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# JPRS Report

# Science & Technology

## USSR: Life Sciences

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# Science & Technology
## USSR: Life Sciences

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## Study of Induction of Tumor Necrosis Factor and Inteleukin-1 With Use of Glycopolymers Isolated From *Pseudomonas solanacearum* and *Clavibacter michiganense*

*917C0199A Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 11 Mar 90) pp 17-23*

[Article by L. D. Barbanets, Ye. D. Prokopyeva, A. A. Prokopyev, and S. A. Ketlinskiy, Institute of Microbiology and Virology, UkSSR Academy of Sciences, Kiev; All-Union Scientific Research Institute of Ultrapure Biopreparations, Leningrad]

UDC 579.222

[Abstract] The capability of glycopolymers to affect the body's immune response is prompting researchers to look for drugs that stimulate nonspecific and specific resistance to bacterial and viral infections and to spontaneous tumor processes. Studies have shown that tumor necrosis can result from the use of bacterial cell-wall components such as peptidoglycanes and lipopolysaccharides. However, those biopolymers do not have a direct cytotoxic effect on tumor cells, and their effects are mediated through activation of the immune system. An important target of bacterial glycopolymers, therefore, is the system of mononuclear phagocytes, whose activation is accompanied by the production of a number of immune mediators, among them tumor necrosis factor (TCF) and interleukin-1 (IL-1). Those monokines represent some of the endogenous mediators that play an important role in the development of the immune response. The researchers here studied the capability of lipopolysaccharides (LPS) from *Pseudomonas solanacearum* and polysaccharides (PS) from *Clavibacter michiganense* to induce the production of TCF and IL-1 in a culture of mouse peritoneal macrophages stimulated by thioglycolate. The target cells were mouse fibroblasts of the line L 929. The researchers found that LPS effectively induced the synthesis of both mediators, on a level comparable with LPS of *E. coli* O55:B5. Certain of the polysaccharides from *C. michiganense* (β-D-galactopyranose among them) were found to have a pronounced stimulatory effect in terms of TCF production. Neutral polysaccharides had no effect. The researchers judged the activity of the extracellular polysaccharide (glucose + glucuronic acid) to be considerable in terms of both IL-1 and TCF production. References 16: 7 Russian, 9 Western.

## *Clostridium acetobutylicum* Reduction of 3-Nitrophthalic Hydrazide

*917C0199B Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 23 Jun 89) pp 23-26*

[Article by P. I. Gvozdyak, I. Ye. Kalinichenko, N. F. Mogilevich, and T. M. Tkachuk, Institute of Colloidal Chemistry and Water Chemistry, UkSSR Academy of Sciences, Kiev]

UDC 579.852.13:083.1

[Abstract] Microbial reduction reactions are used in environmental protection, biotechnology, and organic-synthesis technology. Estimating the physiological state of a microbial population, however, requires measurements that take a great deal of time, which is why researchers are seeking new techniques for that purpose. The researchers here studied the microbial reduction of 3-nitrophthalic hydrazide (3-NPH) and its use in monitoring the activity of *Clostridium* bacteria. 3-NPH was chosen because the product of its reduction is 3-aminophthalic hydrazide (luminol), which, upon oxidation, produces an intense chemiluminescence. By recording that reaction, one can identify very small quantities of luminol (on the order of $10^{-12}$g) against a background of unreduced 3-NPH. The reduction (by *Clostridium acetobutylicum*) was studied in anaerobic conditions at 37°C. The experiments indicated that the detection limit of luminol in aqueous solutions was 1 x $10^{-12}$mole/$l^{-1}$, with a linear dependence between the intensity of the glow and the concentration of luminol at $10^{-5}$ - $10^{-12}$ mole/$l^{-1}$. At $10^{-4}$ - $10^{-5}$, the extent of reduction did not depend on initial concentration of 3-NPH. NPH reduction was effected by active, growing cells, as evidenced by the absence of luminol in the cultivation medium during the lag phase and by its increased levels in proportion to the increase in biomass. This chemiluminescent technique for determining luminol makes it possible to determine physiological activity and is more sensitive than photometry. The researchers provide an equation for describing the proportionality of reduction rate to 3-NPH concentration and bacterial content in the reactin medium: V = k x n x c, where V is the reaction constant, k is the rate constant, n is the content of actively metabolizing bacteria, and c is the concentration of hydrazide in solution. Figures 1; references 4: 3 Russian, 1 Western.

## Role of Sulfur Cycle Bacteria in the Corrosion of the Lead Sheath of an Armored Cable

*917C0199C Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 27 Feb 90) pp 34-38*

[Article by S. B. Yanover, A. I. Lisaya, N. P. Zvyagintseva, O. A. Lunev, and Ye. I. Andreyuk, Institute of Microbiology and Virology, UkSSR Academy of Sciences, Kiev]

UDC 579.69:620.193.8

[Abstract] The fact that there has been little study of the microbiological factor in the corrosion of the lead sheaths of underground cable prompted the researchers here to study the effect of sulfur cycle bacteria on the corrosion of lead protected by steel jacketing. Polished lead wrapped in filter paper and sandwiched between two steel plates was placed in a container that held 1 kg of sterile loamy soil with a moisture content of 60 percent (tap water). Strains of sulfate-reducing and

thionic bacteria (taken from components of destroyed cable) were introduced, as was a combination of the two. The soil was inoculated with 4-day cultures of bacteria at $10^6$ cell/g soil. The sulfate-reducing bacteria were found to grow more vigorously in association than in individual cultures. Visual inspection of the samples indicated that the corrosion products that formed varied as a function of the experiment variable. In the soil inoculated with the sulfate-reducing bacteria, lead sulfides formed on the lead, with pitting beneath the sulfide film. In the soil infected with the thionic bacteria, a dark red product developed over a considerable area of the lead sample, with bulging, bubbles and cracks over 70 percent of the surface. Two types of corrosion products formed in the soil inoculated with a combination of the bacteria: black lead sulfides and dark red products. X-ray structural analysis of the corrosion products showed them to be $PbO_{1,37}$, $PbO_{1,44}$, $PbO_{1,55}$, and $PbO_2$. The deepest pitting was noted after 13 months on the samples in the soil infected with thionic bacteria and the combination of the two bacteria. Cathode polarization of the lead protected by steel jacketing in the presence of sulfate cycle bacteria was ineffective. Figures 3; references 9: 6 Russian, 3 Western.

## Use of Bacteria for Separating Oil From Solid Particles

*917C0199D Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 19 Apr 89) pp 38-42*

[Article by P. I. Gvozdyak, N. I. Podorvan, and N. P. Gvozdyak, Institute of Colloidal Chemistry and Water Chemistry, UkSSR Academy of Sciences, Kiev]

UDC 579.69:55

[Abstract] The absence of an explanation of the mechanism underlying the extraction of oil from seams by means of microorganisms prompted the researchers to study the process of the microbiological separation of oil from solid particles and to study the separation of oil from solid phase in the periodic cultivation of bacteria in anaerobic conditions. The study involved the use of anaerobic bacteria from the sludge pit of the Afipskiy Oil Refining Plant and from the Bortnicheskiy Aeration Station in Kiev. Also used were pure cultures of *Arthrobacter variabilis* 671, *A. simplex* 667, *A. tumescens* 669, and *A. siderocapsulatus* 1122. River sand treated with crude oil from the Dolinsk deposit served as the medium from the oil to be separated. It was mixed with oil and applied in a microlayer on a 7.5 x 5.5 cm glass slide; the mixture was then seeded with the microorganisms. An agar medium was added, and the slide was covered with another piece of glass or with cellophane, polyethylene film, and glass. The study of the microbial separation of the oil in anaerobic period cultivation was performed in 25-ml test tubes. The most active of the bacteria were the *Arthrobacter variabilis* 671, the *A. tumescens* 669, and the complex from the Bortnicheskiy Aeration Station, which, within five days, clarified the sand, produced a gas in the sand-oil layer, and resulted in a film of oil on the surface of the medium. Figures 4; references 14: 5 Russian, 9 Western.

## Bioemulsifier Produced by Culture of *Bacillus* Species and Its Properties

*917C0199E Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 11 Mar 90) pp 78-82*

[Article by A. N. Shulga, S. A. Yeliseyev, Ye. V. Karpenko, A. R. Kirchiv, and A. A. Turovskiy, Department of Physical Chemistry and Technology of Fuel Resources, Institute of Physical Chemistry, UkSSR Academy of Sciences, Lvov]

UDC 579.85211.22

[Abstract] Although bioemulsifiers that are produced by microorganisms are of interest to a number of industries, only one bioemulsifier is being manufactured in biotechnology—emulsane, which is produced by acinobacteria grown on hydrocarbons and is used in the transport of viscous oils, the improvement of their fuel properties, and the removal of hydrocarbon pollutants from tankers and containers. In their study of the capability of a culture of *Bacillus* sp. C-14 to produce a bioemulsifier, the researchers used saccharose as the sole source of hydrocarbon and energy. The bioemulsifier was isolated with a technique originally advanced by McInerney (Biosurfactant and enhanced oil recovery, U.S. patent No 4,522,261) and modified by the authors. The bioemulsifier they produced contained carbohydrates, proteins, and lipids and was highly effective in terms of hydrocarbons ($E^{24}$ 69-83 percent). The researchers compared emulsions of liquid parafins ($C_{12}$ - $C_{14}$) produced by the bioemulsifier with those produced by Tween-80, and they found no appreciable differences in structure. An important feature pointed out by the researchers is that their bioemulsifier is active in the pHrange of 6.0 - 9.0. Figures 3; references 9: 2 Russian, 7 Western.

## Effect of Signal '37°C-Low pH' on Plague Microbe Cells

*917C0199F Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 52 No 5, Sep-Oct 90 (manuscript received 18 Apr 89) pp 88-92*

[Article by S. O. Vodopyanov, Rostov-na-Donu Scientific Research Antiplague Institute]

UDC 579.842.23.24

[Abstract] Of the three specific signals capable of specifically rearranging metabolism in the plague microbe, the signal "37°C-low pH" (which mimics the conditions of macrophage phagolysis in which phagocytized plague microbe cells multiply) was studied in terms of its effect on the kinetics of formation and the accumulation of

subunit and high-polymer forms of adhesive fimbrin in plague cells. The researchers focused on *Yersinia pestis* EB 76. In determining the dynamics of the restructured metabolism of the microbe by the signal, fimbriated cells of EB 76 were placed in a fresh bullion with pH 5.0 and were incubated at 37°C in aerated conditions. With EIA, fimbrin formation was recorded after 90 minutes of incubation. Electrophoresis and immunoblotting were used to confirm the EIA positive. Further data indicated the existence of two forms of fimbrin with identical electrophoretic mobility in PAGE—cell-bound and secretory. A minute portion of the "cellular" fimbrin has reduced mobility in 15 percent sodium dodecylsulfate-PAGE. The researchers noted that the adhesive fimbrin was more rapidly expressed than fraction I antigen in the few hours of activity of the 37°C-low pH signal. Figures 3; references 10: 5 Russian, 5 Western.

## Effects of Oxygen on L-Lactate-Cytochrome C Oxidoreductase Activity and Cytochrome C and Lactate Levels in Candida Utilis

*917C0285A Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 25 Dec 89) pp 725-730*

[Article by S. S. Yeremina, R. N. Matyashova and V. A. Shnyrova, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

UDC 582.282.23.017.7

[Abstract] An analysis was conducted on oxygen effects on cytochrome C and cytochrome C-dependent enzymes and lactate levels in Candida utilis grown on Ryder's medium supplemented with 5 percent yeast hydrolysate, pH 5.0 - 6.0. Evaluation of the metabolic patterns of the biphasic growth—initially on glucose and after its depletion on accumulated ethanol—showed that cytochrome C (0.6 - 1.1 nmoles/mg protein) rose almost 5-fold after 24 h when $pO_2$ fell to 0 percent, with a parallel increase in the concentration of lactate. Concomitant enzymatic changes included a sharp increase in the activity of L-lactate-cytochrome C oxidoreductase and unaltered NAD(P)H-cytochrome C oxidoreductase activity, while D-lactate-cytochrome C oxidoreductase was virtually undetectable. The increase in cytochome C was attributed to lactate accumulation, in turn attributed to excess NAD(H). Figures 1; tables 1; references 18: 8 Russian, 10 Western.

## Biosynthesis of Fusicoccin in Mixed Cultures(tab)

*917C0285B Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 09 Aug 89) pp 790-796*

[Article by R. A. Maksimova, T. S. Sharkova, N. P. Palmova, K. A. Abbasova, G. S. Muromtsev and A. N. Polin, Biological Faculty, Moscow State University]

UDC 579/582.022-083

[Abstract] An analysis was conducted on the synthesis and composition of fusicoccin, a plant growth regulator, by Fusicoccum amygdali in mixed cultures with other fungi and bacteria (Staphyloccus aureus 209, Bacillus subtilis 42, Escherichia coli 110, Pseudomonas fluorescencs 71). The bacteria were found to be without effect on fusicoccin production in 96 h submerged mixed cultures, or when supernatants from 48 h mixed cultures were added to F. amygdali cultures. However, fusococcin biosynthesis was inhibited in mixed cultures with the fungi Trichothecium roseum and Pycnoporus cinnabarinus, and increased 2- to 3-fold in the presence of Trichoderma harzianum. Cultures with Candida sp. showed both elevated production of fusicoccin and increased the chemical heterogeneity of the fusicoccin components. On balance, C. lipolytica and T. harzianum appear to be the most promising associates for enhancing production and variety of fusicoccin species. Figures 1; tables 3; references 12: 9 Russian, 3 Western.

## Microbial Interactions in Exopolysaccharide-Producing Mixed Culture

*917C0285C Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 30 Jun 89) pp 797-805*

[Article by T. A. Grinberg, T. P. Pirog, V. N. Buklova and Yu. R. Malashenko, Institute of Microbiology imeni D. K. Zabolotnyy, Ukrainian SSR Academy of Sciences, Kiev]

UDC 579.8.017.7:577.114.5.083

[Abstract] Studies were conducted on the microbial interactions prevailing in an exopolysaccharide-producing mixed culture consisting of 70-80 percent Acinetobacter sp., 15-20 percent Micrococcus sp. and 5-10 percent Candida tropicalis. The high-viscosity polysaccharide, produced by the Acinetobacter sp., which had a MW of 3 x 10E3 to 5 x 10E5 D and was composed of arabinose:xylose:mannose:galactose:-glucose (0.66:1.22:0.20:3.78:1.00), was not utilized by the mixed culture. A trophic relationship was observed to predominate among the genera: commensialism applied to the association between Acinetobacter sp. and C. tropicalis, mutualism to C. tropicalis and Micrococcus sp., and neutralism to Acinetobacter sp. and Micrococcus sp. The ability to support exopolysaccharide synthesis by the mixed culture was unaffected by three months of storage at 4°C. Figures 2; tables 5; references 15: 10 Russian, 5 Western.

## Coimmobilization of Bdellovibrio Bacteriovorus 109D-Escherichia Coli System in Polyacrylamide Gel

*917C0285D Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 30 Oct 89) pp 812-818*

[Article by A. V. Afinogenova, A. P. Shorokhova and B. A. Fikhte, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

UDC 579.[835.91+842.11].088

[Abstract] An analysis was conducted on host-parasite relationships in a Bdellovibrio bacteriovorus 109D-Escherichia coli B system immobilized in polyacrylamide gel, which demonstrated that B. bacteriovorus within the host bacterium are protected from the toxic effects of the reagents employed in polymerization. Free B. bacteriovorus lost mobility and were inactivated on the carrier, while intracellular B. bacteriovorus remained viable in the periplasmatic space of the host. In addition, immobilization on granular carriers was shown to improve the survival of both the host and parasite and actually enhanced E. coli growth. After three months of storage at +4°C, 30 percent of the B. bacteriovorus and 18 percent of the E. coli cells remained viable. Figures 3; tables 2; references 12: 6 Russian, 6 Western.

## Comparative Analysis of NP-1T Cyanophages Lysogenizing Nostoc and Plectonema Nitrogen-Fixing Cyanobacteria

*917C0285E Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 19 Jul 89) pp 819-826*

[Article by M. M. Muradov, G. V. Cherkasova, D. U. Akhmedova, F. D. Kamilova, R. S. Mukhamedova, A. A. Abdukarimov and A. G. Khalmuradov, Institute of Microbiology and of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

UDC 579.81:582.232

[Abstract] Comparative microbiological, ultrastructural, and biochemical analyses were carried out on NP-1T series of cyanophagses isolated from various water bodies in the Tashkent Oblast and capable of establishing a lysogenic state in Nostoc sp. and Plectonema sp. cyanobateria. The resultant data demonstrated morphological variations, species-specificity characterisitics, and differences in the lytic cycles among the cyanophages. In addition, restriction analysis yielded markedly different patterns of DNA fragments, underlying the species-specificity of the cyanophages. Figures 3; tables 5; references 16: 10 Russian, 6 Western.

## Anaerocellum Thermophilum Gen. Nov. Sp. Nov.: Extremely Thermophilic Cellulose Degrading Eubacterial Isolate From Geyser Valley in Kamchatka

*917C0285F Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 02 Mar 89) pp 871-879*

[Article by V. A. Svetlichnyy, T. P. Svetlichnaya, N. A. Chernykh and G. A. Zavarzin, Institute of Microbiology, USSR Academy of Sciences, Moscow]

UDC 579.841.017.7(571.66)

[Abstract] An extremely thermophilic, obligately anerobic eubacterium has been isolated from a boggy meadow in Geyser Valley in Kamchata, designated as Anaerocellum thermophilum gen. nov. sp. nov., type strain Z-1320. A. thermophilum is a asporogenic, chemoorganotrophic, peritrichous rod (2.5 - 4.0 μ x 0.7 μ) growing singly or in pairs, capable of growth at 40 - 83°C and a pH range of 5.0 - 8.3. However, optimum growth conditions consist of a temperature of 72 - 75°C and a pH of 7.1 - 7.3. The rods are Gram positive with a thicker outer cell wall and an inner thinner but more electron-dense membrane. The GC content of DNA is 36.7 percent and maximum utilization of cellulose occurs at 73 - 78°C. On a medium with 10 g/L cellulose and 0.5 g/L yeast extract the generation time is 110 min. The primary fermentation products are lactate and acetate from cellulose, starch and a variety of mono- and disaccharides. Growth is inhibited by chloramphenicol, benzylpenicillin, vancomycin, streptomycin and tetracycline, but not by rifampicin. Figures 4; tables 1; references 17: 1 Russian, 16 Western.

## Bioluminescent Planktonic Bacteria in Coral Reefs and Tropical Littoral Waters of Indian Ocean and South China Sea

*917C0285G Moscow MIKROBIOLOGIYA in Russian Vol 59 No 5, Sep-Oct 90 (manuscript received 27 Jun 89) pp 912-920*

[Article by G. A. Primakova and A. M. Kuznetsov, Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

UDC 579.81+843

[Abstract] Samples of planktonic bacteria collected in January-May, 1984, from coral reefs and tropical littoral waters in the Indian Ocean and South China Sea showed that the level of bioluminescent bacteria ranged from 10E2 to 10E4 CFU/L, representing 0.1 - 0.6 percent of the saprophytic bacteria. The number of luminescent bacteria found in aggregates approaches 85 percent, with the aggregates generally ranging in size from 3 - 8 μ, but $< 200$ μ. The dominant isolate was represented by Vibrio harveyi (91.8 percent), with Photobacterium leiognathi accounting for only 8.8 percent of the luminescent bacteria in the various samples. Figures 3; tables 4; references 20: 7 Russian, 13 Western.

## Investigation of Effect of Preparation of 'Solco' Lactobacteria on Survival Rate and Intestinal Microflora in Irradiated Animals

*917C0286A Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 90 (manuscript received 14 Feb 90) pp 6-9*

[Article by V. Bossart, S. Popova-Barzashka, N. P. Tarabrina, and V. M. Korshunov, Second Moscow Medical Institute imeni N. I. Pirogov, "Solco", Basel, Switzerland]

UDC 615.37:579.684.1].015.4.076.9

[Abstract] A Solco (Switzerland) lactobacteria strain was investigated for its potential use in the normalization of intestinal microflora in the development of post-radiation dysbacteriosis. Outbred albino mice (18-20 g) were irradiated with 700 R gamma-quanta (100 R/min) and then administered intragastral injections of live *Lactobacillus acidophilus* (Solco) once per day on days 1, 3, 5, 7, 9, 12, and 14 following irradiation. The results demonstrated that *L. acidophilus* 11/83 normalizes the balance of small and large intestine microflora. A comparison of the results of independent investigations on the effect of Solco lactobacteria and other lactobacteria on intestinal biocenoses in irradiated mice indicated that the former better suppress the excess reproduction of enterobacteria and increase the number of lactobacteria in the animals' intestinal tracts. In addition, the Solco lactobacteria normalize the intestinal microflora by diminishing the number of pathogenic microorganisms in the small intestine, and inhibiting population of the small intestine with enterobacteria, enterococci, and staphylococci, which results in an increase in the survival rate of the animals (41.68 percent for the experimental group, as opposed to 21.66 percent for the control group, 30 days after exposure). These findings suggest that the Solco lactobacteria can be used as a bacterial preparation to regulate intestinal microbiocenoses. Tables 3; references 6: Russian.

## *Yersinia pestis* Phage of Novel Serovar

*917C0286B Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 90 (manuscript received 21 Nov 89) pp 9-12*

[Article by N. N. Novoseltsev and V. I. Marchenkov, Rostov on the Don Scientific Research Anti-Plague Institute]

UDC 578.81:579.843.95].083.33

[Abstract] Phage P was isolated from *Yersinia pestis* 2247, a natural strain found in fleas in the Aral Karakumy of a Central Asian desert focus. Electron microscopy demonstrated that the original phage and its mutant have an equilateral hexagonal head and process that can be reduced. In addition, other conventional methods showed that phage P and its mutant are serologically identical. The results indicate that phage P and its mutant have no serological relationship to phages of the first and second serovars. These data thus permit classification of phage P as a moderate phage that differs substantially from the *Y. pestis* phage of serovar 2. The source of isolation, high degree of specificity, and absence of serological features common to the currently known phages of *Y. pestis* permit classification of phage P as a new serovar 3 of *Y. pestis* phages. Tables 1; references 10: Russian.

## Aspects of O-Specific Humoral Immune Response in Mice Vaccinated With *Salmonella choleraesuis* Antigens

*917C0286C Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 90 (manuscript received 25 Dec 89) pp 56-59*

[Article by N. P. Vaneyeva, N. Yu. Alekseyeva, G. N. Torsunova, N. B. Bogdanova, N. Ye. Yastrebova, and S. I. Yelkina, Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, USSR Academy of Medical Sciences; Immunology Institute, USSR Ministry of Health, Moscow]

UDC 615.371:579.842.14].015.46:612.017.1+612.017.1.014.46:[615.371:579.842.1

[Abstract] A comparative investigation of the O-specific humoral response in female CBA x C57BL/6 $F_1$ mice (18-20 g) was conducted following their intraperitoneal injection with a hydroxylamine vaccine (HAV), O-antigen, or O-specific polysaccharide of *Salmonella typhimurium* or *S. choleraesuis* in doses of 1, 10, or 100 μg. They were re-immunized 14 days later with the same antigens in a 10 μg dose. Results of enzyme immunoassay of 340 sera from the mice demonstrated that a single immunization with varying doses of HAV and O-antigen of *S. typhimurium* resulted in the development of a weak specific immune response, while immunization with HAV or the O-antigen of *S. choleraesuis* did not elicit any immune response. In addition, analysis of the secondary immune response to HAV of *S. typhimurium* demonstrated a general trend toward a large increase in the level of O-specific IgM antibodies as compared to the IgG antibody level, in contrast to the secondary immune response of *S. choleraesuis* HAV, in which a higher antibody level was noted after *S. choleraesuis* HAV re-immunization with a 10 μg dose per mouse. It was also shown that neither the O-polysaccharide of *S. typhimurium* or *S. choleraesuis* induced an O-specific immune response even after repeat immunization. In conclusion, the findings indicate that *S. choleraesuis* HAV cannot protect mice from the *S. choleraesuis* infection. Tables 2; references 7: 6 Russian, 1 Western.

## Tissue Heterogeneity of Mononuclear Phagocyte Cell System in Interaction With *Yersinia pestis*

*917C0286D Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 90 (manuscript received 14 Feb 90) pp 75-78*

[Article by G. I. Vasilyeva, A. K. Kiseleva, B. D. Rublev, Ye. Ye. Sokolova, V. S. Kagramanov, and L. N. Tkachenko, Scientific Research Anti-Plague Institute, Rostov on the Don]

UDC 579.842.23.04:612.112.3

[Abstract] The heterogeneity of populations of mononuclear phagocyte cell (MPC) systems that vary in location in their

interaction with *Yersinia pestis* was investigated in 250-300 g outbred guinea pigs. The results demonstrated that the MPC system populations that vary in location are heterogenous in their phagocytic activity with respect to *Y. pestis*. In addition, the MPC system populations differ from one another in their lysosome content, with alveolar macrophages being the most enriched with lysosomes. The data also demonstrate that macrophages from different tissues are heterogenous in the intensity of change in oxygen-dependent metabolic processes upon contact with the plague pathogen. Alveolar macrophages are less active than peritoneal macrophages in this respect. Moreover, the digesting activity of alveolar macrophages is much lower in comparison to macrophages from other tissues. These findings demonstrate that MPC system populations that vary in location have their own characteristic aspects and that data obtained on one population should not be extrapolated to others. Finally, the results also indicate that reproduction of *Y. pestis* in the macrophages elicits greater virulence, antiphagocytic properties, and cytopathic activity, which result in the death of a significant number of these cells. Figures 1; tables 2; references 14: 3 Russian, 11 Western.

## Prevention and Treatment of Fatal Staphylococcus Infection in Guinea Pigs With Synthetic Regulatory Opioid Peptide Dalargin

*917C0286E Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 90 (manuscript received 25 Feb 90) pp 112-113*

[Article by S. B. Pashutin and T. D. Samykina, Surgery Institute imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

UDC 615.919:579.861.2].015.4.076.9

[Abstract] This paper presents experimental substantiation for the development of new methods of preventing and limiting the infection process with the use of the synthetic leu-enkephalin analog dalargin in the comprehensive treatment of purulent surgical infections. *Staphylococcus aureus* strain 6567 was administered to 142 outbred male guinea pigs (330-350 g) to both rear paws (100 µl each, intramuscularly) to induce septic shock, or to the right rear paw (100 µl, intramuscularly) to induce generalized infection. Dalargin was administered (100 µg/kg, intramuscularly) 1 and 3 h after infection, but it only extended life by 6 h in the septic shock experimental group, to 24 h. Dalargin was administered to the generalized infection group 6 h after infection, and increased the survival rate from 0 percent for the control group to 30 percent for the experimental group. Repeat dalargin injections (100 µg/kg) 1, 2, and 3 days later enhanced resistance to *Staphylococcus aureus* infection and increased the survival rate to 60 percent. These data demonstrate that dalargin enhances resistance to bacterial infection and the effectiveness of pathogenetic therapy.

## Laboratory Assessment of Quality and Standardization of New Plasma-Replacing Protein-Saline Solution "Protesalin" for Shock Therapy

*917C0145A Moscow GEMATOLOGIYA I TRANFUZIOLOGIYA in Russian No 10 Oct 90 pp 30-33*

[Article by R. B. Gutnik, N. I. Laricheva, M. S. Voloshina et al.; Scientific Research Institute of Hematology and Blood Transfusion; Institute of Problems of Oncology; UkSSR Academy of Sciences; Kiev]

UDC 615.384.036.8:616-001.26-08

[Abstract] The Kiev Scientific Research Institute of Hematology and Blood Transfusion has produced a complex action plasma-substituting protein solution [PSS] based on donor blood serum. Heat treatment of PSS inactivated AIDS virus and hepatitis B virus. Results of laboratory study of the quality and standardization of the plasma substitute during storage at different temperatures were described. After storage for six months at room temperature (15°C-25°C) or at 4 + or - 2 °C), the PSS indicators did not differ from those for fresh blood. Apyrogenicity of the solution remained stable at all times under all conditions of the experiment. All samples except three non-sterile samples were non-toxic throughout the experiment. PSS preserved its immunological activity throughout the experiment. Comparative analysis of the initial preparation and pasteurized samples showed no reliable increase of level of the high molecular fraction due to increased aggregated forms of protein after heat treatment of PSS. Formed elements were practically absent. The studies made possible development of technological schemes of production, creation of a finished medicinal form and standardization and postulation of quality control methods of the preparation. Figures 2; references 11: 9 Russian, 1 Western.

## Rapid Method of Assessing Rheological Properties of Blood

*917C0145B Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian No 10, Oct 90 pp 36-37*

[Article by S. I. Moiseyev, V. K. Osipov, K. V. Yefimov and Ye. V. Morozova; Scientific Research Institute of Oncology imeni Professor N. N. Petrov, USSR Ministry of Health, Leningrad]

UDC 616.151.5-074

[Abstract] A complex of methods developed at the Institute of Oncology imeni professor N. N. Petrov made it possible to assess, without the use of special equipment, in 20 minutes, the basic factors which determine viscosity of the blood (aggregation of thrombocytes and erythrocytes, deformability of erythrocytes and the hematocrit). The procedure requires only graduated centrifuge test tubes, a laboratory centrifuge, a photoelectrocalorimeter (or a microscope with a Goryayev chamber) and two working solutions. Solution No. 1 contains 3 ml of 0.077 M EDTA, 5 ml of a 4 percent solution of clarified formalin, 12 ml of 0.1 M phosphate buffer, pH 7.4, 290 mosm. Solution No. 2 contains 3 ml of 0.077 M EDTA, 17 ml of 0.1 M phosphate buffer, pH 7.4, 290 mosm. The method was used to assess rheological properties in 19 oncological patients with lung cancer or breast cancer and 12 healthy patients. Findings by the use of this method agreed with data obtained by other methods. The method may be used in any hospital since it does not require special equipment and is simple. References 17: 12 Russian, 5 Western.

## Directed Reconstruction of Influenza Virus Hemagglutinin Gene

*917C0157A Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 24 No 5, Sep-Oct 90 (manuscript received 03 Apr 89) pp 1230-1240*

[Article by V. A. Petrenko, S. M. Kipriyanov, L. N. Semenova, A. N. Boldyrev, P. I. Pozdnyakov, A. M. Yeroshkin, and G. F. Sivolobova, All-Union Molecular Biology Scientific Research Institute, "Vektor" Scientific Production Association, Koltsovo, Novosibirsk Oblast]

UDC 578.832.1:577.213.3

[Abstract] This paper presents techniques for reconstructing the hemagglutinin (HA) gene to produce structural HA analogs. The HA gene obtained from influenza virus strain X/Leningrad/54/1 (H1N1) was employed in oligonucleotide directed mutagenesis involving the removal of 30 nucleotides (536-565 on coding chain) coding for one of the protein molecule's surface regions and simultaneous organization of a unique restriction recognition site *Xho*I in its place. Computer analysis of the M13*mp*9HA DNA structure revealed the probable binding site for the oligomer mutagen with all of the elements necessary for spontaneous deletion mutagenesis. The findings suggest that the oligonucleotide plays the role of a "sticky end", briefly obstructing normal copying of matrix DNA. Of the 220 clones selected for analysis, 35 (16 percent) were mutants. Results of detailed DNA structure analysis on eight of these mutants indicated that certain difficulties in oligonucleotide mutagenesis of the HA gene were associated with the structure of the gene itself. The results also demonstrated that self-complementary sequences on the DNA lead to the formation of unplanned deletions, especially when using Klenow fragments of DNA polymerase I for mutagenesis. On the other hand, using active DNA polymerase I increases mutagenesis accuracy. These findings may prove to be of significance in the development of a new generation of vaccines and diagnosticums. Figures 7; references 20: 10 Russian, 10 Western.

## Theoretical Analysis of Kinetic Mechanisms of Processes of Secondary Messenger System Interaction in Response to External Chemical Signal Activation of Cell

*917C0157B Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 24 No 5, Sep-Oct 90 (manuscript received 27 Oct 89) pp 1261-1273*

[Article by Ye. M. Melikhova and I. N. Kurochkin, Scientific Center for the Development and Application of Contemporary Methods of Molecular Diagnostics, USSR Ministry of Health, Moscow]

UDC 577.171.6

[Abstract] The behavioral kinetics of a system of interacting secondary messengers are theoretically analyzed with consideration of experimental verification methods of various models. Experiments measuring the intracellular concentrations of various secondary messengers confirm the existence of an oscillating condition in a system of interacting secondary messengers. Results of numerous studies demonstrated that ligand type and concentration affect the amplitude of damped oscillations, or the effectiveness of the response. Many authors explain the existence of damped oscillations in cytoplasmic calcium concentrations with a hypothesis that the signal travels in only one direction. They also suggest that intracellular calcium oscillations arise as a result of a negative reverse connection between the two metabolites that conduct the signal. Figures 10; tables 4; references 28: 4 Russian, 24 Western.

## Construction and Features of Hybrid Operon That Codes Hepatitis B Virus HBcAg and β-Galactosidase of *Escherichia coli*

*917C0157C Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 24 No 5, Sep-Oct 90 (manuscript received 13 Mar 90) pp 1339-1350*

[Article by I. V. Makeyeva, T. I. Kalinina, V. S. Neplyuyeva, Yu. Ye. Khudyakov, Yu. P. Kadoshnikov, and V. D. Smirnov, Virology Institute, USSR Academy of Medical Sciences, Moscow]

UDC 577.217:52

[Abstract] The properties of a hybrid operon were investigated in an operon in which the first cistron codes for HBcAg of the hepatitis B virus and the second cistron codes for β-galactosidase in *Escherichia coli*. In addition, the functional activity of each cistron and the second cistron's translation effectiveness were studied as a function of the initiator codon's structure and the first cistron's expression. A "boiling" technique was employed to isolate the plasmid DNA from K12ΔH1*trp*(M72 Sm$^r$)*lacZ*$^-$*am bio-uvr*B*trp*EA2. In all, four plasmids were constructed with hybrid operons that had been constructed in several steps using plasmids and restrictases. In expression of the first cistron, the two techniques proposed for translating the sequence that codes for HBcAg which would otherwise not occur due to re-initiation entailed the use of pRC17H, pCRL2411, and pRC23 plasmids to determine the synthesis of different variations of HBcAg. The results demonstrated that pCRL2411 and pRC23 provide a high level of HBc-antigen production in *E. coli*. The synthetic operon, the second cistron of which has a functionally active synthetic translation initiation zone, effectively synthesized *E. coli* β-galactosidase as a result of free translation initiation (in the case of pRC17), or as a result of realization of a more complex mechanism that includes re-initiation elements (in the case of pCRL2411 and pRC23). The production levels of β-galactosidase for pCRL2411T and pRC17T were about the same, while that of pCRL2411 was 2.5-fold higher than that in

pRC17 clones. This is additional proof favoring differences in the translation initiation mechanism of the second cistron in pRC17 and pCRL2411. These findings demonstrate that the effectiveness of cistron expression depends on the translation initiation mechanism and the initiator codon's structure. Figures 6; references 42: 11 Russian, 31 Western.

## Mechanism of Cytochrome P450 Activation of Molecular Oxygen in Oxenoid Model. Role of Substrate Structure

*917C0157D Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 24 No 5, Sep-Oct 90 (manuscript received 3 Apr 90) pp 1373-1380*

[Article by A. V. Kuznetsov, Scientific Research Institute of Occupational Hygiene and Diseases, USSR Academy of Medical Sciences, Moscow]

UDC 577.332.2

[Abstract] Enzyme activity as a function of a substrate's electron structure was investigated within the framework of an oxenoid model with the aid of quantum chemical calculations. The effect of various substituents on arene oxide stability was studied on several mono-substituted benzene derivatives. The results demonstrated that the oxenoid model of the mechanism of cytochrome P450 oxidation of substrates makes it possible to describe the basic traits of the biotransformation of compounds with a benzene ring. The model satisfactorily predicts the preferred position of aromatic system hydroxylation, and the ease of hydroxylation as a function of substrate structure and toxicity of mono-substituted benzene derivatives. Figures 2; tables 2; references 41: 17 Russian, 24 Western.

## Effect of Delta-9-Tetrahydrocannabinol on Receptor and Physicochemical Properties of Rat Cerebral Membranes

*917C0162D Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 29 Jan 90) pp 497-499*

[Article by A. V. Yeremenko, I. S. Uvarova, and I. N. Kurochkin, Molecular Diagnostics Scientific Center, USSR Ministry of Health, Moscow]

UDC 612.82.014.467.06:615.217.22].08

[Abstract] The effect of delta-9-tetrahydrocannabinol (delta-9-THC) on β-adrenergic, M-acetylcholine, $D_2$-dopamine, 5-HT-serotonin, μ-opioid, and benzodiazepine receptors and the physicochemical status of cerebral neuronal membranes were investigated on 150-200 g male Sprague-Dawley rats as a means of furthering the understanding of the effect of cannabimimetic compounds on the cellular level. Experiments with tritium-labeled ligands in 50 ml of tris-HCl buffer, pH 7.4, 37°C demonstrated that delta-9-THC in a 10 μM concentration decreases the amount of labeled LSD [expansion not provided] and spiperone that is specifically bound as the amount of total non-specific binding increases. It was shown that the effect of delta-9-THC on binding labeled spiperone and LSD is mediated through the lipid phase of the membrane, since this substance and its derivatives are strongly lyophilic compounds. In addition, the data indicate that the delta-9-THC receptor system evidently has a more complex mechanism that cannot simply be explained by the membranotropic properties of this compound. These findings suggest that delta-9-THC exhibits some selective activity on dopamine and serotonin receptor systems. Figures 2; tables 1; references 15: 3 Russian, 12 Western.

## Kemantane Pharmacokinetics in Rats

*917C0162E Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 10 Oct 89) pp 501-503*

[Article by S. S. Boyko, V. P. Zherdev, A. A. Dvoryaninov, I. Yanku, and E. Bukhar, Pharmacology Scientific Research Institute, USSR Academy of Medical Sciences; Experimental Pharmacology Institute, Czechoslovakia Academy of Sciences, Prague, Czechoslovakia]

UDC 615.275.4.033.07:543.544

[Abstract] Previous studies on kemantane (1-oxyadamantane-4-one), a nitrogen-free oxygen-containing adamantane derivative synthesized by the Pharmacology Institute, USSR Academy of Medical Sciences, demonstrated that this preparation exhibits immunostimulating properties in animals with depressed immune systems and has an inducing effect on the cytochrome P450 system. This paper presents the results of experimental trials on 180-220 g outbred male rats administered 50 mg/kg of kemantane orally to determine the preparation's pharmacokinetics and its elimination from the body. Data obtained by gas-liquid chromatography demonstrated that kemantane is absorbed quickly and completely by the body, appearing in the blood within 5 min of its administration. It peaks at 15 min, and by 60 min is no longer detected in the blood. Kemantane quickly breaks down into a metabolite (adamantane-1,4-diol) which has immunostimulant activity similar to that of kemantane. Adamantane-1,4-diol is detected in the blood within 15 min of administration, peaking at 30 min, and is found in the internal organs within 60 min. The data suggest that kemantane is rapidly metabolized because it does not have a substituent at the second position on the admantane ring. Figures 1; tables 1; references 6: Russian.

## Clinical and Laboratory Effect of Leukinferon In Purulent Infection

*917C0241C Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 9, Sep 90 (manuscript received 11 Oct 89) pp 36-38*

[Article by S. M. Belotskiy, V. A. Karlov, O. B. Filyukova, V. P. Kuznetsov, V. S. Zuyeva, Ye. V. Gutsu, O. A. Krastin, T. I. Snastina, and T. G. Karpinskaya, Microbiology Laboratory with Groups of Immunology and Clinical Pharmacology, Section of Wounds and Wound Infection, Department of Cardiac Surgery, Surgery Institute imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences; Epidemiology and Microbiology Institute imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

UDC 616-002.3-022.7-036-074

[Abstract] This paper presents detailed clinical and immunological description of leukinferon using data obtained from three groups of patients (local infection, widespread infection, and preventive treatment, 57 total) intramuscularly administered 2 ml of the preparation daily or every other day (three injections total) starting 1 - 3 days after surgery. The results demonstrated that the body temperature returned to normal three times faster in the experimental group than in the control group. In addition, analysis of peripheral blood neutrophil function demonstrated that leukinferon reduced the period of leukocytosis and respiratory neutrophil burst and decreased the active T-lymphocyte concentration in all three groups. The results also showed that leukinferon acts mainly on the phagocyte system, with lymphocyte and monocyte products (cytokines) exhibiting some effect on neutrophil function. Moreover, the effectiveness of the preparation depends on how radical the operation was and how serious the patient's condition is. Finally, these findings suggest that

leukinferon can be used as an agent for urgent immunological correction of a purulent infection. Tables 2; references 7: 5 Russian, 2 Western.

## Gene-Engineered Human Interferon Alpha-2 (Reaferon) in Ointment Used to Manage Some Skin and Mucous Membrane Diseases

*917C0241D Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 9, Sep 90 (manuscript received 30 Aug 89) pp 38-40*

[Article by V. V. Parfenov, V. N. Grebenyuk, Ye. I. Abramova, Yu. V. Voronin, V. V. Bumyalis, T. N. Volodina, and L. A. Denisov, Immunology Institute of the Ministry of the Medical Industry, Moscow Oblast; Central Skin and Venerologic Institute, USSR Ministry of Health, Moscow]

UDC 615.339:578.245]:615.454.1].03:616.5-085

[Abstract] Clinical trials were performed on volunteers with chronic skin and mucous membrane diseases to determine the therapeutic effects of $\alpha_2$-interferon in ointment form and to demonstrate whether this preparation was non-toxic. The volunteers, who suffered from recurring herpes of the genitalia, buttocks, face, and mouth (71), recurring aphthous stomatitis (6), and pemphigus vulgaris complicated by recurring herpes simplex (17) applied the ointment preparation to the affected areas two to three times per day. The ointment has an antiviral activity of $8 \times 10^5$ IU/ml and was potent for up to three months when stored in a cool, dry, dark place. The results indicated that 77 percent of the patients noted improvement or significant improvement in their conditions. In addition, the ointment was tolerated well, and no side effects or deviation in the differential blood count or general urine analysis were noted. Therefore, these findings recommend the introduction of the interferon ointment into public health practice. References 8: 5 Russian, 3 Western.

## Antibiotic Binding to Leukocytes of Brucellosis Patients

*917C0241E Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 9, Sep 90 (manuscript received 17 Feb 89) pp 40-42*

[Article by A. Z. Nigmatulin, A. Ye. Gulyayev, L. V. Gubenko, M. S. Srymbetov, and G. I. Sharafutdinova, Karagandinsk Medical Institute]

UDC 616.98:579.841.93]-085.33

[Abstract] This paper describes the first phase of the cellular pharmacokinetics of antibiotics acting on brucellosis, based on the antibiotics' interaction with the leukocytes in terms of how the preparations bind with the cells. The study encompassed 18 patients aged 23 - 54 years with chronic brucellosis in the exacerbated stage. Metacycline, rifampicin, gentamycin, and erythromycin, which act both intra- and extracellularly, were administered to the patients. The results demonstrated that metacycline, rifampicin, and gentamycin all bound with a large number of brucellae in the intracellular environment, which binding was somewhat elevated at the height of the disease and then diminished. Penetration of erythromycin into the brucellosis-infected cells, on the other hand, drops at the height of the disease and remains depressed. The data of cellular pharmacokinetics indicate that metacycline, gentamycin, and rifampicin are the most effective due to the fact that they are better sorbed by the infected cells. These findings suggest that the presence of intracellular bacteria may change the quantitative characteristics of the interaction of these cells. In addition, the direction of these changes evidently depends on the specific ratio of the different types of mechanisms by which the preparations penetrate the cell. Tables 1; references 16: 7 Russian, 9 Western.

## Pharmacological and Physicochemical Properties of Cytochrome C Obtained Biotechnologically

*917C0254A Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 24 No 10, Oct 90 (manuscript received 3 Jan 90) pp 14-22*

[Article by V. V. Beregovykh, Ye. R. Davidov, V. I. Kozlov, S. P. Kuprin, V. V. Gatsura, L. N. Sernov, All-Union Scientific Research Institute of Protein Synthesis; All-Union Science Center for Biologically Active Substances]

UDC 615.355:577.152.122].015.4.07

[Abstract] A comparative study was made of injectable cytochrome *c* produced at the All-Union Scientific Research Institute of Protein Synthesis from the ethanol-utilizing yeast *Pichiamembranae faciens* and cytochrome *c* from the traditional sources of the heart muscle of horses and cattle. Because of the limited supply of the traditional cytochrome *c* in clinics, the researchers here sought to illuminate the possibility of replacing it with the synthetic pigment-protein. They first compared the physicochemical properties of the synthetic ($c_{biotech}$) against those of the cytochrome *c* from horses ($c_h$). Molecular masses were similar, but $c_{biotech}$ exhibited a pI of 9.8, as opposed to a pI of 10.3 for $c_h$. Alanine, serine, proline, and arginine contents were higher in $c_{biotech}$, whereas isoleucine and lysine contents were lower. Cytochrome $c_{biotech}$ may have an amino acid residue of trimethylated lysine, which is not found in the pigments of animal origin. In terms of structural characteristics of hemic groups, optical absorption spectra of solutions of the proteins were virtually identical, although some differences were noted in the region of the α-band of absorption of the ferrocytochrome *c*'s near 550 nm. EPR spectra of oxidized paramagnetic forms were similarly close. The researchers surmise that the protein globule of

the synthetic may have a somewhat lesser influence on hemic group than do the pigments of animal origin. The greatest differences between the pigments were found in reaction capability. In ascorbate reduction and ferrocyanide oxidation, redox rate was at least 3 - 4 times higher for $c_{biotech}$ than for $c_h$. The effective charges of both proteins in the active center were at +3 - +3.5. The cytochrome $c_{biotech}$ was found to restore respiratory activity to mitochondria to 75 percent of baseline levels, as opposed to a figure of 35 percent produced by cytochrome of animal origin. In terms of kinetic functional properties, cytochrome $c_{biotech}$ was judged more effective. In a set of experiments involving ligation of the trachea, preliminary injection of $c_{biotech}$ into mice in doses of 5 mg/kg and 10 mg/kg consistently extended the biolectrical activity of the myocardium to roughly 14 and 18 minutes, versus 11 for control. In tourniquet shock studies, injection of $c_{biotech}$ failed to prevent bradycardia, but did reduce the elevation of the *ST* segment substantially. Injection of $c_{biotech}$ was more effective than control in increasing rate of contraction and relaxation of the heart muscle after ligation of the coronary artery. References 26: 15 Russian, 11 Western.

## Synthesis and Study of Vascular Activity of 3-Dimethoxyphosphorylpropyl Ethers of N-Acyl Derivatives of Neuroactive Monocarboxylic Amino Acids

*917C0254B Moscow*
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
*in Russian Vol 24 No 10, Oct 90 (manuscript received 13 Nov 89) pp 41-44*

[Article by G. V. Kovalev, A. I. Rakhimov, A. A. Ozerov, V. I. Petrov, V. A. Sazhin, and O. P. Buzinova, Volgograd Medical Institute]

UDC 547.466.6:615.225.2

[Abstract] As inhibitory mediators in the central nervous system, neuroactive monocarboxylic amino acids—particularly γ-aminobutyric acid, β-alanine, and glycine—participate in the central regulation of blood circulation. But their use as cardiovascular drugs is limited by their low penetration of the blood-brain barrier. That prompted the researchers here to synthesize analogs with good penetration ability: 3 dimethoxyphosphorylpropyl ethers of N-acyl derivatives of glycine (VII), β-alanine (VIII), and γ-aminobutyric acid (IX). The synthesis was performed with alkylation of sodium or potassium salts of N-benzoylglycine (I), N-acetyl-β-alanine (II), and N-acetyl-γ-aminobutyric acid (III) by allylbromide in a medium of aqueous acetonitrile in the presence of interphase transport catalysts, with subsequent homolytic phosphorylation of the allyl ethers bydimethyl phosphite in the presence of a peroxide indicator. The resesearchers used a technique of their own to prepare the allyl ethers of the N-acylated amino acids: alkylation of sodium or potassium salts by allylbromide in the presence of crown ethers (15-crown-5, 18-crown-6, and dibenzo-18-crown-6) in a molar ratio of acyl amino acid salt to allybromide to crown ether of 1:(1-1.25):(0.02 - 0.05) at 20-80°C in a medium of aqueous acetonitril with water content of up to 20 percent weight. The aqueous solution of the salt is added to the crown-ether solution in acetonitrile, and the emulsion is treated with allylbromide, which precludes the need for preparation of nonaqueous salts or the use of absolute solvents. Administration of compound VII (50 mg/kg, or 1/50 of $LD_{50}$) to cats failed to raise systemic arterial pressure after 5 - 30 minutes, but markedly amplified functioning of the left ventricle and an increase in minute circulation volume were accompanied by a dramatic reduction in general peripheral resistance. Compound VIII, in a similar dose, produced a two-phase effect on systemic arterial pressure: a sharp drop in the first 5 - 15 minutes, against a backdrop of reduced left-ventricle functioning and lowered peripheral resistance, and then a rise in arterial pressure during the next 15 - 30 minutes, with a sharp increase in peripheral resistance. Compound IX generally raised arterial pressure during the first 5 - 30 minutes. The $LD_{50}$ for compounds VII, VIII, and IX when injected intraperitoneally in mice is 2630, 1700, and 1950 mg/kg, respectively. The researchers surmise that, after penetration of the blood-brain barrier, compounds VIII and IX undergo a metabolic transformation in which dimethoxyphosphorylpropyl and acetyl fragments are detached from the initial structure. In bonding with specific receptors, the γ-aminobutyric acid and β-alanine that are formed exert a central sympathetic-inhibiting effect that lowers the arterial pressure. The VII fragment, after detachment of the dimethoxyphosphorylpropyl component, probably does not split anymore and results in hypertensive and cardiotonic effects. References 9: 8 Russian, 1 Western.

## Synthesis and Antiviral Activity of 2-Anilinomethyl Derivatives of 5-Oxyindole

*917C0254C Moscow*
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
*in Russian Vol 24 No 10, Oct 90 (manuscript received 03 Nov 89) pp 52-53*

[Article by M. V. Mezentseva, I. S. Nikolayeva, Ye. A. Golovanova, and A. N. Fomina, All-Union Scientific Research Chemical and Pharmaceutical Institute imeni S. Ordzhonikidze]

UDC 615.281:578.8].547.751].012.1

[Abstract] In light of the antiviral properties shown by 2-alkylaminomethyl derivatives of 5-acetoxy(oxy)indole and the absence of data on 2-arylaminomethyl derivatives of indole in the literature, the researchers here chose to synthesize compounds that are similar in structure—2-anilinomethyl derivatives of 5-acetoxy(oxy)indole—and study their antiviral activity. The antiviral activity was examined in relation to RNA-containing influence virus $A_0$/FPV (H7N7) in a culture of cells of initially trypsinized chick embryo fibroblasts. The cells

were infected with 10 $TCD_{50}$ of the virus. Virus-inhibiting activity was judged on the basis of suppression of cytopathic effect and reduction of infectious titer in the cells. The compounds were tested in concentrations of 5.0 μg/ml and 2.5 μg/ml. None of the compounds exhibited a high degree of antiviral activity, but two of the 1-methyl-2-anilinomethyl-3-ethoxycarbonyl-4-dialkylaminomethyl-5-oxy-6-bromindole derivatives ($C_{22}H_{26}BrN_3O_3$ and $C_{22}H_{28}BrN_3O_3$) did show activity equal to 0.75 lg $TCD_{50}$. Figures 1; references 2: Russian.

## Synthesis, Structure, and Antibacterial Activity of Coordination Compounds of *d*-Elements With Certain Schiff Bases

*917C0254D Moscow*
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
*in Russian Vol 24 No 10, Oct 90 (manuscript received 19 Oct 89) pp 58-61*

[Article by N. M. Samus, E. N. Shlyakhov, P. M. Ketrush, Tarkodzhiyel Mianperem, T. A. Burdenko, N. Ya. Burlaku, Ye. K. Osadchaya, and V. I. Tsapkov, Kishinev University imeni V. I. Lenina, Kishinev Medical Institute]

UDC 615.281:547.724.1].012.1

[Abstract] The fact that many coordination compounds of biometals with Schiff bases have selective physiological activity and that, in most cases, biometal complexes are more active biologically than are the ligands themselves prompted the researchers to synthesize coordination compounds of copper (2+), cobalt (2+), nickel (2+), zinc, palladium, and platinum with condensation products of β-hydrazones of isatin (Ia) or 5-bromoisatin (Ib), 5-nitroisatin (Ic), 5-methylisatin (Id), and 5-nitrofurfurol (II). They studied their composition, physicochemical properties, and structure and identified the effect of those factors on antibacterial activity. The experimental test bacteria were in vitro *Staphylococcus aureus* (Wood 46), *Bacillus anthracis, Escherichia coli, Salmonella typhimurium-1,* and *Proteus vulgaris.* Data of elemental analysis and of the physicochemical properties suggest that, in the presence of ions (2+) of copper, cobalt, nickel, zinc, palladium, and platinum as a matrix, there is condensation of the amino group Ia-d with II, with the formation of $N^1$-(5-nitro-2-furfurylidene)-$N^2$-(β-isatin)azine of IIIa-d, which thus yield IV-XV. Magnetochemical studies indicated that the values of the effective magnetic moments of the copper complexes are close to the pure spin value for one unpaired electron, which suggests a monomer structure. IR-spectra analysis demonstrated that Schiff bases produced on the matrix of the metal ions behave like bidentate ligands, coordinating via the carbonyl oxygen of isatin and the nitrogen of $N^2$IIIa-d, with the formation of a five-member metal cycle. The nature of the central ion was found to exert an influence on the antibacterial activity in terms of *S. aureus* and *B. anthracis.* Figures 2; references 9: Russian.

## Analysis of Structure-Property Relationship in β-Endorphins

*917C0254E Moscow*
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
*in Russian Vol 24 No 10, Oct 90 (manuscript received 11 Oct 89) pp 61-64*

[Article by Ye. P. Kharchenko, Institute of Evolutional Physiology and Biochemistry imeni I. M. Sechenova, USSR Academy of Sciences, Leningrad]

UDC 615.31:[547.95:547.943].015.11

[Abstract] The use of topological indexes in relation to calcitonin from various animals and to their synthetic analogs has been successful in terms of predicting calcitonin activity, a fact that led the researcher to examine the suitability of topological indexes for another class of regulatory peptides—β-endorphins. Findings of an analysis of the link between structure and activity in relation to published data are based on the use of a large group of traits and various topological indexes that confirm the fundamental possibility of using topological indexes for complex compounds. The researcher found that replacements of amino acids outside the enkephalin fragment, especially at the C-end of the endorphin, produced discrete changed of bioactivity, which made it possible to identify the region of correlational changes in the structure activity relationship. In the endorphins chosen for analysis, the N-end fragment in the evolutionary endorphin variants is conservative, and the region outside the enkephalin fragment exhibits variation. Topological indexes with low degeneracy were selected for peptide description, because peptides often have identical amino acid composition, but different sequences. The use of six main topological indexes, plus their component indexes and nearly 30 different amino, made it possible to sort through some 330 integral quantitative features of endorphins. It was found that the ability of the endorphin to bind with an opioid receptor is associated with a growth in the pI of the endorphin molecule. To a lesser extent, the relationship of structure to activity is also defined by molecular weight and hydrophobicity. Figures 1; references 18: 6 Russian, 12 Western.

## Comparative Study of the Stimulatory Properties Certain Phenylpropanoids

*917C0254F Moscow*
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
*in Russian Vol 24 No 10, Oct 90 (manuscript received 22 Dec 89) pp 66-68*

[Article by S. Ya. Sokolov, V. P. Boyko, V. A. Kurkin, G. G. Zapesochnaya, N. V. Rvantsova, and N. A. Grinenko, VILR Scientific Production Association, Moscow]

UDC 615.322:582.715].015.4.07

[Abstract] A comparative study of the biological activity of triandrin and other phenylpropanoids based on cinnamic alcohol focused on stimulatory properties (spontaneous motor activity and antihypnotic properties), with the results subjected to variational statistics processing. The compounds examined were isolated from the root stock of*Rhodiola rosea* L. and from the bark of *Salix viminalis* L. and *Syringa vulgaris* L. An additional compound was produced in the enzymatic hydrolysis of triandrin with β-glucosidase. Triandrin was found to exhibit the most pronounced stimulation, followed closely by rosavidin. The stimulatory effects were noted 30 minutes after administration intragastrically in outbred mice weighing 18-20 g; they continued for 90 minutes. The study of neurotropic activity on a chloral hydrate sleep model showed triandrin and rosavidin, again, to have the most pronounced activity, as they shortened the chloral hydrate-induced sleep by an average of 12.2 - 20.2 percent and 8.7 - 17.7 percent. Syringin proved to be the most effective in reducing the duration of a sodium-barbital-induced sleep. In examining the antihypnotic properties, the researchers found that the waking effects of triandrin and rosavidin were mediated through the cerebral cortex; those of syringin, through the subcortical structures. Figures 1; references 14: 10 Russian, 4 Western.

## Gas-Liquid Chromatography Determination of Thymol and Carvacrol in Raw Plant Material and Tinctures of Thyme

*917C0254G Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 24 No 10, Oct 90 (manuscript received 20 Sep 88) pp 69-71*

[Article by S. V. Sur, F. M. Tulyupa, A. Ya. Tolok, and T. N. Peresypkina, Institute of Colloidal Chemistry and Water Chemistry, UkSSR Academy of Sciences, Kiev; Zaporozhye Medical Institute]

UDC 543.544:615.07

[Abstract] The phenols thymol and carvacrol, which are responsible for the antibacterial and expectorant action of drugs that are based on them, are considered the main biologically active substances of the medicinal plant *Thymus serpillum* L. However, their content may vary, depending on a number of factors such as conditions and place of growth, preparation time, and duration of drying and storage. Existing methods for determining thymol and carvacrol content are inaccurate and time-consuming and require 5-10 ml of essential oils. Although a number of researchers have studied the use of chromatography for such determinations, their work consists primarily of comparative studies involving relative amounts of essential oil components. The researchers here used gas-liquid chromatography to determine absolute content. Essential oils were isolated by steam distillation and distilled mixtures of essential oils and methyl salicylate were analyzed with an LKhM-80 chromatograph with superox 20M. Figures 3; references 18: 11 Russian, 7 Western.

## Tranquilizing Activity of Nonbenzodiazepine Serotonin Agonists

*917C0271A Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 53 No 5, Sep-Oct 90 (manuscript received 17 May 89) pp 13-16*

[Article by I. I. Abramets, A. T. Dolzhenko, I. V. Komisarov, I. M. Samoylovich, A. N. Talalenko and N. A. Kharin, Chair of Pharmacology with a course on Clinical Pharmacology, Donetsk Medical Institute]

UDC 615.214.2.015.4.07

[Abstract] A correlation analysis was conducted on tranquilizing effects and serotonergic mechanisms of selected tranquilizing agents. Studies on 180 g outbred rats showed a high degreee of correlation (r = 0.85) between the tranquilizing activity of serotonin agonists (buspirone, ipsapirone, kampiron [sic], pyramidinylpiperazine) and inhibition of pulsatile release of $^{1}$H-serotonin from the raphe nuclei in midbrain section following electric stimulation. A similar degree of correlation (r = 0.6) was lacking in the case of cerebral hemisphere sections. In addition, a high degree of correlation (r = 0.94) was also observed between anxiolytic activities of tranquilizers (aminazine, triptazine [sic]), antidepressants (amitriptyline, imipramine) and beta-carbolines (harman, 3,4,-tetramethyleneharman) and their enhancement of serotonin-mediated hyperpolarization of sensory ganglia. These observations were consistent with the interpretation that the agents in question ACT via type 1A serotonin receptors. Figures 1; tables 3; references 13: 4 Russian, 9 Western.

## Neurochemical Aspects of Morphine and Pentapeptide FK33-824 Action on Cerebrocortical Excitability

*917C0271B Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 53 No 5, Sep-Oct 90 (manuscript received 10 Jul 89) pp 16-20*

[Article by V. P. Fisenko, Chair of Pharmacology, Therapeutic and Sanitary-Hygienic Faculties, 1st Moscow Medical Institute imeni I. M. Sechenov]

UDC 615.212.7.015.4:612.82].076.9

[Abstract] An analysis was conducted on the mechanism of inhibitory action of morphine and pentapeptide FK33-824 on cerebrocortical excitability in cats treated with a variety of agents influencing neurotransmitter systems. The results demonstrated that GABAergics (muscimol, valproic acid, aminoacetic acid), serotonergics (5-hydroxytryptophan, fluoxetine) and catecholaminergics and choline antagonists enhanced the inhibitory effects of morphine and FK33-824. Agents with the

opposite actions, i.e., inhibitors of GABAergic (thiosemicarbazide, bicucullin, picrotoxin), serotonergic (p-chlorophenylalanine, methysergid) and catecholaminergic (6-hydroxydopamine, alpha-methyl-p-tyrosine) mechanisms and choline agonists (physostygmine), attenuated the inhibitory effects of morphine and FK33-284 on cortical excitability. In addition, the effects of morphine and FK33-284 were also diminished by the beta-blocker propranolol, but not affected by alpha-blockers (phentolamine, phenoxybenzamine, yohimbine). Accordingly, the study demonstrated that the effects of morphine and FK33-284 on cerebrocortical excitability are clearly mediated via interplay of various neurotrasmitter mechanisms. Tables 2; references 20: 4 Russian, 16 Western.

## Antagonism of Monoamines of Direct Action of Neuroleptic on Release of Excitatory Amino Acids

*917C0271C Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 53 No 5, Sep-Oct 90 (manuscript received 22 Jun 88) pp 22-24*

[Article by G. I. Kovalev, A. V. Prikhozhan and K. S. Rayevskiy, Laboratory of Neurochemical Pharmacology, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

UDC 615.214.2.015.4:[612.825.015:577.112.384.2].07

[Abstract] Perfusion studies on cerebrocortical synaptosomes derived from male Wistar rats resulted in the demonstration that 10E-6 to 10E-4 M concentrations of tranquilizers depressed $K^+$-induced release of $^3H$-D-aspartic acid. Further, release was not affected by 10E-5 M serotonin or 10E-7 M dopamine. However, serotonin overcame the inhibitory effects of haloperidol, aminazine, fluorophenazine and clozapine, but not of carbidine. Dopamine, on the other hand, inhibited release induced by atypical tranquilizers (clozapine, carbidine). Such pharmacodynamics are difficult to explain with absolute certainty, although it is evident that the neuroleptics act on presynaptic heteroreceptor mechanisms of the subcortical formations that innervate the cerebal cortex. Figures 1; tables 2; references 13: 3 Russian, 10 Western.

## Effects of Dexamethsone on Orientation and CNS Amino Acid Composition in Rats with Induced Neurosis

*917C0271D Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 53 No 5, Sep-Oct 90 (manuscript received 27 Jun 89) pp 25-27*

[Article by P. A. Nerush, Chair of Pharmacology, Dnepropetrovsk Medical Institute]

UDC 616.85-092.9-07:616.831-008.934.66-02:615.357:577.175.53

[Abstract] Studies on outbred, 180-220 g, female rats with experimental neurosis induced by conflict situations showed that marked imbalance of neurotransmitters accompanying disordered orienting behavior. Specifically, GABA levels were seen to be elevated in the cerebral cortex (by 56 percent; $p < 0.01$), hippocampus (29 percent; $p < 0.05$) and caudate body (27 percent; $p < 0.001$), while glutamic acid was elevated in the hippocampus (28 percent; $p > 0.05$) and the caudate body (25 percent; $p < 0.05$). Concomitantly, cortical glycine diminished by 20 percent ($p < 0.05$), with a similar fall found in phenylalanine in all the structures of interest. Treatment of control animals with dexamethasone (50 μ/kg; i.p.) diminished motor activity and led to behavior patterns analogous to the type of disorientation seen in the 'neurotic' rats. Administration of dexamethasone to 'neurotic' animals resulted in enhancement of orienting behavior concomitantly with reduced locomotor activity. Furthermore, dexamethasone-induced depression of neurotransmitters was much more profound in neurotic rats than in control animals, particularly in the case of GABA levels in the hippocampus. These findings indicate a relationship between imbalance in amino acid transmitters and pathogenesis of neurosis. The hippocampal effects of dexamethasone were presumably due to a high concentration of glucocorticoid receptors in that formation. Tables 3; references 14: 12 Russian, 2 Western.

## Isolation of Antibiotic-Producing Actinomyces From Soil Samples Pretreated With Ultraviolet Light

*917C0282A Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 11, Nov 90 (manuscript received 12 Feb 90) pp 6-8*

[Article by O. A. Galatenko and L. P. Terekhova, All-Union Scientific Research Institute for Novel Antibiotic Research, USSR Academy of Medical Sciences, Moscow]

UDC 579.873.11.083.12:615.332:577.182.36].012.6

[Abstract] Ultraviolet light irradiation of suspensions of 17 soil samples from various regions of the USSR was used for selective isolation of certain groups of *Actinomyces* from the soil, with a view toward finding new antibiotic producers. The soil samples, prepared in $1:10^2$-$10^4$ dilutions, were irradiated at a distance of 20 cm for 30 sec, 1 min, or 2 min. Morphological traits and cell wall type were used to determine the species of the isolated strains, with a total of 2,539 *Actinomyces* strains isolated. At 30 sec of ultraviolet radiation exposure, 691 strains were isolated, while after 2 min this figure was 375. In addition, the number of *Streptomyces* strains decreased from 70 percent of the total before exposure to 30 percent after exposure. The results demonstrated that cultures of rare genera as a whole are less sensitive to

ultraviolet radiation than *Streptomyces*, with *Micromonospora* exhibiting the best resistance to ultraviolet light and composing 45 percent of the total number of strains isolated following 2 min exposure. *Nocardiopsis* and *Amycolatopsis* also exhibited a high degree of resistance to ultraviolet light. Tables 3; references 3: 1 Russian, 2 Western.

## Investigation of Antibiotic Polypeptide Nisine Produced by Culture of *Streptococcus lactis*, MSU Strain

*917C0282B Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 11, Nov 90 (manuscript received 18 Dec 89) pp 8-10*

[Article by N. S. Yegorov, I. P. Baranova, and M. N. Khodzhayev, Moscow State University imeni M. V. Lomonosov]

UDC 615.331:577.182.44].07

[Abstract] The composition of nisine, a polypeptide antibiotic produced by *Streptococcus lactis*, strain MSU, was investigated. *S. lactis*, strain MSU, was cultivated in standard conditions. The native solution obtained was eluted from the column, dialysis was performed, and the resulting preparation was lyophilically dried. The preparation was shown to have an activity of 800-1,000 IU/ml. Disk electrophoresis used to investigate nisine in 20 percent polyacrylamide gel in the presence of sodium dodecyl sulfate demonstrated that nisine has a polypeptide component with a molecular mass of 7,000 D. These results and those of determining the authenticity, solubility, and heat stability of nisine show that it meets its technical requirements and indicate that it is identical to nisaplin. Figures 1; tables 2; references 8: 1 Russian, 7 Western.

## Multifactorial Analysis of Combined Antibiotic and Low Molecular Weight Immunostimulant of Microbial Origin in Experimental Plague Infection

*917C0282C Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 11, Nov 90 (manuscript received 14 Nov 89) pp 27-29*

[Article by A. V. Nikitin, L. N. Makarovskaya, I. P. Fomina, L. P. Ivanitskaya, G. O. Popova, N. N. Vinidchenko, Ya. N. Korganov, and M. K. Kudinova, All-Union Scientific Research Institute of Antibiotics, Moscow; Scientific Research Anti-Plague Institute, USSR Ministry of Health, Rostov-on-Don]

UDC 616.98:579.842.23]-092.9-085.33-059:[615.275.4:577.112.853

[Abstract] The combined effect of rifampicin and a low molecular weight immunostimulant of microbial origin on an experimental plague infection was investigated in multifactorial experiments. Outbred albino mice (18-20 g) were subcutaneously infected with a 100 DCL dose of the pathogen. They were then administered rifampicin, 5-50 mg/kg, perorally, in either a preventive course for five days, beginning 6 h after infection, or in a therapeutic course lasting seven days and beginning 24 h after infection. The low molecular weight immunostimulant (0.5-50 mg/kg, subcutaneously) was also administered in preventive (up to 72 h prior to infection) and therapeutic doses (up to 144 h following infection). Formulas were derived to determine the best dosages of the antibiotic and immunostimulant for optimal regulation of survivability and average life span. The results showed that early administration of the immunostimulant makes it possible to significantly decrease the therapeutic dose of the antibiotic. It was also demonstrated that the immunostimulant dose plays a significant role with respect to the average life span. Figures 3; references 3: Russian.

## Kanamycin Pharmacokinetics in Targeted Delivery to Liver in Blood Shadows in Animals With Experimental Acute Cholecystitis

*917C0282D Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 11, Nov 90 (manuscript received 20 Dec 89) pp 37-38*

[Article by Zh. Sh. Zhumadilov and R. V. Makarenkova, Microbiology Laboratory with Groups of Immunology and Clinical Pharmacology, Surgery Institute imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences]

UDC 616.366-002.1-092.9-085.332:577.182.36]-033.1:611.36

[Abstract] The pharmacokinetics of kanamycin in its targeted delivery to the liver in autologous blood shadows were investigated in 25 outbred dogs (12-20 kg) with experimental acute destructive cholecystitis. Kanamycin treatment was initiated 48 h after the onset of acute cholecystitis. Control animals received a 30 mg/kg injection of kanamycin each day for five days, while the experimental group received an intravenous injection of the same dosage in autologous blood shadows for the same period of time. The results demonstrated that blood shadow targeted delivery is very effective; within two days normalization of the body temperature and appetite were noted, as opposed to the control group which continued to experience fatigue, lack of appetite, and fever. Thus, targeted delivery of kanamycin to the liver in blood shadows more effectively arrests acute destructive cholecystitis than untargeted intravenous administration, since high and lasting concentrations of the preparation can be maintained there. Tables 1; references 6: 5 Russian, 1 Western.

## Effect of Enkephalins on Associative Processes in Parietal Cortex Neurons

*917C0161A Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 19 Jan 89) pp 227-229*

[Article by V. A. Pravdivtsev and V. V. Yasnetsov, Smolensk Medical Institute, RFSFR Ministry of Health]

UDC 612.825.263.014.46:[615.31:547.75:547.943].08

[Abstract] The microiontophoretic effect of met- and leu-enkephalins on the formation of association connections in the parietal cortex neurons was investigated in cats to determine what role enkephalins play in learning and memory processes. Investigation of the activity of 185 neurons in 19 cats (3-4 kg) demonstrated that 88 neurons reacted to rhythmic stimulation of the pyramidal tract axons, and that 73 percent displayed an increase in discharge activity. In addition, 86 percent of those neurons reacting to pyramidal tract stimulation altered their activity in response to electrical stimulation of the skin. Analysis of the cells reacting to pyramidal tract stimulation and electrical stimulation of the skin indicated that naloxone blocked the inhibiting effect of opioid peptides in response to neurons, thereby confirming the participation of the opioid receptors in the phenomena described. Short-term enkephalin injection (less than 5 min) was shown to inhibit cellular activity and responses to pyramidal tract stimulation without altering the nature of their association reactions. In contrast, in long-term injections (30 - 40 min), most neurons do not fully regain the response to pyramidal tract stimulation. Figures 2; references 9: 6 Russian, 3 Western.

## Distribution of Labeled Amino Acids and Delta Sleep-Inducing Peptide in Rabbits in Response to Instillation Into Ocular Conjunctiva

*917C0161B Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 29 Dec 89) pp 236-237*

[Article by V. I. Badikov, Ye. P. Gitel, N. Ya. Ivanova, G. L. Ivolgina, M. G. Fedyanina, D. A. Zaytsev, N. F. Myasoyedov, and K. V. Sudakov, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Institute of Molecular Genetics, USSR Academy of Sciences, First Moscow Medical Institute imeni I. M. Sechenov, Moscow]

UDC 615.31:547.96].032.841.1.033.076.9

[Abstract] Scintillation spectroscopy was employed to study the distribution of tritium-labeled valine, glycine, and delta sleep-inducing peptide in 18 adult chinchilla rabbits (3-4 kg). Following instillation of 0.1 ml solutions of the preparations into the conjunctival sac of the eyes, 0.5 ml of fluid from the lateral cerebral ventricles and 1 ml of blood from the marginal vein of the ear were collected 10, 20, and 30 min, and 1, 2, and 6 hours later. Also analyzed were sections of the brain, heart, and spleen. The results indicated that all three substances were found in all of the media and tissues analyzed at 10 min. Maximum $^3$H valine and $^3$H glycine concentrations were noted two hours after instillation in the visual cerebral cortex and thalamus, while maximum $^3$H delta sleep-inducing peptide levels were found in the blood and fluid 20 min after instillation. The rapid rise in radioactivity in the various structures indicates the penetration of the isotope from the conjunctiva directly into the bloodstream. Figures 2; references 5: 3 Russian, 2 Western.

## Unithiol and Magnesium Sulfate Neutralization of Toxic Effect of Gram-Negative Bacteria Endotoxins

*917C0161C Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 04 Jul 89) pp 259-261*

[Article by M. I. Grutman, Yu. V. Persidskiy, V. M. Frolov, R. N. Nagornaya-Persidskaya, and Ye. P. Gushla, Scientific Research Institute of Epidemiology and Infectious Diseases, Ukrainian SSR Ministry of Health, Kiev]

UDC 615.919:579.842].015.2:615.244.9].07

[Abstract] The protective effect of unithiol and a unithiol-magnesium sulfate combination was investigated in male CBA mice (17-20 g) intraperitoneally infected with 0.2 ml $LD_{50}$ *Salmonella typhimurium* or *S. sonnei*. The results demonstrated that administration of unithiol (0.5 mg, intramuscularly) and magnesium sulfate (0.13 mg twice daily) attenuated the otherwise abrupt rise in lipid peroxidation that occurs in *Salmonella* infections. In addition, it was shown that unithiol and magnesium sulfate attenuated the two-fold decrease in cAMP levels in the liver and lungs that occurs following infection with *S. typhimurium*. Antioxidant drugs with sulfhydryl groups, such as unithiol, prevent lipid peroxidation and prostaglandin synthesis in addition to neutralizing gram-negative bacteria endotoxins. These findings suggest that unithiol may be effective in the treatment of gram-negative bacteria infections and that magnesium sulfate enhances unithiol's effectiveness. Tables 3; references 8: 4 Russian, 4 Western.

## Neurotropin Stimulations of Post-Radiation Changes in Neuromediator Processes in Autonomic Function Regulation Centers

*917C0161D Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 28 Dec 89) pp 261-263*

[Article by V. N. Gurin, M. Yu. Tayts, T. V. Dudina, A. I. Yelkina, T. S. Kandybo, G. F. Tsykhun, and Zh. Ye.

Konishi; Physiology Institute, Belorussian SSR Academy of Sciences, Minsk; Bioactive Sciences Institute, Nipon Zoki, Osaka, Japan]

UDC 616.833-02:615.849.1]:615.357:577.175.53

[Abstract] The potential for correcting changes in mediator interrelation and bioenergy support for the cerebrum with neurotropin, a drug with a broad spectrum of action, was investigated on 60 pubertal male Wistar rats (180-220 g) exposed to a 0.5 Gy dose of radiation and then administered $^{131}I$, 6.5 mCu/kg intraperitoneally. In addition to this regimen, the experimental group also received neurotropin injections (50 μg/kg, intramuscularly, three times in one week) three months later. Measurements of Kreb's cycle enzyme activities in cerebral mitochondria six months subsequent to combined ionizing radiation demonstrated decreases in serotonin-, noradrenalin-, dopamine-, and GABA-ergic mediator processes in the parietal cortex, hypothalamus, lateral vestibular nuclei and the locus ceruleus with a concomitant elevation of glycine-ergic processes. Also noted were 20 - 46 percent decreases in Kreb's cycle dehydrogenase activity in the cerebral mitochondria and neuronal uptake of choline in the parietal cortex and nuclei of the raphe. The results demonstrated that neurotropin attenuates and normalizes neuromediator process activities in the parietal cortex and decreases cAMP concentrations. These findings thus indicate that neurotropin reduces chronic radiation stress and diencephalic changes underlying systemic disturbances in the body. Figures 1; references 11: 9 Russian, 2 Western.

## Arginine Antiradical and Antioxidant Effect and Its Impact on Lipid Peroxidation Activity in Response to Hypoxia

*917C0161E Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 23 Mar 89) pp 263-265*

[Article by N. P. Milyutina, A. A. Ananyan, and V. S. Shchugaley, Biology Scientific Research Institute, Chair of Biochemistry and Bioengineering, Rostov State University]

UDC 615.272:547.495.9]03:616-008.922.1].
015.4:616.153.915-39].076.9

[Abstract] The antiradical and antioxidant properties of L-arginine hydrochloride and the effects of exogenous arginine on lipid peroxidation intensity were investigated using the microsomal membranes of the liver and testes of albino rats subjected to high altitude (9,000 m above sea level) hypoxia for one hour. Intraperitoneal administration of 120 mg/100 g L-arginine hydrochloride 30 min prior to the experiment demonstrated that arginine directly reacts with superoxide anion radicals and effectively traps singlet oxygen and hydroxyl radicals, thereby inhibiting lipid peroxidation due to its antiradical activity and amino and imino groups. These findings indicate that arginine pretreatment normalizes hypoxia-induced lipid peroxidation. Figures 2; tables 2; references 14: 8 Russian, 6 Western.

## Delta Sleep-Inducing Peptide Effect on Rat Electrophysiological Sleep Patterns During Alcohol Deprivation

*917C0161F Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 21 Sep 89) pp 281-283*

[Article by I. V. Viglinskaya, R. M. Salimov, and A. I. Mayskiy, Laboratory for Development and Study of Agents for the Prevention and Treatment of Drug Addiction; Pharmacology Scientific Research Institute, Moscow]

UDC 616.89-008.441.13-06-085.31:547.964.4]-
092.9-07:616.8-009.836- 073.97

[Abstract] The effect of delta sleep-inducing peptide (DSIP) on electrophysiological sleep patterns during alcohol deprivation was investigated on outbred male albino rats (180-200 g) with a high average daily consumption of 15 percent ethanol. A 13-month period of maintenance on alcohol, food, and water was followed by a period of adaptation for further experimentation. The rats' sleep patterns were continuously monitored for four hours per day for several days, and then followed by alcohol deprivation and continued monitoring 24 and 48 hours later. The results demonstrated that alcohol deprivation is accompanied by extensive disturbances in electrophysiological sleep patterns, most notably deficits (2 percent) and excesses (12 percent and more) in REM (rapid eye movement) sleep. Subsequent to a 15-day period during which alcohol was available, the rats were deprived of alcohol and administered 0.1 mg/kg of DSIP intraperitoneally 1 h prior to electrophysiological sleep pattern monitoring. The findings showed that even after only one DSIP treatment, REM had normalized in rats previously exhibiting an REM deficit. Thus, it is shown that DSIP helps normalize sleep patterns disturbed by alcohol deprivation. This preparation is therefore recommended for clinical trials in the treatment of ethanol withdrawal syndrome in alcoholics. Tables 1; references 9: 5 Russian, 4 Western.

## Immune Response to Synthetic Polysaccharide-Protein Conjugate

*917C0161H Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 29 Dec 89) pp 293-294*

[Article by T. A. Makarenko, N. A. Kocharova, Yu. Ye. Tsvetkov, L. S. Yedvabnaya, Yu. A. Knirel, L. V. Bakinovskiy, Ye. V. Kholodkova, Ye. S. Stanislavskiy, and

N. K. Kochetkov, Scientific Research Institute of Vaccines and Sera imeni N. I. Mechnikov, USSR Academy of Medical Sciences; Organic Chemistry Institute imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow]

UDC 612.017.1.014.46:[615.37:547.458+547.96

[Abstract] A conjugate of bovine serum albumin (BSA) and α-1,6-mannan, a synthetic polysaccharide with a $C_n$ of approximately 10 containing an aglycon spacer and a free amino group, was produced following thiophosgene treatment of the synthetic polysaccharide to convert it into an isothiocyanate derivative. The immune response to this synthetic antigen was investigated in 2 - 2.5 kg chinchilla rabbits injected first subcutaneously and then intravenously with 1 mg of the synthetic polysaccharide-BSA antigen each time. Results of indirect enzyme immunoassay demonstrated that adsorption of specific antibodies occurs almost at the level of "natural" antibodies in normal serum. The findings also indicated that the conjugate has much more pronounced inhibiting properties than either the BSA or synthetic polysaccharide alone. In conclusion, it was shown that the synthetic α-1,6-mannan conjugated with BSA does in fact stimulate the formation of specific antibodies in rabbits. Figures 1; references 7: 1 Russian, 6 Western.

## Anticataleptic Effect of Delta Sleep-Inducing Peptide and Its Effect on Cerebral Monoamino Oxidase Activity in Rats Genetically Predisposed to Catalepsy

*917C0161I Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 9, Sep 90 (manuscript received 22 Sep 89) pp 306-308*

[Article by N. N. Voytenko, V. G. Kolpakov, and T. A. Alekhina, Laboratories of Phenogenetic Behavior and Evolutionary Genetics; Cytology and Genetics Institute, Siberian Division, USSR Academy of Sciences, Novosibirsk]

UDC 616.895.8-07:616.153.1:577.158.2/-055.5.7-092.9

[Abstract] The effect of delta sleep-inducing peptide (DSIP) on the development of catalepsy was investigated in Wistar rats (4 months old, 220-250 g) genetically predisposed to this disease. Rats predisposed to catalepsy maintained a forcibly held vertical pose four times longer than noncataleptic rats. The cataleptic rats also exhibited less motor activity, fewer unmotivated stereotypical behavioral acts, and more emotional reaction to being held. The experimental animals were administered 12 or 120 μg/100 g of DSIP intraperitoneally 60 min prior to an exploratory behavior test lasting 5 min to measure motor activity. The results demonstrated that 120 μg/100 g of DSIP normalized behavior in cataleptic rats while halving the time they maintained vertical poses and reducing emotional reaction to being held. It was also shown that 12 μg/100 g of DSIP had no effect on behavior, but it did reduce vertical pose duration somewhat. Investigation of the effect of cerebral monoamino oxidase (MAO) activity in cataleptic rats demonstrated that MAO-A was resistant to high doses of DSIP, probably due to structural changes in this mitochondrial enzyme in the brain, whereas in control animals, DSIP enhanced MAO-A activity. The results also indicate that MAO-A regulates neuromediators in the brain that are involved in the development of catalepsy. In addition, these findings show that MAO-A and -B function in rats is displaced and that the MAO-A resistant to peptide regulation in cataleptics apparently cannot create an adequate level, release, or reverse uptake of serotonin and dopamine, which may be the reason for the development of catalepsy. Finally, the data indicate that DSIP, by inhibiting MAO-B, corrects the dopamine level in its receptors, thus reducing the expression of catalepsy in rats genetically predisposed to this disease. Figures 1; tables 2; references 18: 10 Russian, 8 Western.

## Functional Aspects of Cutaneous Mechanoreceptors in Albino Rat in Response to Transcranial Electrical Stimulation

*917C0162A Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 27 Feb 90) pp 458-460*

[Article by L. D. Yenin, G. N. Akoyev, V. P. Lebedev, and I. L. Potekhina, Laboratory of Reception Physiology, Group of Physiological Mechanisms of Electrical Anesthesia, Physiology Institute imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

UDC 612.79.014.467].06:615.844].08

[Abstract] The effect of transcranial electrical stimulation (TES) on the function of cutaneous mechanoreceptors was investigated on albino Wistar male rats (180-200 g) using the impulse activity taken from isolated ischiatic nerve fibers. The nerve fibers were separated from the nerve trunk and placed between two silver electrodes in two adjacent cubicles filled with Henck's solution. Combined alternating and direct currents (70 Hz, 1.2 mA, 50 μsec) were used for electrical stimulation. The results demonstrated that afferent impulses to low- and medium-threshold receptor units arose in response to mechanical irritation (100-300 μm amplitude), while impulse activity in high-threshold receptor units was observed only with maximum intensity mechanical stimuli (600 μm amplitude). It was shown that transcranial electrical stimulation completely suppresses receptor unit responses to mechanical stimulation and that the anesthesia and analgesia period that develops as a result of TES is preceded by a period of extreme pain. It was also demonstrated that TES completely blocks afferent impulses to mechanical irritation in low-, medium-, and high-threshold receptor units, acting on the skin afferents by activating central opiatergic mechanisms of the antinociceptive system and releasing more

opiopeptides. The endorphins and enkephalins evidently suppress the function of the skin afferents, as expressed in the form of anesthesia and analgesia. The results also indicated that TES significantly and reversibly alters the receptor function of the skin afferents. These findings suggest that endogenous opiopeptides may help regulate and form the afferent current in both the central nervous system and in the sensory endings. Figures 1; references 14: 3 Russian, 11 Western.

## Effect of Melatonin and Epiphysis Removal on Monooxygenase System Status in Rat Liver

*917C0162B Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 3 Apr 89) pp 478-480*

[Article by A. V. Popov, V. V. Zarubin, E. B. Arushanyan, and T. M. Luneva, Chair of Pharmacology, Stavropolskiy Medical Institute and Microbe Biochemistry Laboratory, Antiplague Scientific Research Institute of the Caucasus and Transcaucasus]

UDC 612.351.11:577.152.143].014.46:615.357.814.53+615.357.814.53. 015:4:[612.351.11:577.152.143

[Abstract] The status of microsomal oxidation processes in the liver in response to melatonin administration (1 mg/kg per day, 24 days) before and after epiphysis removal was assessed in 44 outbred male rats (140-200 g). Investigation of monooxygenase system enzyme activity in hepatic microsomes demonstrated that chronic administration of melatonin is accompanied by a 1.4- to 1.6-fold rise in the amount of microsomal cytochromes P-450 and $b_5$. Also revealed were a rise in NADH-dependent flavoprotein activity. In addition, melatonin depressed NADPH-dependent N-demethylase and n-hydroxylase activity. The biochemical changes following epiphysis removal were in many ways opposite to the effects of melatonin administration, thus indicating their specific character. There were also significant decreases in P-450 and $b_5$ cytochrome contents in rats that had their epiphysis removed. These opposite changes were found for almost all indices and were enhanced both by melatonin administration and epiphysis removal, thus suggesting that there are other biologically active factors in the epiphysis that modify the hepatic microsomal oxidation system. These data indicate that the adaptogenic properties of melatonin probably occur by means of auxiliary mechanisms of activating the hepatic monooxygenase system. The findings suggest that the biochemical effects of exogenous melatonin are governed by the secretion of the endogenous hormone or other epiphyseal factors through the melatonin receptors. Figures 2; tables 1; references 13: 7 Russian, 6 Western.

## Effect of Rapid Eye Movement Sleep Deprivation in Rotational and Stereotypical Behavior Elicited by Selective Dopamine Receptor Agonists

*917C0162C Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 8 Jun 89) pp 495-497*

[Article by N. A. Bondarenko, V. Klimek, J. Maj, and A. V. Valdman, Pharmacology Scientific Research Institute, USSR Academy of Medical Sciences, Moscow; Pharmacology Institute, Academy of Sciences, Krakow, Poland]

UDC 615.214.32.015.4.076.7

[Abstract] The effect of $D_1$ and $D_2$ agonists of dopamine (DA) receptors Ly-171555 and SKF-38393 on the induction of rotational (qualitative and quantitative behavioral index of DA receptor function) and stereotypical behavior was investigated on 150-180 g outbred male rats with a unilateral striatal kainic acid lesion prior to and following prolonged rapid eye movement (REM) sleep deprivation. It was shown that Ly-171555 stimulation of $D_2$ receptors elicited ipsilateral rotation in a dose-dependent manner, but had no effect on oral forms of stereotypy. On the other hand, SKF-38393 elicited intensive oral stereotypical reactions, but no rotation. The results demonstrated that increased doses of apomorphine and the mixed DA receptor agonists decreased ipsilateral rotation by 85.5 percent with a concomitant rise in oral stereotypy. These data suggest that agonist amplification of ipsilateral rotation following REM sleep deprivation is mediated by a nonidentical shift in DA receptor subtype sensitivity in both the nigrostriatal and mesolimbic systems. Furthermore, long-term intensive reaction of endogenous DA with both DA receptor subtypes in REM sleep deprivation results in a selective increase in $D_1$ subtype sensitivity. In other studies, it was shown that REM sleep deprivation accompanied by stress enhances tyrosine hydroxylase activity, which is coupled with an increase in tyrosine hydroxylase affinity for tyrosine and α-methyl paratyrosine (MPT). It was also demonstrated that a single administration of α-MPT to animals subjected to REM sleep deprivation completely precluded the effect of Ly-171555, with subsequent SKF-38393 administration restoring rotation behavior. The results indicated that inadequate tonic activation of $D_1$ receptors to endogenous DA prevents manifestation of the effect of selective $D_2$ receptor agonists of Ly-171555, thus indicating that the postsynaptic $D_2$ receptors are not supersensitive, nor are they functionally associated with $D_1$ receptors. These data show that selective agonist induction of DA receptors of rotational and stereotypical behavior and its intensity depend on the degree and duration with which the complementary receptor subtype stimulates endogenous DA. The findings suggest that long-term intensive tonic activation of DA receptors elicited by behavioral REM

sleep deprivation and chronic antidepressant administration can result in different changes in $D_1$ and $D_2$ subtype sensitivity of DA receptors. Tables 3; references 13: 2 Russian, 11 Western.

### Role of Gamma Aminobutyric $Acid_A$ and Gamma Aminobutyric $Acid_B$ Recepetors in Mechanism of Inhibiting Contractile Activity of Myometrium in Rabbits Under Influence of Gamma Aminobutyric Acid, Aminooxyacetic Acid, and Phenibut

*917C0162F Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 16 Mar 90) pp 503-504*

[Article by P. I. Sizov and V. S. Yasnetsov, Chair of Pharmacology, Smolensk Medical Institute]

UDC 618.141-009.1-02:615.31:547.466.3

[Abstract] The effects of gamma aminobutyric acid (GABA) substances on the contractile activity of the myometrium were investigated on 122 sections of uterine horns isolated from 29 rabbits lacking ovaries or shown to not be pregnant. The results demonstrated that GABA, aminooxyacetic acid (AOAA), and phenibut in low concentrations stimulate contractile activity in the myometrium and facilitate the presynaptic release of excitatory neuromediators. On the other hand, higher concentrations of GABA, AOAA, and phenibut inhibit the contractile activity of the myometrium due to specific binding of $GABA_A$ receptors in the myometrium and post-synaptic inhibition, as indicated by the antagonistic effects of GABA and AOAA on myometrium contractions. This suggests that the opposite effect of GABA in high concentrations in rabbits lacking ovaries or shown to not be pregnant is due to the fact that the peripheral $GABA_A$ receptors in the myometrium are low affinity receptors. These data suggest that the GABA-ergic system helps regulate the inhibitory function of the uterus in rabbits. The findings recommend the use of GABA positive substances in preclinical studies and clinical trials as a potential aid in maintaining pregnancy when pathological hypertonicity of the uterus resulting from a GABA deficiency threatens miscarriage. Figures 1; references 9: 6 Russian, 3 Western.

### Effect of Gamma Aminobutyric Acid-ergic Agents on Development of Neurogenic Gastric Ulcers in Rats

*917C0162G Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 10 Oct 89) pp 504-506*

[Article by V. V. Bulon, I. S. Zavodskaya, and L. K. Khnychenko, Pharmacotherapy Laboratory, Pharmacology Department; Experimental Medicine Scientific Research Institute, USSR Academy of Medical Sciences, Leningrad]

UDC 616.33-02:613.863]-092.9-085.214.22

[Abstract] The potential for using the gamma-aminobutyric acid (GABA) drugs phenibut and piracetam, which affect biogenic amine metabolism, activate bioenergetic processes, and stimulate protein and nucleic acid synthesis for pharmacologic correction of neurogenic gastric ulcers caused by extreme pressures on the body was investigated on 180-200 g outbred male albino rats. Phenibut and piracetam (50 mg/kg) were intraperitoneally administered 30 min prior to the experiments to assess their efficacy. Electrical stimulation (3 hours, 8 W per 10 rats, 20 Hz, 10 msec pulses) in rats that had been fasting for two days was shown to induce an average of 5.5 hemorrhagic erosions in the gastric mucosa of control animals. Control animals also exhibited decreases in noradrenalin levels (from .45 to 0.19 μg/g) and a 57 percent decrease in the macroergic enzyme coefficient of the compounds. A 76 percent rise in malonic dialdehyde indicated the activation of lipid peroxidation in the tissues. The results demonstrated that piracetam and phenibut both prevented the depletion of noradrenalin reserves in the stomach and attenuated decreases in enzyme coefficient concentrations, with piracetam offering better protection to the stomach, decreasing the number of hemorrhagic erosions from 5.5 to 1.1 on the average, as opposed to 2.6 ulcers per animal for phenibut. The findings demonstrated that both piracetam and phenibut enhance resistance to extreme pressures on the body and can be used to prevent and manage gastric diseases stemming from nervous problems. Tables 1; references 15: 14 Russian, 1 Western.

### Selective Effect of Neuroleptics on Dopamine-Dependent Disturbance of Behavior in Rats as Assessed in Extrapolation Escape Test

*917C0162H Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 110 No 11, Nov 90 (manuscript received 8 Jun 89) pp 506-508*

[Article by N. A. Bondarenko, Pharmacology Scientific Research Institute, USSR Academy of Medical Sciences, Moscow]

UDC 615.214.2/.3.015.4:612.821.3.014.46:615.357.452

[Abstract] Experimental trials were conducted on albino outbred male rats (220-250 g) to investigate the effect of neuroleptics from various chemical groups in comparison with the effect of antidepressants, tranquilizers, and nootropic agents on L-dioxyphenylalanine (L-DOPA)-induced behavioral pathology in an extrapolation escape test (EET). One hour prior to testing, 0.2 ml/100 g of benzerazide [sic], an aromatic amino acid peripheral decarboxylase inhibitor, was administered together with L-DOPA to enhance the central effect of the latter. The results demonstrated that administration of 3-oxybenzylhydrazine in a dose blocking dopamine synthesis in cerebral tissue prevents behavioral escape disorders in the EET in rats that received L-DOPA, thus

indicating the relationship between this form of behavioral pathology and increased cerebral content of dopamine that forms from the exogenous L-DOPA. Among the psychotropic agents with various effects, classical and atypical neuroleptics such as Aminazine, trifluoroperazine, and haloperidol had the most pronounced effect on behavioral escape, restoring escape ability in 80 - 90 percent of experimental animals. It was also shown that high doses of sulpiride and haloperidol (50 and 1 mg/kg, respectively) in rats that received L-DOPA attenuated the efficacy of these substances in comparison with lower doses. In addition, the findings demonstrated that 3-oxybenzylhydrazine and neuroleptic restoration of the rats' ability to escape was accompanied by the weakening of stereotypical hyperactivity. The data of the EET revealed a pharmacologically specific form of dopamine-dependent behavioral pathology in rats that can be selectively corrected by neuroleptics with various chemical structures, including benzamide derivatives. Tables 1; references 15: 6 Russian, 9 Western.

## Endogenous Peptide Prolactin Used To Enhance Resistance to Emotional Stress

*917C0180A Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 6 Feb 90) pp 346-348*

[Article by Ye. A. Yumatov and O. A. Meshcheryakova, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

UDC 613.863-084:[615.357:577.175.328

[Abstract] The possibility of employing prolactin to enhance resistance to emotional stress was investigated on 127 August male rats (220-250 g) and 67 outbred male rats (250-300 g) selected because of their predisposition to emotional stress. The animals were intraperitoneally administered 50-250 μg/kg of bovine prolactin from 15 days to 1 h before stress was induced in the rats by placing them four to a cage and holding their tails with white plaster for 5 h per day for 5 days. All of the series of experiments indicated the long term anti-stress effect of a single injection of prolactin, which completely prevented the onset of classical manifestations of emotional stress (involution of the thymus, adrenal cortex hypertrophy, and stomach ulcers) observed in control animals. A possible mechanism suggested for prolactin's action is its participation in the central neuromediator integration of negative emotional excitation. Figures 2; references 15: 8 Russian, 7 Western.

## Effect of Organic Calcium Antagonists and Magnesium on Corazol Kindling Development

*917C0180B Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 16 Feb 90) pp 348-350*

[Article by G. N. Kryzhanovskiy, M. N. Karpova, and O. Yu. Pankov, Scientific Research Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow]

UDC 615.31:546.41].015.23.03:[616.8-009.24-02:615.221].015.4.076.9

[Abstract] The effect of organic calcium antagonists finoptin (verapamil) and riodipine (a 1,4-dihydropyridine) and magnesium (magnesium sulfate) on susceptibility to seizures induced by daily injections of Corazol (30-40 mg/kg, intraperitoneally) in subconvulsive doses was investigated on 85 male Wistar rats. Various combinations of 10 or 15 mg/kg finoptin, 2 mg/kg riodipine, and magnesium sulfate (0.15-0.3 ml of a 5 percent solution/100 g) were injected intraperitoneally 15 min prior to each Corazol injection. The results showed that the animals administered finoptin, magnesium, and riodipine exhibited a 12 - 14 day delay in the development of convulsions and a reduction in their severity. Moreover, even after the injections stop, the rats still exhibit an elevated susceptibility to seizures for eight months (period of observation). These data indicate that long-term administration of Corazol in subconvulsive doses elicits an increasing elevation in susceptibility to seizures, while the use of calcium antagonists and magnesium delays the onset of this elevated susceptibility. In other words, the results suggest that calcium antagonists and magnesium can inhibit the development of an elevated disposition to convulsions in response to kindling and that this phenomenon is associated with the involvement of the calcium current in the neuronal membranes. Furthermore, the extended time needed for finoptin and magnesium to become effective in decreasing the severity of convulsions indicates that they must be used long-term to have any effect on activation of the calcium channel. Finally, the mechanisms of chronic epileptogenesis (the development of kindling-induced seizure susceptibility) and convulsions are different. Figures 3; references 15: 4 Russian, 11 Western.

## Disturbance of Mechanisms That Maintain Resting Cardiomyocyte Membrane Potential in Response to Stress and Its Prevention

*917C0180C Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 18 Oct 89) pp 363-365*

[Article by I. L. Yasinskiy, V. V. Malyshev, F. Z. Meyerson, Central Scientific Research Laboratory, Irkutsk Medical Institute; Laboratory of Cardiac Pathophysiology, Institute of General Pathology and Pathophysiology, USSR Academy of Medical Sciences, Moscow]

UDC 616.127-018.1-02:613.863]-07

[Abstract] In the search for means of preventing stress-induced injury to the heart, the possibility of preventing these disturbances while restoring the cardiomyocyte

membrane potential with a metabolite of the central stress-limiting system, gamma sodium hydroxybutyrate (GSHB), and α-tocopherol and ionol antioxidants was investigated in male rats (200-240 g) subjected to immobilization stress. GSHB (100 mg/kg intraperitoneally) was administered 0.5 h prior to and 2 h and 4 h following immobilization to assess the possibility of preventing post-stress disturbances in the processes responsible for maintaining and restoring the resting potential. The hearts were isolated from the animals 1 h after the stress was terminated and stored for 1.5 h in a solution at 4°C and then reperfused at 36°C to yield information on the transitional characteristics of restoring the membrane potential. Analysis of ionol, which was administered in a dose of 60 mg/kg 48 h, 24 h, and 1 h prior to stress, and α-tocopherol, which was administered in a dose of 100 mg/kg 24 h prior to stress, showed that pretreatment of the animals definitely helped maintain the post-stress resting potential prior to and following cold incubation and normalized the process of restoring the cardiomyocyte membrane potential during warming reperfusion. Ionol was shown to be more effective than α-tocopherol, while GSHB surpassed both of the antioxidants in preventing inhibition of the processes for restoring the resting potential during stress and practically eliminated the disturbances due to stress. Figures 1; references 12: 9 Russian, 3 Western.

## Comparison of Protective Effect of Ceruloplasmin From Healthy Donors and Wilson's Disease Patients

*917C0180E Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 21 Nov 89) pp 368-370*

[Article by Ye. L. Sayenko, O. V. Skorobagatko, and A. I. Yaropolov, Laboratory of the Kinetics of Biochemical Processes, Biochemistry Institute imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

UDC 615.366.153.1:577.152.1].015.4:[616.155.1-02:616.36+616.88]- 007.17-092.4

[Abstract] The protective effect of ceruloplasmin (CP), a very important antioxidant in human blood obtained from healthy donor blood, and a ceruloplasmin-like protein (pat-CP) from the blood of Wilson's disease (WD) patients was compared on erythrocytes. The binding of CP and pat-CP with erythrocytes from healthy people and WD patients was also studied. The ability of CP to prevent copper-induced destruction of human erythrocytes is three times greater than that of pat-CP and indicates that CP may be an effective agent for preventing hemolytic anemia due to WD. In addition, comparative analysis of the kinetic parameters of the oxidase activity of CP and pat-CP and the absence of ferroxidase activity in pat-CP and its molecular mass of 60 kD, which is half that of CP, suggest that pat-CP may be half of the CP molecule, lacking the high affinity centers for catalyzing the oxidation of organic substrates and $Fe^{2+}$. Moreover, in spite of the fact that pat-CP lacks ferroxidase activity, pat-CP is four times more effective than CP in inhibiting $Fe^{2+}$-induced lysis of erythrocytes, and it is two times more effective in the degree to which it inhibits superoxide radical-induced erythrocyte lysis. These data indicate that the greater protective effect of pat-CP is due to the fact that more pat-CP is bound to the erythrocyte membrane. Furthermore, the results demonstrate that the protective effect of CP in iron-induced erythrocyte lysis is not associated with ferroxidase activity. In summary, results of the comparison of oxidase activity and the protective effect of CP demonstrate no direct relationship between these two factors. Figures 2; tables 1; references 5: Western.

## Effect of Oxiracetam and Piracetam on Electrical Activity of Cerebral Cortex Neurons

*917C0180F Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 10 Dec 89) pp 381-382*

[Article by V. V. Yasnetsov, V. A. Pravdivtsev, I. N. Krylova, V. V. Chukayev, and V. S. Shashkov, Scientific Research Laboratory of Biologically Active Substances from Hydrobionts, USSR Ministry of Health, Moscow]

UDC 612.825.014.423.014.46:615.214.3:547.745

[Abstract] The effects of oxiracetam and piracetam on the impulse activity of cerebral cortex neurons were investigated in 11 male rabbits (2.3-2.5 kg) and seven male cats (3.1-3.6 kg). The results of microionophoretic research showed that oxiracetam and piracetam have about the same effect on spontaneous activity in neurons of the I somatosensory zone in the cerebral cortex and that they suppressed background impulse activity. In addition, it was found that 70 percent of cerebral cortex neurons are sensitive to nootropes, which may underlie the mechanism of their action on the higher integrative functions of the brain. Furthermore, it was also demonstrated that among the cortex neurons of the cerebral hemispheres there is a small population of cells in which the antagonistic relationships between the nootropes and opioids are manifested. Figures 2; tables 1; references 5: 3 Russian, 2 Western.

## Nootropic Activity of Nicotinamide and Its Structural Analogs

*917C0180G Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 16 Feb 90) pp 384-386*

[Article by R. A. Akhundov, V. A. Zagorevskiy, and T. A. Voronina, Pharmacology Institute, USSR Academy of Medical Sciences, Moscow; Azerbaijan Medical Institute, Baku]

UDC 615.356:577.164.15/.017:615.214.31/.076.9

[Abstract] Nicotinamide, which has tranquilizing and stress-protecting properties, and its structural analogs nicomorpholin [sic] and azethylnicotinate [sic] were investigated as substances with nootropic activity on male albino outbred mice (22-26 g). All three of these compounds were administered intraperitoneally 30 - 40 min prior to investigation. Experiments on the antihypoxic effect of nicotinamide revealed a distinct protective effect in conditions of hypobaric hypoxia, increasing survival 2.5-fold. It also increased viability in normobaric hypoxia and "rigid" hemic hypoxia. However, nicomorpholin and azethylnicotinate were shown to be even more effective than nicotinamide in antihypoxic activity. Furthermore, these compounds exhibited antiamnestic properties in conditioned passive avoidance reflexes, with the analogs again shown to be more effective. Nicotinamide and its analogs were compared with piracetam, pyritinol, and meclofenoxate, and a certain structural-electron similarity was found between piracetam and nicotinamide. This similarity was in the presence and arrangement of p- and π-electron systems and the distance between the atoms entering the polar centers of the molecules. Figures 1; tables 2; references 7: 5 Russian, 2 Western.

## Involvement of Dihydropyridine-Sensitive Ca-Channels in Psychotropic Effect of Nootropes

*917C0180H Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 16 Feb 90) pp 386-389*

[Article by Yu. G. Bobkov, P. V. Polev, A. I. Machula, Ye. A. Valdman, N. M. Soldatov, and S. M. Dudkin, Scientific Production Center for Biomedical Technology, USSR Ministry of Health, Moscow]

UDC 615.214.22.015.4:612.821.2.06:612.822.1.015.31:546.41

[Abstract] The effects of nootropes and various L-channel blockers in cerebral channels on simple memory tests were investigated on outbred male mice (16-20 g) and Wistar rats (200-220 g) in conditioned passive avoidance reactions. The preparations were administered intraperitoneally in 10 mg/kg doses 1 h prior to initiation of learning, with riodipin, verapamil, and diltiazem exhibiting the maximum and most similar effects as evidenced by the significant decrease in the duration of the avoidance reaction latent period and the number of mice that "learned" within 24 h. It was hypothesized that deterioration in the reproduction of learning that occurred in response to administration of the Ca-channel blockers was associated with their direct inactivating effect on dihydropyridine-sensitive Ca-channels. Data from experiments on the effects of piracetam and oxiracetam on learning indicate that these agents effectively stimulate learning and memory in animals and express marked antagonism with respect to the inhibiting effect of diltiazem. In addition, the results show that antagonism in the effect of the blockers and nootropes on learning and reproduction may be due to their effect on the biosynthesis of L-type Ca-channels. Furthermore, it is possible that the plasticity of these channels in the cerebral cortex plasma membranes is one of the important properties of the $Ca^{2+}$ regulatory system that governs memory formation. Finally, the results also have fundamental practical significance, since Ca-channel blockers are widely used for treating cardiovascular diseases. Figures 1; tables 3; references 14: 2 Russian, 12 Western.

## Emoxypine Pharmacokinetics in Norm and in Experimental Pathology Models

*917C0180I Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 15 Dec 89) pp 389-390*

[Article by Ye. V. Mishina, N. G. Filippenko, V. V. Pichugin, V. P. Zherdev, A. V. Lebedev, N. V. Kameneva, and A. A. Shvedova, Department of Clinical Pharmacology, Kursk Medical Institute; Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences; Chemical Physics Institute, Moscow]

UDC 615.272.014.4.25].033.07

[Abstract] The experimental pharmacokinetics of emoxypine, a biogenic antioxidant currently used as an angio- and retinoprotector that also has a protective effect in myocardial infarction by limiting the size of the infarction, were investigated following intravenous administration (10 mg/kg) to 1.8-3.2 kg rabbits in which experimental pathologies were simulated. High performance liquid chromatography was employed to measure emoxypine concentrations before and after infusion. The results demonstrated that emoxypine is rapidly excreted and is removed quickly from the blood. It penetrates into the organs and tissues where it is deposited and metabolized. Moreover, the post-infarction status significantly alters emoxypine pharmacokinetics, and changes were especially marked in the stages of emoxypine distribution and excretion. Finally, the simulated pathological conditions radically affect emoxypine kinetics. Figures 1; tables 1; references 6: Russian.

## Effect of Liposomal Form of Triombrast on Lipid Composition in Blood and Organs in Experimental Animals

*917C0180J Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 18 Jul 89) pp 393-395*

[Article by O. A. Rozenberg, N. L. Shimanovskiy, Ye. N. Mineyeva, N. Ya. Mikhaylova, N. V. Makaryeva, M. A. Dolgopyatova, K. P. Khanson, and P. V. Sergeyev, Central X-Ray Radiology Scientific Research Institute,

USSR Ministry of Health, Leningrad; Second Moscow Medical Institute imeni N. I. Pirogov]

UDC 616.153.915-092.9-073.755.4

[Abstract] The effect of the liposomal form of triombrast (LFT) on the lipid composition of the blood and organs was investigated in 50 outbred male rats (120-150 g) administered 5 mg/kg of this preparation intravenously. Analysis of the lipid composition in the plasma, erythrocytes, liver, spleen, and kidneys revealed changes within 2 h after the LFT was injected, except in the kidneys. In addition, the phosphatidylcholine, phospholipid, and cholesterol levels were elevated two- to three-fold, while triglyceride and fatty acid concentrations increased by three to five times. In contrast, the administration of free triombrast to control rats had no effect on the lipid composition, while the triglyceride level in the plasma increased by 1.9-fold. Normalization of the lipid composition in the blood and organs was noted 12 h after administering the LFT, with no differences noted between the experimental and control groups 24 h after administering the preparation. The elevated lipid content observed in the erythrocytes is probably due to inspecific sorption of the liposomes on the erythrocytes. Although the LFT elevates the lipid content in the blood, liver, and spleen, these changes pass quickly and differ little from the ordinary fluctuations in lipid composition that are involved with digestion and and will not impede the clinical use of liposomal forms of X-ray contrasting agents. Tables 1; references 9: 4 Russian, 5 Western.

## Effect of Triophene on Thrombocyte Aggregation

*917C0180K Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 28 Jun 88) pp 395-396*

[Article by A. N. Tulupov, L. V. Filev, A. N. Belskikh, Yu. V. Medvedev, and V. G. Popov, Military Medical Academy imeni S. M. Kirov, Leningrad]

UDC 616.155.25-008.1-085.279.53

[Abstract] The antiaggregant potential of triophene, a known biostimulant, was investigated *in vitro* using thrombocytes from 12 healthy donors and 20 patients with acute purulent-deteriorating illnesses of the lungs and pleura in which hyperaggregation of the platelets was observed. The data showed that aggregation of the platelets was slow and poorly reversible, but treating the thrombocytes with persantin slightly improved the aggregation rate and degree and rate of deaggregation. However, incubating the thrombocytes with triophene substantially improved indices of adenosine-diphosphate-disodium salt-induced aggregation. Results demonstrating the favorable effects of triophene treatment of thrombocytes *in vitro* on the aggregation properties of these cells reveal new possibilities for drug correction in the thrombocytic link of hemostasis. Tables 1; references 4: 3 Russian, 1 Western.

## Effect of Dalargin on Mitotic Processes in Stomach Epithelium During Stress

*917C0180L Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 12 Jan 90) pp 399-401*

[Article by S. S. Timoshin, S. I. Shvets, N. B. Murzina, and G. P. Berezina, Central Scientific Research Laboratory, Khabarovsk Medical Institute]

UDC 616.33-018.73-018.15-02:613.863]-02:615.31:[547.95:547.943

[Abstract] The effect of dalargin, a leu-enkephalin analog, on the accumulation of malonic dialdehyde and the noradrenalin content in stomach tissue was investigated in 150-180 g male rats administered 10 μg/kg of the preparation. The proliferative processes in the pylorus were assessed by the amount of $^{3}$H-thymidine labeled nuclei and the intensity of the label, which characterizes the rate of DNA synthesis. The results demonstrated that 1 h following the end of immobilization stress, the number of $^{3}$H-thymidine labeled nuclei in the pyloric epithelium decreased four-fold and the label intensity decreased 1.7-fold in the control, while these figures were two-fold and zero, respectively, for animals pretreated with dalargin. Thus, these data indicate that dalargin prevents stress-induced disturbances in DNA synthesis and mitosis and attenuates the decrease in the proliferative pool. In addition, the findings also showed that dalargin pretreatment of the rats prevented the stress-induced 1.5-fold elevation of malonic dialdehyde that otherwise occurred in control animals. Moreover, dalargin's ability to decrease the noradrenalin tissue concentration contributes to the maintenance of homeostasis during stress. In conclusion, these data indicate that dalargin can be used to not only treat exacerbation of stomach and duodenal ulcers, but it can also be used to prevent and treat acute ulcers and erosions. Tables 1; references 15: 14 Russian, 1 Western.

## Investigation of Effect of Immunostimulant T-Activin on Thymocyte Plasma Membrane Electrical Properties Using Fluorescent Probes

*917C0180M Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 20 Dec 89) pp 402-404*

[Article by V. A. Petrov, A. V. Sinegubov, Ye. V. Sokolova, N. V. Glukhova, V. V. Smeyanov, and L. V. Kovalchuk, Department of Biophysics and Immunology, Biomedical Faculty, Second Moscow Medical Institute imeni N. I. Pirogov]

UDC 615.362.438.017:615.275.4/.015.4:/
612.438.014:576.314/.076.9

[Abstract] The effect of T-activin on the electrical properties of a membrane suspension of thymocytes obtained from two-month-old CBA x C57B1 mice was investigated using a method of membrane fluorescent probes. The thymic lymphocytes were placed in Henck's solution and diluted with neuraminidase to a final concentration of 50 units/ml and incubated at 37°C for 30 min. The results showed that T-activin evidently did not cause any changes in the structure of the polar layer of the thymocyte membrane at the site of the various probes and did not affect the water status in it. It was shown that the fluorescent intensity of the positively charged probe 2-(n-dimethylaminostyryl)-4-methylpyridinium decreased by approximately 20 percent, while the fluorescent intensity of the negative probe 1-anilinonaphtalene-8-sulfonate [sic] (ANS) increased by 2.3-fold. These phenomena are explained by an increase in the positive charge of the thymocyte membrane layer, a decrease in the negative charge, and depolarization of the transmembrane potential on the plasma membrane. In conclusion, T-activin apparently elicits depolarization and a decrease in the transmembrane potential on the thymocyte plasma membrane. As a result, ANS enters the cell and binds with intracellular membrane structures, causing an increase in its fluorescence. Figures 2; references 15: 10 Russian, 5 Western.

## In Vitro Effect of Arginine Vasopressin on Rat Thyroid Gland

*917C0180N Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 28 Dec 89) pp 423-425*

[Article by G. V. Dityateva, I. A. Krasnovskaya, and V. I. Skopicheva, Neuroendocrinology Laboratory, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences; Cytology Institute, USSR Academy of Sciences, Leningrad]

UDC 615.357:577.175.343].015.4:612.44].076.9

[Abstract] The effects of neurohormones on the thyroid gland were investigated *in vitro* on thyroid glands obtained from young male Wistar rats to obtain a definite answer as to whether these hormones have a direct effect on thyrocytes. The results demonstrated that after incubating the thyroid glands for 30 min with thyrotropic hormone (TTH), there is an increase in the height of the thyroid epithelium and a slight increase in the amount of $^3$H-leucine label above the thyrocytes, with further incubation with TTH leading to enhanced elimination of the thyroid hormones. In another series of experiments, it was shown that 0.5 h after vasopressin (in a concentration of 5 x $10^{-11}$ M/l, which is typical of the level in the blood of stressed animals) starts acting on the thyrocytes, there is significant accumulation of the radioautograph above the thyrocytes, thus indicating the activation of thyroid hormone formation. The abrupt decrease in the amount of label that occurs when the gland is incubated up to 2 h in a culture containing vasopressin but lacking $^3$H-leucine demonstrates the intensive processes of elimination of the thyroid hormones from the gland pieces being incubated. Conclusions drawn from these observations make it possible to suggest that thyroglobulin forms and accumulates in the follicles when the thyroid gland is incubated in a hormone-deficient culture. In addition, it was shown that TTH accelerates colloid resorption and elimination of the thyroid hormones, as reflected by the lack of labeled thyroglobulin accumulation in the colloid and by the increase in the height of the thyrocytes. Moreover, the effect of vasopressin depends on its concentration: low doses of vasopressin stimulate the peripheral endocrine glands while high doses inhibit them. In conclusion, these results demonstrate the direct paraadenohypophyseal effect of vasopressin on the rat thyroid hormone. Figures 3; references 16: 4 Russian, 12 Western.

## Dalargin Control of Ocular Lymphodrainage Tracts

*917C0180O Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 2 Dec 89) pp 436-438*

[Article by Ye. G. Rapis, V. P. Tumanov, Yu. M. Levin, and N. Kh. Kurbanov, Turkmen Scientific Research Institute of Ocular Diseases, Ashkhabad]

UDC 617.7-007.681-092.9-085.31:[547.95:547.943]-036.8-07

[Abstract] Experimental trials on the effect of dalargin on ocular drainage tracts were conducted in control rabbits and in rabbits with experimental hypertension and simulation of secondary glaucoma. There were three series of experiments on 82 eyes in chinchilla and giant albino rabbits: 1. morphologic investigation of the drainage tracts in the ocular anterior chanber and vitreous body following subconjunctival or electrophoretic administration of dalargin (the same amount and concentration of dalargin, 0.1 percent, 0.2-0.3 ml, was used in all cases); 2. determination of dalargin's effect on ophthalmotonus in normal intraocular pressure and in experimental ophthalmohypertension; and 3. simulation of secondary glaucoma using sulfuric acid and dalargin's effect in this situation. The results demonstrated that intraocular pressure increased from the baseline level of 20-22 mm Hg to 30-41 mm Hg in nine out of ten cases following the burn to simulate secondary glaucoma. After dalargin administration, the intraocular pressure dropped within 30 min to 2 h from 2 to 10 mm Hg in nine out of ten cases. Figures 3; references 5: 3 Russian, 2 Western.

## Radioautographic and Immunohistochemical Analysis of $^3$H-Melatonin Distribution in Endocrine and Non-Endocrine Organs

*917C0180P Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 10, Oct 90 (manuscript received 29 Nov 89) pp 438-440*

[Article by V. V. Yuzhakov, I. M. Kvetnoy, and G. A. Petrova, Scientific Research Institute of Medical Radiology, Obninsk]

UDC 616.43-018.1.008.94:612.826.33.018

[Abstract] This report presents data on the radioautographic and immunohistochemical investigation of the distribution of $^3$H-melatonin in some endocrine and non-endocrine organs soon after its administration (185 kBq/g, intraperitoneally) to male $BDF_1$ rats. The animals were sacrificed 5 min, 1 h, and 3 h after injection to determine $^3$H-melatonin contents in the adrenal glands, duodenum, pancreas, and spleen. The results demonstrated that $^3$H-melatonin was found in all the organs 5 min after injection, while at 1 h, the greatest concentrations were found in the duodenum, adrenal glands, and pancreas. The findings suggest that the disparity in the nature of the distribution of the radioactive label and the histotopographic location of the melatonin-containing cells in all of the organs analyzed is evidently due to the different recording capacities of the methods employed. A comparison of the radioautographic and immunohistochemical data indicates that the products of melatonin metabolism are quickly carried throughout the body and most heavily concentrated in cells with a high level of biosynthetic processes in the adrenal medullary cells, pancreatic acinar cells, and duodenal epitheliocytes in the villi. These results thus demonstrate that exogenous melatonin can accumulate in some endocrine cells as well as non-endocrine cells in endo- and non-endocrine organs. References 18: 5 Russian, 13 Western.

## B-Endorphin Influence on Conditioned Response in Cats

*917C0191A Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 21 Dec 89) pp 992-1000*

[Article by A. I. Karamyan (dec.), Yu. A. Pankov, A. L. Protsenko, T. N. Sollertinskaya and I. L. Kofman, Laboratory of Comparative Physiology and Pathology of the Central Nervous System, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Laboratory of Molecular Biology, Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow]

UDC 612.821+577.15/.17

[Abstract] Further definition of β-endorphin effects on higher nervous functions was undertaken in 3.5-5 kg cats, employing conditioned food responses. In conventional tests subcutaneous administration of β-endorphin in doses of 10-16 μg/kg facilitated both positive and negative conditioned responses. The latter indicated that β-endorphin acted via a neurochemical mechanism in effecting adaptation to variable environmental conditions. However, in a more complex setting involving a choice between a preferred and secondary feed box and two positive stimuli, the effects of β-endorphin were predicated on the level of original conditioning and individual typology. Accordingly, the effects of β-endorphin on behavioral strategy were especially significant in animals with low initial selection accuracy because of an undue preference for the feed box for which they were originally conditioned. In the latter case perseverance of feed box preference was interpreted to reflect neurotic-type behavior. Figures 4; tables 1; references 23: 16 Russian, 7 Western.

## Comparative Assessment of Quinolinic Acid and L-Kynurenine Effects on Voltage-Gated Ion Channels of Mollusk Neuronal Membranes

*917C0191B Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 20 Nov 89) pp 1017-1022*

[Article by I. Yu. Artemyev, Laboratory of Neuron Physiology, Chair of Physiology, State Pedagogical Institute imeni A. I. Gertsen, Leningrad]

UDC 612.822.3:612.014.3

[Abstract] Neurons of the visceral ganglion of the mollusk Lymnaea stagnalis were used for a comparative assessment of the effects of tryptophan metabolites quinolinic acid and L-kynurenine on $K^+$ channels. Oscillographic studies on the membrane potentials of the isolated neurons showed that quinolinic acid in concentrations of 7 x 10E-5 to 10E-3 M diminished the amplitude of the $K^+$ current, whereas L-kynurenine at concentrations of 10E-5 to 10E-3 M in the perfusate in some case was inhibitory and in others enhanced $K^+$ flow. The inhibitory effects of both metabolites were attributed to their interaction with N-methy-D-aspartate receptors. The increase in amplitude in some neurons was attributed to L-kynurenine action on $GABA_B$ receptors. Figures 2; tables 2; references 17: 9 Russian, 8 Western.

## Pharmacologic Analysis of Adrenergic Modulation of Parasympathetic Inhibition of Myocardial Contractility

*917C0191C Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 16 May 89) pp 1036-1042*

[Article by L. V. Sorokin and N. M. Afanasyev, Laboratory of Pharmacology of Blood Substituents, All-Union

Scientific Research Institute of Technology of Blood Substituents and Hormonal Preparations, Moscow]

UDC 612.171+612.178

[Abstract] A series of agonists and antagonists of α- and β-adrenoreceptors were employed in an analysis of adrenergic modulation of myocardial contractility following vagal stimulation. The studies were performed on sinoatrial preparations of the frog Rana temporaria and male chinchilla rabbits, the latter involving EKG monitoring following intavenous injections of the pharmacologic agents. The results revealed that the beta-blocker obsidan did not affect parasympathetic inhibition, but prolonged epinephrine-induced inhibition of contractility. The combination of the $\alpha_2$-blocker yohimbine and epinephrine or isadrine almost completely abrogated the effect of vagal stimulation. Finally, Clofelin potentiated vagal effects on the myocardium. These observations indicate the presence of $\alpha_2$- and β-adrenoreceptors on the presynaptic endings of parasympathetic fibers through which adrenergic modulation of cardiac cholinergic mechanisms is exercised. Figures 5; references 7: 4 Russian, 3 Western.

## Positive Chronotropic Influence of Salsolinol on Isolated Rat Heart

*917C0191D Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 27 Sep 89) pp 1043-1047*

[Article by N. A. Sokolova, L. I. Chudakov, I. P. Ashmarin, T. M. Vinogradova, N. D. Volodin, G. P. Vlasov and I. N. Nikonova, Chair of Human and Animal Physiology, Biological Faculty, State University; No 23 Research Department, Institute of Physicotechnical Problems, Moscow; Laboratory of the Synthesis of Physiologically Active Polymers, Institute of Macromolecular Compounds, USSR Academy of Sciences, Leningrad]

UDC 612.172.2+612.014.46

[Abstract] Pharmacologic trials were conducted with salsolinol (6,7-dioxy-1-methyl-1,2,3,4-tetrahydroisoquinoline), a product of nonenzymatic condensation between dopamine and acetaldehyde in chronic alcoholism, to assess its cardiac effects. Studies on isolated heart preparations derived from outbred, 180-220 g, male rats revealed a dose-dependent positive chronotropic effect with $EC_{50}$ = 5.6 x 10E-6 M. The cardiotropic effects of salsolinol were blocked by the beta-blocker propranolol (10E-5 g/L) and potentiated by naloxone (3.1 x 10E-5 M), an opioid antagonist. In addition, naloxone mitigated salsolinol-induced arrhythmia. Accordingly, these findings indicate that salsolinol may be a significant factor in the cardiac status of alcoholics. Figures 2; references 14: 3 Russian, 11 Western.

## Somatotype and Ventilatory Response to Hypercapnic Stimulation

*917C0191E Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 16 Oct 89) pp 1061-1067*

[Article by P. M. Shmerling, S. G. Krivoshchekov, Laboratory of Shift Work Physiology, Institute of Physiology, Siberian Branch, USSR Academy of Medical Sciences, Novosibirsk]

UDC 612.2:612.23+612.273

[Abstract] Hypercapnic sensitivity (S) was assessed in the case of 30 men with a mean height of 174.6 cm and a body weight of 69.5 kg in relation to fat content (%F) and muscle mass (%M). The results of regression analyses demonstrated that S is directly related to the fat content and indirectly to the muscle mass: S = (6.704 - 0.098) x %M and S = (0.338 + 0.106) x %F. Accordingly, these findings indicate that individuals with a better muscular development and relatively smaller fat deposits are better able to withstand hypercapnia. Figures 1; tables 2; references 20: 3 Russian, 17 Western.

## Mechanisms of Simultaneous Enhancement of Heat and Cold Tolerance in Rats

*917C0191F Moscow FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 76 No 8, Aug 90 (manuscript received 16 Jun 89) pp 1078-1083*

[Article by Yu. I. Rossomakhin, Chair of Human and Animal Physiology, State University, Donetsk]

UDC 612.53+577.4

[Abstract] An analysis was conducted on the physiological aspects of two months of simultaneous heat and cold adaptation of outbred, 160-180 g, male rats, consisting of alternating days of 4 h at 38°C and 16 h at -7 to 2°C. Monitoring of cutaneous and rectal temperatures, heart rate, respiratory rate, body weight, and weight of salivary glands, thyroid, brown fat and heart demonstated that in heat-preadapted rats (38°C, 4 h/day, 3 months) simultaneous heat and cold adaptation enhanced tolerance of both factors. The physiological mechanisms responsible for this phenomenon involved both more efficient thermogenesis and heat release (primarily via salivary evaporation). In addition, in simultaneously adapted animals thermogenesis involved adrenergic mechanisms to a greater degree than thyroid mechanisms, in distinction to rats adapted only to cold. Accordingly, in the dually adapted rats thermogenesis is based on a more flexible mechanism capable of a faster response to changes in environmental temperatures. Tables 4; references 13: 4 Russian, 9 Western.

## Cytokines and Their Role in Infection Pathology and Therapy

*917C0241A Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 35 No 9, Sep 90 (manuscript received 12 Feb 90) pp 12-14*

[Article by M. M. Vyadro, All-Union Antibiotics Scientific Research Institute, Moscow]

UDC 616.9-092-078.33

[Abstract] A general summary of cytokines and their role in infection pathology and therapy is presented, with the review focusing on tumor necrosis factor, interleukin-1, and interleukin-6, which have become particularly significant in the pathogenesis of the infection process because they mediate diseases and are protective factors of the body. Cytokines are a universal mediator of the cellular response to inflammation, infection, tumors, stress, and other stimuli. The metabolic effects of cytokines play a substantial role in the pathogenesis of endotoxic shock. Moreover, cytokines themselves play an important role in the pathogenesis of serious septic infections. In addition, cytokines help kill various pathogens and may be regarded as potential candidates for use in the comprehensive treatment of patients with neutropenia who are at high risk for developing infections. Furthermore, data on the involvement of cytokines in the pathogenesis of the infection process are necessary for the development of new pathogenetic directions in infection therapy. Finally, using the potential for cytokine-induced antibacterial reactions and prevention or attenuation of undesirable toxic effects will help in the formation of new fields in the comprehensive treatment of the infection process. References 15: 2 Russian, 13 Western.

## β-Lipotropin and β-Endorphin in Hypothalamic Syndrome

*917C0258A Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYATERAPIYA in Russian No 5, Sep-Oct 90 (manuscript received 7 Feb 90) pp 9-12*

[Article by F. I. Dzhafarov, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

UDC 616.831.41-008.6-07:616.831.4-008.939.6

[Abstract] Against the backdrop of their effect on the central mechanisms underlying the self-regulation of the main functions of the body, physiologically active endogenous peptides have been shown to take part in the formation of emotions, motivation, and memory, as well as in the restoration of the sphere of motivation-emotion disrupted by injury, surgical intervention, or the blockade of protein synthesis. A great many endogenous peptides are derivatives of the β-lipotropichormone of the hypophysis. Such peptides are found in various structures of the CNS, particularly in parts of the hypothalamus, whose arcuate region is regarded primarily as a β-lipotropin-synthetizing or -concentrating area of the brain. β-Lipotropin and some of its derivatives affect feeding behavior and metabolic processes. Yet, the participation of those peptides in processes involving the disruption of hypothalamic function in experiment is virtually unstudied. The work reported here examined the possible role of β-lipotropin (β-LPT) and β-endorphin in the compensation of feeding motivation and the associated functions after experimental injury of the arcuate section of the hypothalamus in 90 outbred albino male rats. Intraventricular microinjection of β-LPT (group II) and β-endorphin (group III) after arcuate injury was found to be effective in terms of restoration of the disrupted functions. By day 15 of observation after injection of β-LPT, group II exhibited much greater feeding, drinking, and orientation-exploratory activity than did control. Comfort behavior and spontaneous sleep and drowsiness declined. In group III, the volume of food consumed not only returned to baseline, it exceeded baseline by 13.3 percent. Food-seeking activity increased by some 47 percent. Drinking activity, however, dropped by 9.5 percent, and water intake declined. Orientation-exploratory behavior increased, but comfort-seeking acts and spontaneous sleep and drowsiness fell off. The data indicate that injury to the arcuate region of the hypothalamus is accompanied by the formation of a specific syndrome that includes disruption of forms of behavior such as feeding and drinking. That region affects feeding motivation. The data also point to the possibility that the effects of β-LPT and β-endorphin on the manifestations of the hypothalamic syndrome are tied to the elimination of the deficiency of those endogenous compounds and to the restoration of the functional links of that structure to other sections of the brain. Figures 1; references 21: 15 Russian, 6 Western.

## Age-Related Features of Contractility of the Heart and Its Adrenergic Regulation in Catecholamine Damage to the Myocardium

*917C0258B Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 90 (manuscript received 18 Oct 88) pp 17-19*

[Article by L. M. Lobanok, A. Ye. Kiriyenkov, and O. N. Khotyanova, Institute of Radiobiology, BSSR Academy of Sciences, Minsk]

UDC 616.127-02:[615.357:577.175.52]-07:616.12-008.4-053.8/.9-092.9

[Abstract] Catecholamines play an important role in the regulation of vital processes of the body, and they do not cause pathologic changes in cell structure and function, because of the modulatory, self-limiting component of the adrenergic effect. But when catecholamine levels rise to excessive levels for lengthy periods of time, as they do,

for example, during stress, the modulatory component is not effective enough, and the adrenergic reaction is transformed from an adaptational-compensatory effect to a pathologic effect. So-called catecholamine damage to the myocardium and to other tissue results, largely because of the relative myocardial hypoxia, disruptions of microcirculation, changes in membrane permeability and adrenergic regulation, and the effects of free radicals. Since the biomechanics of the myocardium and its neurohumoral regulation change substantially with age, one can assume that the damaging effect of catecholamines at various stages of ontogenesis has features that must be elucidated if mechanisms of pathogenesis are to be understood and prevented. The researchers investigated the contractile function of the heart and adrenergic mechanisms of its regulation in the presence of catecholamine damage to the myocardium in 8-month-old and 26-month-old rats that had been injected with adrenaline (1 mg/kg i.m.) two days before the experiment. The functional response of the heart to stimulation of adrenergic receptors underwent substantial change. The chronotropic and inotropic responses of the catecholamine-damaged heart to such stimulation also changed considerably, and they were found to be a function of age. Studies of isolated cell preparations indicated that lengthy or massive stimulation of β-adrenergic structures leads to desensitization of those receptors, which may be a result from a reduction of their number or from changes in the adenylate cyclase system. In catecholamine damage to cardiomyocytes, the inotropic response of the heart to stimulation of both α- and β-adrenergic structures declines. Reduction of the inotropic response and the reaction of the coronary channel to stimulation of β-receptors in the 8-month-old rats was accompanied by increased sensitivity of myocardium cells and vessels to isoprenaline, whereas in the older rats, the shift of the curve to the left was inconsistent. The changes noted in the younger rats may be due to an increase in β-adrenergic receptors that have a high affinity for agonists or to enhanced transmembrane signal transmission, and they may serve to amplify the contractility of undamaged parts of the myocardium. The maintenance of the pumping function of the heart in the older rats with catecholamine damage to myocardial fibers and desensitization of some of the adrenergic receptors is effected via compensatory amplification of the contractile function of undamaged parts of the heart muscle, which may be due to glycolosis and the resistance of the myocardium to the effects of hypoxia. Figures 1; references 8: 4 Russian, 4 Western.

## Effect of Acute Blood Loss on Hemostasis in Dogs Unadapted to High Altitudes

*917C0258C Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 90 (manuscript received 12 Jan 89) pp 28-33*

[Article by A. G. Rachkov, L. G. Rachkova, and S. B. Daniyarov, Department of Normal Physiology, Kirghiz Medical Institute, Frunze]

UDC 616-005.1-036.11-092:612.275.1]-092.9-07:616.151.5

[Abstract] In acute blood loss, hypercoagulation develops, accompanied by intravascular blood coagulation and activation of fibrinolysis, which is a defense mechanism of the body aimed at dissolving the fibrin in the blood channel. The absence of data on the effect of acute blood loss on hemostasis in an individual unadapted to high altitudes led the researchers to study the hemostasis system in 15 mongrel dogs (8-15 kg) subjected to acute blood loss after three days at 3,200 meters above sea level (on the Tuya-Ashu Plateau). The volume of blood loss constituted 2.5 percent of body weight. Dogs undergoing the same procedures at 760 meters above sea level (in Frunze) served as the control. In the Frunze dogs, the acute blood loss was attended by the expected hypercoagulation and activation of fibrinolysis, along with lower adhesive and aggregational activity of blood platelets. For the experimental dogs, the three-day stay itself resulted in hypercoagulation, with intravascular coagulation and amplified fibrinolysis. The blood-letting on the third day led to a decline in thrombocyte levels that was not as substantial as that observed at 760 meters. Although the number of blood platelets increased after five minutes, it returned to baseline values after 30 minutes. Thrombocyte adhesion rose after one minute of blood loss, but could not be determined after five minutes, because it coagulated when it was passed through fiberglass fabric, which indicates an excess of thrombin that is unneutralized by the anticoagulants. Platelet aggregation after one and five minutes was down sharply, because of thrombin in the blood channel, which causes the formation of aggregates that stick in the capillaries. After 30 minutes, an electrocoagulogram pointed to hypocoagulation. Results of the analysis indicate that intravascular blood coagulation in high altitudes leads to the accumulation of products that are degradative of fibrinogenesis and to the development of secondary hypocoagulation that has a protective function and prevents death in acute blood loss. The secondary hypocoagulation in the dogs prevented further growth of intensity of intravascular blood coagulation. References 7: Russian.

## Neuroautonomic Mechanisms for Maintaining Blood Oxygen Balance in Individuals Exposed to Gaseous Hypoxic Mixture

*917C0258D Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 90 (manuscript received 7 Feb 89) pp 33-37*

[Article by Yu. Yu. Kiryachkov, V. V. Shakhtarin, Ya. M. Khmelevskiy, G. F. Palyga, V. Yu. Sloventantor, and A. P. Kruglikov, Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk]

UDC 616.839-008.6-092:612.273.2]-07

[Abstract] Changes that take place in the autonomic nervous system (ANS) in hypoxia are generally associated with the $pO_2$ levels in the inhaled gas mixture. Little heed, however, has been paid to the relationship of those changes to the initial adaptational state of the body. The work reported here studied the extent to which the blood oxygen balance is maintained in 95 individuals exposed to a gaseous hypoxic mixture, and it elucidated the nature of the interaction between peripheral and central sections of the ANS in relation to the baseline functional state of the body. In a reclining position, the individuals breathed a 10 percent oxygen hypoxic mixture for 25 minutes. Blood oxygen balance was evaluated on the basis of declines in $pO_2$ levels in venous blood. Also studied were $pCO_2$ and pH levels. Evaluation of central section activity was based on the Bayevskiy tension index (TI), whereas that of the peripheral sections was based on degree of vasoconstriction of skin vessels, which was determined with transcutaneous oxyimetry ($tcpO_2$). Analysis of TI and $tcpO_2$ variations enabled the delineation of five types of body response to hypoxia in terms of heart beat rate, arterial pressure, minute volume, and acid-alkaline state. Figures 1; references 21: 16 Russian, 5 Western.

## Transport of ($^3$)H-GABA Across Phenozane-K-Modified Synaptosomal Membranes

*917C0288A Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 15 Oct 88) pp 321-327*

[Article by A. D. Zhdanova, S. I. Zharikov, A. Yu. Budantsev and L. I. Chernyavskaya*. Institutes of Biological Physics (Pushchino) and of *Chemical Physics (Moscow), USSR Academy of Sciences]

UDC 577.352.46+577.352.335

[Abstract] Incubation studies with synaptosomal preparations derived from the cortex and subcortical structures of 140-150 g male Wistar rats led to the demonstration that phenozane-K (potassium γ-(4-oxy-3,5-di-tert-butylphenyl)propionate) exerted a concentration-dependent effect on sodium-dependent membrane transport of radio-labeled GABA. A 5 min preincubation with low concentrations (10E-7 to 10E-5 M) phenozane-K stimulated [$^3$]H-GABA transport, at 10E-9 and 10E-4 M phenozane-K had no effect, and in high concentrations (10E-3 M) phenozane-K inhibited GABA transport across synaptosomal membranes. In the latter case, simultaneous incubation with 1 mg/ml of BSA abrogated inhibition. The fact that BSA precludes phenozane-K action was interpreted to indicate that BSA binds unsaturated fatty acids released by the action of the antioxidant, thereby altering membrane viscosity. Accordingly, the mechanism of action of phenozane-K on the synaptosomal membranes involved their structural modification rather than antioxidant action. Tables 2; references 21: 10 Russian, 11 Western.

## Immune Modulation of Neurochemical and Neurophysiological Processes: Catecholamine Levels, Behavior and Seizure Predisposition of White Rats Immunized With Albumin-Sydnofen Conjugate

*917C0288B Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 20 Apr 89) pp 328-334*

[Article by I. P. Ashmarin, R. A. Danilova, Ye. I. Melnik, M. F. Obukhova, Sh. K. Sagimbayeva, M. L. Tsirenina, S. Yu. Ganzha and N. A. Koltovaya, Moscow state University; Institute of Applied Molecular Biology, USSR Ministry of Health, Moscow]

UDC 612.017.1:612.8.015.3:612.8-009.24

[Abstract] An investigation was conducted on the neurological sequelae resulting from generation of antibodies against the analeptic sydnofen (3-(beta-phenylisopropyl)-sydnonemino), using sydnofen-BSA conjugate, based on the assumption that such antibodies may be expected to interact with analogous endogenous factors. Studies on white rats demonstrated hat immunization led eventually to depression of plasma norepinephrine and brain epinephrine levels in 32 - 47 days. In addition, brain dopamine levels showed a reduction in 12 days, reaching statistically significant depression in 32 - 47 days. Behavioral correlates revealed deterioration in maze-based food seeking along with general passivity and occasional evidence of fear. The latent period for conditioned avoidance reactions was prolonged and the threshold for corazol(60 mg/kg; s.c.)-induced convulsions was elevated. The findings were consistent with the interpretation that generation of antibodies against sydnofen resulted in interference with endogenous neurochemical mechanisms in a time-related fashion corresponding to the immune response. These findings suggest a possible 'inverse' method for immune intervention in neurological processes by generation of antibodies against exogenous and endogenous neural factors. Figures 3; references 9: 5 Russian, 4 Western.

## Blood Peptide Patterns in Parkinsonism Patients Before and After Therapy

*917C0288C Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 13 Mar 89) pp 336-345*

[Article by O. N. Koreshonkov, A. V. Korolkov, O. A. Nikitin, M. N. Margulis and S. A. Dambinova, Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

UDC 612.822.1+616.858-008.6

[Abstract] A 1.5- to 2-fold increase was observed in the 300-2500 D peptide fraction of plasma in patients with

Parkinsonism after either electrostimulation or autohemotransfusion therapy, in comparison with plasma obtained before therapy and that derived from healthy donors. Studies on the effects of the 300-2500 D fractions on L[$^3$]-glutamate binding to rat cortical receptors and postmortem human cortical tissue showed that inhibition was less pronounced with the post-treatment fractions than with the control or pretreatment fractions. In addition, the post-treatment fraction were less effective in inducing depolarization of Planorbis corneus neurons than the control fractions. Finally, the post-treatment fractions had a marked anticataleptic effects in mice treated with haloperidol and alleviated the effects of reserpine. These observations suggest that both therapeutic modalities employed in the management of Parkinsonism enhance geenration of unique 300 t0 2500 D peptides that are responsible for clinical improvement via neurochemical mechanisms. Figures 6; tables 1; references 17: 13 Russian, 4 Western.

## Effects of Phospholipase $A_2$ and Central Asian Cobra Venom on Synaptosomal Muscarinic Receptors in Rat Brain

*917C0288D Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 13 Mar 89) pp 346-351*

[Article by G. N, Moskovkin, T. P. Kichikulova and B. N. Manukhin, Institute of Developmental Biology imeni N. K. Koltsov, USSR Academy of Sciences, Moscow]

UDC 612.822.1:615.214.2

[Abstract] Synaptosomal preparations derived from the brains of Wistar rats were employed in assessing the effects of neat Naja naja oxiana cobra venon and its phospholipase $A_2$ (PL) component on muscarinic receptors. Analysis of binding plots of the muscarinic receptor blocker [$^3$H]quinuclidinylbenzylate showed essentially parallel dose-dependent reduction in binding and $K_d$ values with the venom and PL. Evidently, PL is the major component responsible for the action of the cobra venom on muscarinic receptors. Figures 2; tables 1; references 10: 6 Russian, 4 Western.

## Neurochemical Correlates of Hippocampal Involvement in Conditioned Reflexes in Rats

*917C0288E Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 13 Apr 89) pp 352-357*

[Article by I. S. Chogovadze, G. D. Mikeladze, Institute of Physiology imeni I. S. Beritashvili, Georgian SSR Academy of Sciences, Tbilisi]

UDC 612.82.821.2

[Abstract] Conditioned avoidance reflex in 100-120 g male rats was used as a model system for studies on hippocampal neurochemical correlates of conditioned behavior. The results demonstrated that in conditioned animals hippocampal levels of GABA, dopamine and norepinephrine dropped significantly, while serotonin rose. Neuropeptide assays revealed significant reductions in the levels of beta-endorphin and substance P, and an increase in arg-vasopressin. In addition, ligand bindings studies demonstrated a marked decrease in muscarinic receptors and a sharp increase in dopamine and GABA receptors, while the concentrations of beta-adrenoreceptors remained unaltered. Finally, both cAMP-dependent and $Ca^{2+}$-calmodulin-dependent protein kinases showed significant elevations in activity. Accordingly, these findings demonstrated that establishment of a conditioned reflex was accompanied by activation of hippocampal dopamine-GABA-choline and peptiergic systems via interneurons projecting from the septal region. Figures 4; references 20: 5 Russian, 15 Western.

## Effects of Delta Sleep-Inducing Peptide on Cerebral and Hepatic Polyamine Levels in Normothermic and Hypothermic Rats

*917C0288F Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 19 Mar 89) pp 358-364*

[Article by T. I. Bondarenko, A. A. Krichevskaya and Ye. A. Chernogubov, Rostov State University]

UDC 612.821.7+557.15/17+612.8.015

[Abstract] Further studies were conducted on the role of the delta sleep-inducing protein (DSIP) in stress, using outbred 150-180 g males subjected to 0 - 2°C for three days as the experimental model. Studies on control animals demonstrated that 12 μg/kg of DSIP given i.p. led to statistically significant elevations of putrescine, spermidine and spermine in the brain after three days, but had no telling effect on polyamine levels in the liver. However, protein levels were significantly elevated in both organs after three days. The increase in protein levels in DSIP-pretreated animals after three days at 0 - 2°C was far less pronounced. In addition, whereas cold exposure resulted in significant depression of cerebral levels of putrescine, spermidine and spermine, pretreatment with DSIP prevented such changes and maintained the polyamines at control levels. Furthermore, cold was shown to induce significant elevations in hepatic polyamine levels; DSIP pretreatment abrogated such elevations in the case of putrescine and spermine, but led to a significant drop in hepatic spermidine. The results were interpreted to suggest that DSIP facilitated adaptation to cold largely by equilibrating metabolic processess. Tables 3; references 22: 10 Russian, 1 Czech, 11 Western.

## Cardioactive Substances in Bovine Adrenal Medulla

*917C0288G Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 19 Mar 89) pp 365-370*

[Article by Z. Kh. Paronyan, R. M. Srapionyan, S. S. Abramyan, L. A. Grigoryan and A. A. Galoyan, Institute of Biochemistry, Armenian SSR Academy of Sciences, Yerevan]

UDC 577.112

[Abstract] Cardioactive factors isolated from the bovine adrenal medulla were tested for the effects of various forms of physical treatment on their effects of rat brain cAMP phosphodiesterase and coronary vasodilation in cats. The results showed that six of the eight factors were completely inactivated by treatment with 6 N HCl or 1 N NaOH; factors $M3_1$ and $M4_1$ retained some activity. In addition, only factor $M3_1$ retained some biological activity after heat treatment at 90°C for various durations. Factors $M3_1$ and $M4_1$ displayed were resistant to inactivation by trypsin and chymotrypsin. In general, the data suggested that $M3_1$ is related to hypothalamic neurohormone C. In addition, the relative resistance of some factors to certain physical factors was attributed to glycosylation. Figures 3; references 8: 7 Russian, 1 Western.

## Effects of Microinjections of Amphetamine into Nucleus Accumbens and of Bicucullin into Substantia Nigra on Synaptic Discharge of Dopamine in Striatum

*917C0288H Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 10 Apr 89) pp 390-394*

[Article by N. B. Saulskaya, A. F. Yakimovskiy and I. V. Karpova, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

UDC 612.82:577.1

[Abstract] Release of dopamine into the extracellular space of the striatum in response to microinjections of amphetamine (0.5 μg) into the nuclus accumbens, bicucullin (0.2 μg) into the substantia nigra, or a combination of both, was assayed in 200-350 g male Wistar rats to assess the influence of n. accumbens on the striatum. The results demonstrated that microinjection of amphetamine into the n. accumbens reduced the dopamine level in the extracellular space of the striatum. Administration of bicucullin into the s. nigra led to elevation of dopamine levels, while injection of both agents gave results analogous to those obtained with injection of amphetamine alone. These observations demonstrated that GABA A-receptors in the medial region of the s. nigra are not involved in the mechanisns responsible for the regulatory effects of n. accumbens on the nigrostriatal dopaminergic system. Synaptic release of dopamine in the s. nigra evidently is controlled by NA, a mechanism that appears to predominate over GABA-dependent s. nigra control mechanisms. Figures 3; references 11: 2 Russian, 9 Western.

## Effects of Neuroactive 4-Phenylpyridine and 4,4'-Bipyridine Derivatives on Reverse Synaptosomal Uptake of Dopamine in Mouse Brain

*917C0288I Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 16 Dec 88) pp 395-399*

[Article by L. S. Solyakov, L. N. Petrova, V. V. Kalashnikov, S. Ye. Tkachenko and S. O. Bachurin, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka]

UDC 577.352.46

[Abstract] Since 1-methy-4-phenylpyridinium (I) has been shown to induce Parkinsonian symptomatology in mice and primates, an assessment was made of the neurochemical effects of structural analogs of I as potential environmental health hazards leading to Parkinsonism. The study involved the effects of N-substituted 4-phenylpyrdines (II) and 4,4'-dipyridyls (III) on reverse dopamine uptake in $P_2$ fractions of synaptosomal preparations derived from the brains of mice. Analysis of kinetic data demonstrated that every congener behaved as a reversible competitive inhibitor of dopamine uptake. Compound I was shown to be the most efficient inhibitor with a $K_i$ = ca. 0.37 mM, essentially equivalent to that of dopamine itself. In the case of series II compound inhibition was inversely related to lipophilicity. Low inhibitory activity of compounds III was due to lack of protonation of the pyridyl nitrogen atom at pH 7.4. Accordingly, inhibitory efficiency was shown to be related to the degree to which the II derivatives served as cyclic analogues of biogenic amines. Figures 1; tables 1; references 13: 1 Russian, 12 Western.

## Effects of Bicyclic Phosphorus Esters and Picrotoxin on GABA Binding

*917C0288J Yerevan NEYROKHIMIYA in Russian Vol 8 No 3, Jul-Sep 90 (manuscript received 1 Feb 88) pp 400-404*

[Article by G. Ya. Pervukhin, A. A. Maslov, V. B. Sokolov, V. I. Fetisov and I. V. Martynov, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

UDC 612.815.1.577.354

[Abstract] The fact that certain bicyclic phosphorus esters have been shown to behave as picrotoxin-like GABA antagonists and as Cl channel blockers has led to

analysis of additional congeners for similar effects. Accordingly, an analysis was conducted on the effect of 4-propyl-bicyclophosphate (PBCP) on GABA-dependent Cl permeability and interaction of binding sites for the PBCP-picrotoxin-[$^3$H]-GABA triad, using cerebral synaptosomal preparations derived from 200-250 g male Wistar rats. The results led to the interpretation that PCBP was a more efficient Cl channel blocker than picrotoxin and, consequently, a more potent convulsant. The results implied partial overlap of PCPB and picrotoxin binding sites and direct interaction of PCBP with the ionophoric domain. The data were consistent with dual allosteric effects in the triad, suggesting that BCBP and GABA interact via several domains including the specific binding site for picrotoxin. In addition, the PBCP binding site is positioned in a manner capable of exerting a direct effect on Cl channels. Figures 2; tables 1; figures 15: 3 Russian, 12 Western.

## Conditioned Feedback and Inhibitory Reorganization of Receptive Fields of Cortical Neurons as the Basis of Subconscious Alteration of Thresholds of Visual Recognition and Detection

*917C0295A Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOVA in Russian Vol 40 No 5, Sep-Oct 90 (manuscript received 28 Apr 90) pp 842-849*

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

UDC 612.821.6+612.822.3+612.825.54

[Abstract] Three sets of data are described and compared: a set pertaining to significant adaptive and adaptational modification of the receptive fields of the neurons of the visual cortex of cats immobilized with d-tubocurarine; a set pertaining to conditioned-reflex, selective subsensory alteration of the threshold of an individual's perception (detection and recognition) of a letter in relation to two control letters; and a set pertaining to the role of spatially specialized cortical inhibition in the formation both of adaptive modifications of receptive fields and of the detector properties of visual cortex neurons. The receptive fields of the neurons of the primary visual cortex in the cats were found to be highly adaptive. The researchers propose a hypothesis in which the adaptiveness is explained by the local inhibitory interneuron interactions that form the receptive fields and modify them in relation to the state of the visual system and the body as a whole. They identified subsensory, counter-phase changes in the thresholds of visual detection and recognition of the image of a letter after its conditioned-reflex reinforcement via tactile or aural stimulation. Figures 5; references 18: 10 Russian, 8 Western.

## Evoked Activity of the Brain in Hyperbaric Conditions

*917C0295B Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. F. PAVLOVA in Russian Vol 40 No 5, Sep-Oct 90 (manuscript received 16 Apr 90) pp 879-883*

[Article by I. Stoilova, Institute for the Study of the Brain, Bulgarian Academy of Sciences, Sofiya]

UDC 612.822.3

[Abstract] Long-term pressure-chamber tests involved 14 individuals subject to pressures of 11-46 atm. Three subjects remained at 11 atm for 8 days; three were kept at 21 atm or 15 days; six remained at 36 atm for 3 - 7 days, and two stayed at 46 atm for 3 days. Visually evoked potentials (VEP) produced by 0.3 J flashes (200 μsec, 1.5-3 sec apart) were recorded before the hyperbaric regime was effected, "on the ground", during decompression, and after the hyperbaric regime, with measurements taken mainly from the $O_1$, $O_2$, and $C_z$ regions. In the initial hyperbaric period, VEP amplitude generally declined and latent periods were extended, regardless of the magnitude of pressure. Time of onset of changes varied with the individual. Although changes varied with pressure, markedness of change was not found to be proportional to pressure. Initial changes gradually returned to baseline. "On the ground," however, potentials destabilized—component amplitudes increased, latent periods were again extended. The authors conclude that the changes they noted in the amplitude-time parameters of the evoked responses indicate a restructuring of the work of the functional brain systems that take part in generating responses to light stimuli. Figures 4; references 13: 3 Russian, 10 Western.

## Effect of Cholinergic Substances on Mechanisms of Visual Recognition in Monkeys

*917C0295C Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. F. PAVLOVA in Russian Vol 40 No 5, Sep-Oct 90 (manuscript received 12 Jul 89) pp 968-973*

[Article by K. N. Dudkin, V. K. Kruchinin, I. V. Chuyeva, O. F. Noskov, V. D. Tonkopiy, Institute of Physiology imeni I. P. Pavlova, USSR Academy of Sciences, Leningrad]

UDC 612.821.6+612.821.2

[Abstract] A comparative study was made of processes associated with visual recognition of black-and-white and color stimuli in six 2- to 6-year old macaque rhesus monkeys administered drugs that selectively affected the functional state of cholinergic structures of the brain, which have been shown to play a substantial role in learning, memory, and visual discrimination. The researchers found that central M-cholinolytics had no effect on the functional state of

cognitive structures responsible for visual recognition, even when administered in toxic doses. Thorazine, however, did disrupt visual discrimination (black-and-white at 5 mg/kg, and color at 7 mg/kg), which was thought to be due to its cholinolytic effect, as well as to its modulating effect on other mediator systems associated with that drug's antidepressive action. Galantamine, administered systemically in doses of 0.1-0.5 mg/kg, produced no effect, although it did restore visual discrimination lost from thorazine administration. References 18: 9 Russian, 9 Western.

## Work of Belorussian Radiation Medicine Institute Described

*917C0117A Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 9, Sep 90 pp 25-27*

[Interview with A. V. Matyukhin, director of the Radiation Medicine Scientific Research Institute about the current radiation situation in the republic: "Further Study and Comprehension Needed Following Chernobyl Nuclear Power Station Accident"]

UDC 615.2(476)

[Text] *"Vladimir Aleksandrovich, would you please tell us how the Radiation Medicine Institute came to be and what its tasks and plans for development are?*

The Belorussian Radiation Medicine Scientific Research Institute was founded May 1, 1988, on the basis of a resolution of the directive agencies and the Belorussian SSR Council of Ministers, dated March 5, 1988. The Department of Radiation Medicine of the Central Scientific Research Laboratory of the Minsk Medical Institute, the Laboratory of Radiation Hygiene and Chromosomal Aberrations, the Clinical Section of the Oncology and Medical Radiology Belorussian Scientific Research Institute, and the Belorussian Children's Specialized Clinic became the base for the institute. In January 1989, the clinic on the base of the former "Aksakovshchina" sanatorium of the Fourth Main Directorate of the Belorussian SSR Ministry of Public Health was transferred to the institute.

The institute is directed by the leading institution in the Belorussian SSR Ministry of Health system on problems in radiation medicine. The Belorussian SSR Council of Ministers has granted permission to build a complex for the institute in the village of Novinki. But for now it is situated on four bases (Prospekt Masherova, 23; Ul. Krasnoarmeyskaya, 15; Aksakovshchina, and Borovlyany), that are up to 50 km from one another, so there are difficulties with personnel, offices, equipment, and finances.

In October 1989, a branch of the institute was opened in Gomel, in February 1990 another was opened in Mogilev, and yet another branch opening is planned in Vitebsk.

In August 1989 the Board of the Belorussian SSR Ministry of Health outlined the basic fields of scientific research work for the institute:

—to study the distribution of radionuclides in food products and how they enter the body; to assess the actual and projected amounts of radiation the people in the republic are exposed to; and to develop measures to reduce these amounts;

—to comprehensively assess and predict the health status of the people in controlled rayons of the Belorussian SSR and to develop scientific bases of public health examinations and distribute a Register, as well as to develop techniques for diagnosing and correcting detected disturbances caused by radiation.

In addition to scientific research work, the institute performs a large amount of organizational and methodical, consulting, and practical work in controlled rayons. In 1989 alone 15 expeditions of institute colleagues were organized during which more than 10,000 people were examined. Those persons needing more thorough examination and treatment were sent to the institute clinic or profile clinics and institutes. More than 15,000 people were examined in the public health polyclinic section. At the institute clinic 2,570 patients, including 1,483 children, were examined and treated.

*What kind of equipment does the institute have?*

For today, medical practice and science would be incomprehensible without complex modern equipment. The institute has the minimum of modern diagnostic equipment (ultrasonic and endoscopic infrared imagers), electrodiagnostic equipment (human radiation counters for measuring the internal content of radionuclides), some laboratory equipment (radioimmune laboratory, biochemical analyzer for blood and urine, and $\alpha$- and $\gamma$-radiation spectrometers); and we have obtained an X-ray-fluorescent spectrometer for investigating microelements and a "Tekhnikon" blood analyzer. At the same time the institute and its branches are in acute need of ultrasound diagnostic equipment, endoscopes, a computer tomograph, mobile clinico-diagnostic and radiometric laboratories, and computers. We need reagents that are bought with hard currency.

I would like to take the opportunity to express my sincere thanks to the Belorussian Division of the Soviet Peace Fund for allocating 160,000 rubles to obtain this equipment.

*What is the subject of your investigations?*

The health status of the people in contaminated areas is the subject of our investigations. The biomedical sequelae of the accident at the Chernobyl Nuclear Power Station are being studied on the populational, individual, organic, cellular, molecular, and submolecular levels with the purpose of developing techniques for the early diagnosis and correction of possible disturbances.

*What effects do the radionuclides that have fallen out as a result of the Chernobyl accident have on the health of people and biological aspects of living organisms?*

Low doses of radiation have an effect on the victims of the Chernobyl accident. The biological effects of low doses have not been thoroughly studied. They have no specific signs, so it is difficult to determine their contribution to the general level of cancers and genetic disturbances by virtue of the low probability of manifestation of these problems. Moreover, in the contaminated territories, the effect of chemical factors released during the

accident also must be considered. The possible consequences of iodine radionuclide exposure on the thyroid gland in children are of special concern. This problem is being thoroughly studied at the institute in the endocrinology laboratory directed by Professor L. N. Astakhova. The material gathered demonstrated that an adverse tendency towards thyroid diseases arises when children are exposed to low doses of radiation and goitrogen concomitantly. Anemic syndrome in children is increasing. But this pathology is linked to a significant degree with nutritional disturbances or an unbalanced diet or one lacking in protein due to limited consumption of local produce, especially dairy products. The incidence of inflammatory diseases of the laryngeal-pharynx organs in children and hypertension and coronary disease in adults is increasing. All of the medical sequelae of the Chernobyl accident need further study and comprehension. It is still early to categorically confirm or deny anything.

*What is the probability of an increase in the number of cancers from radionuclide fallout subsequent to the explosion at present and in the future?*

The Belorussian Scientific Research Institute of Oncology and Medical Radiology is studying the questions of analyzing oncologic diseases in the republic. Morbidity in the republic as a whole in 1986 was 229.9 cases per 100,000 people and 247.2 cases per 100,000 in 1988. These numbers for the Gomel Oblast were 223.0 and 240.9, respectively, and 258.7 and 272.1 per 100,000 people for the Mogilev Oblast. Their growth rates are approximately identical. In some contaminated rayons the annual growth in morbidity was higher: 41 percent in Krasnopol, 40 percent in Vetkov, 31 percent in Slavgorod, while in Cherikov there was a 4 percent increase. These figures for Narovlyan and Checher were 6 percent and 1 percent, respectively. The growth rate in oncologic diseases cannot be unambiguously described in this case, either.

For the inhabitants of the rayons suffering from the Chernobyl accident, the elevation in the number of cases of terminal malignant tumors and leukemias, as predicted according to a "thresholdless" hypothesis, might be 0.04 percent and 0.1 percent, respectively, on a spontaneous level.

*Are there any other sources of irradiation for the Belorussian people in addition to the Chernobyl Nuclear Power Station?*

The Belorussian people are subjected to irradiation in the form of a natural radiation background and medical procedures. The total dose from these sources can reach 0.2-0.4 REM (roentgen equivalent man) per year.

*Do the consequences of atmospheric nuclear bomb explosions prior to 1963 have a direct bearing on Belorussia?*

As a result of atmospheric nuclear tests prior to 1963, Belorussia was subjected to radioactive contamination, as a result of which food products even prior to the Chernobyl accident contained the synthetic radionuclides cesium and strontium.

*How reliably buried are the radiation wastes, contaminated earth, and water used for radioactive decontamination of equipment, buildings, etc., during the cleanup of the accident?*

In order to dispose of the radioactive wastes that accumulated during radioactive decontamination, army subunits built special repositories. Permanent repositories are currently being built in the Gomel and Mogilev Oblasts that will reliably and safely store the wastes without harming the environment.

*Which radionuclides are most hazardous to the people of the republic and where are they most concentrated?*

Cesium-137, cesium-134, and strontium-90 to a lesser degree, are presently the main ingredients in the formation of external and internal irradiation doses. Radionuclides in food products, mainly milk products, are the source of internal irradiation.

*When will we have dosimeters and be able to freely buy them?*

The production of several thousand dosimeters for measuring the dose rate is planned for 1990. It should be noted that these dosimeters are not designed for radiometric control of food products.

*Is there any reason for people everywhere to fear for their safety, or do emotions contribute to this to a greater degree?*

It is completely natural for people to fear for their safety. The fear of nuclear weapons hung on the people for many years. So now even small but real doses or radiation have a negative bearing on the people. In connection with this, weighted information on the part of medical workers and complete openness in questions of the medical consequences of exposure to low doses of radiation on human health is extremely important.

*How do you feel about the resettlement of large numbers of people from the areas contaminated by radionuclides? Was this justified? At what degree of contamination must this be done?*

The resettlement of people from the territories contaminated by the radionuclides was justified. There was the possibility of doses accumulating for life which would exceed the maximum established by the Belorussian SSR Ministry of Public Health. In making this decision, they decided that the radiation factor must not limit the people in any way with respect to their lifestyle, work, rest, or eating conditions. If these conditions could not be met, then resettlement was discussed. However, it must be kept in mind that the process of resettlement and the period for adapting to a new residence are also accompanied by negative health effects.

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## Organization and Analysis of Operation of Day Hospitals

*917C0127A Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 1990 (manuscript received 18 Apr 90) pp 37-39*

[Article by N. I. Stepanenko, V. I. Zayats, and Yu. G. Zemko, Health Department of Vitebsk Oblast Executive Committee, Department of Social Hygiene and Health Care Organization of Vitebsk Medical Institute; first paragraph is author abstract]

UDC 614.2:616-08-039.57

[Text] *Abstract: This article examines the organization of day hospitals at treatment-and-prevention facilities. A study was made of the structure of morbidity and the efficacy of day hospitals at urban polyclinics as related to treatment outcomes. It was shown that 95.2 percent of the patients who complete treatment are recovered or improved upon discharge. Tables 3, references 1. Key words: day hospitals, effective form of operation.*

Improving the quality of medical care rendered to the public is of critical importance at the present stage of new economic conditions. In connection with that, new, more refined forms of medical service are needed.

The day hospital is one of the progressive organizational forms of active treatment of patients who, for a number of social reasons, cannot be hospitalized in ordinary hospitals.[1]

The purpose of this report is to study the operation of day hospitals and their efficacy at treatment-and-prevention facilities of this oblast over the past year.

The comprehensive, special-purpose oblast program Zdorovye [health] calls for the establishment of a broad network of day hospital facilities at city, rayon, and rural hospitals, at rural medical outpatient facilities, and at paramedic-obstetrics centers. A model of day hospitals was refined in Vitebsk at the Kalinin Polyclinic and at the Dokshitsy Central Rayon Polyclinic, and the experience gained in their operation has begun to be disseminated. Day hospitals are in operation in the polyclinics of 16 treatment-and-prevention facilities, with a total of 113 beds; last year, 3,588 patients were treated at those hospitals, including 374 children. There are five day-infirmaries at hospitals (1,270 patients were treated) and 12 home infirmaries in the oblast (1,021 patients were treated).

At the present time in Vitebsk, there are six day-hospitals, with a total of 69 beds. A total of 1,986 patients have been treated in those facilities since they opened. The largest day hospitals have been set up at the Kalinin polyclinic and the polyclinic No. 1 of Oktyabrskiy Rayon, and their operation is coordinated with departments of rehabilitation therapy.

It should be noted that all day hospitals operate mainly for a single shift, and their schedules are approximately the same: five days per week, from 9 am to 5 pm. However, there are differences both in forms and methods of day-hospital operation, and in structure of patient selection, equipment, and outfitting of facilities.

Such hospitals are allotted salaries for 2.5 physicians, 2.5 nurses and 2.0 nurse's aides. All of the physicians have long clinical tenure, and they are proficient in emergency care and resuscitation techniques. The hospitals are staffed and equipped without additional expenditures, as the polyclinic's personnel and equipment are used.

The therapeutic, diagnostic and rehabilitation measures used at day hospitals, as well as the indications and contraindications for admitting patients and the functions and duties of medical personnel have been developed were at the facilities.

Before being admitted to a day hospital, patients undergo a given number of tests (blood tests, chest x-rays, ECG, and others). Then the district internist sends the patient, along with the test results, to a commission headed by the deputy chief physician, or by a department head, for therapy. In turn, the commission, which is set up in every polyclinic, decides the questions of patient screening, additional tests, the possibility of the need for drug therapy or physiotherapy, therapeutic physical exercise, or transfer to a specialized hospital in the city. Specialists are consulted when necessary. A stay at the day hospital enables patients to undergo a course of treatment ahead of the population serviced by the polyclinic and without interrupting their customary social ties, thereby precluding the psychological trauma associated with admission to ordinary hospitals.

It has been established that, for the most part, those who are treated at day hospitals are individuals who have problems associated with internal medicine. They consist mainly of individuals with diseases of respiratory organs (acute bronchitis, exacerbation of chronic bronchitis, residual phenomena associated with acute pneumonia), grade I-II hypertensive disease, exacerbation of chronic gastritis, diseases of the kidneys and liver. It should be noted that, to some measure, surgical patients (with endarteritis obliterans, thrombophlebitis, varicose veins of lower extremities) make use of day hospitals, as do neurological patients (sequelae of cerebrocranial trauma, diseases of the peripheral nervous system).

We investigated the structure of morbidity and efficacy of treatment in that subunit.

Analysis of the structure of diseases for which patients were treated revealed the following. Of all patients who completed treatment, 39.3 percent had suffered from chronic, nonspecific lung disease; 25.5 percent, from vascular disease; 17.5 percent, from digestive organ disease; and 17.7 percent, from neurological and other diseases.

Investigation of morbidity in terms of individual nosological forms revealed that, among vascular diseases, endarteritis obliterans (30 percent of all patients with surgical pathology) and varicose veins of the lower extremities (20 percent) predominated. Predominant in

bronchopulmonary system pathology were acute pneumonia and chronic bronchitis (90 percent); radiculitis was predominant among the neurological cases, and chronic gastritis among cases of gastrointestinal tract disease. Other diseases included cirrhosis of the liver and chronic glomerulonephritis.

Consequently, the morbidity structure varied and, in our opinion, was largely determined by the specialty of the physician working at the day hospital.

We evaluated the efficacy of day hospitals as a function of outcome of patient treatment at each polyclinic individually and in the city as a whole.

**Table 1. Structure of Patients Who Had Completed Treatment at Polyclinic Day Hospitals**

| Nature of illness | Percentage |
|---|---|
| Cardiological | 52.5 |
| Pulmonological | 27.0 |
| Neurological and gastroenterological | 18.0 |
| Combined pathology | 2.5 |

**Table 2. Average Duration of Treatment in 1989**

| Disease | At polyclinic day hospitals, in days | At oblast hospitals, in days |
|---|---|---|
| Acute bronchitis | 10 | 14.0 |
| Chronic bronchitis | 10-11 | 16.3 |
| Hypertensive disease, grade II | 7-8 | 14.9 |
| Chronic ischemic heart disease | 9-10 | 17.1 |
| Peptic ulcer of stomach and duodenum | 12-13 | 18.1 |

As can be seen in Table 3, treatment resulted in considerable improvement in an average of 73.5 percent of the patients, and 21.7 percent made a complete recovery. At the same time, the condition of 4.1 percent of the patients remained unchanged. Worsening occurred in only 0.7 percent of the cases.

**Table 3. Results of Treatment (in percentage of number of patients who underwent treatment) at Day Hospitals in Vitebsk**

| Results | Polyclinic imeni Lenin | Polyclinic imeni Kalinin | Polyclinic No. 1 | VTZ [expansion unknown] polyclinic | Average for the city |
|---|---|---|---|---|---|
| Improvement | 65.3 | 83.9 | 80.0 | 64.7 | 73.5 |
| Recovery | 29.7 | 13.1 | 14.0 | 30.0 | 21.7 |
| No change | 3.1 | 2.5 | 6.0 | 5.0 | 4.1 |
| Worsening | 1.9 | 0.5 | — | 0.3 | 0.7 |

Further analysis of the performance of day hospitals revealed that duration of treatment per patient lasted an average of 11.5 days, reaching 15 days in a number of day hospitals.

It should be noted that that indicator is a function of diagnosis, the patient's age and efficacy of instituted treatment.

### Conclusions

1. Day hospitals are an economically advantageous and effective form of rendering medical care. They make it possible to augment availability of hospital care to the public; permit more efficient use of beds; enable the improvement of health of groups of patients who are sick often and for long periods of time, the disabled and the unemployed; and make it possible to effect medical, vocational and social rehabilitation.

2. Day hospitals at treatment-and-prevention facilities represent a promising direction in the search for new ways to further improve medical care of the public.

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1. Zagorodniy, V. V., Bodaretskiy G. M., Grigorenko, V. V., et al., "Organization of Day Hospitals at Polyclinics," SOV. ZDRAVOOKHR., 1989, No 12, pp 41-42.

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## Trade Unions Help Chernobyl

*917C0139A Moscow TRUD in Russian 20 Nov p 1*

[Article picked up from TASS; first paragraph is TRUD introduction]

[Text] More than 700,000 people affected by the accident at the Chernobyl Nuclear Electric Power Plant will undergo rehabilitation and treatment next year at trade-union convalescent centers in our country.

Expansion of help for Chernobyl victims is called for by a special program that was designed to cover the period 1990-1995 and was approved on 29 November [1990] by the presidium of the Council of the Universal Confederation of Trade Unions (VKP) of the USSR. Tied to a single national program, the document is aimed at providing normal living and working conditions and medical, community, trade and cultural services to victims of the nuclear accident.

The trade-union program calls for, in particular, the construction of at least 300 health-improvement centers (with accommodations for 500 people in each) for school children and their parents in ecologically clean regions of European USSR within the next two years.

It was decided to establish an All-Union fund of trade-union solidarity to care for children living near Chernobyl and other ecologically problematic areas.

## Funds for Leukemia Treatment

*917C0139B Moscow KOMSOMOLSKAYA PRAVDA in Russian 14 Nov 90 p 2*

[Article by O. Chegodayeva: "We Continue to Die of Leukemia: For Our Country, Treatment of the Disease Has Become a Serious Economic Problem"]

[Text] Only a few years ago, the diagnosis of acute leukemia sounded like a death sentence for our children, whereas in many foreign clinics, hematologists had achieved considerable success in the treatment of the disease. If 5 - 25 percent of the patients pulled through in the Soviet Union, the figure is as high as 80 percent in developed countries. Today, the situation has changed somewhat; however, patients' hopes are linked mainly to foreign medicine. Soviet medicine is able thus far to administer the necessary treatment to only 10 percent of all cases. What about the other 90 percent? Each of the 5,500 new patients who appear every year wants to avail himself of the chance to be cured. The reason that this can be done for only a few people is the high cost of the treatment. One day of treatment in our hospital costs 90-180 rubles. The course of treatment lasts two years. Our indigent health care sector does not have that kind of money. Of course, charitable funds are helpful, but still the problem of saving dying children remains largely a private, family problem.

Letters to the editor serve merely as a sad confirmation of the above. There is not enough money from charities for everyone. Treatment abroad costs $50,000-150,000, and bone marrow transplants cost $100,000-200,000. Thus far, two such operations have been performed successfully in the Soviet Union, but about 500 children need them. That is why parents of sick children have worn a path to funding organizations and enterprises and send desperate letters with requests to collect funds. And that even though it is obvious to every sensible person that it would be wiser to spend hard currency to train specialists abroad and to purchase needed products than to collect such currency all over the world for each child.

Hematologists need a well-outfitted center with its own equipment and broad foreign contacts. They need financial independence. We are encouraged by the fact that the same opinion is held at the USSR Ministry of Health. For example, as of next year, the government will finance every bone marrow transplant operation, i.e., it will allocate 90,000 rubles per child. Transplant departments are being organized in Moscow, Leningrad, Kirovo, Novosibirsk, Krasnoyarsk, Barnaul, Kiev, Kharkov, Gomel and Minsk. As early as late November or early December, there will be a founding congress for a new international association, "World Hematologists for Children". Its objective will be to collect funds and use them to save the lives of children. The cash will be used both for foreign treatment and for development of our own base. The founders of the association will be the Soviet Cultural Fund, Chernobyl Aid Fund, Soviet Peace Fund, Union of Lease-Holders and Entrepreneurs, Soviet Radio, the Orthodox Church, and many international charitable funds, such as World Physicians. Distribution of funds will be controlled by the Founders' Council. All of the activities of association members will be carried out, unlike many of our funds, on a charitable basis, without remuneration.

The first contributions to this noble cause have already been made, but the status of the new association has not yet been officially confirmed. We must hurry. The forecast of physicians is that starting in 1990, an increase is expected in number of leukemia cases in zones affected by radiation. Our children cannot wait. We are appealing to the Supreme Soviet of the USSR not to allow this plan to be left only as a plan. For all those who need help, as well as those who would like to support the World Hematologists for Children Association, the address is: 117513, Moscow, Leninskiy Prospekt 113, Republic Pediatric Hospital, World Hematologists for Children Association; phone: 434-81-41.

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