32-34 kD. The enzyme showed high efficiency in hydrolysis of l-acyllysophosphatidylcholine with a narrow pH optimum at 7.5 in 0.1 M tris-HCl buffer. Enzymatic activity was abolished by treatment with surfactants, with Na-DS exhibiting the highest level of inhibitory activity. Lysophospholipase was also shown to be efficient in lysing human erythrocytes, with 50 percent lysis observed with 0.075 µg/ml of the enzyme after 100-120 min of incubation under controlled conditions. Both the catalytic and hemolytic activities of the enzyme were affected by metal ions, with activation seen with Ca^{2+} and Mn^{2+} , inhibition with Cu^{2+} and Zn^{2+} ; Mg^{2+} and Sr^{2+} were without effect. These observations indicate that lysophospholipase may be used as a molecular probe in studies on membranes: in addition, an understanding of its biological effects also provides a better understanding of its biological effects also provides a better understanding of the mechanisms underlying its toxicity. Figures 6; references 26: 16 Russian, 10 Western.

UDC 577.152.1

Inhibition of UV-Induced Accumulation of Lipid Hydroperoxides by Melanins and Ommochromes

18400136c Moscow BIOKHIMIYA in Russian
Vol 53 No 7, Jul 88 (manuscript received 20 May 87)
pp 1117-1120

[Article by M. G. Pustynnikov and A. Ye. Dontsov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] An investigation was conducted on the effects of DOPA-melanin and ommochromes on UV-induced lipid peroxidation. Exposure of cardiolipin to UV yielded a direct dose-response plot in terms of hydroperoxide accumulation. Addition of DOPA-melanin or of ommochrome decelerated the rate of lipid peroxidation and yielded saturation kinetics indicative of chemical inhibition of peroxidation. In addition, use of DOPA-melanin and of the ommochrome preparation in a screen mode at the maximum absorption band also attenuated peroxidation. Thus, both agents were seen to diminish lipid peroxidation induced by UV light by two mechanisms: optical and chemical. The former involved attenuation of the UV energy reaching cardiolipin, and the latter mechanism was

based on the antiradical activities of melanin and ommochrome and, possibly, quenching of active oxygen. Figures 4; references 16: 6 Russian, 10 Western.

UDC 577.112.6

Opioid-Like Peptides Differing Markedly in Primary Structure from Enkephalins

18400136d Moscow BIOKHIMIYA in Russian
Vol 53 No 7, Jul 88 (manuscript received 21 May 87)
pp 1128-1135

[Article by Ye. P. Kharchenko, V. N. Kalikhevich, T. V. Sokolova, K. I. Shestiyak, Z. A. Ardemasova and Ye. I. Sorochinskaya, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Leningrad State University imeni A. A. Zhdanov]

[Abstract] Screening studies on various endogenous peptides for opioid-like activities covered dinorphin, histone H2b, major myelin protein, natriuretic atrial peptides, and the immunomodulating agent splenin. In addition, selected dipeptides and free amino acids were also evaluated in the mouse tail-pinch tests (more reliable than thermal pain) with and without administration of naloxone (opioid antagonist). The peptides and fragments under study exhibited, for the most part analgesic effects on intra-cisternal administration to mice in doses of 10^{-9} to 10^{-7} M/mouse. In some cases their analgesic efficacy exceeded that of leu-enkephalin, and in all instances was abolished by naloxone. In addition, the dipeptide Lys-Arg was also shown to be analgesic, as was the amino acid arginine (but not lysine or histidine). The opioid-like activities of these peptides, so unlike the conventional enkephalins in their primary structure, suggest that their analgesic activities are due either to secondary or tertiary structural characteristics or to their involvement in metabolic transformation of the enkephalins. References 16: 10 Russian, 6 Western.

UDC 579.24

Immobilization of E. Coli Cells In Macroporous Cryogels Based On Polyacrylamide

18400137a Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 24 No 4
Jul-Aug 88 (manuscript received 19 Sep 86) pp 504-513

[Article by K. A. Lusta, N. G. Starostina, N. B. Gorkina, B. A. Fikhte, V. I. Lozinskiy, Ye. S. Vaynerman and S. V. Rogozhin, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino; Institute of Heteroorganic Compounds, USSR Academy of Sciences, Moscow]

[Abstract] A study is made of the possibility of immobilizing microbial cells in cryogels based on cross-linked polyacrylamide. To produce the gels, a reaction system consisting of the comonomers in the presence of a polymerization initiator is frozen at -5 to -40°C. This produces heterophase sponge-like cryogels with well-developed system of macropores formed in the gel mass by the crystals of the frozen solvent. E. coli cells were immobilized with three methods: they were introduced

into the reaction mixture, with subsequent cryopolymerization; by filling the pore spaces of previously generated cryogels and then fixing the cells with dilute glutaric dialdehyde, and by filling the macropores of the polymer matrix with modified surface. The advantages and disadvantages of the three methods are noted. The first method is best suited for microorganisms which are resistant to the toxic effect of acrylamide and its radicals and which tolerate freezing and thawing well. The second method is suitable for cells which do not lose their physiological activity when treated by cross-linking agents like glutaric dialdehyde. The third method yields good viability characteristics of its immobilized cell populations and provides good opportunities for cell reproduction. It also yields improved mass transfer between the immobilized microorganisms and their environment. Figures 11, references 27: 12 Russian, 15 Western.

UDC 579.24

Study of Immobilized *Aspergillus Clavatus* Cells Producing Ribonuclease

18400137b Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 24 No 4
Jul-Aug 88 (manuscript received 27 Nov 86) pp 514-519

[Article by R. Zh. Manolov, I. M. Tavobilov, V. I. Lozinskiy, Ye. S. Vaynerman, Ye. F. Titova, Ye. M. Belavtseva,

S. I. Bezborodova, S. V. Rogozhin and A. M. Bezborodov, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; Institute of Heteroorganic Compounds, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] A study is made of the immobilization of spores of the fungus *Aspergillus clavatus*, which produces guanyl ribonuclease, on a polyvinyl alcohol cryogel, and of the functioning of microorganisms enclosed in the macroporous gel carrier. The ribonuclease is particularly useful in molecular biology, for the preparative production of nucleotides, and for the synthesis of oligoribonucleotides. Ribonuclease secretion is investigated both in a batch reactor and in a flow-through reactor. Immobilization is found to substantially lengthen the time of productive functioning of the cells. The production characteristics are better because of the simpler procedure for separating the immobilized cells from the culture fluid in batch reactors or the continuity of the process in flow-through reactors. Selection of the spores for direct immobilization rather than cells of the mycelial fungus significantly facilitates the immobilization procedure. Figures 3, references 22: 10 Russian, 12 Western.

UDC 577.352.465:577.352.56

Structural Factors of Effects of Batrachotoxin Derivatives on Nerve Fiber Sodium Channels

18400105a Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 5, May 88 (manuscript received 9 Dec 87) pp 475-491

[Article by B. I. Khodorov, L. D. Zaborovskaya, E. A. Yelin*, M. Z. Maksudov, O. B. Tikhomirova* and V. N. Leonov,* Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow; *Institute of Bioorganic Chemistry imeni M. M. Shenyakin, USSR Academy of Sciences, Moscow]

[Abstract] Structure-activity relationships were evaluated for nine batrachotoxin (BTX) derivatives vis-a-vis their effects on sodium channels of single myelinated fibers from the sciatic trunk of the frog *Rana ridibunda*. The voltage-clamp studies were conducted on the nodes of Ranvier to assess the full potential of BTX, a steroid alkaloid functioning as a complete agonist on the sodium channels, and of its congeners in modifying channel function. The resultant data demonstrated that replacement of the CH₂ group by the C=O group on the homomorpholin ring of 7,8-dihydro-BTX modifying function. This effect was interpreted as indicating that protonation of the third nitrogen atom is a prerequisite for the interaction of BTX with its receptor. Furthermore, since the quaternary analog of BTX retained its activity it appears that the active form of BTX is charged. Contrary to predictions based on the 'oxygen triad' model of Coddington [Coddington, P.W., J. Am. Chem. Soc., 105: 3172, 1983], transfer of the 11-hydroxy group from the alpha to the beta position lessened the efficacy of the toxin. BTX analogs in which the 11-hydroxy group was either oxidized or acetylated, or the polyacetal bond reduced, affected only a small portion of the sodium channels, evidencing blocking activity. The effectiveness of the BTX analogs in acting on the sodium channels was predicated on their ability to bind to BTX receptors. Binding was found to be predicated on adequate fit. Improper positioning of the analogs on the receptor either abolished activity or led to channel blockage. Figures 9; references 25: 2 Russian, 23 Western.

UDC 577.352.465

Short Half-Life Conducting States of Alamethicin Channel

1840105b Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 5, May 88 (manuscript received 2 Oct 87) pp 544-550

[Article by L. N. Yermishkin, P. A. Grigoryeva and F. E. Ilyasov, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] An analysis was conducted on the lifetimes of open ionic channels formed by the incorporation of the 20 amino acid antibiotic alamethicin in lecithin-cholesterol bilayer lipid membranes. The electrophysiologic

studies demonstrated that the different conducting states were correlated with open channel lifetimes, corresponding to a slow state of ca. 20 msec, and a rapid exponential component of ca. 50 μ sec. In the millisecond range of conducting process may be described as a Markov process with sequential transitions corresponding to changes in the disposition of the alamethicin monomers forming the channel. Graphical depictions of putative transitions in alamethicin are presented to account for the exponential conduction phases. Figures 5; references 6 (Western).

Amphiphilic Properties of Angiotensin and Its Fragments

18400140a Moscow BIOFIZIKA in Russian Vol 53 No 4, Jul-Aug 88 (manuscript received 18 Dec 86) pp 556-558

[Article by S. G. Galaktionov, V. M. Tseytin, I. A. Vakser and Ye. V. Prokhorchik, All-Union Scientific Research Institute of the Microbiological Industry, Minsk]

[Abstract] Current views hold that bioactive peptides exert their effects by interaction with specific receptors, and that the interaction involves hydrophobic forces. In order to obtain a better appreciation of the behavior of peptides in such situations, an analysis was conducted on the amphiphilic properties of angiotensin and its fragments. Consequently, calculations were made of the stable states of the peptides at water: lipophilic phase interfaces, including determinations of the transfer energies (ΔU in kJ/mole) for the entire angiotensin and its peptide fragments. The resultant data demonstrated that for angiotensinamide, ΔU was 25.5 kJ/mole, and the ΔU varied for the various di-, tri-, and tetrapeptides from 9.2 to 38.9 kJ/mole. Employing previously described methods of calculation and potential functions, led to the demonstration that the most stable peptide conformation at the interface differs from that in solution. In addition, the conformation of the biologically active state of the peptide is much more stable at the interface than in solution. In addition, the conformation of the biologically active state of the peptide is much more stable at the interface than in solution. Figures 2; references 15: 5 Russian, 10 Western.

UDC 577.37

Phototransfer of Electrons in Protein-Bearing Vesicles

18400140b Moscow BIOFIZIKA in Russian Vol 53 No 4, Jul-Aug 88 (manuscript received 15 Jul 85; in final form 21 Jul 86) pp 589-593

[Article by L. A. Khmara, A. Ye. Arkhipets and A. I. Kryukov, Institute of Physical Chemistry imeni L. V. Pissarzhevskiy, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Changes in redox potential were used to monitor photo induced electron transfer in phospholipid vesicles bearing structural proteins isolated from the

photosynthetic membranes of *Pisum sativum* chloroplasts. The system was based on sensitization provided by either chlorophyll-a or its synthetic analog Mg-tetra-4-tert-butylphthalocyanin, potassium ferricyanide as the electron acceptor, and Na_2EDTA as the electron donor. Evaluation of the vesicular systems, both protein-free and protein-bearing, yielded kinetic plots of changes in the redox potentials of both systems, demonstrating

light-induced electron transfer. The efficiency of the electron transfer was diminished in the protein-bearing system, which may have been due to quenching of the photoexcited sensitizers by the proteins with mechanisms involving energy or electron transfer. These findings demonstrated that it is possible to construct systems modeling natural photocatalytic transformation of solar energy. Figures; references 8: 7 Russian, 1 Western.

UDC 616.936 (-37)(575.4)

Malaria Incidence Mapping of Turkmen SSR

18400121 Ashkhabad ZDRAVOOKHRANENIYE
TURKMENISTANA in Russian No 7, Jul 88 pp 30-36

[Article by Ye. N. Ponirovskiy, O. Mamedniyazov, and K. V. Morozova, Institute of Zoology, TuSSR Academy of Sciences Republic Health-Epidemiology Station, TuSSR Ministry of Health]

[Abstract] Because of large-scale irrigation programs in the desert areas in Turkmenistan, the epidemiologic situation concerning malaria has become more complex. There is a sharp rise in malaria brought in from neighboring countries, and cases originated in certain areas of the republic. Initial data for the malaria incidence mapping was based on literature data from the Health-Epidemiology Station report of malaria incidence during 1965-1986. This period corresponded to the time when malaria was considered to have been eradicated in the republic. Ten regions of high mosquito infestation were identified, and all were shown to be malariogenic. Three levels of malaria risk were identified: hypermalariogenic (the initial incidence of malaria high, with cases originating in the last 22 years both locally and from out of country, with population density high: Kopetdag foothills, Amu Darya valley and Tedzheno-Murgab valley and delta region); mesomalariogenic (medium to high initial level of malaria, with only isolated new cases and population density generally low: Kugitan mountains and foothills, Sumbar mountains and foothills, and Amu Darya delta region); and hypomalariogenic (low initial malaria level, only isolated new cases noted in 22 years, mainly those brought into the country, low population density: mountainous Kopetdag, subtropic coastal area, Western Uzboysk and Kelif-Uzboysk region). Detailed geographical composition, mosquito species, and number of malaria cases are listed for each of these areas. Figure 1; references 17: 16 Russian, 1 Western.

UDC 616.936.1-022.375-078:576.893.192.6.097.22(47+57)

Results of Study of Drug-resistant Tropical Malaria Imported Into USSR

18400128 Moscow MEDITSINSKAYA
PARAZITOLOGIYA I PARAZITARNNE BOLEZNI in
Russian No 4, Jul-Aug 88 (manuscript received
19 Apr 88) pp 3-6

[Article by A. M. Filippov, M. I. Alekseyeva, Yu. P. Gorbunova, T. Ya. Akhizarova, and A. D. Masterskikh, Central Order of Lenin Institute for Advanced Training of Physicians, Moscow]

[Abstract] A study conducted from 1984 through December 1987 at the Municipal Clinical Hospital imeni S. P. Botkin revealed the clinical and diagnostic aspects of drug-resistant tropical malaria in the use of chloroquine and other anti-malaria drugs. The study involved 90 patients (45 foreigners and 45 Soviet citizens) who had been infected abroad with *P. falciparum*. The malarial agent was drug-resistant in 24 of the patients, with the level of resistance of *P. falciparum* to chloroquine low in all six foreign patients and in 17 of the 18 Soviet patients. The resistant malaria was moderately severe in the foreign patients and severe in 41 percent of the Soviet patients. Among the patients in the group with drug-sensitive malaria, the percentage of patients whose malaria ran a severe course was half that among the individuals with drug-resistant malaria (22 percent). In chloroquine-sensitive malaria, parasites were no longer found in the blood in most patients on the third day of treatment. In drug-resistant malaria, only 1/3 of the foreign patients and about 6 percent of the Soviet patients were free of parasites by the fourth day of treatment; 30 percent of the Soviet patients had parasites in the blood after the 6th day of treatment. A case history of a 40-year old Soviet citizen who took chloroquine regularly while in Angola was discussed. He developed acute malaria and his condition worsened in spite of use of fansidar. He was hospitalized in Moscow, where he recovered. References 16: 8 Russian; 8 Western.

UDC 577.29

Integration of Recombinant Cosmids Containing *Aspergillus Terreus* DNA Into the *Saccharomyces Cerevisiae* Genome

18400116a Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 302 No 2 Sep 88 (manuscript
received 31 Apr 88) pp 456-459

[Article by Ye. A. Shubochkina and I. I. Fodor, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow oblast]

[Abstract] The expression of the DNA of heterologous organisms introduced into the cells of saccharomycetes as autonomously replicating plasmids has been intensely studied, but no data have appeared on the possibility of recombining heterologous DNA with the genome of *S. cerevisiae*. The integration of recombinant plasmids into the yeast genome occurs strictly by homology, but the influence of the dimensions and degree of homology of sequences on frequency of plasmid-chromosome recombination has been little studied. This article studies the nature of integration of cosmid molecules carrying long DNA inserts of the mycelial fungus *A. terreus* into the genome of *S. cerevisiae*. The results indicated that cloned *A. terreus* DNA included in the cosmid molecules can recombine with sequence of the XII *S. cerevisiae* chromosome, apparently forming chimera ribosome clusters. The results thus demonstrate for the first time that the DNA of heterologous organisms, introduced to yeast cells as a result of transformation, can recombine in vivo with the corresponding yeast genome sequences. Figures 2, references 15: 2 Russian, 13 Western.

UDC 577.21

Novel Vector for Direct Recombinant Selection for *Escherichia Coli*

18400117a Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 302 No 6, Sep 88 (manuscript
received 16 May 88) pp 718-720

[Article by E. E. Aavik and A. L. Kheynaru, Tartu State University; Estonian Biocenter for Genetic and Cellular Engineering, Estonian SSR Academy of Sciences, Tartu]

[Abstract] Description is provided of conventional genetic engineering techniques for the construction of vectors for direct recombinant selection in *E. coli* system, using the K230 gene. The latter gene codes for catechol-2,3-dioxygenase (EC 1.13.11.12) which transforms 1,2-dihydroxybenzene in the bright-yellow compound semialdehyde-2-hydroxymuconic acid. Consequently, bacterial colonies bearing K230 are readily detected by spraying the colonies with 0.1 M catechol

solution and monitoring them for yellow color. The K230 sequence was isolated from plasmid pWWO derived from *Pseudomonas putida* PaW160 TOL using Xho-I restriction endonuclease, and cloned into Sall site of plasmid pUC9. The latter was used for transformation of *E. coli* DH1. Recombinant colonies of *E. coli* DH1 yielded K230-bearing plasmid pCO2 (4.9 kb). Subsequent manipulation of pCO2, including the introduction of linkers, and additional transformation of *E. coli* provided another plasmid (pCO3, 4.3 kb). Both were further supplemented with additional polylinkers and used in subsequent transformations of *E. coli*, eventually yielding plasmid pCO4 (4.3 kb). pCO4 contained 8 useful restriction sites as follows: SacI, Xho-I, KpnI, PstI, BglII, ClaI, NdeI, and EcoRV. An additional advantage of pCO4 lies in the fact that transformed clones are readily identified and no special bacterial strains are required. Figures 1; references: 14 Western.

UDC 577.2k3.39

Rearrangement in 2 μ m DNA Responsible for Replicator Activation in Integrative Vector of *Saccharomyces Cerevisiae*

18400117b Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 302 No 6, Sep 88 (manuscript
received 31 Mar 88) pp 720-723

[Article by Ye. A. Shubochkina, O. V. Krasnikova and I. I. Fodor, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Gene cloning in *S. cerevisiae* often relies on vectors constructed with the yeast 2 μ m plasmid that has been shown to have two origins, of which only one is active in vivo. Recombinant plasmids bearing a large EcoRI fragment of the B-form of the 2 μ m DNA have been shown to be inefficient in transforming *cir*^o strains of *S. cerevisiae*, while giving a high frequency of transformation in the case of *cir*⁺ strains. Nevertheless, a recombinant plasmid pOK9 was discovered that transformed *cir*^o cells with a high frequency. pOK9 contains a large EcoRI fragment of the B-form of the 2 μ m DNA and has been shown to give rise to a large series of stable, replicating plasmids as a result of rearrangements in the 2 μ m DNA. Detailed genetic analyses demonstrated that the high stability of these plasmids was attributable to their stabilization by the REP system of the rearranged 2 μ m DNA. The rearrangement evidently involves a 4.1 kp fragment in the 2 μ m DNA obtained by treatment with EcoRI. This fragment encompasses the ori (origin) site that is functional in vitro but not in vivo under normal conditions. The rearrangement is evidently responsible for activation of the 'silent' ori site. The nature of the changes is currently under further study. Figures 3; tables 1; references 8 Western.

UDC 577.391; 612.01.017.1

Effect of Gamma-irradiation on Immunological Properties of Brucella Protective Antigen

18400079b Moscow RADIOBIOLOGIYA in Russian
Vol 28 No 3, May-Jun 88 (manuscript received
20 Jan 87) pp 403-407

[Article by A. V. Pronin, Ye. A. Dranovskaya, V. Ye. Malikov, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Individual studies have established that ionizing radiation amplifies the protective effects of brucella protective antigen (BPA). A comparative study of the effect of a BPA of a protein polysaccharide nature and a γ -irradiated BPA on the mongrel guinea pig immune system involved animals of both sexes (weight 300-350 g), which were immunized once intramuscularly in a 0.6-2.0 mg dose of BPA or γ -BPA in 0.5 ml of normal saline (pH 7.0 plus or minus 0.2). Immunization of the animals by a 0.6 mg dose of BPA suppressed the response to phytohemagglutinin and concanavalin A (Con A) by the 3rd day, by 65 percent and 60 percent, respectively. Immunization of animals with γ -BPA significantly increased the response to phytohemagglutinin (by a factor of 3.8-5.0) and to Con A (2.2-2.6). Immunization with BPA was found to suppress the spontaneous proliferative activity of lymphocytes. In animals immunized with 1 mg γ -BPA or 0.6 mg BPA, splenocyte activity was higher than in controls and remained as such on the 30th day after immunization, when the antigen was no longer present. The splenocytic response to mitogens was activated 7 days after injection of γ -BPA. Gamma-BPA circulated in the blood longer than BPA, induced more intense and longer synthesis of antibodies and resulted in the development of a stronger immunity. Some 52.5 percent of the animals immunized with BPA demonstrated good immunity to infection 6 months after immunization, whereas 71.4 percent of animals immunized with γ -BPA showed good immunity. Figures 2; references 12: 11 Russian; 1 Western.

UDC 577.112.6.083.3

Synthesis and Antigenic and Immunogenic Properties of Polypeptides (Lys-Ser-Glu)

18400104a Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 5, May 88
(manuscript received 18 Feb 87; in the final form
10 Nov 87) pp 596-605

[Article by Sh. Kh. Khalikov, R. V. Valiyev, A. N. Sharetskiy* and L. V. Aristovskaya*, Tajik State University imeni V. I. Lenin, Dushanbe; *Scientific Research Institute of General Communal Hygiene imeni A. N. Sysin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Conventional methods were employed for the synthesis of (Lys-Ser-Glu)_n, with the initial di- and tri-peptides prepared by elongation at the C-end using N,N'-dicyclohexylcarbodiimide or mixed anhydrides. Subsequent block condensation of pentafluorophenyl esters of the tripeptides were used for the synthesis of oligomers, and polycondensation of dipeptide 2,4,5-trichlorophenyl esters was used for polypeptide preparation. Immunochemical studies with a 20,000 D (Lys-Ser-Glu)_n polytripeptide showed it to be much more immunogenic in various lines of inbred mice than in chinchilla rabbits, eliciting both IgM and IgG antibodies. The (Lys-Ser-Glu) moiety constituted an antigenic determinant. The Ser residue appeared to be the dominant amino acid in terms of immune recognition in the tripeptide sequence, with the dipeptide sequence Ser-Glu constituting the more important domain within the epitope. In distinction to the antibodies produced by mice, the rabbit antibodies cross-reacted with a variety of heterologous antigens (HlgG, BIgG, OVA), confirming the wide distribution in nature of the (Lys-Ser-Glu) epitope. Figures 2; references 17: 5 Russian, 12 Western.

UDC 615.373.6.015.2:615.384].015.46

Immunochemical Characteristics of Immunoglobulin G Conjugated to Dextran

18400124f Moscow BYULLETEN
EKSPERIMENTALNOY BIOLOGII I MEDITSINY
in Russian Vol 106 No 7, Jul 88 (manuscript received
3 Sep 86) pp 78-80

[Article by A. A. Ivanov, N. L. Kalinin, Ye. T. Gromakovskaya, A. D. Levin, Ye. A. Podrez and V. P. Torchilin, Institute of Biophysics, USSR Ministry of Health; All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow; Perm Scientific Research Institute of Vaccines and Sera]

[Abstract] Previously described methodology was used to conjugate rabbit IgG (specific for sheep erythrocytes) and equine IgG to dextran (35-50 kD), in order to assess the effects of conjugation on antigen binding and other properties of IgG. A variety of immunochemical and immunobiological techniques led to the demonstration that conjugation modulated the activity of the IgG preparations. Basically, two major types of conjugates were obtained: protein-dextran-protein and protein-dextran. The large MW protein-dextran-protein conjugates showed enhanced antigen-binding activity vis-a-vis the native antibody, while failing to interact with complement and with cellular Fc receptors. These preliminary studies demonstrated the feasibility of modulating antibody function and tailoring them for specific needs. Figures 3; references 14: 10 Russian, 4 Western.

UDC 614.7:615.285.7+615.285.7.065.07

Hygienic Problems of Study of Microbial Fungicides

18400130 Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 88 (manuscript received 1 Jun 87) pp 29-31

[Article by T. G. Omelyanets, G. P. Melnik, M. T. Takhirov, All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, Kiev; Uzbek Scientific Research Institute of Public Health, Hygiene and Occupational Diseases, Tashkent]

[Abstract] The researchers studied hygienic aspects of the use of preparations containing antagonist-bacteria of

the *Pseudomonas* genus (*Ps. aurantiaca*, *Ps. mycophaga*, *Ps. sp.*) and of the fungi of *Trichoderma lignorum*, *Gliocladium roseum* and *Gliocladium virens*, which have been used to create a whole series of effective microbial preparations for use in plant disease control. The study included assessment of virulence, toxicity, toxigenicity, infectiousness, allergenic properties and effect on normal microflora of the body when different pathways of entry are used. The microorganisms were found to be nonvirulent for laboratory animals and were noninvasive upon intraabdominal, peroral and intranasal administration; they had low toxicity and toxigenicity. They may produce a sensitizing and dysbacteriogenic effect. Safe levels of their use in different areas must be established, especially in the air of the workplace. References: 6 (Russian).

UDC 616.211-002-009.86+616.833.15-009.7]-085.849.19

Treatment of Vasomotor Rhinitis, Trigeminal Neuralgias and Sluder's Syndrome by Helium-neon Laser Irradiation of the Sphenopalatine Ganglion

18400129a Moscow VESTNIK

OTORINOLARINGOLOGII in Russian No 4,

Jul-Aug 88 (manuscript received 17 Dec 87) pp 35-40

[Article by M. A. Shuster, V. M. Isayev, V. I. Rechitskiy, M. Kh. Timirgaleyev, Department of Otolaryngology, Moscow Oblast Clinical Scientific Research Institute imeni M. F. Vladimirovskiy]

[Abstract] Treatment of vasomotor rhinitis and of various prosopalgias has traditionally been difficult and, often, ineffective. Since biological tissue is very sensitive to laser emissions, the authors developed a new method for treating such conditions that uses irradiation of the sphenopalatine ganglion with a helium-neon laser. The therapeutic laser attachment UFL-01 ("Yagoda") was used with LG-38, LG-35, and LG-104 helium-neon lasers operating at a wavelength of 0.63 micrometer and a power of 10-50 mW in a treatment that followed careful clinical examination. Most patients with a neurovegetative form of vasomotor rhinitis showed improvement after one or two procedures. Depending on the effectiveness of the therapy and the length of remission, 1-3 courses of treatment of 5-12 procedures each were required. In 19 of 25 patients, all symptoms disappeared after one course; in four patients, they were improved; and in two, there was no effect. Nine patients with an allergic form of vasomotor rhinitis had no symptoms or had substantially diminished symptoms after one course of treatment; six patients showed no improvement. Of 18 patients in which follow-ups were done for one to two years—10 with the neurovegetative form, 8 with the allergic form—eight (neurovegetative) remained in stable remission. Two from the first group and all eight of the second required additional courses of treatment. Forty-nine of 65 individuals with trigeminal neuralgia were free of pain after one course of treatment. Six of 10 individuals diagnosed with Sluder's syndrome experienced no pain after one course of treatment. One to three courses were required to remove the other symptoms. The procedure is recommended for practice, but is contraindicated for benign and malignant tumors, diseases of the blood or blood-producing organs, and chronic specific infections. Figures 2; references 19; 17 Russian; 2 Western.

UDC 615.849.19,03:616-072.1

Use of Low-intensity Laser Irradiation to Improve Endoscopic Diagnosis

18400129b Moscow MEDITSINSKAYA TEKHNIKA in Russian No 5, Sep-Oct 88 (manuscript received 21 Dec 88) pp 25-31

[Article by A. A. Bekeshko, G. N. Zmiyevskoy, I. B. Kardashova, N. D. Minochkina, N. V. Rubinskiy, All-Union Scientific Research Institute of Medical Instrument-Making, Moscow]

[Abstract] Modern endoscopic diagnosis is based prima-

rily on recording the color changes of an organ that are characteristic of a given pathology, a procedure that is highly subjective. But evaluations based on contrast (with observations made in monochromatic lighting) remove the need for direct visual observation and can be quantified. For that reason, the researchers examined the possibility of improving the diagnostic capabilities of the endoscope by using laser illumination (an LG-62 type helium-cadmium laser, operating in the blue-violet region of the spectrum at $\lambda = 0.55 \mu$) with three domestic endoscopes (GDB-VO-3, EGDB-VO-4, and DB-VO-1). The test object was a model of the digestive tract used for endoscopic demonstrations and training, with drops of bloods placed on the surface to simulate an "open pathology." Use of the monochromatic laser illumination produced an image contrast that was, on average, 25 percent greater than that produced with white light. The authors conclude that the laser-endoscope combination makes it possible to increase the contrast of the pathology image against a background of healthy tissue. The use of monofilament light guides for transmitting the laser light through the endoscope instrument channel makes it possible to produce an image of internal cavities in monochromatic light for virtually any endoscope with an instrument channel. Figures 4; references 11: 10 Russian; 1 Western.

UDC 616.137.9-004.6-085.849.19-036.8

Effect of Low-Power Infrared Laser Radiation On Regional Hemodynamics In Patients With Atherosclerosis of Arteries In the Legs

18400139b Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY in Russian No 4 Jul-Aug 88 (manuscript received 2 Mar 88) pp 54-55

[Article by A. A. Minenkov, V. Ye. Illaryonov, A. P. Dovganyuk and V. I. Rechitskiy, Central Scientific Research Institute of Health Resort Science and Physical Therapy, Moscow]

[Abstract] Clinical observations were performed on 60 patients with atherosclerosis of arteries in the legs to determine the effect of laser radiation on regional hemodynamics in patients with this pathology. Thermographic studies were performed on 49 patients, with temperature measured at various levels of the leg, at the foot, and at the toes. Significant changes in temperature gradient were observed in the overwhelming majority of patients treated with the laser beam, the temperature gradient decreasing by an average of 31.8 percent of its initial value. Laser treatment also achieved a significant increase in blood flow in the affected area. In patients exposed to noncoherent IR and red radiation, slight improvements were observed in half the patients. References 6: Russian.

UDC 616.127-005.4-085.849.19-06

Clinical-Pathochemical Basis of Exacerbation In Ischemic Heart Disease Patients With Helium-Neon Laser Treatment

18400141a Moscow KARDIOLOGIYA in Russian
Vol 28 No 8 Aug 88 (manuscript received 20 May 87)
pp 72-75

[Article by I. M. Korochkin, A. V. Kartelishev, S. Yu. Leshakov, G. M. Kapustina, N. S. Vernekina, G. V. Babushkina, S. F. Berkinbayev and A. R. Yevstigneyev, Department of Internal Diseases No. 4, Second Moscow Medical Institute imeni N. I. Pirogov; Clinical Psychiatric Hospital No. 1 imeni V. P. Kashchenko]

[Abstract] A study is presented of the dynamics of lipid and phospholipid composition of erythrocyte membranes, antioxidant protection indices, and lipid peroxidation in ischemic heart disease patients undergoing laser therapy. Good effects were achieved in 91 percent of functional class II patients as opposed to 60 percent of patients treated by traditional therapy, and satisfactory results were achieved in 9 percent as opposed to 40 percent of patients treated by traditional therapy. Laser therapy tended to reduce content of free cholesterol in cell membranes and increase the acidic fractions of total phospholipid content. Determination of the content of α -tocopherol after treatment indicated the advantage of laser therapy, practically normalizing its content. The increase in phospholipids and free cholesterol in the membranes observed during exacerbation in some cases indicates not an increase in destructive disorders, but rather possible activation of metabolic processes directed toward rebuilding of membrane structures. The phenomenon of exacerbation observed in patients following 5-7 laser treatments probably reflects a metabolic adjustment in the cell membrane apparatus. The phenomenon is probably a general biological phenomenon inherent in laser therapy in general for various diseases. Natural antioxidants such as vitamin E and retinol, plus a combination of free fatty acids and phospholipids, should be prescribed to prevent exacerbation. Figures 2, references 12: Russian.

UDC 616.12-089:612.014.481+616-072.1

Laser Destruction of Bundle of His Through Cardioendoscope

18400141b Moscow KARDIOLOGIYA in Russian
Vol 28 No 8 Aug 88 (manuscript received 28 Oct 87)
pp 94-96

[Article by Yu. Yu. Bredikis, V. A. Obelenyus and A. Yu. Knepa, Central Scientific Research Laboratory, Kaunas Medical Institute]

[Abstract] Surgical treatment of tachyarrhythmia accompanied by elevated atrioventricular conductivity can be performed by laser coagulation of the atrioventricular bundle, the bundle of His, without the use of artificial circulation. The operation utilizes a yag laser operating at a wavelength of 1.064 μ m, the beam of which penetrates deeply into the myocardium, coagulating it and interrupting conduction of electrical excitation. This article studies the use of a cardioendoscope in the performance of this operation. Experiments were performed on mongrel dogs under intravenous narcosis. Full transverse heart block was successfully created in all experiments. It was achieved in the first radiation session in only 14 of 34 cases. In the remaining cases, laser coagulation had to be repeated two or three times. The method of irradiation through a polyurethane balloon was most successful, requiring manipulation of just one instrument, with the radiation spot coinciding with the center of the visual field. In later experiments, to facilitate positioning of the beam, the invisible laser beam was made visible by adding red radiation from a helium-neon laser. References 12: 2 Russian, 10 Western.

Reactivation of Superoxide Dismutase by Helium-Neon Laser

18400140e Moscow BIOFIZIKA in Russian
Vol 53 No 4, Jul-Aug 88 (manuscript received 11 May 87) pp 717-719

[Article by Ye. A. Gorbatenkova, O. A. Azizova and Yu. A. Vladimirov, Scientific Research Institute of Physicochemical Medicine, Moscow]

[Abstract] In order to assess the possible mechanisms responsible for the therapeutic efficacy of a helium-neon laser in various inflammatory conditions, the effects of the laser on superoxide dismutase was evaluated in view of the depression of enzyme activity in such conditions. Superoxide dismutase was inactivated either by exposure to low pH or 2 h or treatment with hydrogen peroxide. In both cases irradiation of the solutions with LG-78 helium-neon laser (632.8 nm, 2 mW output) resulted in recovery of enzyme activity and of the absorption spectrum of the native enzyme. These observations provide support for the contention that the therapeutic effectiveness of the helium-neon laser may, at least in part, be due to enzyme reactivation in pathologic processes (hypoxia, inflammation) that lead to inactivation of tissue enzymes. Figs. 2; references 15: 1 Russian, 4 Western.

'Iris'—Joint Soviet-French Eye Microsurgery Enterprise

18400144a Moscow LITERATURNAYA GAZETA in Russian 26 Oct 88 p 9

[Article by Kirill Privalov, Paris correspondent of LITERATURNAYA GAZETA: "Iridescent Prospects of 'Iris'"]

[Text] "The establishment of our enterprise conforms to the general line of restructuring. I am convinced that collaboration with Professor Fedorov will serve as a powerful impetus for development of unique surgical technology. Until recently, all plans for establishing joint enterprises in the USSR implied the use of western scientific and technological advances. But now, for the first time to my knowledge, Soviet technology will serve as the basis for operating a joint Soviet-French enterprise," Pierre Fournier, vice-president of the Bouygues Association, the largest constructing firm in the West, said to me.

An agreement was signed in Paris concerning the establishment of a joint enterprise, between the intersectorial scientific and technological complex (MNTK), "Eye Microsurgery," headed by Professor S. N. Fedorov, and the Bouygues Association. "Iris" (from the Greek for the iridal membrane of the eye) will be the name of the Soviet-French organization. Using French builders and businessmen, there will be a hotel for foreign patients attached to the surgical complex of MNTK, called Eye Microsurgery. It is planned to sell tours in many countries for treatment in this Microsurgery. It is planned to sell tours in many countries for treatment in this specialized hotel, for a minimum of 4 days. In addition, by decision of the board of the new organization, such hotel-hospitals will also be opened in other cities of the USSR, where branches of MNTK already exist and are being opened—in Leningrad, Volgograd, Novosibirsk, Khabarovsk.... There are plans to commence work on construction and operation of ophthalmological centers, including surgical units, abroad as well. These enterprises will operate on the basis of complete cost accounting and self-financing, including converted currency.

"'Iris' will serve the most humane purposes," says Pierre Fournier. "The moment we established contact with Professor Svyatoslav Fedorov, it is not only in France that we sensed interest in this project on the part of business and financial circles. Just look at the impressive firms and banks that wanted to participate in our company: Pullman International Hotels, Credit Lyonnais, Banque National de Paris, Banque de l'Union Europeenne! They also include the USSR Vneshekonombank [Foreign Economic Bank], as well as Eurobank. Professor Svyatoslav Fedorov and his surgical wizards are our guarantee of success."

Just what is the Bouygues concern? It is a whole empire, the enterprises of which according to the most conservative data, employ 55,000 people. In France, they call

billionaire Francis Bouygues the Concrete King. His immediate projects include participation in construction of the tunnel across the English Channel, the Euro-Disneyland amusement park in France, and the pipe line on the Arabian Peninsula. Not to mention the fact that Bouygues is also TF-1 (the first commercial television channel of Paris) and supplies water to French cities, produces electrical equipment, insulation materials, household batteries and luxury item shops.... We are impressed by the rate of growth of this multiconcern. As reported by FIGARO, trade turnover of the Bouygues group, which was founded in 1952, constituted 9.6 billion francs in 1980 and already 45.8 billion in 1986!

The agreement dealing with establishment of "Iris" is for a 25-year period, and it can be extended by agreement of both sides. But time does not wait, and the participants of this joint enterprise have already begun to implement the project. Bouygues representatives are heading for Moscow to vote for company presidents and take care of a number of formalities at the USSR Ministry of Finance. The "Concrete King" is ready to start the work tomorrow.

Kidney and Pancreas Transplantation in Latvia

18400144b Riga SOVETSKAYA LATVIYA in Russian 20 Nov 88 p 4

[Article by G. Greydane; "The Operation Was a Success"]

[Text] An extremely complicated operation was performed for the first time in Latvia, at the Republic Clinical Hospital imeni P. Stradyn: a kidney together with pancreas was successfully transplanted in a patient. This is the sixth such operation in our country (five were performed at the Scientific Research Institute of Transplantation in Moscow).

The patient who underwent this operation is 26 years old. He has had diabetes mellitus for almost half his life. As a result, he developed diabetic nephropathy, irreversible damage to the kidneys. Since April of this year, the patient survived thanks to insulin injections and kidney dialysis three times a week. Only an organ transplant could save his life.

It became possible to perform this operation thanks to the selfless work of surgeons—Professor R. Rozental, chief of the center, Ya. Bitsans, head of the kidney transplant department, V. Strokan and V. Shevelev, surgeons specializing in transplantation, Docent A. Sondore, anesthesiologist, G. Silinshmit, attending endocrinologist, nurses and laboratory technicians.

The operation lasted 7 hours. The kidney and pancreas were taken from a donor who had expired of cerebrocranial trauma in a motor vehicle accident. Soon after the operation, the patient no longer needed injections.

The accepted pancreas is producing the needed amount of insulin on its own and controls sugar metabolism in the blood. The kidney is also functioning normally.

Some experience has been gained in treating diabetic patients by means of transplantation of donor pancreatic cells. The surgeons of Riga have performed more than 200 such transplants. However, this was the first transplant of the pancreas, rather than its cells. There are four patients currently waiting for a similar operation.

At the present time, Latvian physicians also have permission to transplant the heart and liver. It must be stated that organs for transplants are taken from a donor only after all steps have been taken to resuscitate him and death has been established. This is an important ethical aspect of the work of surgeons.

UDC 616-001.36-08-07:612.015.11

Effectiveness of Elimination of Lipid Peroxidation Products in Different Methods of Detoxification Therapy of Shock Trauma Patients

1840119 *Leningrad VESTNIK KHIRURGII IMENI I.I. GREKOVA in Russian Vol 140 No 6, Jun 88*
(manuscript received 15 Sep 87) pp 53-58

[Article by M. V. Grinev, Yu. N. Tsibin, T. V. Kazuyeva, M. V. Assur, M. P. Loginova, M. N. Tarelkina, G. M. Frolov, And N. K. Razumova, Scientific Research Institute of First Aid imeni I. I. Dzhanelidze, Leningrad]

[Abstract] The role of lipid peroxidation activation in development of intoxication during shock trauma has not been studied adequately. The intensity of free radical oxidation of lipids was evaluated by the content of malonic dialdehyde (MDA) in the blood of 42 patients and 15 volunteer controls aged 20-65 years. The detoxification treatment consisted of the use of extracorporeal donor spleen perfusion. It was shown that shock trauma resulted in a 4-fold elevation of MDA levels in the blood plasma and a 1.7 fold increase in erythrocytes, by comparison with the levels in the controls. The use of extracorporeal spleen perfusion resulted in lowering the level of MDA; maximum effect was observed 1 hour after the procedure, and this effect lasted for 24 hours. The MDA level in erythrocytes remained essentially the same. Plasmapheresis showed a tendency to lower MDA levels in serum and in erythrocytes, but not consistently. The difference between the xenospleen and plasmapheresis is that the spleen passed the blood lipids through without diminishing their levels, while plasmapheresis resulted in considerable loss of the lipids. References 20: 14 Russian, 6 Western.

UDC 616.831-008.922.1-008.64-085.835.12

Hyperbaric Oxygenation in Treatment of Hypoxic Brain Injuries

18400131 *Moscow KHIRURGIYA in Russian No 8, Aug 88* (manuscript received 18 Apr 86) pp 104-106

[Article by M. Yu. Belokurov, A. V. Golland, A. Kh. Kochetov, Anesthesiology-reanimatology Course, Department of Surgery, Faculty of Advanced Training of Physicians, Department of Hospital Surgery, Yaroslav Medical Institute]

[Abstract] An assessment of the effectiveness of hyperbaric oxygenation combined with traditional artificial ventilation of the lungs involved a study of 17 patients with coma of hypoxic origin. The coma was caused by post-strangulation asphyxia in 9 patients, by cardiac arrest in 3, by CO and methemoglobin formers in 3, by fatty embolism in 1 and by an asthmatic condition in 1 patient. The comas lasted from 1.5 hours to 9 days. Patients ranged in age from 14 to 76 years. Clinical assessment of effectiveness of the combined treatment and dynamics of the patients' conditions used the scale developed by A. R. Shakhnovich et al., which considers 13 neurological signs and determines the phase of the coma on the basis of five of these signs. Effectiveness of the treatment in the different cases was discussed. Use of the combined therapy made it possible to achieve, in a shorter time than that required in traditional therapy, reduction of depth of the general cerebral symptoms, to restore the patient to consciousness and to save the life of some patients. References: 4 (Russian).

UDC 615.471.03:616-073.75

First Trials With Portable X-Ray Machine "Elektronika-100D"

18400222a *Moscow VESTNIK RENTGENOLOGII I RADIOLOGII in Russian No 5, Sep-Oct 88* (manuscript received 28 Oct 86) pp 76-81

[Article by E. G. Chikirdin, T. A. Popova, B. M. Rassokhin and M. G. Ostrogradskaya, Moscow Scientific Research Radiological Institute, RSFSR Ministry of Health]

[Abstract] The first introductory trials were conducted with clinical testing of the relatively inexpensive and small portable x-ray machine "Elektronika-1000." Cur-sory operational details are provided as to exposure times and voltages, with the notation that the operating personnel are to remain at a distance of 4.5 m from the machine during exposure. The trials involved 100 patients, 20 to 70 years in age, with various pathologies of the skeletal system. The system was found satisfactory for use in office radiology, home care, and other sites requiring a small machine. Tabulated data are provided on recommended anodal potentials, anodal currents, exposure duration, and focusing distance for various bony structures. Figures 2.

UDC 616-089.843-032:611.14

Improved Vascular Prostheses From Umbilical Cord Vein

18400222b Riga IZVESTIYA AKADEMII NAUK
LATVIYSKOY SSR in Russian No 9, Sep 88
(manuscript received 19 Jun 87) pp 118-125

[Article by B. A. Purinya, D. D. Mungalov, A. S. Krikovtsov, T. I. Shrayer and L. S. Barbarash, Institute of Polymer Mechanics, Latvian SSR Academy of Sciences; Kemerovo Medical Institute]

[Abstract] Mechanical, histologic, histochemical and ultrastructural studies were conducted on prostheses derived from the umbilical vein to assess the latter as a readily available source for vascular repair. Normal-looking umbilical cords were selected for the study and processed in several steps, commencing with washing with blood preservative solution 7B. The two umbilical

arteries were removed from the cord, followed by washing and fixation with 0.625 percent glutaraldehyde for 4-6 days with two changes of the fixative. Following fixation the prosthesis was washed and treated with 0.5-1.0 mg papain per 1.0 gm cord tissue at 65°C for 60 min in acetate buffer, pH 6.0-7.0. After the enzyme treatment the cord was washed with sterile normal saline and immersed in 0.625 percent glutaraldehyde solution until use. Evaluation of the prosthesis based on the umbilical vein demonstrated that it exceeded currently available prostheses in terms of strength and elasticity, with the tensile strength with the present method of preparation exceeding by 16.8 percent that of prostheses prepared by other methods. In addition, the wall thickness of the umbilical vein preparation was 0.75 plus or minus 0.16 mm, close to the wall thickness (0.53 plus or minus 0.03 mm) of the saphenous vein in humans. Ultrastructural analysis revealed that the strength of the prostheses was due to the arrangement of the collagen fibers and their cross-linking by collagen fibrils. Figures 3; references 19: 15 Russian, 4 Western.

UDC 579.842.15+579.842.11]:579.253

Differentiation of Virulent Shigellae and Invasive Escherichia from Avirulent Forms by Indirect Immunoenzyme Assay

18400102a Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian* No 6, Jun 88 (manuscript received 21 Mar 87) pp 55-61

[Article by I. A. Nastichkin and A. A. Sokolenko, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Confirmatory studies were undertaken on the report that virulent and avirulent shigellae and escherichiae may be differentiated on the basis of indirect immunoassay of the surface antigenic virulence marker (AVM) [Pal, T., et al.; J. Clin. Microbiol., 21(3): 415, 1985]. These findings were correlated with the presence of 120 and 140 MD virulence plasmids. The studies were conducted with 11 virulent and 23 avirulent strains of *Shigella flexneri*, *Sh. dysenteriae*, and *Sh. sonnei*, and with smooth enteroinvasive *E. coli* 0124 and 14 rough forms. The indirect immunoassay test for AVM is regarded as significant if the OD of a positive control exceeds, 2.1-fold, that of the negative control or of a specimen under comparison. The results with the bacteria in question yielded values for the virulent forms that were 2.32- to 5.08-fold greater than for the avirulent forms, providing confirmation for the applicability of this approach to the differentiation of these genera on the basis of virulence. However, this approach was not applicable to avirulent forms that bear the 120 to 140 MD plasmids or their fragments. In the latter case, as demonstrated by studies on *E. coli*, immunoassay studies with an isolated outer membrane protein antigen showed a 2.24-fold greater value for the virulent strain than for the plasmid-bearing avirulent form. The latter finding suggests that such outer membrane proteins enter into the AVM in strains bearing the plasmids or their fragments. Figures 1; references 17; 7 Russian, 10 Western.

UDC 579.887.9.083.12

Isolation and Identification of Novel Legionella Species

18400102b Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian* No 6, Jun 88 (manuscript received 27 Jul 87) p 110

[Article by I. S. Tartakovskiy, V. Kasovskiy, Ye. Tsvetkova, O. I. Barkhatova, A. Tomov and S. V. Prozorovskiy, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow; Higher Military Medical Institute, Sofia, Bulgaria]

[Abstract] Bacteriologic studies were conducted on water samples implicated in an outbreak of legionellosis, in order to define the species spectrum. Direct immunofluorescence techniques led to the identification of

Legionella pneumophila, *L. dumoffii*, and *L. longbeachae*. These findings point to the circulation of at the least three species of legionella in the USSR.

UDC 579.843.4:579.253.43

Isolation and Characteristics of Mutants of Luminescent Bacteria With High Sensitivity to Aliphatic Aldehydes

18400132 Moscow *BIOLOGICHESKIYE NAUKI in Russian* No 8, Aug 88 (manuscript received 4 Mar 88) pp 84-89

[Article by V. A. Marganiya, Yu. A. Malkov, V. S. Danilov, and N. S. Yegorov, Department of Microbiology, Moscow State University imeni M. V. Lomonosov]

[Abstract] Aldehyde-dependent mutants with improved characteristics were produced from 2 species of marine luminescent bacteria (*Photobacterium fischeri* 6 and *Benkeia harveyi* 392) and were tested for their sensitivity to aldehydes in a wide range of concentrations. Treatment of the bacteria by nitrosoguanidine in concentrations ranging from 10^{-7} M to 10^{-14} M produced 123 dark aldehyde-dependent mutants. Sequential selection of mutants most sensitive to microquantities of aliphatic aldehydes was carried out. The eight most promising mutants were tested in a wide range of concentrations of aldehyde in the sample. The threshold of sensitivity of the aldehyde-dependent mutants was 10^{-14} M. All mutants retained their luminescence intensity after storage for 2 years and maintained the capacity to stimulate luminescence when exposed to aliphatic aldehydes. The aldehyde-dependent mutants are sensitive biosensors and can be used in microanalysis of both saturated and unsaturated aliphatic aldehydes. Figures 14; 4 Russian; 10 Western.

UDC 587.6

Degradation of α -Methylstyrene and Toluene By Plasmid-Containing Strains of Pseudomonas Bacteria

18400138b Moscow *IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian* No 4 Jul-Aug 88 (manuscript received 28 Aug 86) pp 558-564

[Article by L. A. Golobleva, A. M. Boronin, R. M. Aliyeva, S. A. Rustemov, V. V. Kochetkov and G. A. Tusupbekova, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino; Institute of Microbiology and Virology, Kazakh Academy of Sciences]

[Abstract] Previous experimental data have indicated that plasmids controlling the transformation of α -methylstyrene by *P. acidovorans* 9 participate in the breakdown process. This article studies a new series of microorganisms obtained from acetaldehyde production waste water, determining their ability to assimilate various aromatic compounds and the nature of the genetic

control of degradation of these compounds. Eleven strains of microorganisms that utilize α -methylstyrene and toluene as their sole sources of carbon energy and are resistant to mercury ions were isolated from the waste. Two of the strains belonged to the species *P. fluorescens*, the rest to *P. aeruginosa*. The *P. aeruginosa* strains were grown on saccharose, lactose, and maltose. All the strains vigorously metabolized the reduced aromatic compounds, but not the oxidized compounds. The results indicated that the strain

P. aeruginosa BS176 contains a conjugative plasmid with a molecular mass of 130 amu; the plasmid controls the degradation of α -methylstyrene and toluene and carries the genetic determinant of resistance to mercury ions. The plasmid, which apparently effects genetic control of the oxidation of toluene via two metabolic paths, is found in the strain of *P. aeruginosa* extracted from the waste of synthetic rubber production. Figures 3, references 15:5 Russian, 10 Western.

UDC 577.27

Selective Toxicity of Antibody-Ricin-A-Chain Conjugate For Tumorous Human B-cells. II. Comparison of Activity of Immunotoxins Obtained from Polyclonal and Monoclonal Antibodies
18400134a Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 4, Jul-Aug 88 (manuscript received 16 Jun 87) pp 911-916

[Article by A. G. Tonevitskiy, O. S. Zhukova, V. A. Rakhmanova, Ye. L. Arseneva, G. T. Bogacheva, All-Union Cardiology Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] With an eye to increasing the effectiveness and selectivity of immunotoxins—synthetic hybrid molecules that contain toxins or their catalytic subunits conjugated with antibodies that interact with specific antigens on a target-cell surface—the authors compare the cytotoxic activity of conjugates obtained on the basis of monoclonal and polyclonal antibodies to one and the same antigen, an IgG L-chain, on the surface of Burkitt EB-3 lymphoma cells. The comparison is used specifically to assess the possibility of an increase in immunotoxin activity by increasing the effectiveness of delivery of the ricin A-chain to target cells by optimal selection of a vector: polyclonal antibodies instead of monoclonal antibodies or a mixture of monoclonal antibodies to one marker-antigen. A 50-percent inhibition of protein synthesis 18 hours after the treatment of the cells with the immunotoxins occurred at concentrations of the conjugates of 1.2×10^{-9} M and 0.7×10^{-9} M with polyclonal and monoclonal antibodies, respectively. These values were obtained owing to the fact that only part of the molecules in the polyclonal antibodies preparation can react with the target cells. Control conjugates obtained from monoclonal antibodies that do not react with L-chains on the lymphoma cell surface or that contain non-immune serum IgG did not affect the target cells significantly even at a concentration of 10^{-7} M. No significant differences appeared in immunotoxins from polyclonal and monoclonal antibodies in the kinetics of protein synthesis inhibition. After 60 minutes of treating the lymphoma cells, conjugate activity remained approximately the same. A 30-minute treatment, however, elevated somewhat the cytotoxic activity of the conjugate with monoclonal antibodies. Figures 3; references 17: 2 Russian; 15 Western.

UDC 577.21.6.3.1.

Study of Effectiveness of Chloramphenicol Acetyltransferase Gene Expression Under Control of Allogenic Regulatory Regions in Escherichia Coli Cells. III. Study of Relative Effectiveness of Cloned Promoters of Escherichia Coli and Coliphages

18400134b Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 22 No 4, Jul-Aug 88 (manuscript received 8 Sep 87) pp 1033-1044

[Article by M. E. Trukhan, R. L. Gorovits, M. I. Lebedeva, A. L. Lapidus, S. V. Mashko, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] The interaction of structure and function of regulatory DNA sequences and the specificity of protein-nucleic recognition has been of practical interest to researchers in recent years because, in securing expression of heterologic genes in *E. coli* and other microorganisms, the structural part of the cloned gene must be placed under the control of a well-characterized prokaryotic promoter. Thus, the authors here measured the rate of initiation of model *cat* gene transcription under the control of *E. coli* promoters (P_{lac} UV5, P_{trp} , P_{cat} , P_{tac}), the $\lambda(P_L, P_R)$ phage, and the $\phi X174 (P_D)$ phage, using hybridization of pulse-labelled *in vivo* mRNA with DNA coding sites. They used a chloramphenicol acetyltransferase (Cm-acetylase) gene of the plasmid pBR325 as the model. The *bla(Ap^r)* gene, present in all recombinant plasmids and with its own constitutive promoter, made it possible to use the level of suitable mRNA in the cell as an internal standard, making it possible to standardize absolute amounts of *cat* gene mRNA synthesized from different promoters. The researchers found that the use of the P_R promoter instead of the *lac* UV5 or the *trp* OP made it possible to increase the effectiveness of expression of the cloned allogenic gene. They concluded that, in engineering new vector systems for the expression of genes in *coli*, the choice of the "strongest" promoter is not as important as the use of a well-regulated promoter and highly effective initiation of translation of the allogenic protein product. Figures 4; references 23: 5 Russian; 18 Western.

UDC 577.3

Adsorption On Receptors: Molecular-Statistical Model of "Dose-Effect" Relation

18400138a Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 4 Jul-Aug 88 (manuscript received 12 Jan 87) pp 531-537

[Article by S. N. Bushelev, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] A theoretical model is constructed of the variation in biological activity with concentration. Adsorption on receptors or the interaction of biologically active substance molecules with receptors on the surface on the target of action of the biologically active substances was studied. Targets may range from biopolymers to larger component systems such as cell membranes. In spite of its simple initial assumptions—independence and equivalence of binding sites—the model makes it possible to describe, among others, the three most typical forms of dose-effect curves—the arched Langmuir curve, the S-curve, and the curve with a maximum—without introducing any additional considerations such as interaction of centers or nonequivalence of centers. A model with two types of binding centers is used to describe experimental dose curves of the anthracycline antibiotics daunorubicin and doxorubicin, which act against tumor cells *in vitro*. It is concluded that tumor cells have two types of centers for binding with anthracycline antibiotics: receptors and acceptors. The former are apparently located on the cell membrane, the latter are internal centers bound with the DNA. Figure 1, references 8: 6 Russian, 2 Western.

UDC 577.391;612.419;577.44

Effect of Millimeter Range Radiation on Effectiveness of Bone Marrow Transplantation
18400079a Moscow RADIOBIOLOGIYA in Russian
Vol 28 No 3, May-Jun 88 (manuscript received 9 Oct 87) pp 361-364

[Article by N. D. Devyatkov, L. A. Sevastyanova (now deceased), E. S. Zubenkova, M. B. Golant]

[Abstract] With L. A. Sevastyanov having clearly demonstrated that exposure to low-intensity millimeter electromagnetic radiation helped reduce the toxic action of chemotherapy agents and x-ray irradiation in laboratory animals, the researchers here performed several series of experiments on more than 200 hybrid (CBAXC₅₇Bl) F₁ mice to study the possibility of amplifying the protective effect of the electromagnetic radiation by using it to activate transplanted animal bone marrow. Recipient mice, subjected to bone marrow transplantation were exposed to a 10 Gy lethal dose of γ -irradiation. Donor mice, which provided the bone marrow, were exposed to electromagnetic radiation for one hour, with the wavelength modulated in a range of 7.09-7.12 mm at a frequency of 50 Hz; flux density was 12.5 mV/cm². Lethal outcome, dynamics of weight change and cellular structure of the bone marrow after 30 days were used to judge the biological effects of the experiments. Transplantation of bone marrow from unirradiated mice into mice irradiated with a 10 Gy dose increased the length of survival 2.5-fold, while use of bone marrow of donors subjected to millimeter range radiation increased the mean length of survival 35-fold. A correlation was observed between weight loss and life span. Controls

irradiated with a lethal dose lost 4-6 grams of body weight (dropping from 20-22 g to 16.5 g) after the fifth day and died on the eighth day. Recipients of bone marrow taken from irradiated mice on the first, second, and third days after irradiation maintained a body weight of 19.5-21 g for 20-30 days. Mice in the group with bone marrow from irradiated donors showed cell counts of 22×10^6 to 28×10^6 . References: 8 (Russian).

Possible Mechanism of Action of HF Pulsatile Fields

18400140d Moscow BIOFIZIKA in Russian
Vol 53 No 4, Jul-Aug 88 (manuscript received 29 May 86; in final form 20 Jan 87) pp 698-702

[Article by R. E. Tigranyan, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Experimental studies were conducted with pulsatile HF fields and various liquid targets (ethanol, 1 M NaCl) using a 70 W generator modulated to deliver 10^{-5} to 10^{-3} sec pulses at frequencies of 10 to 10^4 Hz. An analysis was conducted on the various types of elastic waves that were generated and their specific effects. The mathematical study suggested that shearing waves may have biological consequences based on an acoustic mechanism of action. The latter stems from the demonstration that part of the absorbed electromagnetic energy is transformed into intense mechanical oscillations. The pulsations under study were shown to affect frog nerve action potentials in terms of conduction and amplitude, if the HF pulse was synchronized with the active state of the nerve. Figures 4; references 23: 12 Russian, 11 Western.

Long-acting, Nonaddictive Morphine Preparation
18400146 Moscow TRUD in Russian 2 Dec 88 p 4

[Article by S. Aleksandrov under the rubric "Science is Searching": "The Pain Will Disappear"; first paragraph is source introduction to article]

[Text] A group of Soviet specialists has developed a drug unlike no other in the world. This drug, which is a rarity today, has been named "morfilong." A single injection will relieve a patient's pain for an entire day.

Vladimir Zhorov, doctor of medical sciences, decided to study narcotic medications after fate was unkind to him. Zhorov was a tankman in World War II and, as happened with many others, he was badly burned. It wasn't easy for him to get away from it, and the pain wasn't sweet. At that point, he had find out for himself what the pluses and minuses of narcotics are.

The effect of narcotics is well known. All it takes is for morphine or a similar drug to enter the bloodstream, and it's like a big wave that envelops the body. Pain disappears, anxious thoughts are eliminated and calmness ensues. But all waves recede. After about 3 hours, the pain inevitably returns, and you can't have a second injection of the narcotic after such a short time, since the body will become accustomed to this artificial well-being. This means more hours of agony. But what do you do if there's nothing that can be done about it?

Why can't anything be done it? Zhorov asked himself that question. His father, a former front-line surgeon, advised Zhorov to do research on narcotics. But as life would have it, it wasn't until 1967 that Vladimir Isaakovich began working on the drug which later became known as "morfilong."

The idea was as follows: add to ordinary morphine hydrochloride a special polymer which would, as it were, "release" the drug into the blood in small portions. Helping Zhorov in this work were the experimental chemists and technicians Yu. Kirsh, V. Shumskiy, T. Karaputadze and Yu. Bayramov. The drug was ready in 1970, and the experiments and the clinical tests began. They continued almost up to this year. Morfilong was administered for various problems—cancer, burns, and severe fractures and traumas—and in the post-op period. A single injection of the drug provided complete relief of pain for 22-24 hours. Most important, it can administered to children as well as to the elderly, and the body accepts the drug without becoming accustomed to it.

The Moscow Scientific Research Institute of Oncology imeni P. A. Hertsen, where Zhorov worked, felt that morfilong could make for considerable savings in home-care of cancer patients, since it is injected only once a day. Use of regular morphine in the same situation requires multiple injections. The new drug will save tens of millions of rubles—after all, each visit to a patient by a nurse costs 20 rubles.

So does this mean that the job is done?

An author's certificate has been issued for the drug, and it has been patented in the USA and Great Britain. Zhorov had occasion to visit America with a delegation of physicians. He spoke about his drug in Baltimore. He was invited, immediately, to remain there to work for two or three years or to sign a contract with a drug firm which promised to have the drug in series production within 6 months. Zhorov refused.

At home, he received a 50-ruble award for the author's certificate and the silver medal of the Exhibition of Achievements of the National Economy of the USSR. Production of two million ampules of morfilong per year has been set up. True, there are promises that production will reach about 17 million ampules per year soon, but even that is still very little. The drug is not only scarce—many experienced physicians do not even know about it.

You can't help but ask, just what's the problem? The skeptically inclined reader will immediately say that it's a result of the eternal bureaucratic red tape and commotion. The reader may be right. But it's not even a matter of whether it's time to finally boost our drug production up to the world level or even to make it so that the world level would be striving to catch up with us, which would be useful itself. But competition is not the point. What's important is that people whose illnesses force them to suffer pain should be able to find relief. It is important that there be no such thing as a drug shortage. But for now, there is one. Morfilong is one example.

UDC 615.285.7:547.241].033/.034+615.285.7:547.241].099

Metabolism and Selective Toxicity of Organophosphorus Pesticides

18400106a Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, May 88 (manuscript received 17 Feb 87) pp 53-59

[Article by Ye. A. Yershova, Yu. S. Kagan, M. A. Klisenko and M. V. Pismennaya, All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastic, USSR Ministry of Health, Kiev]

[Abstract] A study was conducted on novel Soviet organophosphorus pesticides (OPP) to assess the structural correlates of metabolism and mammalian toxicity. The studies encompassed two groups of OPPs, one represented by thiophosphates and phosphonates incorporating amino acid moieties, and the second group consisting of thiopropyl derivatives of phosphoric acid. The resultant data demonstrated that mammalian metabolism was of key importance in determining OPP toxicity. The metabolism of OPP bearing an ester bond rests on the susceptibility of the compound to the action of carboxylesterase; otherwise enhanced toxicity may be anticipated. In addition, toxicity is also predicated on the

anticholinesterase activity of the P=O metabolites that permeate the blood-brain barrier. Diminished toxicity for the mammalian organism requires structural features that avoid steric interference with the action of carboxylesterase, an important enzyme in metabolic detoxication. Metabolic inactivation of the thiopropyl congeners of phosphoric acid is largely dependent on the polarity of groups present on the aryl moiety of the OPP molecule. Polarity favors detoxication by enhancing removal of the thiopropyl group in the mammalian organism. These observations may be used in the design of OPPS with selective toxicity for pests while behaving as innocuous agents with respect to mammals. Figures 1; references 19: 16 Russian, 3 Western.

UDC 546.881.616.153.922-085-272.4.001.6

1-Oxovanadatran — Experimental Cholesterosis Inhibitor

18400116b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 302 No 2 Sep 88 (manuscript received 5 Apr 88) pp 468-469

[Article by N. S. Kononova, A. I. Pertsovskiy, M. G. Voronkov, corresponding member, USSR Academy of Sciences, I. F. Shinkarchuk, Z. A. Ovchinnikova and V. P. Baryshok, Yalta Scientific Research Institute of Physical Methods of Treatment and Medical Climatology imeni I. M. Sechenov; Irkutsk Institute of Organic Chemistry, Siberian Division, USSR Academy of Sciences]

[Abstract] Traces of vanadium have been reported to inhibit the synthesis of cholesterol in the stage of transformation of mevalonic acid to squalene and increase catabolism of cholesterol in the liver. The blood vanadium content of atherosclerosis patients is greatly reduced. Parenteral or oral administration of inorganic vanadium compounds at 0.3-1.0 mg/kg to laboratory animals with alimentary hypercholesterolemia over 3-6 months decreases the content of cholesterol in the blood and in the aorta by 1.5-2 times, compared with controls, with no toxic effects. The authors studied the effects of low doses of 1-oxovanadatran, which has better cell membrane permeability than inorganic vanadium, on experimental atherosclerosis, as well as the effect of ammonium metavanadate in experiments on rabbits. Both of the vanadium compounds studied reliably decreased the content of cholesterol in the blood, aorta and liver, ammonium metavanadate having somewhat greater hypocholesterolemic effect, 1-oxovanadatran decreasing the content of cholesterol in the aorta, and particularly in the liver, by a substantially greater margin. References 14: 11 Russian, 3 Western.

UDC 612.82

Allosteric Modification of 1A Serotonin Receptors by Harmans

18400117d Moscow DODLADY AKADEMII NAUK SSSR in Russian Vol 302 No 6, Sep 88 (manuscript received 16 Mar 88) pp 749-752

[Article by I. V. Komissarov, I. I. Abramets and I. M. Samoylovich, Donetsk State Medical Institute imeni M. Gorkiy]

[Abstract] To further define the scope and mechanism of action of the betacarbolines, harman and two of its congeners were evaluated for their effects on serotonin receptors of the lumbar ganglia of mature (160-200 g) rats. The in vitro perfusion studies dealt with harman, 3,4-tetra-methyleneharman (C-412), and methyl harman-8-carboxylate (C-506) in terms of their effects on membrane potentials and with the manner in which they affected neuronal response to serotonin perfusion. Harman, in concentrations of 10^{-7} and 10^{-5} M, had no effect on the membrane potential. However, in a concentration of 10^{-7} M harman potentiated the hyperpolarization induced by serotonin, and enhanced membrane conductivity mediated by serotonin. At the higher concentration (10^{-5} M) harman acted to diminish these effects of serotonin. C-412 and C-506 were likewise without effect on the membrane potential, but over a wide concentration range C-412 enhanced the effects seen with serotonin, while C-506 mitigated them. The data were interpreted to indicate that, in conjunctions with observations made with serotonin agonists and antagonists, the harmans exerted their effects on 1A serotonin receptors via a mechanism involving allosteric modification. Figures 1; references 10: 1 Russian, 9 Western.

UDC 615.214:547.785.5].012.1

Synthesis and Neuropsychotropic Action of Adamantyl Substituted Imidazo [1,2-a]Benzimidazoles

18400123a Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 7, Jul 88 (manuscript received 14 Jul 87) pp 815-819

[Article by I. S. Morozov, V. A. Anisimova, N. I. Avdyunina, O. A. Lukova, B. M. Pyatin, N. A. Militareva, N. P. Bykov, R. G. Dvalishvili and A. A. Khranilov, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow; Scientific Research Institute of Physical and Organic Chemistry, Rostov University]

[Abstract] As part of a search for novel neuropsychotropic agents a series of aminomethyl derivatives of imidazo[1,2-a]benzimidazole, bearing an adamantane moiety, were synthesized for animal testing. The synthetic approach relied on the systems developed by

Yutilov et al. [KHIMIYA GETEROTSIK. SOYEDINE-NIY, No 3: 416-420, 1965] and Simonov et al. [ibid, No 1:111-114, 1973], which made it possible to use mild reaction conditions (e.g., acetone, room temperature). The administration of 5-50 mg/kg of these agents to white, mongrel male mice showed enhancement of spontaneous motor activity, with peak activity occurring 3-5 h after administration. Studies with rats using similar dosages failed to show any improvement in physical performance in swim tests. Determinations of acute toxicity on mice yielded LD₅₀ values in the 56.4 to 178 mg/kg range. These findings suggest that the synthetic agents employed in this study may be useful in the preparation of novel psychotropic agents. Figures 1; references 12: 10 Russian, 2 Western.

UDC 615.214.3:547.781.1].012.1

Synthesis and Pharmacological Properties of N-Adamantylamides of Benzimidazole-3-Acetate
18400123b Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No, Jul 88 (manuscript received 10 Mar 87) pp 819-822

[Article by N. I. Avdyunina, I. S. Morozov, R. F. Bolshakova, N. A. Militareva, N. V. Klimova, N. P. Bykov, B. M. Pyatin, A. A. Khranilov and E. G. Dvalishvili, Scientific Research Institute Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Abstract] As part of a research program designed to yield novel psychotropic agents, five new N-adamantylamide derivatives of benzimidazole-3-acetate were obtained in an approach commencing with the reaction of 1-alkyl-2-aminobenzimidazoles with N-(chloroacetyl)-aminoadamantanes. Trials with mongrel male mice and rats showed that the agents exerted variable neurotropic effects in a dose-dependent manner, resulting in either stimulation or inhibition of spontaneous motor activity. In addition, most agents also prevented the onset of trifluoperazine-induced catalepsy, pointing to their dopamine mimetic properties. On balance, these agents were felt to be promising congeners for further assessment and, on mice, were demonstrated to possess moderate toxicity (LD₅₀ values ranging from 65.0 to 564.0 mg/kg). Figures 1; references 12: 8 Russian, 4 Western.

UDC 615.281:578]:547.898].012.1

Synthesis and Antiviral Activities of Derivatives of 18-Crown-6 Ethers

18400123c Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 7, Jul 88 (manuscript received 26 Mar 87) pp 836-839

[Article by E. I. Ivanov, A. A. Polishchuk, Ye. I. Boreko, G. V. Vlado and L. V. Korobchenko, Physiocochemical Institute imeni A. V. Bogatskiy, Odessa; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk]

[Abstract] In view of the demonstration that certain crown ethers possess antiviral properties, additional congeners were synthesized for testing in tissue culture

against a wide variety of viral agents. Specifically, novel 18-crown-6 ethers incorporating azole, azine, or azepine radicals were obtained and screened in plaque formation tests. Trials with vaccinia, herpes simplex, fowl plague, Newcastle disease, vesicular stomatitis, VEE, influenza, and ECHO-6 viruses showed that certain agents were weakly or moderately active against vaccinia. Introduction of thiazole or quinazoline moieties into the basic 18-crown-6 ether structure yielded two additional compounds with weak activities against influenza and vesicular stomatitis. Figures 1; references 5: 3 Russian, 2 Western.

UDC 615.849.1.015.25.076.9

Radioprotective Properties of Pyrrolidone-Containing Heterocyclic Analogs of S-Aminoalkylisothioureas

18400123d Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 7, Jul 88 (manuscript received 2 Mar 87) pp 839-843

[Article by B. V. Golomolzin, E. A. Tarakhtiy, I. P. Tregubenko, G. A. Ryazanova, F. P. Sidelkovskaya, V. A. Ponomarenko and M. M. Vlasova, Ural Polytechnical Institute imeni S. M. Kirov; Institute of Plant and Animal Ecology, Ural Scientific Center, Sverdlovsk; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow]

[Abstract] The discovery that the S-aminoalkylisothioureas possess radioprotective properties led to the synthesis of congeners incorporating pyrrolidone in the hope of mitigating toxicity and improving efficacy. Pyrrolidone was selected because this moiety combines hydro- and lipophilicity, factors that may enhance biological activity. Basically, the pyrrolidone analogs failed to show any enhanced radio-protective efficacy or attenuated toxicity vis-a-vis the parent compounds in studies on BALB male mice. One of the newly synthesized agents, a 2-(1-N-pyrrolidonyl-3-dialkylaminopropyl-2)thio-3-arylquinazolinone⁴. HCl, improved the survival rate to 75 percent, and therefore appears to merit further studies. Figures 1; references 5 (Russian).

UDC 615.31:[547.95:547.943].032.21.033

Dalargin Bioavailability in Rats Following Intranasal Administration

18400126d Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 7, Jul 88 (manuscript received 29 Jun 87) pp 48-50

[Article by V. A. Vinogradov, Ye. I. Kalenikova and A. S. Sokolov, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] A comparative analysis was conducted on the bioavailability of dalargin (Tyr-D-Ala-Gly-Phe-Leu-Arg) following intranasal, intra-muscular, or intravenous

administration in rats, to determine whether the intranasal route is a viable route of administration for clinical consideration. The studies were conducted on 300-400 g male Wistar rats, and consisted of monitoring of blood levels of tritium-labeled dalargin and catabolic products. The latter determinations demonstrated that tyrosine, and the N-terminal tetra- and pentapeptides represented the major breakdown products in the blood stream. The highest levels of dalargin were attained 10 min after intranasal or intramuscular administration (300 µg/kg). The half-times for elimination after intramuscular and intranasal administrations were, respectively, 23.2 and 21.3 min, with corresponding values for absolute bioavailability of 15 and 8 percent (100 percent for intravenous route). In view of the efficacy of intramuscular dalargin in the management of peptic ulcers, the fact that intranasal administration of dalargin yielded a relative bioavailability of 54 percent vis-a-vis intramuscular injection indicates that intranasal administration may have clinical applications. The possibility of intranasal administration may contribute to greater use of dalargin in the treatment of gastric and peptic ulcers, since oral administration is excluded because of rapid enzymatic degradation of dalargin in the gastrointestinal tract. Figures 3; references 7: 2 Russian, 5 Western.

UDC 616.859.1-092.9-092:616.831-008.6:577.175.82

Vestibuloprotective Characteristics of Certain Regulatory Peptides

18400124e Moscow BYULLETEN
EKSPERIMENTALNOY BIOLOGII I MEDITSINY in
Russian Vol 106 No 7, Jul 88 (manuscript received
1 Oct 87) pp 50-52

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

[Abstract] Screening trials were conducted with a series of regulatory peptides to identify those with vestibuloprotective (anti-motion sickness) properties. The peptides were administered into the 4th ventricle of the brain in male cats, subjected to vertical and horizontal accelerations to simulate motion sickness. The resultant findings showed that the following peptides prevented vestibular imbalance: substance P, an undecapeptide derived from a hydra, and gamma- and des-try¹-gamma-endorphins, as well as naloxone, Beta-Lipotropin,

ACTH, and alpha-endorphin failed to protect against motion sickness. These observations suggest that automatic disorders of the vestibular apparatus entail pathogenetic mechanisms in which certain regulatory peptides are involved. References 15: 8 Russian, 7 Western.

UDC 616.342-002.44-085.243.4:615.458.03

Use of Dalargin Aerosol To Treat Exacerbation of Uncomplicated Duodenal Ulcer

18400139a Moscow VOPROSY KURORTOLOGII,
FIZIOTERAPII I LECHEBNOYFIZICHESKOY
KULTURY in Russian No 4 Jul-Aug 88 (manuscript
received 24 Dec 87) pp 19-25

[Article by N. P. Buglak, N. N. Bogdanov, V. A. Vinogradov and M.I. Titov, Crimean Medical Institute]

[Abstract] The opioid hexapeptide dalargin, a leu-enkephalin analogue, has a clear protective effect on the gastroduodenal mucosa. This article reports on a search for a method of administration of dalargin that facilitates a rapid increase in its active surface and rapid entry into the blood and lymph, while protecting it from the proteases in biological fluids. Experiments were performed on 75 rats using an experimental model of duodenal cysteamine ulcer; the dalargin was administered as an aerosol with an inhalation unit consisting of three sealed chambers of 0.06 m³ each. It was found that inhalation of the aerosol produced a clear cytoprotective effect, decreasing the number of ulcers by a factor of 30. Gastrocepin was less effective when administered by the same technique. In a second series of experiments, dalargin was effective in doses of 2, 10 and 50 µg/kg. Clinical studies were performed on 48 patients with endoscopically confirmed duodenal ulcer. All patients received diet therapy, one group received an IM injection of dalargin 1 mg in 1 ml of 0.9 percent saline b.i.d., total 42 mg. Another group of patients inhaled dalargin, 1 mg in 5-10 ml distilled water b.i.d. for one week, once per day for the next two weeks, total 28 mg. Inhalation was found to be superior to IM administration in cytoprotective effect, with 22 of 23 patients achieving full closing of the ulcer, while in the 23rd patient the size of the ulcer was decreased to less than half its initial size. All patients reported rapid disappearance of pain and other symptoms, with no side effects. References 16: Russian.

UDC 612.017.2-06:612.273.2

Enhancement of Resistance to Extreme Stress Factors by Normobaric Hypoxic Stimulation

18400106b Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian
No 5, May 88 (manuscript 5 Jan 87) pp 77-80

[Article by R. B. Strelkov, A. G. Belykh, Yu. M. Karash, I. Yu. Kiryanov, A. I. Matyushin, V. M. Roykhel, A. Ya. Chizhov and V. V. Pogodina, 2nd Moscow Medical Institute imeni N. I. Pirogov]

[Abstract] Soviet scientists have demonstrated that resistance to various endogenous and exogenous stressful factors may be enhanced by normobaric hypoxia induced by breathing a gas mixture consisting of 10 + 1 percent oxygen and 90 +/- 1 percent nitrogen. A summary of studies conducted with various animals (rats, rabbits, mice) subjected to asphyxia, hemorrhagic shock, or toxic chemical agents, after various therapeutic priming schedules (e.g., 5 min at a time for a total of 30 min/day for 2 to 3 weeks), resulted in significantly enhanced tolerance of the insults. Similarly, clinical trials involving 94 women with salpingoophoritis treated with intermittent inhalation of the gas mixture (5 min of hypoxic mixture alternated with 5 min of air breathing for a total of 30 min of hypoxic gas per session, for a total of 15 to 30 sessions) showed reduction in pain, inflammation, and sleep disorders in a significant number of patients. Finally, 115 oncologic patients were managed with the hypoxic gas mixture (30 min/day, 4-4.5 weeks) in a combination with conventional therapeutic modalities. The 5-year survival rates for patients with lung cancer that had been subjected to normobaric hypoxic stimulation was 17.1 percent, versus 5.0 percent for patients deprived of this modality. The 7-years survival figures for breast cancer patients with and without hypoxic stimulation were, respectively 65.0 percent and 45.0 percent. These findings, both experimental and clinical, supported and confirmed the efficacy of normobaric hypoxic stimulation in enhancing resistance to various insults, suggesting that normobaric hypoxic stimulation may also be a method of mitigating the side effects of certain therapeutic measures. references 14 (Russian).

UDC 612.815

Modeling The Influence Of Ion Channel Blockage On End Plate Currents

18400116c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 302 No 2 Sep 88 (manuscript received 25 Feb 88) pp 495-498

[Article by V. A. Snetkov and N. R. Nigmatullin, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; State Medical Institute imeni S. V. Kurashov, Kazan]

[Abstract] In order to clarify the features of sequential blockade of an open channel under conditions approximating actual synaptic transmission, the authors have

developed a mathematical model, a further development of the numerical model of miniature end plate currents, which is useful in determining the relationship between structure and action of blockers and in analyzing situations which are difficult to interpret, such as the effect of rapidly dissociating blockers. In the model a system of nonlinear differential equations in a flat symmetrical coordinate system describes processes occurring within the active zone of a synapse, represented by a circle with a radius of 1.3 μm . The model can be used to describe the effect of various open ion channel blockers at the macroscopic level. The model can be effectively used to study their influence on the kinetics of miniature end plate currents under various experimental conditions—for example, when the membrane potential changes or when the miniature end plate current drop is determined only to a certain extent by closure of ionic channels. Figures 2, references 9: 4 Russian, 5 Western.

UDC 616.24-008.4-092.9-085.357:577.175.829

Reversal of Respiratory Failure by Thyrotropin Releasing Hormone

18400124a Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 7, Jul 88 (manuscript received 5 Aug 87) pp 17-19

[Article by Ts. V. Serbenyuk, I. Ye. Gurskaya, A. D. Slyuta, G. Ya. Roze and P. Ya. Romanovskiy, Chair of Animal and Human Physiology, Biological Faculty, Moscow State University imeni M. V. Lomonosov]

[Abstract] The detection of TRH (thyrotropin releasing hormone) in the respiratory center of the medulla oblongata led to experiments designed to provide additional information about the role of TRH in respiratory control. Studies, with Nembutal (40 mg/kg)-anesthetized cats, showed that intravenous administration of 20-30 $\mu\text{g/kg}$ TRH led to an increase in the respiratory rate of 20-30 percent and, occasionally, to awakening. Further studies with cats anesthetized with 50-60 mg/kg Nembutal showed that 20-30 $\mu\text{g/kg}$ TRH reversed respiratory failure induced by artificial hyperventilation, and prevented failure of this type if given 15-20 min prior to artificial hyperventilation. In addition, while bilateral vagotomies in such animal preparations led to a 30-40 percent decrease in the rate of respiration, administration of 20-30 $\mu\text{g/kg}$ TRH led to reversal of the downward trend within 25-30 min. Furthermore, administration of 20-30 $\mu\text{g/kg}$ TRH 10-20 min before the bilateral vagotomies mitigated the extent of respiratory slowdown. These preliminary findings demonstrated that TRH, in addition to its obvious endocrine effects, also is involved in modulation of respiratory activity. Figures 3; references 9: 2 Russian, 7 Western.

UDC 613.863-07:616.155.1/3-007.1-02:615.31:[547.95:547.943

Opioid Peptide Modulation of Hemopoietic Response to Stress

18400124b Moscow *BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian* Vol 106 No 7, Jul 88 (manuscript received 30 Jun 87) pp 23-26

[Article by Ye. D. Goldberg, O. Yu. Zakharova and A. M. Dygay, Institute of Pharmacology, Tomsk Scientific Center, USSR Academy of Medical Sciences]

[Abstract] Outbred male mice were used in trials on the effects of leu-enkephalin and its synthetic analog, dalargin, on hemopoietic response to the stress of immobilization. The animals were immobilized in the supine position for 6 h, after which they were injected intravenously with either 100 µg/kg leu-enkephalin or dalargin. Monitoring of blood differential counts and bone marrow cytology for the next 10 days revealed marked differences in the hemopoietic responses of the control and experimental animals. The control animals presented with marked neutrophilic leukocytosis with 3 h of immobilization, with the count exceeding the baseline level by 191 percent. Concomitantly, eosinophils continued to fall and virtually disappeared from the peripheral blood in 12 h. The bone marrow showed a 233 percent increase in lymphoid elements during the first 12 h, while differential counts showed a pronounced lymphopenia. A day after the onset of immobilization the hematologic and bone marrow showed recovery of normal parameters. Six to 8 days later the control animals developed marked bone marrow hyperplasia, with elevation of myelokaryocytes to 140 percent above baseline level, and increases in erythro- and granulocytogenesis by 245 and 140 percent, respectively. Treatment of the animals with leu-enkephalin or dalargin reversed the effects of stress on the hemopoietic system, with dalargin shown to be the more potent agent. The effects of dalargin were shown to be due to depression of plasma corticosteroid levels to below control levels, whereas in the untreated mice the corticosteroids rose to 38.3 µg/100 ml at 6 h, and persisted at levels exceeding 30 µg/100 ml for about 3 days (22.4 µg/100 ml control level). Figures 2; references 7 (Russian).

UDC 612.841.0143:612.6.014.43

Effects of Dalargin (Stable Leu-Enkephalin Analog) on Cell Division of Rat Corneal Epithelium

18400124g Moscow *BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian* Vol 106 No 7, Jul 88 (manuscript received 9 Jun 87) pp 97-99

[Article by T. D. Pankova, S. S. Timoshin, M. I. Radivov and M. I. Totov, Central Scientific Research Laboratory, Khabarovsk Medical Institute]

[Abstract] Trials were conducted to determine the effects of dalargin, a stable analog of leu-enkephalin, on cell division of corneal epithelium in order to ascertain whether dalargin effects, on the mitotic cycle, underlie its therapeutic effectiveness in the management of ulcers. The study was conducted with male, 180-220 g, rats treated intraperitoneally with 10 µg/kg dalargin at 0800 hours, with the mitotic index, DNA synthesis, etc., monitored for the subsequent 24 h. The tritium-labeled thymidine incorporation data revealed that DNA synthesis was increased during the period of observation, and was accompanied by a 1.7- to 3.1-fold increase in the index of labeled nuclei, a 1.2- to 3/5-fold increase in the mitotic index, and a shortened G₂ phase. These findings were consistent with a dalargin mechanism of action involving acceleration of the mitotic cycle, enhancement of DNA synthesis, and expansion of the pool of proliferative cells. Figures 1; references 12: 7 Russian, 5 Western.

Informational Characteristics of Neuronal and Synaptic Plasticity

18400140c Moscow *BIOFIZIKA in Russian* Vol 53 No 4, Jul-Aug 88 (manuscript received 18 Feb 86; in final form 18 Dec 86) pp 659-666

[Article by A. A. Frolov and I. P. Muravyev, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] A mathematical analysis was conducted on information loss in relation to neuronal plasticity seen in neuronal networks exhibiting Hebb-type [Hebb, O.O., *The Organization of Behavior*, Wiley, 1949] and Albus-type [Albus, I.S., *Math. Biosci.*, 10: 25, 1971] plasticity. The loss of information in transition from 'complicated' decoding (when information is derived for an entire array of recorded information) to 'simple' decoding (when information is derived for individual events) in a neuronal network with indeterminate structure was so great for a system with gradual plasticity that it lost its advantage over a binary type of plasticity in terms of informational capacity. Consequently, such losses did not apply to Albus-type synaptic networks, while losses for the Hebb-type networks were defined by the functional parameters of the network. References 7: 5 Russian, 2 Western.

UDC 614.2+616—053.2—084

Organization of Annual Mass Health Screening of Children

18400113 Alma-Ata ZDRAVOOKHRANENIYE
KAZAKHSTANA in Russian No 6, Jun 88 pp 17-19

[Article by N. M. Abragimov, S. A. Gagarina, and D. S. Khasangaliyeva, Children's Polyclinic No. 1, Alma-Ata, under the rubric "Mass Health Screening"]

[Text] In 1983, by order of the republic's health minister, the Leninskiy Rayon was designated as the primary experimental area for annual mass health screening. A permanent commission for overseeing the annual mass health screening of children was set up here. The contingents of children who were to get medical checkups were designated, as were the timetables and numbers of individuals each stage of the screening would involve. The work schedules of specialists were altered, and specific days of the week—including Saturdays—were chosen. Instructions involving the screening were formulated for physicians.

Department heads from polyclinics, together with district physicians, determined beforehand, according to a schedule, the number of children it would take for a steady flow on Saturdays, which are the lightest days for pediatricians. The schedule was set up in such a manner that children from a given district only would be invited to undergo the health checkup on a given Saturday. The district nurses and physicians regulate the flow based on the load. The medical nurses first make anthropometric measurements of the child, who is then sent to the laboratory, to the specialists, and then, with all the examination results, to the district pediatrician, who draws a conclusion and preliminarily places the child in a given health group. For a child with health aberrations, depending on the pathology identified, the specialist or district physician fills out Form No. 30 and registers the child in an outpatient clinic.

In 1985, more than 11,000 of 19,000 children who underwent health screening were registered in an outpatient clinic.

As a result of the screening, children between the ages of one month and 14 years were distributed according to health group as follows: group I, 56.7 percent; group II, 32.6 percent; group III, 10.6 percent.

Among the children examined for the first time, 2,603 were identified as having some sort of disease, and 1,320 children were newly registered in an outpatient clinic—695 by a pediatrician, 113 by a surgeon, 124 by a neuropathologist, 169 by an otolaryngologist, 102 by an oculist, 117 by a gynecologist, 11 by a dermatologist, 77 by a logopedist, and 30 by a stomatologist.

Thus, because of the increase in the number of individuals identified for the first time with a given disease, the number of outpatients rose from the year 1984 by 20.6 percent of the total number of children. Moreover, the number of outpatients per pediatrician and per thousand children grew in like manner to 165 from 99.2 and to 206 from 123, respectively. The overall percentage of children in the outpatient group who underwent health-improvement therapy grew to 25.5 from 24.3.

Analysis of the work done in the mass health screening indicates that the personnel and equipment that are allotted for providing medical care to the existing contingent of the population are insufficient for carrying out the mass health screening program. In addition, the annual mass medical checkups conducted by school physicians and physicians in preschool facilities are still not very effective. On average, school physicians identify no more than 15 percent of the functional disturbances among the total number of first-time aberrations that are detected among children, and only about 8.5 percent of the chronic diseases. Basically, these aberrations are detected only in the contingent of children who are made to undergo mandatory examination in which specialists participate, which means, in a number of cases, that detection is late and health-improvement measures must be taken. It should be noted that pediatricians today be able to predict approaching changes in the health of a child at the most critical moments of the child's development. Such prediction can be made on the basis of several quick tests.

For that reason, to make mass medical checkups effective and to improve the initial detection of various health and developmental aberrations, we used diagnostic tests developed in 1984 by the Scientific Research Institute of Hygiene of Children and Teenagers of the USSR Ministry of Health.

Underlying these screening tests is the principal of early detection of the pathologies most frequently encountered in children. The tests make it possible to detect in the children the most probable aberrations of the gastrointestinal tract, the cardiovascular system, the endocrine system, the urinary system, otolaryngological organs, and the organs of vision, as well as anomalies in physical development and the locomotor system and allergic diseases. The screening program includes a survey questionnaire for the parents and the students that uses a special form.

Monitoring children's health with the screening program is based on new principles of organization of mass medical checkups that consist of the following stages: prephysician service, physician's examination, and examination by polyclinic specialists of children sent to them by the physicians from schools and preschool facilities.

Use of the screening programs for an organized population (schools and preschool facilities) have enabled us to improve the detectability of health aberrations in school-age children and preschoolers, to efficiently use the time of physicians and polyclinic specialists, and to lighten the load of the laboratory. Thus, from the preliminary results of examination with the screening tests, 3,045 of 10,902 students were identified as having various health aberrations. Of those 3,405 students, 950 needed to see a neuropathologist; 315, a rheumatologist; 300, a surgeon; 430, an otolaryngologist; 100, an allergologist; 283, a gastroenterologist; and 420, a nephrologist. Among 3,721 children at preschool facilities, the overwhelming majority needed to see an otolaryngologist, a neuropathologist, or an allergologist.

The nurses in the schools spent an average of 10 minutes per child examining with the screening tests.

It should be noted that in the mass health screening, we are having trouble with the flow of mass checkups of children by specialists such as allergologists, gastroenterologists, nephrologists, and neuropathologists. This overload of district and specialized services—associated with a growing number of visits and due in part to universal mass health screening—is a crucial problem that needs to be solved.

We feel that the way out of this situation is strict differentiation of contingents of children via tests at the first stage of examination, which results in not a mass checkup, but only a checkup of children who need to see a specialist. This makes it possible to increase considerably the detectability of diseases in children by school physicians, physicians at preschool facilities, and polyclinic specialists, which enables timely treatment and prevention of children's diseases.

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Component Analysis of Dynamics of Morbidity of USSR Population Due to Malignant Neoplasms From 1975 to 1985

18400115 Leningrad VOPROSY ONKOLOGII in Russian Vol 34 No 7, Jul 88 pp 793-798

[Article by V. V. Dvoyrin and Ye. M. Aksel, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Text] Estimating the changes in the dynamics of morbidity due to malignant neoplasms is important to health care organizers in planning and managing oncological care. Traditional methods of medical statistics make it possible to determine the size of the changes that have occurred and to quantitatively characterize the trend of the development of these changes, and special methodological procedures make it possible to estimate the role of the cohort effect in the dynamics of age indicators.

However, organizers and epidemiologists alike are often faced with nonstandard questions, for example, the degree to which increased morbidity is associated with the "aging" of the population and the increased risk of morbidity connected with the appearance of new or the intensification of existing epidemiological factors. Of course, the problem may be formulated thus, provided there have been no significant changes in accounting procedures or diagnosis quality during the period being studied.

The literature includes attempts to solve this class of problems by using the component method. Thus, Yu. A. Korchak-Chepurkovskiy³ put forth the idea of breaking down the average life span into components corresponding to the change in mortality in individual age groups. This idea was developed further in the work of Ye. Andreyev¹. Ye. M. Kitagava⁵ used the component method to break the increase in rough morbidity indicators relating to one and the same population but in different time periods down into component parts.

Seven components of the increase in the number of persons afflicted may be identified⁷. The first three are associated with an increase in population size (Δp), a change in its age structure (Δa), and the combined effect of these factors (Δpa). The true increase in the number of persons afflicted (Δr) caused by the risk in falling ill is the fourth component. The final three components are associated with the combined effect of the change in the risk of falling ill and the increase in the population size (Δpr), the change in its age structure (Δar), and the effect of all three factors (Δpar). The method of calculating them is presented in Table 1. It does not require any special commentary. We have described it in detail in a previous work².

This article uses the component method analyze the dynamics of morbidity due to malignant neoplasms in the USSR for a 10-year period.

The increase in morbidity due to all forms of malignant neoplasms is the result of the cumulative effect of elements of a complex combination of different component structures in the case of individual forms of tumors. In the period from 1975 to 1985, the increase in the number of men suffering from malignant neoplasms (32.8 percent) in the country was 1.8 times higher than was the corresponding indicator for women (18.3 percent). When the increase due to a change in size and age structure of the population was included, it was 1.5 times higher, and when the increase in morbidity risk was included, it was 2.2 times higher. The regularity established was repeated in the case of solid tumors (140 to 199). The true increase in morbidity due to malignant neoplasms of the lymphatic and hematopoietic tissue, on the other hand, is 1.6 times higher in females, whereas the increase in the numbers of persons afflicted on account of a change in population size and age structure is 2.2 times higher in men (Table 2).

Table 1. Example of the calculation of the components of the growth in the number of males suffering from lung cancer in a hypothetical oblast a. Source data

ТАБЛИЦА 1. Пример расчета компонент прироста числа заболевших раком легкого мужчин гипотетической области за период с 1975 по 1985 г.

а. Исходные данные

(1) Возраст (i)	(2) Число заболевших (n _{ij})		(3) Численность населения (N _{ij})		(4) Показатели заболеваемости				(7) Ожидаемое число заболевших в 1985 г. P ₁₁ N ₁₈ ·10 ⁵ (6) (5) 10 ⁻⁵	N ₁ / N ₂ (4) : (5)
					(5) обычные (P _{ij})		(6) стандартизованные (P _i ^c)			
	1975 (j=1)	1985 (j=2)	1975 (j=1)	1985 (j=2)	1975 (j=1)	1985 (j=2)	1975 (j=1)	1985 (j=2)		
(8) До 30	1	2	665 000	695 000	0,15	0,29		0,164	1,04	
30—39	11	12	184 000	194 000	6,71	6,18		0,862	13,02	
40—49	75	88	162 000	152 000	46,2	57,9		7,982	70,38	
50—59	121	294	79 000	141 000	153,2	208,5		14,018	216,0	
60—69	196	223	67 000	61 000	292,5	365,6		20,847	178,4	
70+	101	173	38 000	49 000	265,8	353,1		11,419	130,2	
(9) Всего	n ₁ = 505	n ₂ = 792	N ₁ = 1 175 000	N ₂ = 1 292 000	P ₁ = 43,0	P ₂ = 61,3	P ₁ ^c = 43,0	P ₂ ^c = 55,3	E(n ₂) = 609	0,909
(10) Прирост	$\frac{n_2 - n_1}{n_1} 100 = 56,8$		$\frac{N_2 - N_1}{N_1} 100 = 9,9$		$\frac{P_2 - P_1}{P_1} 100 = 42,5$		$\frac{P_2^c - P_1^c}{P_1^c} 100 = 28,6$			

Key: 1. Age—2. Number of persons afflicted—3. Population size—4. Morbidity indicators—5. Usual—6. Standardized—7. Anticipated number of persons afflicted in 1985—8. Up to 30—9. Total—10. Increase

Continuation of Table 1. b. Statistical analysis

Продолжение табл. 1

б. Статистический анализ

(1) Компоненты прироста числа заболевших (x) за счет	(10) Расчет компонент прироста	(11) % прироста	
		$\frac{n_2 - n_1}{n_1 - n_1}$	$\frac{n_2}{100 \Delta}$
(2) 1. Роста численности населения (Δ_n)	$\Delta_n = \frac{N_2 - N_1}{N_1} = 0,099 \cdot 505 = 50$	17,4	9,9
(3) 2. Изменения возрастной структуры населения (Δ_n)	$\Delta_n = \frac{N_1}{N_2} (E(n_2) - n_1 - \Delta_n) = 0,909 (509 - 505 - 50) = 49$	17,1	9,7
(4) 3. Совместного влияния изменения численности населения и его возрастной структуры (Δ_{nn})	$\Delta_{nn} = \frac{N_2 - N_1}{N_1} \Delta_n = 0,099 \cdot 49 = 5$	1,7	1,0
(5) 4. Изменения риска заболеть (Δ_p)	$\Delta_p = N_1 (P_2^c - P_1^c) \cdot 10^{-6} = 1175000 (55,3 - 43) 10^{-6} = 144$	50,2	28,5
(6) 5. Совместного влияния изменений риска заболеть и численности населения (Δ_{np})	$\Delta_{np} = \frac{N_2 - N_1}{N_1} \Delta_p = 0,099 \cdot 144 = 14$	4,9	2,77
(7) 6. Совместного влияния риска заболеть и возрастной структуры населения (Δ_{np})	$\Delta_{np} = \frac{N_1}{N_2} \left[n_2 - n_1 - \sum_{x=1}^s \Delta_x \right] = 0,909 (792 - 505 - 50 - 49 - 5 - 144 - 14) = 23$	8,0	4,55
(8) 7. Совместного влияния изменений риска заболеть, численности населения и его возрастной структуры (Δ_{nnp})	$\Delta_{nnp} = \frac{N_2 - N_1}{N_1} \Delta_{np} = 0,099 \cdot 23 = 2$	0,7	0,4
(9) Всего	$n_2 - n_1 = 792 - 505 = 287$	100,0	56,8

Key: 1. Components of growth in number of persons afflicted (x) due to—2. Increase in population size—3. Change in age structure of population—4. Combined effect of change in population size and its age structure—5. Change in risk of morbidity—6. Combined effect of changes in risk in morbidity and population size—7. Combined effect of risk of morbidity and age structure of population—8. Combined effect of changes in risk of morbidity, population size, and its age structure—9. Total—10. Computation of components of increase—11. Percentage of increase

Table 2. Components of increase in the number of persons suffering from malignant neoplasms in the USSR in the period from 1975 to 1985 (as a percentage of the initial level)

ТАБЛИЦА 2. Компоненты прироста числа заболевших злокачественными новообразованиями в СССР за период с 1975 по 1985 г. (в % к исходному уровню)

(1) Пол	(2) Локализация	(3) Компоненты прироста числа заболевших										(4) Всего $\sum_{x=1}^7 \Delta$
		$\Delta_{\text{ж}}$	$\Delta_{\text{м}}$	$\Delta_{\text{нв}}$	$\sum_{x=1}^3 \Delta$	$\Delta_{\text{р}}$	$\Delta_{\text{лр}}$	$\Delta_{\text{вр}}$	$\Delta_{\text{лвр}}$	$\sum_{x=6}^7 \Delta$	$\sum_{x=4}^7 \Delta$	
		1	2	3	4	5	6	7				
(5) Мужчины	140—208	10,3	8,5	0,9	19,7	10,4	1,1	1,5	0,1	2,7	13,1	32,8
	140—199	10,3	8,7	0,9	19,9	10,3	1,0	1,5	0,2	2,7	13,0	32,9
	200—208	10,3	12,4	1,3	24,0	7,9	0,8	-2,2	-0,2	-1,6	6,3	30,3
	Полость рта, глотка (6)	10,3	11,3	1,2	22,8	105,9	10,9	6,1	0,6	17,6	123,5	146,3
	Прямая кишка (7)	10,3	7,9	0,8	19,0	48,7	5,0	4,8	0,5	10,3	59,0	78,0
	Легкие (8)	10,3	9,2	1,0	20,5	28,2	2,9	4,3	0,4	7,6	35,8	56,3
	Молочная железа (9)	10,3	11,4	1,2	22,8	20,4	1,9	0,4	0,0	2,3	22,7	45,5
	Гортань (10)	10,3	10,8	1,2	22,3	17,7	1,8	2,0	0,2	4,0	21,7	44,0
	Кожа (11)	10,3	9,0	0,9	20,2	9,5	1,0	0,0	0,0	1,0	10,5	30,7
	Пищевод (12)	10,3	10,3	1,0	21,3	-2,9	-0,3	0,2	0,0	-0,1	-3,0	18,3
	Желудок (13)	10,3	8,3	0,8	19,4	-20,7	-2,1	-0,7	-0,1	-2,9	-23,6	-4,1
	Губа (14)	10,3	7,6	0,8	18,7	-24,9	-2,6	-0,1	0,0	-2,7	-27,6	-8,9
	140—208	8,0	5,0	0,4	13,4	4,7	0,4	-0,2	0,0	0,2	4,9	18,3
	140—199	8,0	5,1	0,4	13,5	4,3	0,4	-0,2	0,0	0,2	4,5	18,0
	200—208	8,0	2,5	0,2	10,7	12,6	1,0	0,0	0,0	1,0	13,6	24,3
(13) Женщины	Молочная железа (16)	8,0	1,8	0,2	10,0	41,9	3,3	-0,7	-0,1	2,5	44,4	54,4
	Прямая кишка (17)	8,0	5,7	0,5	14,2	32,0	2,6	1,9	0,2	4,7	36,7	50,9
	Полость рта, глотка (18)	8,0	4,5	0,3	12,8	21,3	1,7	1,8	0,1	3,6	24,9	37,8
	Легкие (19)	8,0	5,9	0,5	14,4	9,7	0,8	1,6	0,1	2,4	12,1	26,5
	Кожа (20)	8,0	7,1	0,6	15,7	3,5	0,3	0,1	0,0	0,4	3,9	19,5
	Гортань (21)	8,0	4,3	0,3	12,6	-0,1	-0,1	-1,4	-0,1	-1,6	-1,7	10,9
	Губа (22)	8,0	7,3	0,6	15,9	-16,4	-1,3	1,4	0,1	0,2	-16,2	-0,3
	Пищевод (23)	8,0	9,2	0,7	17,9	-27,0	-2,2	-2,4	-0,2	-4,8	-31,8	-13,9
	Желудок (24)	8,0	6,7	0,5	15,2	-26,7	-2,1	-1,2	-0,1	-3,4	-30,1	-14,8
	Шейка матки (25)	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	140—208	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	140—199	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	200—208	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	140—208	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	140—199	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5
	200—208	8,0	1,8	0,1	9,9	-24,8	-2,0	-0,6	0,0	-2,6	-27,4	-17,5

Key: 1. Sex—2. Location—3. Components of increase in number of persons afflicted—4. Total—5. Males—6. Oral cavity, pharynx—7. Colon—8. Lungs—9. Mammary glands—10. Larynx—11. Skin—12. Esophagus—13. Stomach—14. Lip—15. Females—16. Mammary glands—17. Colon—18. Oral cavity, pharynx—19. Lungs—20. Skin—21. Larynx—22. Lip—23. Esophagus—24. Stomach—25. Cervix

In Table 2, individual forms of malignant neoplasms range in the direction of a reduction in the overall growth of the number of persons afflicted.

The increase in the number of persons afflicted from 1975 to 1985 on account of an increase in morbidity risk is especially high in the case of cancer of the oral cavity and pharynx (105.9 percent in males and 21.3 percent in females), the colon (48.7 percent and 32 percent), the lungs in males (28.2 percent), and the mammary glands in females (41.9 percent).

The reduction in the number of persons afflicted between 1975 and 1985 on account of a reduction in morbidity risk is especially pronounced in cancer of the stomach (-20.7 percent in males and -26.7 percent in females), the lip (-24.9 percent and -16.4 percent in individuals of both sexes, and in women except for in the case of esophageal cancer (-27 percent), and the cervix (-24.8 percent).

According to the data compiled in Table 2, four groups of morbidities may be identified (Figure 1). These groups are as follows:

—an increase in the number of persons afflicted occurs primarily on account of an increase in morbidity risk (the oral cavity and pharynx, colon, and lungs in males and the mammary glands, colon, and oral cavity and pharynx in females);

—an increase in the number of persons afflicted occurs largely on account of a change in the size and age structure of the population (the mammary glands, larynx, and skin in males and the lungs and skin in women);

—the morbidity risk is reduced, albeit to a lesser extent than the increase in age, on account of different changes in the population, with the number of persons afflicted rising in the final analysis (the esophagus in males and the larynx in females); and

—the morbidity risk decreases more than the growth of the increase due to changes in the size and age structure of the population, which is to say that the number of persons afflicted ultimately decreases (the stomach and lips in males and the lips, esophagus, stomach, and cervix in females).

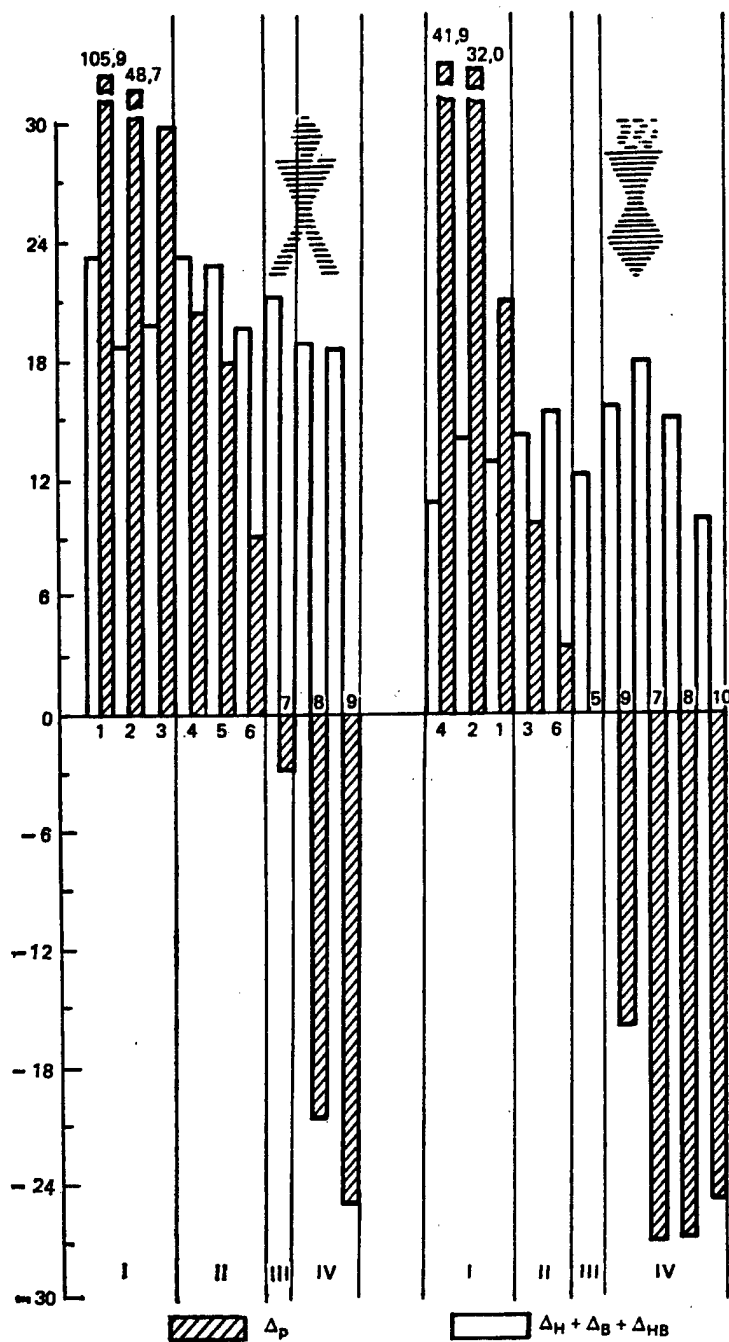


Figure 1. Correlation between percentages of the increase in the number of persons falling ill due to a true increase in risk of morbidity (Δr and the related change in population size and age structure ($\Delta p + \Delta a + \Delta pa$).

Key: 1. Oral cavity, pharynx—2. Colon—3. Lungs—4. Mammary glands—5. Larynx—6. Skin—7. Esophagus—8. Stomach—9. Lip—10. Cervix. Abscissa, groups of persons afflicted; ordinate, percentage.

In each specific case, an analysis of the differences in component structures in the case of specific forms of tumors in different time periods or in different population groups in one and the same time period may yield important information not only for management but also for the construction of epidemiological hypotheses about the possible carcinogenic role of factors of the external environment.

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Substandard Medical Centrifuges Effect on Diagnostic Instruments

18400145a Moscow *SOTSIALISTICHESKAYA INDUSTRIYA* in Russian 26 Nov 88 p 2

[Article by S. Kostrov, engineer, Frunze: "There Are as Many Opinions as There Are Tests"]

[Text] The Frunze Instrument-Building Plant imeni 50th Anniversary of Kirghiz SSR has been producing RS-6 and OS-6M medical centrifuges for 10 years already, and many infractions of GOST's [USSR state standards] have occurred. As a result, the level of radio noise is tens of times higher than allowable. This causes a chain reaction in the operation of other instruments (cardiographs, spectrophotometers and others). The readings made at my insistence and in my presence by the staff of the State Inspectorate of Electromagnetic Interference under the USSR Ministry of Communications and Kirghiz Board of the State Committee for Standards (comrades Mikhalechenko and Shvartsman) indicated that the OS-6M centrifuge generates a noise level when operating at 2500 rpm that is about three times higher than allowed by GOST.

The next check, which was made by the above-mentioned comrades, but this time together with the plant that produces the centrifuge and without my participation, indicated (according to them) that everything is OK. Just how they succeeded in "taming" the instruments is a mystery to me.

Dear editorial board! I ask that you check the RS-6 and OS-6M centrifuges for radio noise in the network with the assistance of personnel working in departments of the State Inspectorate of Electric Communications of Moscow. There are such centrifuges at blood transfusion stations and in hospital diagnostic laboratories. The health and even the life of many patients depends on accuracy of their operation.

Thallium Contamination Cause of Illness in Chernovtsy

18400145b Moscow *SOTSIALISTICHESKAYA INDUSTRIYA* in Russian 10 Nov 88 p 2

[Article by Ye. Kolesnikova, under the rubric, "Follow-up": "Until Thunder Strikes...."]

[Text] Yesterday there was a meeting at the USSR Ministry of Health between reporters and physicians who analyzed the alarming situation, about which this paper reported on 6 November.

Let us briefly recall what this is about. In late August, worried parents started to come to polyclinics complaining that their 2 to 4 year old children suffered active hair loss. In addition to getting bald, the tots had a slight cough, like the one associated with colds. No changes could be detected in blood composition or function of internal organs—kidneys, heart and lungs.

"This is the first time we have encountered such a situation," stated Ye. Chazov, USSR minister of health, at the meeting. We quickly formed three working teams that were to check all versions: either an unknown infection was previously carried to Chernovtsy, or else a fungal disease was spread, or perhaps this was food poisoning. About 20 scientific institutes, and not only medical ones, worked on this problem. Finally, after thorough investigations, they decided on the following version: the children of Chernovtsy suffered chemical poisoning by one of the heavy metals, thallium. The question immediately arose as to the source of thallium in Chernovtsy, and in amounts exceeding the permissible level by tens of times. There is still no answer, but only suppositions, that the metal was carried in with acid rain from industrial enterprises.

At present, all of the children, and there are already 113 victims, are under observation in Moscow and Kiev. The physicians have not found any other alarming symptoms in them, except hair loss. As shown by experiments on animals, thallium is eliminated from the body in 1-2 weeks. After a certain time, the hair grows back.

In conclusion, Ye. Chazov said: "At the present time, intensive work is being done in Chernovtsy to prevent the disease. All children, of whom there are 37,000 in the city, are given vitamins and enzymes for more active digestive function. Roofs and streets are being washed off. Telegrams describing the events in Chernovtsy have been sent to public health agencies of our country. But, as the physicians say, one must treat the disease, not the symptoms. As long as there is no strict monitoring of purity of water, soil and air, a similar situation can occur anywhere.

USSR Health Care and Morbidity Statistics Health Protection

18400206 Moscow *VESTNIK STATISTIKI* in Russian No 12, Dec 88

[Article: "Health Protection"]

[Text] The decree of the CPSU Central Committee and the USSR Council of Ministers titled "Measures for Further Improving Public Health Protection and Strengthening the Material and Technical Base of the Health Care Sector" stipulated the most important directions for further developing and improving all components of health care, and it specified ways in which the health care system could be radically restructured in order to expand the scale and increase the effectiveness of its prophylactic work and provide state-of-the-art medical care to the entire population.

The all-union physicians' conference that was convened in October of this year discussed extensively aspects of restructuring the health care administration, new approaches to planning and financing, and the problems associated with the effectiveness of prevention, with raising the quality of medical care provided to the public

(especially that provided to children and mothers), with the level of the professional training of physicians, and with the role of medical science in restructuring health care.

Investments for the construction of health care facilities were increased significantly during the 12th Five-Year-Plan. Compared with the 11th Five-Year-Plan, the average yearly amount of these investments increased 30 percent. However, expenditures on equipment constitute only one-fourth of all expenditures on the construction of hospitals and polyclinics.

During this period, the average yearly start-up of new hospitals and polyclinics increased by 18 and 38 percent, respectively.

In 1986-1987, thanks to all sources of financing, hospitals with a total of 149,500 beds were opened, as were outpatient-polyclinic facilities that handled a total of 392,200 visits each shift. Health care facilities were constructed by using, primarily, state centralized capital investments and resources from enterprises' funds. They were responsible for 83 percent of the hospitals and 85 percent of the polyclinics that were opened.

The fulfillment of the plan to open health care facilities in 1986-1987 may be characterized by the following data:

	1986		1987	
	Put into operation	Percentage of plan fulfilled	Put into operation	Percentage of plan fulfilled
Hospitals, in thousands of beds				
—From all financing sources	73.3	96	76.2	94
—Including state centralized capital investments and resources from enterprises' funds	59.5	95	63.9	91
Polyclinics, in thousands of visits per shift				
—From all financing sources	176.0	102	216.2	105
—Including state centralized capital investments and resources from enterprises' funds	148.2	98	184.9	103

Last year, hospitals providing 2.7 cots for every 10,000 persons were opened, versus an average of 2.3 in 1981-1985; polyclinics handling 7.6 visits per shift (per every 10,000 people) were opened, as opposed to a figure of 5.2 visits per shift during the earlier period.

In the past two years of the 12th Five-Year-Plan, state centralized capital investments and resources from enterprise funds and the All-Union Communist Subbotniks [voluntary unpaid laborers] accounted for the construction of pediatric and maternity hospitals that provided 20,300 beds and pediatric polyclinics and prenatal clinics that accommodated 51,800 visits per shift (in all, they represented 14-15 percent of the hospitals and polyclinics that were opened thanks to these sources).

Compared with 1986, new pediatric polyclinics increased by 115 percent in 1987, and new prenatal clinics, by 153 percent. The number of pediatric hospitals opened fell by 16 percent.

Long-term construction of health care facilities continues. A 100-bed rayon hospital has been under construction in the village of Kalga in the Chita Oblast (on order by the local soviet; contractor, the Chitagrazhdanstroy Trust of the RSFSR Ministry of Residential and Municipal Construction) since 1974. A 344-bed hospital has been under construction in the city of Svetlograd in the Stavropolskiy Kray since 1976 (on order by the krayispolkom's major construction administration [UKS]; contractor, the Stavropolagropromstroy Association of the RSFSR State Administration of Agroindustrial Construction), and a 200-bed treatment center has been under construction in the city of Rostov since 1977 (on order by the USSR Ministry of Agricultural Machine Building; contractor, the No 7 Trust of the USSR Ministry of Construction in the South). For more than 8 years now, a 193-bed pediatric treatment facility at the No 13 Hospital imeni Filatov has been under construction (on order by the Main Administration of Major Construction; subcontractor, the Glavmosstroy Production Construction Association of the Moscow Construction Committee), etc.

Main Indicators of Development of Health Care (at year's end)

	1980	1985	1987
In thousands			
No. physicians of all specialties	997	1,170	1,232
No. midlevel medical personnel	2,814	3,159	3,295
No. hospital institutions	23.1	23.3	23.6
No. hospital beds	3,324	3,608	3,712
No. medical institutions providing outpatient-polyclinical care	36.1	39.1	40.8
Capacity of outpatient-polyclinic institutions (number of visits per shift)	4,333	4,874	5,135
Per 10,000 population			
No. physicians	37.5	42.0	43.3
No. midlevel medical personnel	105.7	113.5	116.0
No. hospital beds	124.9	129.6	130.6
No. visits per shift to outpatient-polyclinic institutions	163.4	175.0	180.7

In the two years of the current five-year-plan, the number of medical personnel providing services to the public increased by 2-3 percent, and the number of hospital and outpatient-polyclinic institutions increased by 1 and 3 percent, respectively. Furthermore, the availability of in-hospital care was 7 percent below the norm, the

availability of out-of-hospital care was 26 percent below the norm, and the availability of midlevel medical personnel was 24 percent below the norm. In 1987 there were 2.7 midlevel medical personnel per physician when the norm was 3.5.

Main Indicators of Development of Health Care By Union Republic in 1987

	In thousands			Per 10,000 population		
	No. Physicians	No. Midlevel Medical Personnel	No. Hospital Beds	No. Physicians	No. Midlevel Medical Personnel	No. Hospital Beds
USSR	1,232	3,295	3,712	43.3	116.0	130.6
—RSFSR	678	1,780	1,989	46.3	121.6	135.9
—UkSSR	219	588	681	42.7	114.8	133.0
—BSSR	39	112	136	39.1	111.0	133.9
—UzSSR	68	198	236	34.7	101.2	120.4
—KaSSR	64	193	219	38.7	117.1	133.1
—GSSR	30	64	57	56.7	122.3	108.1
—AzSSR	27	65	68	38.7	94.7	98.0
—LiSSR	16	46	46	44.3	125.7	126.0
—MSSR	17	49	54	39.3	116.1	128.6
—LaSSR	13	34	37	49.3	126.8	140.5
—KiSSR	15	43	50	35.1	100.5	118.6
—TaSSR	13	37	52	27.2	75.1	104.2
—ArSSR	14	34	30	39.2	96.9	85.8
—TuSSR	12	34	38	34.7	97.1	109.2
—ESSR	7	18	19	47.9	116.3	122.5

The level of the availability of medical personnel in the central Asian republics and the AzSSR is significantly below the unionwide average (13-37 percent below), and

the number of beds available in the republics of the Transcaucuses and the TaSSR is below the average unionwide level (17-34 percent below).

Maternity and Childhood Protection

	1980	1985	1987
In thousands			
No. prenatal clinics, pediatric polyclinics and outpatient facilities (independent and part of other institutions)	24.3	27.9	29.2
No. beds (medical and obstetrics) for pregnant women and women in childbirth	230.4	245.6	252.7
No. beds for gynecological patients	184.1	197.6	204.3
No. beds for ill children	567.2	611.6	621.9
No. obstetrician-gynecologists	59.4	66.9	70.9
No. pediatricians	116.4	140.2	151.3
Per 10,000 women aged 15-49 years			
No. obstetrician-gynecologists	8.7	9.5	10.1
No. beds (medical and obstetrics) for pregnant women and women in childbirth	33.6	35.0	36.0
No. beds for gynecological patients	26.9	28.1	29.1
Per 10,000 children			
No. pediatricians	17.7	19.9	20.8
No. beds for ill children	86.2	86.7	85.6

The availability of hospital beds and pediatricians varies widely in the country, from area to area. Thus, the availability of pediatric beds in the TuSSR and the republics of the Transcaucuses is lower than the unionwide level by a factor of 1.3-1.9, and the level of physicians available in the MSSR and the central Asian republics is below the unionwide level by a factor of 1.2-1.7. The network of pediatric hospitals has not been developed sufficiently. In

1987, some 17 million children (nearly one-fourth of all children) were under clinical observation in connection with chronic diseases.

The level of availability of medical beds for pregnant women and women in childbirth is below the established norm by a factor of 1.3-1.6 in the TuSSR, UzSSR, KiSSR, AzSSR, and TaSSR. The AzSSR, ArSSR, and BSSR have the fewest obstetrician-gynecologists, with only 7.6-8.3 physicians for every 10,000 women, as compared with a 10.1 average for the country.

Stomatologic Services to the Public (USSR Ministry of Health)

	1980	1985	1987
In thousands			
No. stomatologists and dentists	109.3	123.0	133.6
No. independent stomatologic institutions	1.4	1.6	1.7
No. institutions with stomatologic departments (offices)	23.1	23.5	24.2
No. dental technicians	38.8	47.8	51.2
No. full cost-accounting dental prosthesis departments	6.2	6.6	6.7
Per 10,000 population			
No. stomatologists and dentists	4.1	4.4	4.7
No. dental technicians	1.5	1.7	1.8
Relative proportion of individuals receiving oral hygiene services in the total population, percent	24	27	27

In 1987, some 58 percent of those examined during a planned oral hygiene examination needed stomatologic treatment, with about two-thirds of those examined in the RSFSR, KiSSR, and the Baltic republics needing

treatment. On average throughout the republic, 72 percent of those needing treatment (76 percent of all children who needed treatment) received it, as opposed to only 44 to 48 percent in the central Asian republics (with the exception of the KiSSR).

Ambulance and Emergency Medical Care to the Population (USSR Ministry of Health)

	1980	1985	1987
No. ambulance (emergency medical care) stations (departments), in thousands	4.4	5.0	5.1
No. runs made			
—In millions	77.4	87.9	88.5
—Per 1,000 population	292	317	313
No. individuals receiving care (outpatient and during emergency medical runs)			
—In millions	85.1	94.9	95.9
—Per 1,000 population	321	342	339

The ambulance (emergency medical care) service plays a great role. In 1987, ambulance service was provided to 96 million persons; however, the amount provided was insufficient. There are cases in which patients were not brought to treatment institutions promptly—especially

patients who are in need of emergency surgery, with the outcome frequently being fatal.

In 1987, persons living in rural areas received only half as much emergency medical care as did those who live in cities.

Morbidity of Population Due to Individual Infectious Diseases by Union Republic (per 100,000 population)

	Acute Intestinal Infections		Typhoid and Paratyphoid Fevers A, B, C		Viral Hepatitis (including serum)	
	1986	1987	1986	1987	1986	1987
USSR	594	602	4.7	4.5	301	305
—RSFSR	727	768	1.3	1.1	188	151
—UkSSR	389	304	0.9	0.8	213	178
—BSSR	176	172	0.6	0.5	206	183
—UzSSR	744	722	17.5	19.1	1,205	1,451
—KaSSR	481	532	6.0	5.7	400	359
—GSSR	362	326	3.4	2.3	329	306
—AzSSR	253	247	5.2	4.3	256	264
—LiSSR	165	156	1.6	1.5	266	212
—MSSR	618	606	0.7	1.0	390	295
—LaSSR	205	151	1.3	0.4	204	161
—KiSSR	528	644	14.5	15.7	592	1,074
—TaSSR	1,072	1,069	71.4	60.7	642	1,121
—ArSSR	242	238	2.5	2.0	203	194
—TuSSR	601	622	56.5	47.9	602	775
—ESSR	355	323	0.5	0.6	190	96

	Flu and Acute Upper Respiratory Tract Infections		Meningococcal Infections		Including Cerebrospinal Meningitis	
	1986	1987	1986	1987	1986	1987
USSR	27,383	21,025	5.9	5.4	2.2	2.1
—RSFSR	32,743	24,965	7.0	6.2	2.8	2.5
—UkSSR	29,336	23,304	5.1	4.8	1.3	1.0
—BSSR	26,042	21,080	7.3	9.4	1.6	3.4
—UzSSR	10,543	8,613	3.2	3.3	1.2	1.3
—KaSSR	20,316	15,002	6.5	5.3	3.3	2.6
—GSSR	15,415	11,976	1.2	1.2	—	0.06
—AzSSR	14,294	12,700	0.2	0.3	—	—
—LiSSR	13,656	8,825	4.3	5.1	2.6	3.5
—MSSR	17,658	13,628	10.4	10.1	5.5	5.2
—LaSSR	30,739	17,157	5.5	5.0	3.1	2.6
—KiSSR	13,602	10,938	6.2	6.5	4.3	3.5
—TaSSR	14,638	10,215	3.2	3.9	0.6	0.8
—ArSSR	17,231	14,417	0.8	0.6	0.6	0.1
—TuSSR	12,387	9,454	1.8	2.2	0.5	0.6
—ESSR	28,950	17,387	3.7	3.6	1.7	1.4

Two-thirds of those registered as suffering from acute intestinal infections were children under the age of 15. This is frequently connected with the poor sanitary conditions in population centers. At the beginning of 1988, there was no centralized water supply in 23 of the country's cities with populations over 200,000 or in 606 city-type settlements (15 percent of the total number). Nor was there any centralized sewage removal in 310

cities with a population of more than 4 million or in 1,930 settlements (48 percent of them).

In the first half of 1988, because of an epidemic in the country, 15.4 million cases of influenza were registered, which was 20-fold higher than in the corresponding period of the preceding year.

Of those suffering from meningococcal infections, 85 percent were children under the age of 15.

Morbidity Due to Tuberculosis

Patients Whose Tuberculosis Was Diagnosed for the First Time
1986 1987

In thousands of persons

Total no. of patients with active tuberculosis	125.4	123.7
No. with tuberculosis of the respiratory organs	112.4	111.1
No. with bacillary tuberculosis	48.8	47.3

Per 100,000 population

Total no. of patients with active tuberculosis	44.8	43.7
No. with tuberculosis of the respiratory organs	40.2	39.3
No. with bacillary tuberculosis	17.4	16.7

The total number of patients with active tuberculosis who were registered at treatment institutions at the end of 1987 amounted to 611,000 (the figure was 614,000 in 1986). The most dangerous form of tuberculosis—bacillary—did not decrease. Because of the lack of effectiveness of preventive screening examinations, advanced

forms of tuberculosis was detected in 40 percent of those diagnosed with active tuberculosis of the respiratory organs for the first time. The country's tuberculosis mortality rate is between 2 and 10 times higher than the corresponding indicators in the developed capitalist countries.

Morbidity Due to Tuberculosis by Union Republic

Patients Registered Whose Diagnosis Was Established for the First Time
In thousands Per 100,000 population

	1986	1987	1986	1987
USSR	125.4	123.7	44.8	43.7
—RSFSR	63.1	61.9	43.6	42.4
—UKSSR	20.1	19.5	39.4	38.2
—BSSR	3.8	3.5	37.6	35.0
—UzSSR	9.0	9.3	48.1	48.2
—KaSSR	11.9	12.0	73.8	73.3
—GSSR	1.8	1.8	34.2	33.5
—AzSSR	3.6	3.5	53.9	51.6
—LiSSR	1.2	1.2	32.9	31.7
—MSSR	2.7	2.5	64.7	60.0
—LaSSR	0.8	0.8	30.8	29.3
—KiSSR	2.1	2.1	51.9	50.0
—TaSSR	2.5	2.6	52.7	53.2
—ArSSR	0.8	0.7	23.8	21.6
—TuSSR	1.6	1.9	47.1	55.5
—ESSR	0.4	0.4	28.3	23.5

In 1987, morbidity due to active tuberculosis was higher than the unionwide level in the KaSSR (1.7-fold higher), in the MSSR (1.4-fold higher), and in the AzSSR and

central Asian republics. Compared with 1986, morbidity in the TuSSR increased 18 percent.

No. Patients With Diagnosis of Malignant Neoplasm Established for the First Time, by Individual Site in 1987

	In thousands		Per 100,000 Population ¹	
	Men	Women	Men	Women
Total no. patients with malignant neoplasms	328.7	332.6	255.1	160.4
Including:				
—Lips, oral cavity, pharynx	21.0	5.9	15.9	2.7
—Esophagus	11.9	6.7	9.2	2.9
—Stomach	54.2	41.2	42.2	18.4
—Colon	12.5	16.0	9.9	7.3
—Larynx	12.8	0.8	9.6	0.4
—Trachea, Bronchi, Lungs	88.1	18.9	67.9	8.3
—Skin	30.9	45.4	24.4	20.8
—Mammary glands	0.4	52.0	0.4	27.5
—Uterus	—	44.6	—	22.2
—Lymphatic and hematopoietic tissue	16.5	14.6	12.6	8.1
—Other organs	80.4	86.5	63.0	41.8

¹Standardized indicators that eliminate influence of the population's age structure.

Malignant neoplasms occupy second place among causes of death. The number of patients discovered to be suffering from them and the number of those dying from them increase each year.

At the beginning of 1988, some 2.8 million persons with malignant neoplasms were registered with treatment institutions. In 1987, some 118,000 blue-collar workers, white-collar workers, and farmers were disabled because of the diseases referred to.

Morbidity Due to Malignant Neoplasms by Union Republic

	In thousands		No. Patients Diagnosed for the First Time			
			Per 100,000 Population			
	1986	1987	Customary Indicators	Standardized Indicators	1986	1987
			1986	1987	1986	1987
USSR	641.2	661.3	229.1	233.9	190.8	192.5
—RSFSR	368.9	378.8	255.2	259.9	202.1	198.9
—UkSSR	144.4	149.7	283.4	292.6	202.0	206.9
—BSSR	23.0	24.1	229.9	239.6	173.0	186.0
—UzSSR	15.8	16.5	84.0	85.5	128.0	129.2
—KaSSR	28.2	29.0	174.7	177.1	207.1	190.5
—GSSR	7.1	7.0	135.0	133.8	110.7	108.1
—AzSSR	8.1	8.6	119.1	124.9	154.2	157.2
—LiSSR	9.9	9.9	273.7	270.1	208.8	202.8
—MSSR	7.6	7.6	183.4	181.5	170.3	169.4
—LaSSR	7.1	7.8	272.1	295.8	191.6	206.7
—KiSSR	4.7	5.3	115.5	126.1	146.6	162.6
—TaSSR	3.6	3.9	76.9	80.4	121.4	122.1
—ArSSR	4.9	5.1	144.1	148.8	157.7	160.6
—TuSSR	3.3	3.3	100.3	98.1	156.9	151.6
—ESSR	4.6	4.7	296.6	299.9	215.4	214.1

The highest level of morbidity due to malignant neoplasms occurred in the Baltic republics and the UkSSR, where the level was 5 to 11 percent above the unionwide average. The percentage of those patients in whom

cancer was already in its advanced stages when detected remained virtually unchanged: in 1987 the countrywide level of such patients amounted to 21 percent (versus 19 percent in 1980), and in the UzSSR, KiSSR, TuSSR, and ESSR the level ranged from 26 to 30 percent.

Morbidity Due to Mental Illnesses by Union Republic (in thousands of individuals)

	No. Patients With Diagnosis of Mental Illness Established for First Time		Including			
	1986	1987	Alcoholism and Alcoholic Psychosis		Drug Addiction and Toxic Substance Abuse	
	1986	1987	1986	1987	1986	1987
USSR	1,165.2	1,120.1	548.0	510.8	16.4	24.3
—RSFSR	669.9	641.7	349.5	325.7	6.4	11.7
—UkSSR	256.2	245.8	97.6	92.3	6.6	7.1
—BSSR	44.9	40.1	22.0	19.7	0.2	0.2
—UzSSR	34.2	35.0	8.6	7.7	0.9	1.2
—KaSSR	59.3	61.7	29.6	30.5	0.8	1.6
—GSSR	6.3	6.3	1.5	1.5	0.1	0.2
—AzSSR	7.5	8.6	0.9	1.0	0.1	0.3
—LiSSR	16.1	14.6	7.3	6.7	0.1	0.2
—MSSR	25.9	24.6	12.2	10.7	0.1	0.2
—LaSSR	14.6	13.2	7.9	6.1	0.2	0.2
—KiSSR	10.3	9.0	3.8	2.9	0.2	0.4
—TaSSR	5.8	5.8	2.5	2.0	0.1	0.2
—ArSSR	3.3	3.1	0.5	0.5	0.04	0.05
—TuSSR	4.6	5.3	1.6	1.3	0.5	0.7
—ESSR	6.3	5.3	2.5	2.2	0.02	0.1

Mental illnesses were most prevalent among those with chronic disease. In 1987, some 10 million mental patients were registered at treatment and prophylactic

institutions. Of those, 4.6 million, or 1.6 percent of the total population, suffered from alcoholism, and 61,000 suffered from drug addiction.

Morbidity Due to Mental Illnesses by Union Republic (per 100,000 population)

	No. Patients With Diagnosis of Mental Illness Established for First Time		Including			
	1986	1987	Alcoholism and Alcoholic Psychosis		Drug Addiction and Toxic Substance Abuse	
	1986	1987	1986	1987	1986	1987
USSR	416.3	396.2	195.8	180.7	5.8	8.6
—RSFSR	463.4	440.3	241.8	223.5	4.5	8.0
—UkSSR	502.8	480.6	191.6	180.4	13.0	13.9
—BSSR	448.5	397.3	219.3	195.7	1.9	2.4
—UzSSR	182.5	181.4	45.8	39.8	5.0	6.2
—KaSSR	367.4	377.3	183.1	186.7	5.0	9.7
—GSSR	119.8	120.0	29.3	29.2	2.2	3.0
—AzSSR	110.6	124.8	12.5	14.5	1.8	4.5
—LiSSR	444.8	399.0	202.2	183.9	2.8	6.1
—MSSR	622.1	586.0	293.1	254.6	3.4	4.7
—LaSSR	558.8	500.0	302.4	229.4	5.4	7.8
—KiSSR	252.8	214.5	92.2	68.7	4.8	9.2
—TaSSR	123.3	118.5	53.5	40.8	2.0	3.7
—ArSSR	96.5	91.7	16.2	13.3	1.2	1.5
—TuSSR	138.9	154.1	49.5	38.8	13.3	21.4
—ESSR	403.4	340.8	158.6	142.7	1.4	4.6

Compared with 1986, morbidity due to alcoholism and alcoholic psychosis decreased 8 percent throughout the country as a whole, whereas it increased 2 percent in the KaSSR.

Morbidity due to drug addiction increased 1.5-fold during the specified period, with an increase being noted in all of the union republics. Nearly one-third of those discovered to be suffering from the disease were registered in the UkSSR.

Morbidity Due to Venereal Diseases

Patients Registered With a First-Time Diagnosis of Venereal Disease

In thousands of persons

	1986	1987
All forms of syphilis	21.1	16.0
All forms of gonorrhea	265	244
Including		
—Acute	182	169
—Chronic	83	75

Per 100,000 population

	1986	1987
All forms of syphilis	7.6	5.6
All forms of gonorrhea	95	86
Including		
—Acute	65	60
—Chronic	30	26

There has been a systematic reduction in morbidity due to venereal disease over the past few years. As of the end of 1987, the total number of syphilis patients registered at treatment institutions was 152,000 (versus 182,000 in

1986). Enough is still not being done to detect individuals who spread venereal diseases. Thus, in 1987, no sources of infection were identified in 38 percent of those suffering from syphilis.

Morbidity due to Venereal Diseases by Union Republic (in thousands of persons)

	Patients Registered With a First-Time Diagnosis of Venereal Disease			
	All Forms of Syphilis		Gonorrhea	
	1986	1987	1986	1987
USSR	21.1	16.0	264.8	243.9
—RSFSR	10.5	7.4	170.4	154.0
—UKSSR	3.7	2.9	39.6	37.6
—BSSR	0.3	0.1	8.6	8.8
—UzSSR	1.4	1.2	5.1	4.5
—KaSSR	1.3	0.8	15.6	14.6
—GSSR	1.1	1.3	5.9	5.0
—AzSSR	0.3	0.3	1.3	1.1
—LiSSR	0.1	0.1	3.5	3.2
—MSSR	0.4	0.3	4.6	4.8
—LaSSR	0.2	0.2	2.4	2.1
—KiSSR	0.4	0.3	2.4	2.3
—TaSSR	0.5	0.4	1.1	1.2
—ArSSR	0.3	0.2	1.5	1.9
—TuSSR	0.5	0.4	1.0	1.2
—ESSR	0.1	0.1	1.8	1.6

Compared with 1986, morbidity due to syphilis decreased 26 percent, whereas in the GSSR and LiSSR it increased 19 and 21 percent, respectively. Ten union republics had morbidity rates higher than the unionwide average, with the GSSR having a rate that was 4.6-fold higher and the TuSSR having a rate 2.2-fold higher.

In 1987, morbidity due to gonorrhea fell 9 percent, whereas it increased between 4 and 24 percent in the MSSR, TuSSR, and ArSSR.

Morbidity Due to Venereal Diseases by Union Republic (per 100,000 population)

	Patients Diagnosed With Venereal Disease for the First Time			
	Syphilis in All Forms		Gonorrhea	
	1986	1987	1986	1987
USSR	7.6	5.6	94.6	86.3
—RSFSR	7.2	5.1	117.9	105.7
—UkSSR	7.3	5.7	77.7	73.5
—BSSR	2.8	1.6	85.9	87.0
—UzSSR	7.6	6.1	27.2	23.4
—KaSSR	8.2	4.7	96.8	89.3
—GSSR	21.5	25.5	112.3	95.9
—AzSSR	5.0	4.7	18.7	15.2
—LiSSR	2.4	2.9	96.3	87.2
—MSSR	9.7	7.4	110.7	115.2
—LaSSR	8.8	6.1	92.6	79.9
—KiSSR	9.6	6.1	58.1	55.9
—TaSSR	10.6	7.9	24.4	24.5
—ArSSR	8.5	5.9	44.3	54.8
—TuSSR	14.2	12.1	31.5	35.0
—ESSR	5.4	3.3	117.2	102.5

Morbidity With Temporary Work Disability by Individual Reason (per 100 workers)

	No. Cases		No. Calendar Days	
	1986	1987	1986	1987
Total	103.0	94.5	1,054	1,011
From illness				
Including:	72.7	66.3	878	839
Of which:				
Flu and colds	35.8	28.9	259	219
Trauma	4.0	4.1	92	94
Diseases:				
—Of the circulatory system	5.2	5.3	88	88
—Of the osteomuscular system	5.6	5.9	77	79
—Of the gastrointestinal tract	3.1	3.1	56	55
Complications of pregnancy and the postnatal period	2.3	2.3	36	37
To care for sick persons	28.2	26.1	166	162

In 1987, morbidity with temporary work disability to work was reduced by 8 percent. At the same time, the national economy continued to sustain extensive losses due to disease, trauma, and care for the sick. Each day in 1987, some 3.8 million persons were unable to work for

these reasons. Of these persons, 0.6 million missed work because they had to care for others who were ill (primarily children).

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Feeding Children in Radionuclide-Contaminated Territories

18400120a Minsk ZDRAVOOKHRANENIYE
BELORUSSII in Russian No 6, Jun 88 (manuscript
received 21 Aug 87) pp 53-56

[Article by T. P. Dyubkova, and L. N. Astakhova,
Second Department of Pediatric Diseases with Endocri-
nology Course, Minsk Medical Institute]

[Abstract] The level of radioactive contamination of food products has increased in several areas of Belorus-
sia, especially in the Belorussian-Ukrainian region of
Polesye (Prypyat-Desna basin), as a result of strato-
spheric fallout from nuclear weapons testing over the
years. Nuclear fission products are being ingested in
small quantities with food over the long term. Children
are especially vulnerable to the effects of such contami-
nation. Preventing the build-up of radionuclides in the
body requires careful selection of diet and proper han-
dling of food. Different types of food and food additives
are evaluated on the basis of their ability to reduce the
absorption of radionuclides and to rid the body of them.
Various methods of food preparation are discussed.
Tables demonstrating the effect of food preparation on
strontium-90 and cesium-137 content are provided. It is
concluded that the quantity of radionuclides entering the
body can be reduced by proper technical and culinary
processing of food. References: 18 (Russian)

UDC 616-055.2-084

Family Planning in Rural Region of Andizhan Oblast

18400120b Tashkent MEDITSINSKIY ZHURNAL
UZBEKISTANA in Russian No 7, Jul 88 (manuscript
received 10 Dec 86) pp 61-63

[Article by S. M. Babich, M. Kh. Saliyeva, and D. G.
Rozin, Andizhan State Medical Institute imeni M. I.
Kalinin]

[Abstract] Fergan Valley has a high birth rate and a high
infant mortality rate. In an attempt to introduce family
planning concepts, researchers interviewed 800 Uzbek
women of child-bearing age from a large cotton farm in
Andizhan Oblast. All the women had given birth at least
once. Of those questioned, 91.5 percent believed that it
was necessary to have four to five children, and all of them
did everything possible to maintain each pregnancy; only
after five deliveries were abortions considered. Children
were born every 1 to 1.5 years in 26.4 percent of these
women and every 2 years in 51.5 percent. Analysis of
infant mortality showed that 60 percent of the cases were
due to late medical attention, which was a result of the
mother's preoccupation with her other small children.
Researchers found the short intervals between births to be
the cause of the high infant mortality. At the same time,
the infant mortality led to the short intervals. In 72 percent
of women with a 10-14 month interval between births, the
preceding pregnancy ended with a stillborn child or the

death of the child within 2-3 months of birth. Very little
consultation was carried out concerning family planning.
Contraception measures were ineffective: Only 3.7 percent
of married women used IUD's; birth-control pills were not
practical because these women would forget to take them
routinely, and condoms were not readily available on the
market. It was concluded that family planning programs
should be organized in three phases: health education,
identification of families requiring family planning, and
implementation of the family planning program through
establishment of controlled pregnancy frequencies, meth-
ods of contraception and observation of participating
women.

UDC 616-006-08:615.28]:378.245(1981/1985)

**Analysis of Dissertations on Cancer
Chemotherapy Successfully Defended in
1981-1985**

18400125a Leningrad VOPROSY ONKOLOGII
in Russian Vol 34 No 7, Jul 88 (manuscript received
22 Sep 87) pp 786-792

[Article by L. V. Moroz, A. B. Syrkin and R. M.
Strelkova, All-Union Oncological Scientific Center,
USSR Academy of Medical Sciences, Moscow]

[Abstract] An analysis was conducted on the doctoral
and candidate-level dissertations on cancer chemother-
apy defended in the USSR in 1981-1985, to assess their
relevance to current advances in oncology. The total
number of dissertations on the topic of interest com-
pleted in that time frame was 50. Of that number, 42 (84
percent) of these dissertations were produced at Russian
institutions and 6 at Ukrainian; in addition, Kazakhstan
and Azerbaijan produced one dissertation apiece. The
majority of the dissertations may be regarded as clinical
reports of cancer chemotherapy, with few providing
novel or experimental insight. Furthermore, the clinical
studies sometimes repeated studies conducted abroad,
and few studies were prospective in nature. Further-
more, few studies dealt with side effects of cytostatic
chemotherapy, pain management, or combination che-
motherapy. These findings indicate that the shortcom-
ings briefly delineated here deserve special attention
from the appropriate commission of the Presidium of
the USSR Academy of Medical Sciences.

UDC 616.24-006.6-089+615.28

Survival Rates in Lung Cancer: VTsIEL Data

18400125b Leningrad VOPROSY ONKOLOGII
in Russian Vol 34 No 7, Jul 88 (manuscript received
12 Sep 86) pp 809-814

[Article by D. P. Berezkin, R. I. Vagner, V. N. Filatov
and V. I. Yekimov, Order of the Red Banner of Labor
Scientific Research Institute of Oncology imeni Prof N.
N. Petrov, USSR Ministry of Health, Leningrad]

[Abstract] An analysis was conducted on lung cancer
survival rates in the USSR for 1974-1980, based on data
maintained at the VTsIEL [All-Union Center for Evalu-
ation of Effectiveness of Cancer Patient Management].

The case studies under review covered 7173 patients seen at 38 oncological institutions. The data showed that the overall 5 year survival figure for the USSR was 9 percent, with a relative survival rate of 10 percent (20 percent for women and 8 percent for men). The survival rates were comparable with those reported for the United States in 1973-1979, with the exception that the survival rate for women in the USSR was 1.5-fold greater than in the United States. The 5 year survival figures for stage I, II, III, and IV patients were, respectively, 23, 18, 9, and 2 percent. Surgical therapy and its combination with radiotherapy yielded the highest survival rates. However, in stage IV patients surgical therapy was ineffective, and best results were seen with radiotherapy, chemotherapy, or radiotherapy + chemotherapy combinations. Tables 6; references 4: 3 Russian, 1 Western.

UDC 616.8-053.3-084.3

Mass Health Screening of Neonates and Nursing Children

18400133a Moscow *ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSKOVA* in Russian
Vol 88 No 8, Aug 88 (manuscript received 10 Mar 88)
pp 12-15

[Article by L. T. Zhurba, O. V. Timonina, Department of Nervous Diseases, Department of Pediatrics, 2nd Moscow Medical Institute imeni N. I. Pirogov]

[Abstract] An attempt to determine the nature and frequency of occurrence of various nervous system abnormalities in the general population of children in their first year of life involved mass health screening of neonates and nursing children in a Moscow polyclinic. The specially devised scheme of examination provided data concerning 576 parameters, including information about the mother, the father, the course of pregnancy and birth, the child's condition in the maternity hospital, and the neurological status at the time of examination. The children (930) were examined 3-5 times. In addition to clinical studies, the investigation included diaphanoscopy and EEG studies. The researchers used the following criteria for placing the children in a risk group: neurological disturbances found at the time of examination; deviations in formation of motor, speech, and psychoemotional functions; anomalous course of the neonatal period; presence in the anamnesis of indications of a pathological nature of pregnancy or birth; defects revealed by diaphanoscopy; and pathological findings in the EEG. Some 46 percent of the children were judged to be at risk and in need of regular check-ups and correctional measures. The study showed the importance of such screening and its preventive capabilities and indicated that children should be examined by a neuropathologist once every 3 months, or more often if pathology is found. References 3: 1 Russian; 2 Western.

UDC 616.132.5-036.4-07+616.132.5-036.4-084.3

Early Diagnosis and Examination of Patients With Initial Signs of Pathology of Brachiocephalic Arteries With an Automated Screening System at an Industrial Enterprise

18400133b Moscow *KARDIOLOGIYA* in Russian
Vol 28 No 9, Sep 88 (manuscript received 16 Sep 88)
pp 96-97

[Article by M. P. Vilyanskiy, Z. S. Manelis, A. A. Chumakov, A. Ye. Bernshteyn, Department of Surgery, Faculty of Advanced Training of Physicians, and Department of Nervous Diseases, Yaroslav Medical Institute]

[Abstract] The authors developed an automated screening system that they recommend for use in prophylactic examinations at industrial enterprises and in mass health screening. The system is based on a special, formalized questionnaire to collect data concerning the most prevalent and earliest signs of diseases of vessels of the vertebrobasilar system. Workers fill out the questionnaire, and the authors use the answers to the form's 38 questions to classify patients according to four syndromes: epidemiological syndrome, syndrome involving headaches and emotional and memory disturbances, vestibular-cerebellar disturbances syndrome, and visual disturbances syndrome. Persons at risk are given a special examination, and those found to have signs of disease of vessels of the vertebrobasilar system are grouped according to the severity of pathological changes and need for treatment. Use of the questionnaire among 300 workers and employees of the Yaroslav Motor Plant revealed 149 persons having signs of different degrees of this disease. All high-risk persons have been placed in outpatient care and are examined regularly by a neuropathologist, an internist and an oculist. After treatment, each patient received a control rheoencephalogram and rehospitalization or out-patient treatment if needed. References: 4 (Russian).

UDC 616.89-008.441.33-092-053.6

Features of Formation of Drug Addiction and Toxic Substances Abuse in Juveniles

18400133c Moscow *ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSKOVA* in Russian
Vol 88 No 9, Sep 88 (manuscript received 12 Feb 88)
pp 114-118

[Article by G. Ya. Lukacher, N. V. Makshantseva, Department of Somatoneurological Pathology, All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, USSR Ministry of Health, Moscow]

[Abstract] Thirty-five adolescents ranging in age from 15 to 18 and admitted to the department of psychosomatic disturbances of the Scientific Research Institute of First Aid imeni N. V. Sklifosovskiy in the first hours after

recreational drug and substance use were examined by the authors. Additional data came from analysis of clinical and sociological characteristics of 117 teenagers in 5 Moscow rayons who were observed from 2 to 20 months. The combined group consisted of 86 individuals who were 15-16 years old and 66 who were 17-18. Of the 152 individuals, 84 were first-time users, 58 were occasional users, and 10 were diagnosed as addicts. The drugs and substances they used included ephedron, hashish, tranquilizers, antihistamines, cyclodol, volatile solvents, and ether. Eighty-seven percent of the first-time users were males aged 15-16; whereas the average age for occasional users was 17.2 years. The 10 addicted adolescents represented 6 percent of the combined group. Volatile solvents and tranquilizers were the substances most frequently used. Group use of drugs and substances predominated. Addicts displayed a troubled anamnesis much more often than did one-time users. All youths observed had experienced problems of a microsocial nature; but residual organic changes, pathological deviations of personality and hereditary factors were found only among those diagnosed as addicts. Drug abuse appeared to be rooted in adverse microsocial factors and reflected an anti-social attitude among the youth and, especially among the first-time users, a lack of intellectual interests. Only a small percent of the youths go on to become addicts. The addictive nature of the substances used and the premorbid features of body of the user play an important role in addiction. References 17: 11 Russian; 6 Western.

UDC 618.39-089.888.14:340.614]:313.13

Medical and Demographic Aspects of Illegal Abortion

18400142a Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 8, Aug 88 (manuscript received 12 Jun 87) pp 16-19

[Article by I. Ye. Rotkina, Department of Obstetrics and Gynecology, No 1 Novokuznetsk Institute for Advanced Training of Physicians, USSR Ministry of Health]

[Abstract] A determination of the prevalence of criminal abortions in a large industrial city and an attempt to explain what compels women to resort to illegal abortion involved examination of data obtained from 1,000 anonymous questionnaires filled out by women of late child-bearing age (39.0 plus or minus 0.6 years), the results of questioning, and the primary medical documentation of specialized abortion hospitals and clinics. The questionnaires showed that 74 percent of the women had never had an abortion, 8 percent had had one, and 18 percent had had more than one. Of those who had had illegal abortions, 38.4 percent had terminated the pregnancy without help, and 61.6 percent had enlisted help. The abortion proceeded satisfactorily in 48 percent of the illegal abortions, but 52 percent of the illegal abortions that had been commenced at home required subsequent hospitalization because of complications. In a control group of 1,000 women receiving legal artificially induced

abortions, between 5 percent and 6 percent were women under 20 years of age. In the main study group, the number of women under 20 resorting to illegal abortion was twice as great as that in the control group, which is explained by the fact that the pregnancy had lasted more than 12 weeks and because many in this group were unmarried. Motives for having an abortion were classified and discussed. The three main categories of motives were medical reasons, social reasons and personal or family reasons. The reason women chose illegal abortion when legal abortion was available remained unexplained. Some methods of decreasing illegal abortions were presented and discussed briefly. References 15: 13 Russian; 2 Western.

UDC 613.846-07

Causes of Failure of Anti-Smoking Programs

18400142b Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 8, Aug 88 (manuscript received 8 Dec 87)pp 33-34

[Article by S. R. Sokolovskiy, "Leninskiye skaly" Sanatorium, Pyatgorsk Territorial Council for Administration of Trade Union Health Resorts]

[Abstract] A systematic analysis of causes of ineffectiveness of anti-smoking programs carried out at sanatoria and health resorts used expert assessments based on data obtained from coefficients of relative importance and analytical graph models. Information was collected by interviews and commissions. The expert groups included 40 experts working in 4 subgroups: administrators involved in organization of anti-smoking programs; smokers who had quit after sanatorium-health resort treatment; general practitioners from health resorts; and psychologists, psychotherapists and reflexotherapists with three years of experience in treating smoking problems. Causes of ineffectiveness of programs included: lack of access to anti-smoking information by some smokers, disbelief in the harmfulness in the harmfulness of smoking, lack of emotional response to anti-smoking literature, lack of public determination to eliminate smoking, and failure of general practitioners to emphasize anti-smoking efforts. The scarcity of anti-smoking drugs impedes efforts to eliminate smoking, and the fact that reformed smokers often fail to replace their smoking habit with "positive" habits leads them to return to smoking. A systematic approach to eliminate smoking includes direct administrative measures of reward and punishment; creation of a social setting in which smoking becomes economically, socially and morally unacceptable; high technology capable of providing broad-based and effective service to smokers, with economic incentives for physicians who are effective in anti-smoking work. Anti-smoking programs should consist of methodological, informational, organizational and economic incentive components. If anti-smoking programs are to be effective in the future, their structure must be changed and the economic components must be expanded. References 3 (Russian).

RSFSR Health Minister Discusses Roadblocks in Basic Medical Research

18400147 Moscow SOVETSKAYA ROSSIYA
in Russian 14 Dec 88 p 2

[Interview by SOVETSKAYA ROSSIYA correspondents with Anatoliy Ivanovich Potapov, doctor of medical sciences, corresponding member of the USSR Academy of Medical Sciences, RSFSR health minister; "The Status of Talent"; first paragraph is introduction to interview]

[Abstract] In an interview conducted the day after the opening session of the general assembly of the USSR Academy of Medical Sciences, RSFSR Minister of Health L. A. Potapov suggests that basic medical research in the Soviet Union is not on a par with the rest of the world because of "administrative intervention" in medical science. He cites molecular biology as an example, saying that the equipment that Soviet researchers must use is primitive, compared with that used in the West. The result, he says, is a lack of modern antibiotics and heart drugs, which require advanced biotechnology to produce. Potapov says that the medical profession's problems cannot be solved by merely building more institutes and laboratories. The key, he suggests, is in attracting talented researchers to the profession, supporting them and cultivating them, a process that he feels the USSR Academy of Medical Sciences should oversee. The medical profession, in his view, must be less insular and must strive for more contact and a wider exchange of information with other countries. The leading medical journals must expand their circulation. Potapov suggests that competition for appropriations would better serve basic research and that the medical academy should be a "headquarters of science," as it were, controlling the medical research budget. Coordinating councils and commissions in the RSFSR have been cut and reorganized into 27 problem centers that have broader administrative and financial authority. Potapov feels that the experimental-production end of medical research has been neglected. As a result, he says, instead of producing the requisite drugs, test kits, and instruments, Soviet medical science tends to produce reports. He calls for extreme measures, such as closing certain institutions and converting their space, equipment, and staffs to experimental production bases. Such action has already been taken with the Rostov Scientific Research Institute of Parasitology and the Central Scientific Research Laboratory for Glaucoma of the Kuybyshev Medical Institute and is being considered for the Tyumen Scientific Research Institute of Marginal Infectious Pathology.

UDC 616.89-008.441.13+613.86(574)

Cooperation Between Drug Rehabilitation Services and Police in Overcoming Alcoholism

18400226a Alma-Ata ZDRAVOOKHRANENIYE
KAZAKHSTANA in Russian No 9, Sep 88 pp 16-19

[Article by V. I. Grigoryev and V. N. Klepchikov, Alma-Ata Faculty of Correspondence Education, Karaganda Higher School, USSR Ministry of Internal Affairs; Kazakh SSR Drug Rehabilitation Hospital, Kazakh SSR Ministry of Health]

[Abstract] Health statistics from the sobriety centers in Kazakhstan show that in 1987 the number of individuals detained for inebriation was reduced by 8.6 percent in

comparison with 1986. However, this statistic by itself does not indicate that alcoholism has ceased to be a problem of major proportions, and considerably more could be accomplished by effective cooperation between the drug rehabilitation system and the Ministry of Internal Affairs. The time has come to look past traditional forms of cooperation and devise ways and means for a more concentrated effort in Kazakhstan. One of the more effective measures would be a better exchange of information and a pooling of resources. For example, the drug rehabilitation services reported that there were approximately 3,000 chronic alcoholics in Alma-Ata requiring treatment, whereas the data from the police suggested a figure several times that number. One method for resolving this information conflict would be to utilize a centralized computerized data bank and sharing of information, much in the manner in which it is done in Kiev. Another approach would be to increase the number of alcoholics currently undergoing psychotherapy for alcoholism, which at present encompasses only an estimated 30 percent of the target population. Furthermore, both incarceration and hospitalization often place the occasional drinker in the same category as the chronic alcoholic, to the detriment of the former. These and other issues remain to be resolved, including incorporation of the general physicians into the alcoholism awareness program for earlier identification of potential problem patients.

Occupational Diseases: Statistics and Reality

18400226b Moscow ENERGIYA: EKONOMIKA,
TEKHNIKA, EKOLOGIYA in Russian
No 9, Sep 88 pp 46-49

[Interview with N. F. Izmerov, director, Scientific Research Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences]

[Abstract] Official Soviet health statistics show that the incidence of occupational diseases in the USSR fell by 23.8 percent in the 11th Five-Year Plan. However, on-the-spot studies conducted by specialists from the Scientific Research Institute of Labor Hygiene and Occupational Diseases have shown that this figure and the trend it suggests are highly dubious. Invariably, it has been the experience that the reported data on occupational diseases represents a deliberate under-representation on the part of management and the ministries involved. As a result, conflicts often arise between the medical workers and the management of an industrial enterprise that wishes to suppress reports on adverse health aspects. One of the more effective methods of addressing this problem would be transfer the responsibility for hygienic oversight from the USSR Ministry of Health directly to the USSR Council of Ministers. In addition, with the increasing emphasis on cost effectiveness and financial self-sufficiency, levying of monetary penalties may be expected to force the Soviet industrial sector to take industrial hygiene and health more seriously.

Perinatology and Medical Engineering

18400226c Moscow *TEKHNIKA I NAUKA in Russian*
No 9, Sep 88 pp 23-25

[Interview with Yevgeniy Alekseyevich Chernukha, professor, department head at the All-Union Scientific Research Center for Maternal and Child Health Care, under the rubric "An Acute Problem": "I Need an Engineer"]

[Abstract] With the advent of a period of glasnost in the USSR it has become quite clear that all is not well with perinatology and intensive neonatal care. The basic problem is that knowledge cannot be implemented in the clinical setting without the proper instrumentation, such as ultrasonic scanners, special incubators, various fetal monitoring devices, and so forth. The equipment that is

available is limited to major research centers, Soviet biomedical engineering industry is virtually nonexistent, and technical support personnel are unavailable. The Soviet Union is not a signatory to the WHO convention that regards 500-g fetuses as premature and deserving of intensive care. In Soviet practice, prematurity is not considered in embryos of less than 1000 g. All of this contributes to a high child mortality rate in the USSR. A tentative initial step that has been taken to rectify the serious problems with medical equipment and supplies has been the establishment of a biomedical engineering faculty at the 1st Moscow Medical Institute. Its purpose shall be to service the available equipment, although not too much is expected of the individuals as physicians. But again, it will be a long while, if ever, before these physician/engineers are seen outside major clinical research centers.

Psychological Problems of Decision Making in Questions Involving Multicriterion Choice

18400096 Moscow *PSIKHOLOGICHESKIY ZHURNAL in Russian* Vol 9 No 5, Sep-Oct 88 pp 45-52

[Article by O. I. Larichev, S. B. Rebrik, All-Union Scientific Research Institute of Systems Research, USSR Academy of Sciences, Moscow]

[Abstract] An attempt is made in this survey article to systemize studies of psychological problems encountered in decision making that involve several options, each of which involves qualitative and quantitative assessments. The term "decision making" is taken to mean the activity of a manager aimed at choosing, classifying, or ordering objectives that are based on multicriterion assessments. The author examines nonrepeating problems associated with criterion-expert choice in subjective models—problems such as choice of priority directions in research or choice and assessment of important technical and economic projects—focusing on results pertaining to 3 widely existing problems involving decision making: binary comparison of multicriterion objectives, selection of the best objective from a set of objectives, and classification of multicriterion objectives. Rules and strategies used in such decision making are discussed: the rule of selection based on absolute domination, the conjunctive rule of exclusion of the worst variant of solution, the disjunctive rule of selection, the lexicographic rule of selection, the rule of exclusion of objectives on the basis of criteria, the rule of selection based on domination in the greatest number of criteria, the rule of selection based on the highest assessment, the rule of exclusion based on the lowest assessment, the rule of selection based on the most obvious advantage and the rule of selection based on the greatest overall usefulness. Intricacies and hazards during use of these rules by a decision maker are discussed, as are the practical aspects of studies involving creation of standard methods of decision making. References 22: 10 Russian; 12 Western.

Formation of Occupationally Important Personality Traits in Nuclear Electric Power Plant Operators

18400135a Moscow *PSIKHOLOGICHESKIY ZHURNAL in Russian* Vol 9 No 4, Jul-Aug 88 pp 60-69

[Article by V. N. Abramova, V. V. Belekhev, Obninsk Institute of Nuclear Power Engineering, USSR Ministry of Atomic Power, "Prognoz" Sectorial Scientific Research Laboratory, Kaluga Oblast]

[Abstract] The vital importance of consideration of personality traits in the training and selection of nuclear electric power plant operators is discussed within the

context of a model developed at the Obninsk Prognoz Laboratory for control board personnel. The authors base their evaluations on criteria they developed earlier for evaluating reliability in 11 operator sample groups. The criteria were based on motivation, risk-taking, MMPI tests, and Cattell tests. A comparison of operator MMPI scores and those of third-year students a power-engineering VUZ suggested to the authors that age considerations and personality features are important in actual working conditions. They concluded that stringent occupational requirements could be maintained by beginning training of specialists during adolescence. A system of occupational selection should include occupational orientation of students aspiring to this occupation, psychological screening of students in a power-engineering VUZ and occupational screening before the student begins work at a nuclear power plant or when he is hired. Occupational screening should use psychological criteria based on age and other factors, with evaluation of the prospects of the development of occupationally important personality traits conducted throughout the training at the VUZ and during the OJT period at the plant. Attempts should be made to develop personality traits in individuals that will need little correction in the subsequent years. At the VUZ and during OJT at the plant, personality traits and proper motivation should be developed on a daily basis. Figures 3; references 7 (Russian).

Psychological Aspects of the Development and Operation of Computer-Aided Design Systems

18400135b Moscow *PSIKHOLOGICHESKIY ZHURNAL in Russian* Vol 9 No 4, Jul-Aug 88 pp 70-75

[Article by V. V. Gura, Ye. Yu. Kompan, Taganrog Radio-Engineering Institute, Rostov State University]

[Abstract] Because computer-aided design (CAD) involves the computer-human operator interface, consideration of the psychological factors inherent in development and use is necessary if the highest efficiency is to be achieved in the system. A discussion of psychological problems encountered during development of industrial CAD systems centers on the first line of the industrial CAD system for heat-exchange equipment developed for the Taganrog Industrial Association "Krasnyy kotelshchik" and psychological evaluation of designers and developers working with such systems. The necessity for carrying out psychological studies at early stages of development of industrial CAD systems is emphasized. These procedures provide a better picture of the mental activity of the designer and reveal individual features of users in dealing with linguistic and informational aspects of an industrial CAD system. References 9 (Russian).

UDC 577.391;547.425;615.771.8

Entropy Function and Radioprotective Effectiveness of N-substituted S-2-aminoethylthiosulfates

18400079c Moscow *RADIOBIOLOGIYA* in Russian Vol 28 No 3, May-Jun 88 (manuscript received 21 Jul 87) pp 407-411

[Article by V. K. Mukhomorov, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] An informational approach proposed by the author in 1986 (*RADIOBIOLOGIYA*, Vol 26, No 4, pp 560-563) to predict effective radioprotectors in sulfur-containing compounds is expanded. A somewhat different criterion for selection of effective radioprotective compounds is proposed for a homologous series of N-substituted S-2-aminoethylthiosulfates, which are of interest because it is only by replacing the substituent at the nitrogen atom that a substantial alteration of the radioprotective effectiveness can be brought about. The specific information contained in molecular structure—which is used to estimate radioprotective activity—was coded with a full Shannon entropy function determined from the entropy factors of each of a molecule's atoms. It was found that for the compounds in the series of N-substituted S-2-aminoethylthiosulfates, which are protective in small doses, a system factor can be introduced that makes it possible to reliably distinguish such compounds from compounds that are ineffective, even at large doses. The relationship of toxicity and survival rate to hydrophobicity is examined within the framework of an example that is based on a series of $\text{CH}_3(\text{CH}_2)_n\text{NHCH}_2\text{CH}_2\text{SSO}_3\text{H}$ compounds in which $n = 0-17$. References 11: 5 Russian; 6 Western.

Radiation-hygienic Principles of Optimized Radiation Monitoring in Zones of Surveillance of Nuclear Electric Power Plants

18400097 Moscow *GIGIYENA I SANITARIYA* in Russian No 7, Jul 88 (manuscript received 10 Mar 87) pp 44-48

[Article by L. I. Piskunov, S. I. Treyger, Sverdlovsk Regional Sanitation-epidemiological Station]

[Abstract] Basic aspects of dosimetric monitoring of nuclear electric power plant emissions and the effect of such emissions on a local population are described and discussed against a background of the likelihood of nuclear power plants increasing in number and size. Basic requirements for optimizing radiation monitoring around nuclear power plants must be formulated so that comprehensive, representative data on radiation conditions can be obtained quickly. Direct radiation dosimetry is one of the most objective sources of such data. Long-term dosimetric monitoring around the Beloyarsk nuclear power plant—which is based on mathematical planning of observations, tracking of radioecological patterns, and objective, computerized statistical analysis of initial data—indicates that such comprehensive monitoring can be done. Formulas are derived for determining above-background-level effects and for classifying components due to global radioactive fallout and technogenic radionuclides. Procedural recommendations are made for generalizing calculations of internal and external radiation doses received by a local population from technogenic radionuclides. Use of optimized radiation monitoring after an accident at a nuclear power plant is discussed. References 18 (Russian).

UDC 547.963.3.057:615.281

UDC 578.835:578.233.2

Acyclic Ribavirin Analogs: Synthesis and Antiviral Activity

18400104b Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 5, May 88
(manuscript received 7 Sep 87) pp 689-693

[Article by T. L. Tsilevich, I. L. Shchavaleva, L. N. Nosach*, V. L. Zhovnovataya*, I. P. Smironov, S. V. Kochetkova, B. P. Gottikh and V. L. Florentyev, Institute of Molecular Biology, USSR Academy of Sciences, Moscow; *Institute of Microbiology and Virology imeni D. K. Zabolotnyy, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A series of ribavirin (1-beta-D-ribofuranosyl-1,2,4-triazole-3-carboxamide) analogs were tested for their effectiveness in inhibiting human adenovirus 2 in Hep-2 tissue culture. The compounds under study consisted of 1-(2-hydroxyethoxymethyl)- (I), 1(3-hydroxypropoxymethyl)-, 1-(4-hydroxybutoxymethyl)-, and 1-(2,3-dihydroxypropyl)-1,2,4-triazole-5- and 3-carboxamides. Structure-activity correlation analyses demonstrated that, for antiviral efficacy in tissue culture, the analogs requires an either oxygen atom simulating the O4' furanose ring. Highest anti-viral activity was displayed by compound I, an analog in which the hydroxyl group was a geometric equivalent to the 5'-hydroxyl group of ribose of ribavirin. In addition, elongation of the alkyl side chain was also shown to have a deleterious effect on antiviral activity. References 5 (Russian).

Is the Arg-Gly-Asp Sequence on Foot-and-Mouth Virus Protein Responsible for Virus Binding to Cellular Receptors?

18400122f Moscow BIOORGANICHESKAYA
KHIMIYA in Russian Vol 14 No 7, Jul 88 (manuscript received 5 Feb 88) pp 965-968

[Article by A. Yu. Surovoy, V.T. Ivanov, A. V. Chepurkin*, V. N. Ivanyushchenkov* and N. N. Dryagalin*, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; *All-Union Scientific Foot-and-Mouth Virus Scientific Research Institute, Vladimir]

[Abstract] An analysis was conducted on the factor(s) responsible for the binding of the foot-and-mouth virus (FMV) to cellular receptors, proceeding from an evaluation of the amino acid sequence of the four FMV proteins (V₁, VP₂, VP₃, VP₄). The highly conservative sequence Arg-Gly-Asp, which has been identified as being responsible for the binding of a number of extracellular proteins to cellular receptors, has been found in the hypervariable region (136-160) of VP₁. In addition, a variety of synthetic peptides possessing the Arg-Gly-Asp sequence have strongly suggested that Arg-Gly-Asp constitutes the ligand responsible for the binding of FMV to cellular receptors. Figures 1; tables 1; references 21: 2 Russian, 19 Western.

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