

JPRS 70257

1 December 1977

U S S R

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS  
BIOMEDICAL AND BEHAVIORAL SCIENCES  
No. 82

EAST  
EUROPE

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<b>BIBLIOGRAPHIC DATA SHEET</b>	1. Report No. JPRS 70257	2.	3. Recipient's Accession No.																
4. Title and Subtitle USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - BIOMEDICAL AND BEHAVIORAL SCIENCES, No. 82		5. Report Date 1 December 1977																	
		6.																	
7. Author(s)		8. Performing Organization Rept. No.																	
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201		10. Project/Task/Work Unit No.																	
		11. Contract/Grant No.																	
12. Sponsoring Organization Name and Address		13. Type of Report & Period Covered																	
		14.																	
15. Supplementary Notes																			
16. Abstracts  The report contains abstracts and news items on aerospace medicine, agrotechnology, bionics and bioacoustics, biochemistry, biophysics, environmental and ecological problems, food technology, microbiology, epidemiology and immunology, marine biology, military medicine, physiology, public health, toxicology, radiobiology, veterinary medicine, behavioral science, human engineering, psychology, psychiatry and related fields.																			
17. Key Words and Document Analysis. 17a. Descriptors																			
<table border="0"> <tr> <td>USSR</td> <td>Medicine</td> </tr> <tr> <td>Aerospace Medicine</td> <td>Microbiology</td> </tr> <tr> <td>Agrotechnology</td> <td>Physiology</td> </tr> <tr> <td>Biology</td> <td>Psychology/Psychiatry</td> </tr> <tr> <td>Botany</td> <td>Public Health</td> </tr> <tr> <td>Epidemiology/Immunology</td> <td>Radiobiology</td> </tr> <tr> <td>Human Engineering</td> <td>Toxicology</td> </tr> <tr> <td>Marine Biology</td> <td>Veterinary Medicine</td> </tr> </table>				USSR	Medicine	Aerospace Medicine	Microbiology	Agrotechnology	Physiology	Biology	Psychology/Psychiatry	Botany	Public Health	Epidemiology/Immunology	Radiobiology	Human Engineering	Toxicology	Marine Biology	Veterinary Medicine
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Botany	Public Health																		
Epidemiology/Immunology	Radiobiology																		
Human Engineering	Toxicology																		
Marine Biology	Veterinary Medicine																		
17b. Identifiers/Open-Ended Terms																			
17c. COSATI Field/Group 2, 5E, 5J, 6, 8A																			
18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22151		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 49																
		20. Security Class (This Page) UNCLASSIFIED	22. Price PCA03																

JPRS 70257

1 December 1977

## USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

### BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 82

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

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USSR

USE OF  $^{15}\text{N}$  IN AGROCHEMICAL STUDIES

Moscow IZOTOPY V SSSR in Russian No 47, 1976 pp 36-40

BORISOVA, N. I., All-Union Scientific Research Institute for Fertilizers and Agricultural Soil Science, Moscow

[Abstract] The isotope method is the only one which allows direct tracing of transformations of nitrogen fertilizers in the soil and plants when soil nitrogen is present. It was the first to allow determination of quantitative characteristics of individual processes of transformation of the nitrogen of fertilizers in the soil-plant system under field conditions. This article presents a review of the literature on the subject, including a count of the number of publications on the subject in the USSR between 1952 and 1974, a review of articles on assimilation of nitrogen of mineral fertilizers by various agricultural crops, assimilation of nitrogen in various forms of fertilizers by plants, losses of nitrogen from fertilizers from the soil as a result of denitrification and washing away of nitrogen by precipitation. The expanding application of nitrogen fertilizers makes the problem of development of more effective methods of their application a serious one. The use of the isotope method will therefore be particularly necessary for the development of more reliable methods of application of fertilizers, as well as the search for forms of fertilizers which are converted to a condition capable of being taken up by the plants as they are actually needed by the plants. Tables 5; references: 21 Russian.

USSR

UDC 634.0.863:658.382.3

OUR EXPERIENCE IN TEACHING SAFETY TECHNIQUES

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5, 1977 p 23

LIBZON, A. A., and POPOV, V. S., engineers, Boksitogorsk Biochemical Plant

[Abstract] At the Boksitogorsk Biochemical Plant, new workers are assigned to the shift chief or an experienced engineering and technical workers, who is responsible for instructing the new workers in safe working techniques, familiarizing them with the production technology and equipment, and observing their work to be sure they follow the safety rules. In addition, new workers are given special safety training at two-day theoretical training sessions held at the end of each month by the shop chiefs and safety office. New workers are allowed to work independently only after they have completed the two-day theoretical training course.

USSR

UDC 616-006.6-092-084:612.015

BIOCHEMICAL APPROACHES TO PROPHYLAXIS OF CARCINOGENESIS

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 91-98

RUBENCHIK, B. L., doctor of biological sciences; Laboratory of Carcinogenic Factors, Kiev Institute of Nutritional Hygiene, Ministry of Health Ukrainian SSR

[Abstract] This paper is a survey of recent research in the field of the biochemistry of carcinogenesis. Some 25 research projects conducted in the period 1964-1974 are summarized (19 of these by Soviet scientists). These studies centered around the following main themes: 1) The use of biochemical tissue changes during the early period of carcinogenesis as a basis for estimating the potential blastomogenic capacity of particular substances; 2) the use of data on the metabolism of known carcinogens; 3) biochemical approaches to anticarcinogenesis; 4) the anticarcinogenic effect associated with changes in the activity of microsomal enzymes; 5) the protective effect of "nucleophilic" compounds during carcinogenesis;

6) the action of antioxidants; 7) the effect of sulfur-containing compounds; 8) the chemical suppression of endogenous synthesis of carcinogens within the body; and 9) the possible transfer to the human situation of results obtained in animal experimentation. References 39: 19 Russian, 20 Western.

USSR

UDC 577 150.3+612.315.1

MECHANISM OF THE GENERAL STIMULATORY ACTION OF LASER RADIATION

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 21, No 8, Aug 77 signed to press 24 Jan 77 pp 759-762

BOGUSH, N. A., MOSTOVNIKOV, V. A., MOKHOREVA, S. I., PIKULEV, A. T., RUBINOV, A. N., and KHOKHLOV, I. V., Institute of Physics, Academy of Sciences BSSR; Belorussian State University imeni V. I. Lenin

[Abstract] The authors have studied the effect of high and low intensity laser radiation in a wide spectrum range on the activity of a number of bioenergy enzymes in vivo and in vitro. Wistar rats were irradiated in the head and chest region; tissue homogenates were irradiated in glass cuvettes. Continuous lasers used were helium-neon LG-75 (632.8 nm, output power  $W=20$  mw) and LG-56 (632.8 nm, 2 mw), helium-cadmium LG-31 (442 nm, 10 mw), carbon dioxide LG-31 (10600 nm, 2 w); pulsed laser used was a ruby laser (694 nm; pulse energy  $E_i = 3J$ , pulse length,  $\tau = 3 \times 10^{-8}s$ ). In vitro tests showed that radiation of tissue homogenates with a ruby laser in a monopulse mode with total energy of 30 J lowered the activity of alpha-ketoglutarate dehydrogenase, in brain homogenates, up to 78%, and cardiac muscle homogenates, up to 8%. A small, but reliable decrease in succinate-dehydrogenase of brain and heart was also seen. Continuous laser radiation produced analogous results. In vivo radiation induced changes in the enzyme activity in the organs close to the site of the radiation, and in organs remote from the immediate site of action. The authors suggest existence of a mechanism in the rat body for transmission of information, from the body surface to the internal organs of the rat, concerning the energy and spectrum characteristics of the irradiation. Figures 2; Tables 2; References 14: 9 Russian, 5 Western.



USSR

INVESTIGATION OF TORSION MOVEMENT IN THE HUMAN EYE: III: THE RAPID TORSION PHASE

Moscow BIOFIZIKA in Russian No 4, 1977 signed to press 27 Apr 76 pp 701-705

GALOYAN, V. R., ZENKIN, G. M., and PETROV, A. P., Institute for Problems of Information Transmission, Academy of Sciences USSR, Moscow

[Abstract] The study measured quantitative kinematic features of torsion shifts to understand their function and to seek possible ways of mechanical control over them. Records were made on light-sensitive paper moving at 1 m/s speed in order to observe dynamic eye movements as the subject was shown spots of light. Results indicated that the maximum speed of the shifting torsion movement depended on the amplitude of the light. Increasing speed of deflection reduced the intervals between torsion shifts, to a minimum between 20 and 30 ms. Torsion shifts were shown to be involuntary reflex movements that provided rapid changes in the orientation of the meridian of the retina. Similarities were observed between torsional movements and rotatory nystagmus. Figures 4; References 11: 6 Russian, 5 English, English summary.

USSR

PHARMACEUTICAL SUBSTANCES AS MODIFIERS OF PERMEABILITY OF BILAYER LIPID MEMBRANES

Moscow BIOFIZIKA in Russian No 4, 1977 signed to press 12 Oct 76 pp 723-725

KATZ, M. M. and NIZHNIY, S. V., Scientific Research Institute for Biological Tests of Chemical Compounds, Kupavna (Moscow Oblast)

[Abstract] To test the feasibility of predicting the biological effects of chemical substances a reverse screening process was used involving a variety of anesthetics, antibiotics and other medications. The membranes were formed of a 2:1 phosphatidilcholin-cholesterin solution in *n*-decane, with permittivity of  $1.5 \cdot 10^{-9} \text{ om}^{-1} \cdot \text{cm}^{-2}$ . About 10 percent of the tested substances modified the permeability of the bilayer lipid membranes, but only analgesics and antihistamines increased permeability by a full order of magnitude or more. Table 1; References 13: 8 Russian, 5 English.

USSR

REDUCTION OF ELECTRICAL STABILITY OF LIPID MEMBRANES UNDER THE EFFECTS OF  
ULTRAVIOLET IRRADIATION

Moscow BIOFIZIKA in Russian No 4, 1977 signed to press 9 Nov 76 pp 725-727

PUTVINSKIY, A. V., Second Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Effects of ultraviolet irradiation were measured on bilayer lipid membranes formed from summary grouping of mitochondria lipids, using n-heptane for the solution. As irradiation was conducted current drop was measured on a Soviet ED-05-M electrometer. Results indicated that ultraviolet irradiation caused an irreversible reduction of the electrical stability of the lipid membrane, apparently caused by peroxide photooxidation of unsaturated fatty acids. When argon was used to replace normal air in the test chamber the effects of irradiation were reduced. Both ultraviolet effects and increased electrical field activity contributed to raising the membrane's conductivity. Figures 2; References 5: 4 Russian, 1 English, English summary.

USSR

UDC 576.85

SOME RESULTS AND PROSPECTS OF SCIENTIFIC STUDY ON THE ECOLOGY OF VIRUSES  
IN AZERBAIDZHAN

Baku DOKLADY AKADEMII NAUK AZERBAIDZHANSKOY SSR in Russian Vol 33, No 5,  
1977 signed to press 23 Jul 76 pp 62-67

AKHUNDOV, V. YU., academician, Academy of Sciences AzerSSR

[Abstract] Study of the ecology of various viruses (influenza, arboviruses, and viral rickettsioses) is very important in this republic because the existing variegated climatic, geographic, and zoobotanical conditions have created natural foci of viral agents and vectors. There are almost 40 species of rickettsial-harboring ticks. Over ten transmissible viruses have been newly identified in the republic (e.g., Baku, sindbis, West Nile, Uukuniemi, Takhina, tick encephalitis, Crimean hemorrhagic fever, Bkhandzha, Dkhori, Caspii, Kzyl-Agadzha). Infectious agents of Q-fever, tick typhus, and tsutsugamushi fever have also been identified. Ornithosis infection is found throughout the republic. The author cites current research on the role of chlamidii in the origin of various pathological changes in the musculoskeletal apparatus, the urogenital system, and in pregnancy.

USSR

UDC 676:628.3

REDUCTION IN THE POLLUTION AND VOLUME OF SEWAGE GENERATED BY WOOD CHEMICAL  
PROCESSES AT THE SOLOMBAL'SKIY COMBINE

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5,  
1977 pp 8-9

MALISOV, B. M., junior scientist, and GALYANOVA, N. V., senior laboratory  
worker, Central Scientific Research Institute for the Wood Chemistry  
Industry

[Abstract] After analyzing the results of an examination of the industrial waste formed in the plant sections decomposing sulfate soap and fractionally distilling tall oil, the authors made recommendations intended to reduce the quantity and level of pollution of waste water generated by the plant. It was suggested that lignin substances be burned together with dense black

alkali in soda regenerating boilers, while the acid water be fed after separation of the lignin substances to the section for washing of sulfate soap or be used to prepare sulfuric acid. This reduces the waste water discharged by the plant by 98%, including 99.8% of the organic matter contained in the water. An additional 224,000 rubles per year income is also produced (based on a savings of fuel oil and sodium sulfate per ton of cellulose produced). Tables 2.

USSR

UDC 616.915-036.21:616.915-085.371-039-17

BASIC REGULARITIES OF THE EPIDEMIC PROCESS OF MEASLES UNDER CIRCUMSTANCES  
OF MASS IMMUNIZATION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, 1977 signed to press 2 Nov 76 pp 62-67

KOZLOVA, N. A. and SOBOLEVSKAYA, A. A., Leningrad Institute of  
Epidemiology and Microbiology imeni Pasteur; Leningrad City Sanitary  
Epidemiological Station

[Abstract] Since immunization became commonplace in the 1960s, measles has become less commonplace in Leningrad, but occasional outbreaks have occurred and the present study sought to determine reasons for the failure of the immunization to prevent infections, which could be traced to places where children were found in numbers, for example, day care centers, kindergartens and schools. Records were kept for 144 children's institutions in the years 1972-1975, in seeking to determine the onset of immunity as well as its duration. Results indicated that only sporadic outbreaks of measles occurred in the test periods and both children and adults were stricken. No relationship was established between the time of immunization and catching the disease. The change from production of live measles vaccine to use of a new tissue culture in 1971 was followed by an outbreak. Individual series of immunizations produced in 1963-1969 were apparently ineffective due to lack of standardization. Figure 1; Tables 4; References 9: 7 Russian, 2 English, English summary.

## EFFECT OF LOW-TEMPERATURE PRESERVATION ON CERTAIN FEATURES OF ANTITOXIC TETANUS SERUM

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, 1977 signed to press 13 Jul 76 pp 71-75

TSUTSAYEVA, A. A., MARKOVA, V. M., MEDVEDEVA, G. G., MIKULINSKIY, YU. YE.,  
MARKOVA, L. A., ROZANOV, L. F., and PETRENKO, M. D., Institute for Problems  
of Cryobiology and Cryomedicine, Academy of Sciences Ukrainian SSR,  
Khar'kov; Plant for Bacterial Preparations of the Khar'kov Scientific  
Research Institute of Microbiology, Vaccines and Serums imeni Mechnikov

[Abstract] Previous studies have shown that moderately low temperatures do not preserve properties of proteins for long periods. The present study investigated the effects of liquid nitrogen and cryophylaxis on the specific activity of immune antitoxic antitetanus sera. The cryophilactic agent was polyethylenoxide with a specific molecular weight of 400. The low-temperature effect was measured in terms of preservation of antitoxin titration in white mice weighing 16 g. The antigen spectrum, pyrogenic quality, and other properties were also measured for serums no longer being preserved. Results indicated that antibody titers protected by polyethylenoxide were not changed by freezing. After two years storage at  $-196^{\circ}\text{C}$  with and without the cryophilactic the serum was apyrogenic, and it also remained sterile. Figures 3; Table 1; References 13: 8 Russian, 5 English, English summary.

USSR

UDC 576.8.095

## OXIDATION OF 2-METHYLNAPHTHALENE WITH CANDIDA YEAST

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 33, No 4,  
1977 signed to press 22 Nov 76 pp 68-70

IZMAILOV, N. M., Sector of Microbiology (AS AzerSSR)

[Abstract] The author has found that a strain of *C. guilliermondii*, using  $n\text{-C}_{16}$  as a growth substrate, transforms 2-methyl-naphthalene (2-MN) into 2-naphthoic acid (2-NA). Dicyclic aromatic hydrocarbons, in comparison with mononuclear aromatic hydrocarbons, lower the specific rate of growth of the yeast on  $n\text{-hexadecane}$ . Glucose, used as the sole carbon source completely represses the enzymes which oxidize 2-MN to 2-NA, and decreases the activity of these enzymes when added to a culture growing on  $n\text{-C}_{16}$ . In contrast to the intact cells, washed cells of *C. guilliermondii*, preliminarily-grown on must-agar or  $n\text{-C}_{16}$ , transform 2 methyl-naphthalene (2-MN) into salicylic acid (SA); the intermediate product is 2-naphthoic acid. Addition of a yeast extract to the washed cells significantly increases the yield of SA. The author studied the effect of addition of various sugars on accumulation of SA by the washed cells; the greatest yield occurred with addition of glucose. The sugars used could be placed into three groups on the basis of their effect: the first group, producing a high yield of SA, included glucose, lactose, maltose, xylose and saccharose; the second, producing a low yield of SA included arabinose, sorbitol, rhamnose, and inositol); the third group inhibited hydroxylation of the  $\text{CH}_3$  group of 2-MN (this group included galactose). The yeast does not use 2-MN, naphthoic acid, SA, pyro-catechol, or muconic acid as a growth substrate, but can metabolize them. Nine variants of *Candida* accumulated SA, hence are able to break down the naphthalene nucleus. Two, *C. glaussenii*, and *C. pulcherrima*, cannot break down the nucleus, but can hydroxylize the  $\text{CH}_3$  group. The author concluded that oxygenase oxidation of alkylaromatic hydrocarbons is a specific property of various *Candida* yeasts. Reference: 1 Russian.

USSR

UDC 628.35:634.0.863.5.002

# PURIFICATION OF SPENT FERMENTATION MASH WITH MOLD FUNGI

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5, 1977 p 4

ZHAROVA, T. V., candidate of biological sciences, All-Union Scientific Research Institute for Hydrolysis, ZYRYANOVA, A. G., head chemist, and NOVOSELOVA, N. I., (deceased) Yangiyul'skiy Biochemical Plant

[Abstract] Purification of spent fermentation mash by mold fungi has been in the testing stage at the Yangiyul'skiy Biochemical Plant since 1976. After a separator and from the lower drain of two inoculators, spent fermentation mash (SFM) is sent to a collector, from which it is sent to the apparatus for biological purification by means of fungi. The purification apparatus contains the fungus *Spicaria* sp. The results of purification of the SFM in airlift apparatus 320 m<sup>3</sup> in volume operating with a load of 25-40 m<sup>3</sup>/hr SFM, so that the mash was 2.5-3 hours in the apparatus with a concentration of fungus of 2.8-4.6 g/l in the aeration zone (absolute dry mass), indicated that the level of purification was 53.7-60%, judged from BOD. Variations in pH of the medium between 3.1 and 5.0 and of temperature between room temperature and 41-42 C did not reduce the quality of purification, which at times was as high as 79% reduction in organic matter pollution. Tables 2.

USSR

UDC 634.0.866/.867.004.68

# SAVE MATERIAL RESOURCES!

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5, 1977 pp 19-20

SEMENOVYKH, YA. N. and ZAKHAROV, G. I., engineers, Meyvo-Rudyanskiy Wood Chemical Plant

[Abstract] The workers of the Neyvo-Rudyanskiy Wood Chemical Plant have been active in the All-Union public inspection of the effectiveness of utilization of raw materials, fuel and energy resources under the auspices of the All-Union Council of Trade Unions, Komsomol, and State Committees of the Council of Ministers, USSR for Material and Technical Supply. This



article describes the ways in which the workers at the plant have saved raw materials. The suggestions have included: development of a chamber for heating of pine resin, which has reduced the consumption of steam, mechanized transportation of resin, lengthened the service life of containers, and decreased losses of raw materials; reconstruction of a settling system for turpentine; introduction of washing of turpentine with florentine water in a continuous cycle; improving the lighting system in the combine, which has saved 29,000 kW·hr of electric power per year; and dilution of concentrated alkali with water in the mixer before neutralization of ethers, saving 3.3 tons of turpentine oil each year.

USSR

UDC 634.0.863.5:663.14.039.3

#### KERATIN HYDROLYSATES AS NUTRIENT YEAST FEED GROWTH STIMULATORS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5, 1977 pp 10-11

SHCHERBAKOV, A. A., candidate of chemical sciences, L'vov Polytechnical Institute, KRAYEV, L. N., candidate of technical sciences, KALYUZHNYI, M.YA., doctor of biological sciences, and TARASYUK, D. D., biochemist All-Union Scientific Research Institute for Hydrolysis

[Abstract] This article presents the results of a study of the stimulating effect of keratin hydrolysate on the growth of feed yeasts. This hydrolysate is easily obtained by alkaline hydrolysis of the wastes of meat combines with 13% KOH at elevated temperature, followed by neutralization with phosphoric acid. The influence of the addition of keratin hydrolysate in various concentrations on the accumulation of biomass of the yeast was studied. It was found that keratin hydrolysate stimulates the accumulation of biomass and protein in the yeast when cultivated on a synthetic medium and also on the wood hydrolysates used at the plant. When the transition is made from periodic to continuous cultivation, the optimal stimulator dose is increased from 1 to 2 g/l. Tables 3; References: 2 Russian.

USSR

UDC [676+634.0.866/.867].002.63

REPORTING FROM THE CENTRAL SCIENTIFIC RESEARCH INSTITUTE FOR ECONOMY AND  
LABOR IN THE PAPER INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 5,  
1977 p 29

UNSIGNED (address of Institute: 103012, Moscow, B. Chevkasskiy Per., d 8/6)

[Abstract] The institute mentioned in the title is new, the head institute working on problems of economics and labor, automation of control, scientific and technical information support for the ministry, enterprises and organizations of the cellulose-paper and wood chemical industry. The main areas of operation of the institute include economic research and analysis, creation and introduction of automated management systems and analysis of research on the economics and automation of control and organization of labor, performed both in the Soviet Union and abroad, and the preparation of recommendations for application of the results of these investigations. The institute can perform work on contract with unions and enterprises in the branch and is preparing to publish an annual collection of its scientific work.

USSR

UDC 575.24:576.851.5.095.383:547.96

COMPARATIVE STUDY OF MULTIPLE EXOENZYME FORMS PRODUCED BY MUTANTS OF  
BACILLUS SUBTILIS

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
30 Nov 76 pp 539-546

STRONGIN, A. YA., LUKIN, A. A., IZOTOVA, L. S., ABRAMOV, Z. T.,  
YERMAKOVA, L. M. and STEPANOV, V. M., All-Union Scientific Research  
Institute of Genetics and Selection of Industrial Microorganisms

[Abstract] The molecular forms of subtilisin and alpha-amylase were studied in Bacillus subtilis mutants R,S, P, Pl, P2 and M, which differ in colony type. The R mutants were usually the most active enzyme producers, as determined by the hydrolysis of n-nitroanilide carbobenzoxy-L-alanyl-L-alanyl-L-leucine and amylopectin. Disk polyacrylamide gel electrophoresis revealed significant differences in exocellular proteins of the mutants.

This is due to changes in the cell surface and its associated enzymes which participate in the posttranslational modification of exocellular proteins. Further study of subtilisin by disk electrophoresis and sephadex gel filtration showed that P and M mutants produce an additional subtilisin form with a high molecular weight, on the order of up to 40,000 and low electrophoretic mobility. Other mutants produced this form and only the one of the three usual forms with the lowest mobility. No R type produced the abnormal subtilisin, which was highly hydrophobic and may be a pure translation product or a normally membrane-bound precursor. Streptomycin-independent mutants of R type produced a fourth form of intermediate size, and M mutants produced only two. The data indicate decreased posttranslational modification in the P and M types. Isoelectric focusing in the gel showed that R mutants produce two major amylase forms and one minor form, while P and M types give three forms with higher isoelectric points and with varying ratios between the forms. The presence of altered amylase correlated with the presence of high molecular weight subtilisin or decreased posttranslational modification, except for one mutant which had lost spore-forming ability. Figures 4; Tables 2; References 18: 9 Russian, 9 Western.

USSR

UDC 578.086:582.282.1.123.4.094:577.156

COMPARATIVE CYTO-MORPHOLOGICAL INVESTIGATION OF ASPERGILLUS TERRICOLA STRAINS DURING THE BIOSYNTHESIS OF PROTEOLYTIC ENZYMES

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press 25 Nov 76 pp 529-538

USENKO, L. I., ARAVINA, L. A., KASATKINA, I. D., GREKOVA, V. K., and TERESHIN, I. M., All-Union Scientific Research Technological Institute of Antibiotics and Medical-Purpose Enzymes

[Abstract] Comparative microscopic study of the dynamics of mycelial development in strains 5, n-20 and 208 of *Aspergillus terricola*, during proteolytic enzyme synthesis, was conducted. The first twelve hours of growth correspond to germination and formation of rudimentary colonies, with multiple interwoven young hyphae followed by subsequent diffuse, filar mycelial growth characteristic of strain 208, dense ball colonies characteristic of strain 5 and both found equally in N-20. Neutral red staining volutin granules were observed in embryonic tubes and maternal conidia. From 12 to 36 hours, during intensive young culture growth, branching,

vacuolization, conidial formation, and polymorphism were seen. Maximal development of orthochromatic toluidine blue staining cytoplasm was found at 18 hours. Maturation of the first generation mycelia and initial growth of second generation were seen at 36-60 hours. Sporulation was earliest and most abundant in strain 5 and most meager and latest in 208. Subsurface conidial germination, atrophy of individual cells, and hyphal autolysis were found. Mature cultures from 60 to 96 hours had diffuse mycelia, a decreased number of subsurface conidia, and differentiated hyphae, with large alveolar cytoplasm cells in the central stem and small, monovacuole cells in the lateral branches. Strain 208 was the most differentiated. Broad contact between the mycelium and the surface of the medium facilitated maximal enzyme synthesis. Destructive cell changes and partial culture autolysis were observed from 96 to 168 hours. Rapid cytolysis was characteristic of the monovacuole cells, while slow lysis was seen in stem cells. Figures 7; Tables 1; References: 8 Russian

USSR

UDC 582.282.123.4.095:577.154+577.156

EFFECT OF INOCULATION MATERIAL ON THE BIOSYNTHESIS OF PROTEOLYTIC AND AMYLOLYTIC ENZYMES BY *ASPERGILLUS TERRICOLA*

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press 4 Sep 76 pp 472-476

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[Abstract] The effect of inoculation material on the biosynthesis of proteolytic and amylolytic enzymes by *Aspergillus terricola* N-20 was studied using solid millet or oatmeal flake inoculum substrate. Single shaking 2-3 days after inoculation facilitated conidial formation, while multiple shakings partially disrupted the developing mycelia, so that conidia could not form. The quantity of conidia did not differ for the two substrates. However inoculum prepared on millet gave cultures with 1.5-2.0 times more amylolytic activity, while the highest proteolytic activity was obtained from inoculum prepared on oatmeal flakes and shaken once. In studying this last case further it was determined that conidial viability was maximal on the sixth day of growth, possibly due to germination after this point. Proteolytic activity was constant from day 3 to 8 and decreased by 18-20% from days 10-15. Amylolytic activity reached a maximum on days 6-8.

Biomass accumulation and proteolytic activity were constant for inoculi of  $10^6$  and  $10^9$  conidia/ml, indicating media nutritional limitation, while amylolytic activity increased. However, proteolytic enzyme synthesis increased on increasing the inoculum from  $2.0 \times 10^6$  to  $12 \times 10^6$  conidia/ml. Storing conidia in physiological solution at  $4^\circ$  for 10 days did not affect germinating capacity, but decreased enzyme synthesis. Proteolytic activity decreased 25-30% after 10 days, while amylolytic activity decreased by 20% after 2 days and 70% after 10 days. Figures 2; Tables 4; References 7: 4 Russian, 3 Western.

USSR

UDC 582.282.23.094.095

CERTAIN PROPERTIES OF THE EXTRACELLULAR VESICLES OF *CANDIDA TROPICALIS*  
CULTIVATED ON N-ALKANES

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
13 Aug 76 pp 467-470

CHIGALEYCHIK, A. G., BELOVA, L. A., GRISHCHENKO, V. M., and RYLKIN, S. S.,  
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Sciences USSR

[Abstract] The isolation of the extracellular vesicles produced by *Candida tropicalis* IBFM-303 when growing on n-alkanes from the culture medium and their chemical content and physiological activity were studied. The medium contained 2%  $C_{12}$  to  $C_{26}$  alkanes which increased by 10% with growth. Vesicles were isolated by centrifugation at 165000 g for 1 hour, after cells and hydrocarbons had been removed at 6000 g. Electron microscopy revealed the vesicles to be a fine-grained matrix surrounded by a monolayer membrane. They had a high lipid content with protein and ash elements also present. Vesicle histidine and arginine content were much lower than in the yeast cells, while threonine, serine and alanine were higher. TLC showed that the quantitative phospholipid content of vesicle and cell were different though the same fractions were seen in both. Polyglycerophosphate was 49.3% of total vesicle phospholipid but only 19% of that in the cell. Vesicular lipids had a much higher degree of unsaturation. Introduction of vesicles or the lipids into a *C. tropicalis* culture strongly inhibited cell growth. The lipids were also bactericidal against *E. coli* and *Proteus vulgaris*. The vesicles appear to fill a biological function in the cell,

perhaps as a repressor or depressor of enzyme reactions, participants in physico-chemical processes, or metabolic by-products. Figures 1; Tables 4; References 12: 5 Russian, 7 Western.

USSR

UDC 582.282.23.095.4

CERTAIN GROWTH INDICES OF CANDIDA UTILIS CHEMOSTAT CULTURE AT OPTIMUM AND SUBMAXIMAL TEMPERATURES

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
8 Jul 76 pp 461-466

POZMOGOVA, I. N., and SHUL'GOVSKAYA, YE. M., Institute of Microbiology,  
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[Abstract] The basic growth constants of *Candida utilis* VKMU-1668 in glycerin-limited chemostatic cultures under optimal and submaximal temperatures were determined. At 30° and flow rates from 0.05 to 0.3 hr<sup>-1</sup> biomass concentration, economic coefficient, and cell protein content were constant, while ATP content and energy charge decreased, ADP and AMP content increased. The substrate concentration inducing half-maximum growth, which characterizes the affinity of cell fermentative apparatus for the substrate, was constant at 72 mg/l. Glycerin requirement increased with increasing flow rate and further on increasing the temperature to a submaximal 40°. The expenditure of substrate to maintain life without multiplication, as estimated graphically was near zero at 30° and increased at 40° to 0.08 or 0.39 g glycerin per g biomass per hour. Expenditure of phosphorus to maintain life also increased at 40° to 1.5 or 3.5 mg p/g biomass. Submaximal temperature caused increased ATP accumulation, which was not further increased by decreasing flow rate. This indicates that increasing temperature brings the yeast to a state where they are energetically ready for fast growth and multiplication when the adverse influence is removed. Figures 1; Tables 3; References 14: 4 Russian, 10 Western.

USSR

UDC 582.282.23.095.42

JOINT ACTION OF LIMITING AND INHIBITING FACTORS ON YEAST GROWTH IN A  
CONTINUOUS CULTURE

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
20 Apr 76 pp 456-460

SHKIDCHENKO, A. N., Institute of Biochemistry and Physiology of Micro-  
organisms, Academy of Sciences USSR

[Abstract] The joint action of limiting and inhibiting factors on *Candida utilis* Y-405 yeast in a chemostatic culture was considered. When the concentration of phosphate was growth limiting, 0.054 or 0.025 g/l in the added medium, increasing the concentration of glucose in the nutritive medium increased residual glucose from 0.34 to 0.96 and 1.38% and decreased biomass 5.5 and 15.6%. Oblong cells usually found when yeast are subjected to unfavorable factors were observed. Cell phosphorus content was decreased, which suggested an interaction between glucose growth inhibition and transport of phosphorus into the cell. Interruption of aeration to measure respiratory activity at intervals of 12 hours show that the threshold oxygen concentration increased during glucose inhibition. The data confirm the joint action of limiting and inhibitory factors. Figures 2; Tables 1; References 16: 9 Russian, 7 Western.

USSR/CSSR

UDC 577.154:576.851.5.095.4

AMYLASE PRODUCTION BY PERIODIC AND CONTINUOUS *BACILLUS SUBTILIS* CULTURES

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
20 Dec 76 pp 450-455

PAZLAROVA, YA., FENTSL, Z., TSAPLINA, I. A., YEGOROVA, L. A., and  
LOGINOVA, L. G., Institute of Microbiology, Academy of Sciences USSR,  
Institute of Microbiology, Czechoslovak SR

[Abstract] The synthesis of alpha-amylase by the A32 and A32.6 strains of *Bacillus subtilis* was studied on synthetic McQuillen medium and natural starch-corn medium under periodic and continuous cultivation conditions. Both strains under periodic conditions were found to accumulate maximum biomass after 11-12 hours of growth and maximum amylase after growth began

to decline. Strain A32.6 was somewhat more productive and biomass and enzyme synthesis were greater on natural medium. Specific enzyme synthesis was greater on natural medium and increased as growth rate slowed. In one-stage continuous flow cultivation it was determined that amylase activity decreased more slowly for slower rates of media addition. This was more pronounced on synthetic medium, and may be due to nonuniform m-RNA synthesis or population nonhomogeneity leading to the formation of mutants with low levels of enzyme production. Figures 5; Tables 1; References 7: 1 Russian, 6 Western.

USSR

UDC 582.282.23.095.33:662.66

#### CULTIVATION OF CANDIDA TROPICALIS YEAST ON COAL SUBSTRATES

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
20 Dec 76 pp 583-585

KUCHER, R. V., TUROVSKIY, A. A., DZUMEDZEY, N. V., BAZAROVA, O. V.,  
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[Abstract] Fermentation conditions and biochemical characteristics for obtaining quantitative biomass yields on coal substrates were investigated. Substrate was prepared from type Zh coal oxidized with hydrogen peroxide or nitric acid and extracted with water. Chemical emission, and IR analysis, indicate a content of 5-26 g/l aromatic hydroxypolycarboxylic acids, unsaturated aliphatic compounds and inorganic molecules. Only Candida Tropicalis K-41 gave significant growth, while Candida guilliermondii vsB542 and vkmu-916, C. lipolytica VKMU-47 and VSB342, and Pseudomonas desmoltica VKMB557, did not. C tropicalis after multiple reseeded adaptation gave 1.6-1.8 g/l biomass, total protein 28-34%. The low yield compared to that on petroleum may be due to incomplete adaptation or the need for media additives. Amino acid composition was different for the two oxidizing agents in several cases. Tables 2; References 5: 3 Russian, 2 Western.



## Industrial Toxicology

USSR

UDC 616-006-097 + 616-006-02:547.551

### CARCINOGEN-PROTEIN ANTIGENS AND THE BLASTOGENIC ACTIVITY OF ANILINE DYES

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 72-73

KOROSTELEVA, T. A., SKACHKOV, A. P. and KONDRAT'YEVA, A. F.; Laboratory of Cancer Immunology, Scientific-Research Institute of Oncology imeni Petrov, Ministry of Health USSR

[Abstract] The carcinogens 2-naphthylamine and benzidine are known to play an important part in the development of urinary bladder cancers among workers of the aniline dye industry. This health problem remains acute because of the fact that groups of carcinogens are part of the composition of the molecules of a number of compounds (including dyes) widely used in the textile industry. From tests run on male rats in which dyes containing a benzidine group were administered, the authors conclude that it may be possible to develop an immunological test to determine the carcinogenic properties (if any) of complex compounds containing the radicals of known carcinogens. Such information, if developed, could play a role in the prophylaxis of job-related cancer. Figure 1; References: 3 Russian.

USSR

UDC 616-006-092.9:599.232.4

### 1,2-DIMETHYLHYDRAZINE-INDUCED TUMORS IN MICE OF THE CBA LINE

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 39-43

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[Abstract] 1,2-dimethylhydrazine (DMH) is a carcinogen known for its selective action against the intestine, and, in the case of rats, some other organs as well. Its action against mice is less well known; some observers report intestinal tumors and occasional plasmocellular carcinoma of the anal region (in the case of subcutaneous administration), as well as vascular and pulmonary tumors. Weekly administration to female mice of the CBA line (dose 8 mg/kg) of this carcinogen produced tumors in nearly 100% of the test animals. The tumors were mainly localized--in the uterus, the anal region and the large intestine. The uterine group were in the form

of endometrial sarcomas with admixture of smooth-muscle and vascular components. Among the anal tumors, there was a predominance of planocellular carcinoma, but there were also portions with basalomas and adenoma sebaceum. Epithelial tumors of the intestine, as far as structure was concerned, were the same as those produced by DMH in rats. The authors suspect polytropy of the carcinogenic action of DMH on mice, and give a summary of the frequency of spontaneous and induced sarcoma in mouse uteri. Figure 1; References 13: 1 Russian, 12 Western.

USSR

UDC 612.82:612.015]-08:599.323.4

EFFECT OF DMBA AND BENZ ( $\alpha$ ) ANTHRACENE ON THE BIOGENIC AMINE LEVEL IN THE RAT BRAIN

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 34-39

ANISIMOV, V. N., POZDEYEV, V. K., DMITRIYEVSKAYA, A. YU., GRACHEVA, G. M., IL'IN, A. P. and DIL'MAN, V. M.: Group for Study of the Mechanisms of Aging and the Division of Human Neurophysiology, Institute of Experimental Medicine, Academy of Medical Sciences USSR

[Abstract] A number of problems in the field of chemical carcinogenesis remain unsolved; one of these is the problem of the systemic action of carcinogens on the body, as opposed to action on the cellular and molecular level. Along this line, the authors studied the mechanisms in rats determining the resistivity of the hypothalamus to the action of homeostatic signals under the influence of carcinogens, particularly the blastomogenic polycyclic aromatic hydrocarbons (PAH), which are able to induce hormone-dependent tumors of the mammary gland. Thirty minutes following intravenous administration of 5 mg of DMBA, the level of norepinephrine, dopamine, serotonin, and 5-oxyindolyl acetic acid in the hypothalamus was reduced, while the level of those substances in the brain stem and the large hemispheres remained unchanged. Administration of the noncarcinogenic analog of DMBA (benz( $\alpha$ )anthracene) in the same dosage had no effect on the level of catecholamines in the hypothalamus, but lowered the content of serotonin, without changing the 5-oxyindolyl level, and increased the histamine content. Preliminary administration of L-DOPA prevented a rise (induced by 20-methylcholanthrene) of the level of sensitivity of the hypothalamus-hypophysis system to inhibition by estrogens. Data obtained indicate the presence of a hypothalamic component in the blastomogenic action of the polycyclic hydrocarbons cited. Figure 1; Table 1; References 28: 9 Russian, 19 Western.

USSR

UDC 591.124:599.537

OXYGEN CONSUMPTION BY THE MUSCULAR TISSUE OF THE DOLPHIN PHOCAENA PHOCAENA

Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHMII I FIZIOLOGII in Russian Vol 13,  
No 4, Jul/Aug 77 signed to press 28 Apr 76 pp 508-509

KOLCHINSKAYA, A. Z., MAN'KOVSKAYA, I. N., BUKHMAN, M. G., and SPAKHOV, A. S.,  
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A. A. Bogomolets, Academy of Sciences UkrSSR, Kiev

[Abstract] Earlier studies by this Institute have shown that the oxygen regimen of muscle tissue of marine mammals has many features, related to the evolutionary adaptation of the animals to the intermittent type of breathing and the intermittent supply of oxygen from the blood to the muscular cells. Important here are optimal diffusion parameters of muscle tissue capillaries, a morphological capacity for equalization of  $O_2$  diffusion conditions over the length of the capillary, and a high content of myoglobin. The present article contains data on the rate of consumption of oxygen by various muscles of the title dolphin; muscles examined were those of the right auricle, left ventricle, right ventricle, surface muscles (m. spinalis), and deep-lying muscles (m. longissimi dorsi, m. iliocostalis lateralis). Cardiac oxygen consumption, especially of the left ventricle is higher than that of the skeletal muscles. Tissue respiration in the deep-lying muscles is about four times more intense than that in the surface muscles. The authors suggest that intensity of oxygen consumption in the skeletal muscles is not uniform during the respiratory cycle. Table 1; References 13: 9 Russian, 4 Western.

CERTAIN ASPECTS OF THE PROBLEM OF SLOW INFECTIONS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977  
pp 3-7

TIMAKOV, V. D. (deceased)

[Abstract] The problem of slow infections was first developed within the framework of veterinary medicine, and it was soon found that many slow infections of animals are also dangerous to man. The study of slow infections is of particularly great significance for medicine. The problem of slow infections is currently at the center of attention of infectious disease specialists, neuropathologists and epidemiologists, due to the frequent difficulty of establishing the infectious nature of such diseases, the inevitable fatal outcome of these diseases and the lack of any effective means of prevention or cure. Finally, the problem of slow infections has been found to be closely related to fundamental general biological problems, since some of the pathogens have been found to have such unusual properties that it has indicated the possibility that they may contain a third type of nucleic acid or that the pathogens may be nonnucleic, self-replicating protein-polysaccharide molecules. An increasing number of slow infections is being found, the etiologic agents of which are viruses already known as pathogens of acute infectious diseases which have been studied in detail. One of the most important problems related to slow infections is the study of the role of immunological reactions in the pathogenesis of slow infections in man and animals. In some diseases, the virus may persist in the body, in spite of a continuous immune reaction. Thus, simplified concept of "all or nothing" as concerns the immunological tolerance does not apply to the virology of slow infections. Finally, the author emphasizes the great practical importance of the study of the epidemiological peculiarities of slow infections. Future tasks for investigators include determination of the capability of various viruses for persistence in various hosts, a study of the nature of persistence of viruses and mechanisms resulting in the development of processes leading to the formation of slow infections, which "are not a slow-motion film of acute infections" but rather a new form of interaction of pathogen and body. References 16: 3 Russian, 13 Western.

## PERSISTENCE OF INFLUENZA VIRUS IN CELL CULTURES AND ANTIGENIC STRUCTURE OF ISOLATED VIRUSES (FACTS AND HYPOTHESES)

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977  
pp 27-39

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[Abstract] In the light of the hypotheses stated by several authors concerning the existence of a reservoir of latent influenza infection among persons exposed to the disease, the study of the conditions of development of latent infection caused by the influenza virus in vitro is of particular importance for an understanding of the peculiarities of the pathogenesis and epidemiology of this disease. In the first stage of the study, the primary task was to optimize the process of modeling of persistence of the virus itself. It was found that most of the agents studied were identical in their antigen hemagglutinin and neuraminidase profile to the initial virus (A/Hong Kong/1/68 or A/Victoria/35/72); however, in 11 cases the antigen structure of the isolates differed, these differences being persistent and apparently genotypically determined, retained with all manipulations, including at least three-times passage in chick embryos, lyophilization or long-term storage at 4 C. Cloning had no influence on the phenomenon of separation of the viruses with the new antigenic structure, or even on the antigenic formula of the atypical versions isolated. Tests were made to see whether the viruses with altered antigenic structure resulted from a mutation process. Some, but far from all, of the facts indicated that this was the case. Further research is needed to clarify the question. Figures 2; Tables 12; References 46: 19 Russian, 27 Western.

USSR

UDC 616.988.25-092.9-07:616.831-078

STUDY OF A VIRUS ISOLATED FROM THE BRAIN OF SYRIAN HAMSTERS WITH A  
PERSISTENT INFECTION CAUSED BY AN ATTENUATED STRAIN OF THE VIRAL COMPLEX  
OF TICK-BORNE ENCEPHALITIS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977  
pp 21-26

VOROB'YEVA, M. S., LADYZHENSKAYA, I. P., ASTAKHOVA, A. V., and ZHERENOVSKAYA,  
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Preparations imeni L. A. Tarasevich, Moscow

[Abstract] The task of the present study was: 1) to study the peculiarities of persistence of a virus in the body of Syrian hamsters with normal and suppressed immune response; and 2) to attempt to "unmask" the persisting virus and, if successful, to study its properties. Two attenuated strains of virus from the tick-borne encephalitis complex were used. Data were produced characterizing the peculiarities of persistence of the attenuated strains in the body of Syrian hamsters. There was a difference between the strains, particularly with immunosuppression, manifested as infection only in the hamsters infected with the Yelantsev strain, not with the TR-21-5-Langat strain. The data indicated a change in the antigenic characteristics of the virus as it persisted. It is assumed that under certain conditions, in addition to a change in the characteristics of the virus with respect to a number of biological indicators, a certain change may also occur in the antigenic structure of the virus, i.e., so-called antigenic drift may occur. Figure 1; Tables 5; References 10: 4 Russian, 6 Western.

USSR

UDC 616.988.75-092.9-07:576.858.75.095.5

PERSISTENT INFLUENZA VIRUS IN THE BODY OF SENSITIVE ANIMALS INFECTED WITH  
VARIOUS DOSES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977  
pp 16-21

PAVLENKO, R. G. and MIRCHINK, YE. P., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, Academy of Medical Sciences USSR, Moscow

[Abstract] A number of methodological approaches were analyzed, the combined application of which could effectively separate from the body of a virus carrier the infectious influenza virus long after its administration

not only in high doses, but also in quantities not causing death of the experimental animals. The experiments were performed on mice of the colony SHK which survived after intranasal infection with AO/WSN influenza virus in doses of 100, 0.1 and 0.001 LD<sub>50</sub>. The virus was isolated from the mice by washing out organs in situ and using synthetic corundum to break down the lung tissue cells. It was found that the probability of isolating the virus increased when higher doses were used. Latent forms of influenza infection were found at up to 112 days after infection when high doses were used. Tables 4; References 19: 9 Russian, 10 Western.

USSR

UDC 616.9-036.15

#### SLOW INFECTIONS: THE STATUS OF THE PROBLEM AND CLASSIFICATION OF PATHOGENS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977  
pp 78-83

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[Abstract] A historical review of the study of slow infections is presented. A classification of viruses capable of causing slow infections is presented:

##### A. Ordinary viruses.

###### I. Obligate slow infection pathogens

- 1) Oncogenic viruses:
  - a) oncogenic viruses in man (?);
  - b) oncogenic viruses in animals;
- 2) Other viruses:

###### II. Facultative slow infection pathogens

##### B. Unusual viruses

- 1) The kuru pathogen;
- 2) The Kreizfeld-Jacob disease pathogen;
- 3) The scrapie pathogen;
- 4) The pathogen of infectious mink encephalopathy.

The hypothetical pathogenic basis of each type is presented. Table 1; References 22: 7 Russian, 15 Western.

## PATHOANATOMY AND PATHOGENESIS OF INFLUENZA

Moscow ARKHIV PATOLOGII in Russian No 7, Vol 39, 1977 signed to press  
9 Aug 76 pp 3-14

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[Abstract] A considerable volume of new data on the pathomorphology and pathogenesis of influenza has accumulated in the past 10 years. The principal studies made in this field are surveyed, and a summary of results is given (74 investigations are cited, most of them by Soviet scientists). It has been established that grave forms of influenza most often begin with a virus affection, followed by the development of energy and bacterial complications, among which the staphylococcic group is most frequently encountered. Certain previously unknown mechanisms have been shown to be at work in the case of pulmonary involvement. It is now certain that in the most severe cases of influenza it is the lowering of the general resistance of the organism which is the decisive factor in pathogenesis. The authors describe the morphological features of influenza as they relate to the duration of the disease. Research has been started on the role of certain little-studied factors in the development of influenza; submicroscopic changes, disruption of the permeability of cell membranes, virus particles and their components, immunopathological aspects, and some others. The paper includes summary histories of various groups of influenza patients and some photographs illustrating lung damage. It is concluded that further research should be centered on the nature of the toxic manifestations of complicated forms of the disease, the role of the defensive reactions of the individual and their regulation, and the special features of damage to the cardiovascular system during influenza epidemics. Figures 3; References 74: 60 Russian, 14 Western.



## SPECIES OF HETEROTROPHIC BACTERIA IN THE WATER OF THE RYBINSK RESERVOIR

Moscow MIKROBIOLOGIYA in Russian Vol 46, No 3, May/Jun 77 signed to press  
2 Dec 76 pp 570-577

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[Abstract] The species composition of the dominant microorganisms in the Rybinsk Reservoir was studied using bacteria-free reservoir water as the dilution medium. The dominant families were Pseudomonadaceae and Achromobacteraceae and the most common genus was Caulobacter. Mycobacteraceae was less common. In the center of the reservoir genera Pseudomonas, Caulobacter, Flavobacterium, Mycobacterium and Corynebacterium were found. Extremely pleomorphic Corynebacterium were found in one of the reservoir edge samples. Spirals which did not grow on agar or in sterile water were seen. Caulobacter were found mostly at the end of July and in May and Corynebacterium in March, while Pseudomonas and Flavobacterium occurred at a constant level. When a medium with minimal organic matter was used, Pseudomonas predominated. All isolated cultures except Alcaligenes faecalis utilized carbohydrates and alcohols, all preferred organic nitrogen sources and were aerobic-microaerophilic. The majority could grow from 10° to 37° with optimum temperature between 20-28°. Some Pseudomonas species grew best at 37°. Change in medium pH, liquefaction of gelatin, ammonification of peptone, growth on meat-peptone or potato, the presence of catalase and growth in pure culture in bacteria-free water, were noted in various species. Figures 2; Tables 3; References 14: 11 Russian, 3 Western.

USSR

UDC 616.988.25-07:616.831-008.97  
(Encephalitis)

INTEGRATION OF THE GENOME OF A VIRUS WITH THE GENOME OF BRAIN CELLS IN A  
CASE OF PROGRESSIVE TICK-BORNE ENCEPHALITIS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977 pp 13-15

ZHDANOV, V. M., TERENT'YEV, V. F., FATEYEVA, A. P., KITAYEVA, L. K., and  
GAYDAMOVICH, S. Ya., Institute of Virology imeni D. I. Ivanovskiy, Academy  
of Medical Sciences USSR; Tomsk Medical Institute

[Abstract] Though an acute infection, tick-borne encephalitis may progress chronically. A study of the pathologic materials from tick-borne encephalitis patients with progressive and chronic forms is therefore of great interest. This work describes a study of the brain tissue of a patient who died from this form of tick-borne encephalitis. The case history is presented, plus the results of the molecular-biological investigation of brain tissue specimens. In the light of the data produced, it is considered that the development of chronic and progressive forms of tick-borne encephalitis can be associated with the formation of a DNA provirus and its integration into the DNA of the cell (apparently, connective tissue cells, since neurons do not reproduce) in the CNS. Figure 1; References 6: 2 Russian, 4 Western.

USSR

UDC 616-006-08:615.287-06:616.3-0187-092.9

PROTECTION OF THE ALIMENTARY TRACT OF MICE AGAINST TOXIC EFFECTS FROM  
CYTOSINE ARABINOSIDE

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 44-48

BUKHMEN, V. M., candidate of medical sciences; VYSHINSKAYA, G. Ya.,  
BELYANCHIKOVA, N. I., candidates of biological sciences; and  
SVET-MOLDAVSKIY, G. Ya., doctor of medical sciences; Laboratory of Tumor  
Virology, Oncological Scientific Center, Academy of Medical Sciences USSR

[Abstract] Toxic damage to tissues of the alimentary tract is one of the most frequent complications of antitumor chemotherapy. The Center was previously able to demonstrate the possibility of realizing a selective defense of alimentary tissues against the toxic effects of methotrexate (amethopterin) by the oral administration of a suspension of activated carbon particles containing adsorbed molecules of a specific protector (folic acid). In the present study, attention was directed to a different "protective" suspension, containing desoxycytidine. It is shown that a molecular solution of this metabolite weakens various effects produced by the widely used antimetabolite cytosine arabinoside. Intraperitoneal administration of cytosine arabinoside to grown female mice, 3 times daily for 5 days, in doses of 20 mg/kg, was found to produce lethal toxicosis. There was marked suppression of hemopoiesis by the third day of the experiment, followed by diarrhea on the 5-6th day, and death on the 7th. By contrast, the animals subjected to peroral administration of a molecular solution of 2'-desoxycytidine several minutes before administration of the cytosine arabinoside, showed reduced signs of toxicosis and no instances of death; while analogous administration of that same metabolite adsorbed on activated carbon particles produced only selective protection of the alimentary tract, the other indications of toxicosis remaining unaffected. It is suggested that a suspension of activated carbon with desoxycytidine should be tested as a possible therapeutic agent for patients suffering from cytosine arabinoside poisoning. Figures 3; References 19: 5 Russian, 14 Western.

AUTOMATION OF EEG FREQUENCY ANALYSIS WITH MIR-2 COMPUTER

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 63, No 7,  
Jul 77 signed to press 3 Jan 77 pp 1065-1066

LIMAN, A. D., POPOV, V. M., POL'SHIN, A. K., and PETRICHENKO, A. A.,  
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[Abstract] Frequency analysis of the six basic rhythms of the EEG, and their separation, has made use of serially-manufactured analyzers, e.g., EA-201 (Sen-Ay, Japan), MAF-4 (Nihon-Koden, Japan), Kaizer (Denmark), MV 5202 (Hungary), and the Soviet "Biofizpribor" analyzer. The data are read by electromechanical and electronic counters. The large volume of information thus accumulated suggests the need to employ a computer for further analysis. The authors have used an analog-digital system to automate the EEG frequency analysis, combining the MIR-2 computer, an MV 5202 type analyzer, an MV 5203 integrator, and two digital integrators of the F481 type. The functional scheme of this analog-digital system is diagrammed in the report; it consists of the electroencephalograph, an analyzer of the rhythms of the electroencephalogram; an integrator of the activity of the rhythms of the electroencephalogram, of the pulse from the reference generator; digital integrators; recorder; commutator; timer; a symbol matrix; channel marker; control block; and the MIR-2 (which receives data from the commutator, and is linked to the control block). The sequence of operations is described. Figures 2; References: 2 Russian.

USE OF AN LG-5118 GAS ANALYSER TO MEASURE THE AMOUNT OF OXYGEN CONSUMED  
DURING INCREASED PRESSURE IN A GAS ENVIRONMENT

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 63, No 7, Jul 77  
signed to press 3 Nov 76 pp 1067-1071

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[Abstract] The author describes a relatively simple procedure to determine the amount of oxygen consumed by animals (rabbits) during an extended stay in a hermetically sealed system under normal and elevated pressure of the gas environment of the system. The procedure employs the title galvanic gas analyzer which permits recording, directly in the course of the long stay, a slow change in partial pressure of oxygen in a helium-oxygen atmosphere at pressures up to  $40 \text{ kg/cm}^2$ . A thermostatic oxygen sensor is used, hence the readings do not depend on the temperature of the gaseous medium. Oxygen consumption is determined indirectly based on decrease in  $\text{O}_2$  partial pressure and in total pressure of the gas system, with a one-time absorption, within the system, of gaseous products of metabolism (water vapor,  $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{S}$ , mercaptans, etc.). A discussion of the physical chemical basis of the assay procedure is presented. A schematic diagram of the apparatus for extended testing (up to 20 hrs) of the rabbits in the increased  $\text{He-O}_2$  pressure chamber is provided. The apparatus can apparently be used to study gas exchange in humans under similar conditions. Figure 1; Tables 2; References: 2 Russian.

## MANIPULATOR FOR MICROELECTRODE STUDIES OF BRAIN NEURONS WITHOUT REMOVAL OF THE DURA MATER

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 63, No 7, Jul 77  
signed to press 11 Nov 76 pp 1060-1062

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[Abstract] Chronic studies of brain neurons make use of fine instrumentation which requires removal of the dura mater and limits the duration of an experiment to, at best, two weeks. The author has devised a rather simple manipulator which makes it possible to work with neurons of the cortex or subcortical nuclei, without removal of the dura mater, for an indefinitely long time. The microelectrode in this manipulator is inside a glass needle, the diameter of the point of which is 150-200  $\mu\text{m}$ . The needle freely pierces the dura mater, and the microelectrode then is pushed forward from it. Diagrams of the housing platform--which is attached to the skull of the experimental animal (cat)--and the manipulator device, are illustrated in the report. The housing platform is preliminarily fastened, under nembutal anesthesia, to the skull, and serves to fix the head in a stand. The platform is set at a height of 5-7 mm above the skull in a stereotaxic plane and is fitted with a stereotaxic grid. The housing platform is attached with 8 screws to corresponding drilled apertures in the bone, and provides reliable electric contact. The manipulator has been used for one year, on one cat, without any pathological changes in the condition of the neurons of the visual cortex under study. Figure 1; References 3:  
1 Russian, 2 Western.

USSR

UDC 577.3

SOME APPROACHES TO INTEGRAL EVALUATION OF BODILY REGULATORY CAPABILITIES

Moscow BIOFIZIKA in Russian No 4, 1977 signed to press 2 Aug 74 p 751

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[Abstract] The study developed a methodology and mathematical model for analyzing human regulatory capabilities during physical exertion. The mathematical base was that a linear dependency exists between physiological functions and the given level of exertion. An indirect relationship was established, and it was used successfully to analyze experimental data obtained from performance of tasks on a four-stage ergometric load of 80, 120, 160 and 200 units. The complete article is deposited in the All-Union Institute of Scientific and Technical Information as file No 64-Dep A/1940, dated 11 November 1976

USSR

UDC 616.1-008.1-02:616.839.65-092.9]-072.7

EVALUATION OF THE FUNCTIONAL STATUS OF THE CIRCULATORY SYSTEM BY MEANS OF A MATHEMATICAL MODEL IN DOGS WITH THE AUTONOMIC INNERVATION DISCONNECTED

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, 1977 pp 71-73

LISHCHUK, V. A., SOKOLOV, M. V., SMIRENSKAYA, YE. M., and AKIMOV, P. P., Institute for Cardiovascular Surgery imeni A. N. Bakulev, Academy of Medical Sciences USSR, Moscow

[Abstract] The task of the present study was to estimate the basic parameters of hemodynamics by means of a mathematical model and analyze the status of the circulatory system in dogs with the autonomic innervation disconnected by ganglioblocking substances. The experiments were performed on 11 dogs of both sexes weighing from 20 to 25 kg. Ganglioblocking was achieved by administering pentamine at a dose of 4.5 mg/kg which, according to the literature, causes "complete" denervation of the cardiovascular system. Three dogs served as a control, under deep barbiturate narcosis. Arterial and venous blood pressure was monitored throughout the experiments by means of catheters. It was found that, under the experimental conditions, both

types of pressure and minute volume of blood circulation were highly sensitive to extraction of blood, and that the mathematical model used adequately characterized the experimental results. Tables 2; References: 11 Russian.



USSR

UDC 575.12:633.1

GENETIC SYSTEMS RESPONSIBLE FOR DEPRESSIVE DEVELOPMENT OF HYBRID WHEAT PLANTS

Moscow GENETIKA in Russian Vol 13, No 8, 1977 signed to press 20 Jul 76  
p 1341-1349

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[Abstract] Crossing of different varieties and forms of wheat quite often results--in  $F_1$  and later generations--in depressive development of the hybrid plants, and, sometimes, in their death. This phenomenon has been traced to presence, in the genotypes of the initial parent forms, of dominant, complementary alleles of the genes of necrosis and chlorosis. The authors report their work, which is generally supportive, on this subject, at the Kuban Experimental Station of their institute (VIR), in the years 1969 to 1971. They analyzed about 300 combinations of adapted varieties of winter and spring wheat, and the finest varieties from the world collection of VIR. The authors describe genotypes of varieties which carry dominant alleles of necrosis, chlorosis, and red chlorosis; appearance of the symptoms of these is related to multiple allelism of the complementary genes. A high variation among the necrotic plants in  $F_2$  is due to the dose of necrosis genes. The necrosis, chlorosis, and red chlorosis have a unique influence on the quantitative indices of  $F_1$  hybrids, and the earlier they appear, the stronger their inhibitory effect. Tables 3; References 24: 12 Russian, 12 Western.

USSR

UDC 633.11:631.81

INFLUENCE OF TRACE ELEMENTS ON THE YIELD AND QUALITY OF WINTER WHEAT GRAIN

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 33, No 5, 1977 signed to press 23 Jul 76 pp 52-54

GYUL'AKHMEDOV, A. N., corresponding member, AS AzerSSR, AGAYEV, N. A., AGAYEV, I. G., and DZHAFAROV, YA. A., Institute of Soil Science and Agrochemistry, Academy of Sciences AzerSSR

[Abstract] Mineral fertilizers play an important role in increasing the harvest yield of winter wheat on the Shirvanskaya steppe of this republic; less information is available on their use and efficacy in the Udzharskiy Rayon. The authors have done a five-year (1966-1970) study in the latter rayon of the effectiveness of B, Mn, Cu, Mo, Zn, and Co fertilizer additives on the serozem-meadow soil of the rayon for Bezostaya-1 winter wheat. Addition of these trace elements in 1.0, 2.0, and 3.0 kg/hectare quantities in addition to NPK fertilization had a favorable influence on harvest yield. Manganese was the most effective additive, followed in order of value for grain yield by Mo, Cu, Zn, Co, and B. The authors indicate that the value for quality of yield would be Mo, Mn, Cu, Zn, Co, and B, in that order. Tables 2.

USSR

UDC 633.11:631.81

EFFECT OF TRACE ELEMENTS IN COMBINATION WITH MACROFERTILIZERS ON THE HARVEST OF WINTER WHEAT GRAIN

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 33, No 4, 1977 signed to press 1 Oct 76 pp 56-58

GYUL'AKHMEDOV, A. N., CORRESPONDING MEMBER, Academy of Sciences AzerSSR, and AGAYEV, N. A., Institute of Soil Science and Agrochemistry

[Abstract] These studies were carried out on serozem-meadow soils on the Shirvanskaya steppe (Udzharskiy Rayon) of Azerbaydzhan. Bezostaya-1 winter wheat was used. Soil analysis revealed a low content (2%) of humus; content of hydrolyzable nitrogen, labile phosphorus,  $P_2O_5$ , and calcium,  $K_2O$  was 89.8, 8.9, and 210 mg/kg; content of gross nitrogen,  $P_2O_5$ , and

and K<sub>2</sub>O was 0.11, 0.11, and 3.28%; calcium carbonate was 17.2%; pH of soil 8.0. The content of labile Mn, Cu, Zn, and Mo was low (1.2; 0.3; 0.8, and 0.15 mg/kg. Manganese, copper and zinc additives used amounted to 2 and 3 kg/hectare, molybdenum 1 and 2 kg/h. The fertilizer was added in combination with the trace elements in the form of 1 kg of substance per hectare; various combinations of N, P, and K were tried. Field tests over five years showed increased yields of the wheat after the micro- and macrofertilization (9.0-29.2% increase). The most effective doses of the trace elements were, for Mn, 3 kg/h; for Cu and Zn, 2; for Mo, 1 kg/h. The best combination of the trace elements was with N-P and N-P-K fertilizer; other combinations were less effective.

USSR

UDC 582.282.23:632.118.3

INFLUENCE OF  $\text{Co}^{60}$  GAMMA RAYS ON THE AMINO ACID COMPOSITION OF THE BIOMASS OF *SACCHAROMYCES VINI*

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 4, 1977 signed to press 15 May 76 pp 73-75

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[Abstract] The object of the study was *Saccharomyces vini* of strain P-10 (initial culture) and strains P-200 and P-300, following irradiation with 200 and 300 krad of  $\text{Co}^{60}$  gamma rays. The MO's were grown on a synthetic medium; the transplant material was 5-6 day cultures grown on wort-agar at 28 c. The carbon source used was glucose. Moderate doses of gamma rays resulted in a change in the content of such amino acids as aspartic acid plus serine, phenylalanine, alanine and leucine. The remaining amino acids did not change significantly. The total of unsubstituted amino acids in the strains studied was 57-70% of the total content of acids. No variations were found in the qualitative array of amino acids in the mutant strain. Irradiation produced active mutants which produced amino acids. The mutant strain P-200 manifested an increased capability for accumulation of aspartic acid plus serine, 2.25 times greater than in the control. Table 1; References 9: 5 Russian, 4 Western.

USSR

UDC 615.849.12.015.4:612.11

SHIFTS IN THE RESISTANCE OF ERYTHROCYTES TO ACIDS DURING GENERAL  $\beta$ -IRRADIATION

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 8, 1977 pp 66-67

BERESNEV, V. L. and ZHIL'TSOV, I. F. (Leningrad)

[Abstract] The authors had shown previously that during general  $\beta$ - and  $\gamma$ -irradiation of animals in the dosage range of 560-2,730 rad and 43-212 R, respectively, there is a lowering of the resistance of erythrocytes to acids. The object of the present study was to determine the stability of erythrocytes during general  $\beta$ -irradiation with doses of 2,500, 3,050 and 7,400 rad.  $\text{Kr}^{85}$  was used as a radiation source (maximal  $\beta$ -radiation

energy 672 kev). The tests were run on 200-gram male white rats, confined in a special chamber for a period of 4 hrs. The doses for external  $\beta$ -radiation were calculated by skin surface; the internal  $\beta$ -radiation dose from  $\text{Kr}^{85}$  amounted to 0.02-0.66% of the skin dose. A single general 7,400-rad dose of  $\beta$ -radiation led to substantial changes in erythrocyte resistance, and these showed a phasal character. Lowering of resistance in the initial period of observation was apparently produced by the action of hemolysins formed in the skin; subsequent increase in resistance could be explained by a renewal of erythropoiesis, and also by an increase in the number of young, more resistant cells. Results of erythrocyte and reticulocyte counts are shown graphically for the 7,400 rad dose; resistance data are shown graphically for the 2,500, 3,050 and 7,400 rad doses. Variation of these factors over a 28-day period following irradiation is shown. Figures 3; References: 5 Russian.

USSR

UDC 616.5-001.29-085-07:616.5-003.9

INFLUENCE OF SOME SURFACE-ACTIVE COMPOUNDS ON THE HEALING OF LOCAL RADIATION LESIONS OF THE SKIN

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 22, No 7, Jul 77 signed to press 7 Jul 76 pp 58-63

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[Abstract] This work presents an experimental comparison of the effectiveness of dimethyl sulfoxide, ethonium and dodeconium (a derivative of hexamethylenediamine) as to their influence on the nonspecific reactivity (skin autoflora and phagocytic activity of neutrophils), on the rate of healing of local radiation lesions of the skin and mucous membranes and on the tumorous process. The influence of local application of ethonium on healing of radiation and combined lesions of the skin and mucosa was studied clinically in patients with malignant neoplasms of the maxillo-facial area. It was found that local application of ethonium, both in animal experiments and in clinical experiments, of dodeconium and dimethylsulfoxide in animal experiments, significantly (by 28-48%) accelerated healing of local radiation lesions of the skin and mucosa. Parenteral and local application of these surfactants had no stimulating effect on the growth parameters of a sarcoma 45. The local application of ethonium and dimethylsulfoxide stimulates the phagocytic activity of peripheral

blood leukocytes of rats upon irradiation, in the tumorous process and radiation therapy of tumors. Ethonium, dodeconium and dimethylsulfoxide reduce the skin autoflora population of rats, which is increased by the tumorous process and radiation. Tables 4; References: 5 Russian.

USSR

UDC 616-006-085.849.1-059:615.277.3:546.41

RADIOSENSITIZING EFFECT OF DIHYDROMONOCALCIUM PHOSPHATE DURING TREATMENT OF EXPERIMENTAL TUMORS

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 22, No 7, Jul 77 signed to press 4 Jan 77 pp 79-80

YEFIMOV, M. L., YAKOVLEVA, S. S., and SHAFRANSKIY, L. L., Kazakh Scientific Research Institute for Oncology and Radiology

[Abstract] Dihydromonocalcium phosphate was used for the first time in clinical radiation therapy of cancer. Significant improvement was achieved, both immediate and long-term. This article reports on further experiments studying the influence of this preparation in combination with X-ray therapy on transplanted tumors in white rats. The mineral salt studied, as well as X-ray therapy, had a weak antitumor effect. When the two factors are combined, the immediate therapeutic effect is much greater, and is maximal in rats with lymphosarcoma. The mechanism is not yet known. It may consist of simple summation of the two effects, although a true radiosensitizing effect of dihydromonocalcium phosphate cannot be excluded. There is reason to believe it may be a radiosensitizing substance, since monophosphate is one of the sources of cellular bioenergy, and the substance may be included in the metabolic processes of tumor cells, thus greatly increasing the inhibiting effect of radiation. Figures 3; References: 3 Russian.

## Therapy

USSR

UDC 617-001.17-085.373

### USE OF IMMUNE PREPARATIONS IN TREATMENT OF BURN DISEASE

Moscow KLINICHESKAYA MEDITSINA in Russian Vol 55, No 8, 1977 pp 18-22  
signed to press 12 Aug 76

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[Abstract] This is a relatively brief survey of Soviet treatment of burn patients with immune preparations. Infectious complications are said to be the most frequent cause of death in these patients; the authors stress the need, in view of increasing resistance of microflora to antibiotics, for a new approach to prophylaxis and therapy of infections following burns. They cite the development, by their institute, of ASP (antistaphylococcic plasma) and ASGG (antistaphylococcal gamma globulin). Although burns involve a lowering of the general immunological reactivity, the patients can usually develop antibodies to administered microbial antigens, so that active immunization is accomplished. Active immunization is best undertaken from the outset of treatment. Complications are best treated by the ASP and ASGG type of passive immunization; this treatment can also be employed prophylactically where the patient is unable to respond to active immunization. References 45: 32 Russian, 13 Western.

USSR

UDC 616.5-006-08:615.849.19

### LASERS IN THE TREATMENT OF SKIN CANCER

Leningrad VOPROSY ONKOLOGII in Russian Vol 13, No 7, 1977 pp 83-91

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[Abstract] The medical use of pulsed lasers, especially in treating skin cancer, is briefly summarized for the early 1970s. A number of requirements and limitations on the use of lasers, as formulated by several different authorities, are listed. Most prominent among these are the following: Laser therapy may be resorted to when: 1) conventional methods are

either inadequate or impossible to apply; 2) the tumor is in a diffuse state, but the patient, though in satisfactory condition, insists on some form of treatment; 3) the use of the laser presents no foreseeable danger to either patient or operator; and 4) the patient has been fully informed of possible future dangers and complications, and has given his written consent for the treatment. In addition to this, all laser therapy must be conducted in a proper specialized institution, in which 1) the radiation parameters are carefully calibrated and computed on a strictly individual basis, 2) the doses applied are sufficient for destruction of the given focus, and 3) there is careful observation of the course of the treatment and of the patient's condition. The authors emphasize the existing lack of consensus regarding laser therapy, and the present incompleteness of technical knowledge in this field. Table 1; References: 16 Russian.

CSO: 1840

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