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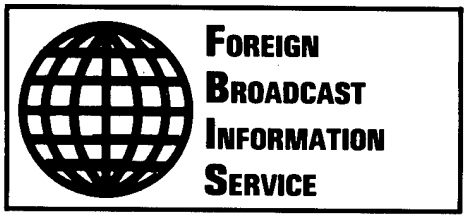

JPRS Report

Science & Technology

Central Eurasia: Life Sciences

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Change in Ultrastructure and Actomyosin Complex of Cardiomyocytes in Experimental Hypergravitation

917C0646A Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian No 4, Apr 91 (manuscript received 22 Jun 90) pp 417-420

[Article by M. O. Nikogosova, M. A. Kayfadzhyan, S. B. Barinyan, and A. A. Akopyan, Pathomorphology Laboratory, Cardiology Institute imeni L. A. Oganesyan, Armenian SSR Ministry of Health, Yerevan]

UDC 612.172.014.2+612.173:612.744.17].014.477.063

[Abstract] The objective of this study was to evaluate the cardiomyocyte ultrastructure in 117 mongrel albino rats (180-200 g) on the basis of contractile function, physicochemical properties, and protein composition of the actomyosin complex in the cardiac muscle after gravitational stress and subsequent resting. The rats were subjected to accelerations of +5g 25-30 minutes per day for 15 days and then sacrificed one (group 1) or 30 (group 2) days after the last rotation. Signs of hypertrophy including an increase in the myofibril diameter, subsequent separation, new formation of contractile structures, hyperplasia of the mitochondria and other organelles, activation of the nucleus, and the formation of deep longitudinal invaginations were found in many of the ventricular cardiomyocytes in group 1 subjects. These changes suggest the possible separation of the cardiomyocyte by lysis. Group 2 rats exhibited more hypertrophied and damaged cells and greater myofibril destruction. The nature of changes in the myofibril ultrastructure, properties, and protein composition of the actomyosin complex under conditions of hypergravitation suggest that some adaptation has occurred. The increase in the number of lysosomes likely indicates that proteases are responsible for damage to the ultrastructure. Moreover, protease activity may contribute to ischemia of the myocardium. In conclusion, these data suggest that the regenerative processes in the myocardium and their wave-like nature occur in several steps. Figures 3; tables 1; references 13: 8 Russian, 5 Western.

Role of Spectral Composition of Light in Induction of New Growth From Triticale Anthers

927C0088A Moscow DOKLADY AKADEMII NAUK BSSR in Russian Vol 35 No 6, Jun 91 (manuscript received 31 Jan 1990) pp 536-539

[Article by S. N. Matveyenko, L. N. Kaminskaya, and BSSR Academy of Sciences Academician L. V. Khotyleva, Institute of Genetics and Cytology, BSSR Academy of Sciences]

UDC 581.143.6:[633.11+633.14

[Abstract] One of the most effective means of the mass production of haploids in grains, especially triticale, is the use of androgenetic growth of pollen in culture in vitro. Selecting the proper cultivation conditions, however, remains a problem. Various studies have looked at factors such as genotype, season, genotype-environment interaction, but few have focused on a decisive morphological factor—light conditions. That prompted the researchers to study eight forms of triticale in an attempt to identify the features of cultivation of the anthers of specific genotypes and to determine the relationship of the process of induction of new growth to the use of red and blue light. Triticale spikes cut at the stage of single-nucleus pollen were kept at +4°C for at least two days and then sterilized. The anthers were removed and placed into a modified, vitamin-enriched Hamborg B5 medium under light filters at 22-24°C. The Nemiga 2, 16/12-14, and GL 17 forms of triticale produced the largest amount of new growth, which was influenced more by genotype than by choice of color of light, although manipulation of illumination did have some effect, i.e., red light produced larger amounts of new growth than did blue, apparently the result of the red light's function as a catalyst of embryoidogenesis. Callusogenesis was determined to a larger extent by genotype. The researchers were able to quickly produce homozygotic lines of triticale in vitro. Figures 1; references 10: 2 Russian, 8 Western.

Increasing the Affinity of Rat Brain M Cholinoreceptors With Single Injection of Cholinolytic Amizil

927C0088B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 317 No 5, Apr 91 (manuscript received 26 Dec 1990) 1261-1264

[Article by V. V. Malygin, S. G. Yevdokimenko, O. G. Serebryakova, and USSR Academy of Sciences Corresponding Member I. V. Martynov, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

UDC 577.25+612.816.7:615.217.34

[Abstract] The ability of neurotransmitter receptors to change their reactivity according to the nature of synaptic influx is a basic mechanism of adaptation, and researchers link the change in the properties of CNS receptors to the therapeutic effect of psychotropic drugs as well as to certain adverse side effects. Muscarinic cholinoreceptors participate in the realization of the most important CNS functions, and a change in the synaptic influx in cholinergic synapses as produced by agonists or antagonists of muscarinic cholinoreceptors or by surgical or chemical denervation leads to a substantial change in their number (B_{max}) and, less often, their affinity. The drama effects produced by psychotropic physiologically active substances, particularly cholinolytics, are little studied at the receptor level, and the researchers here set out to examine the nature and degree of reorganization of rat brain muscarinic cholinoreceptors after a single injection of the cholinolytic amizil (benactyzine, or benzilic acid diethylaminoethyl ester), which has marked psychotropic properties. The experiments involved male Wistar rats (180-220 g) injected with amizil once, intraperitoneally, in doses of 1.7 mg/kg, 3.5 mg/kg, and 7.0 mg/kg. In all cases, the injection substantially changed the parameters of the complexing of the M-cholinoreceptor antagonist 1[^{3}H]-quinuclidine benzylate and the muscarinic cholinoreceptors. The greatest effect was observed one to two hours after injection. If the dose of 1.7 mg/kg increased B_{max} but only produced a negligible change in receptor affinity, the other two doses raised affinity considerably but only slightly changed B_3. All doses produced a clear increase in ratio of number of binding sites to dissociation constant. The M-cholinoreceptor antagonist was found to interact with the homogenous population of receptors, and the complexing was adequately described by a model with one binding center. Complexing with the agonist oxotremorine, however, was better described with a two-center model. Affinity was raised substantially with oxotremorine, and the researchers felt that such changes (with agonist and antagonist alike) were the result of the stabilizing action of amizil on the receptor membrane. References 14: 5 Russian, 9 Western.

Republic Convention-Seminar of Directors of UkSSR Burn Units

927C0110A Kiev KLINICHESKAYA KHIRURGIYA in Russian No 6, Jun 91 (manuscript received 29 Dec 1990) pp 78-79

[Article by Yu. I. Isayev and P. P. Litovchenko, Emergency Hospital, Kharkov; Kiev Scientific Research Institute of Hematology and Blood Transfusion, UkSSR Ministry of Health]

UDC 615-001.17:614.2

[Abstract] The annual convention-seminar of the directors of burn units in the UkSSR, organized by the UkSSR Ministry of Health, was held 25-26 October 1990, in Rovno. The gathering included people in practical health care and institutional researchers and scientists involved in burn trauma. The ministry's chief burn expert, N. Ye. Povstyanoy, listed the organizational, treatment, and research objectives that would help improve burn treatment in the republic. Ye. M. Borovoy and O. V. Kirik presented a paper detailing specialized burn care in the Rovno Oblast, including equipment provided by the joint enterprise Biokor (such as units

with a controlled abacterial medium with simultaneous infrared and UV irradiation). A considerable number of papers were devoted to various aspects of the medical care provided in the event of massive numbers of burn victims. Presenters also noted that when there are large numbers of burn victims, consultation and specialized care needs to be provided in the central rayon hospital by special teams formed in the context of the Meditsina katastrof [Disaster medical care] from among specialized staff members of oblast burn units and the republic burn center. Transportation for burn victims from the injury site, grafts, and cryopreservation of skin were other topics discussed. A decision was made to establish the voluntary Association of Burn Specialists and Plastic Surgeons of the Ukraine.

The Effect of Leafiness of Cuttings and Length of Daylight on Rooting Ability and Growth of *Stewia reabudiana* Bertoni Seedlings

927C0110B Kiev FIZIOLOGIYA I BIOKHIMIYA KULTURNYKH RASTENIY in Russian Vol 23 No 4, Jul-Aug 91 (manuscript received 13 Sep 1990) pp 407-411

[Article by V. F. Zubenko, S. V. Rogovskiy, B. D. Chudnovskiy, and P. P. Shtokal, NPO Sakhsvekla; Belotserkovskaya Experimental Selection Station]

UDC 631.524.2:631.535.2

[Abstract] With sugar and artificial sweeteners said to adversely affect human health, plants that provide natural sweeteners have become the focus of attention among certain researchers. One such plant is *Stewia reabudiana* Bertoni, from whose leaves are extracted a low-calorie substance that is 200-300 times sweeter than saccharose. In 1988 and 1989, the researchers here performed experiments to determine the effect that leafiness of cuttings and the presence of axillary buds on their basal sections have on rooting ability and seedling growth. Green apical stem cuttings with two, three, and four pairs of fully formed leaves and axillary buds near the base of the cuttings (and without the buds) were transplanted in the first third of February and in the second third of April. Rooting ability was found to be sensitive to leafiness and duration of daylight. Rooting ability grew as the initial number of leaves on the cuttings dropped, i.e., when the physiologically young apical part of the plant was put in the ground. If two pairs of leaves resulted in good supply of water to tissues and normal metabolism because of small evaporative surface, four pairs of leaves meant less water for those tissues, disrupting photosynthesis and other metabolic processes. Intensity of rhizogenesis and other organ-forming processes was higher in April than in February. Figures 1; references 20: 8 Russian, 12 Western.

Enhanced Ergosterol Production by Industrial Saccharomycetes

927C0008B Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 22 Feb 90) pp 10-12

[Article by N. A. Sinitskaya, T. Ye. Ogorodnikova, M. V. Gafarova and N. P. Mikhaylova, All-Union Scientific Research Institute of Plant Material Hydrolysis, Leningrad]

UDC 663.14

[Abstract] Physiological studies were conducted on Saccharomyces cerevisiae mutants showing enhanced ergosterol synthesis to determine other physiological correlates. The object was to isolate mutants on par with wild strains in terms of susceptibility to environmental factors. The key findings were that 20 percent of the mutants displayed undue susceptibility to elevated incubation temperatures, 61 percent were intolerant of 1 M KCl, 100 percent were resistant to nystatin, 29.6 percent to candicidin and 50 percent to amphotericin B. Five strains were identified as having commercial promise for the production of ergosta-8,24(28)-diene-3β-ol, ergosta-7,22-diene-3β-ol, cholesta-8,24-diene-3β-ol, cholesta-7,24-β-ol and ergosta-5,7-diene-3β-ol. Tables 2; references 14: 9 Russian, 5 Western.

Intermittent Fluctuations in Tetracycline Resistance in Chemostat Cultures of Recombinant *E. Coli*

927C0008B Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 13 Nov 89) pp 13-15

[Article by V. V. Velkov and V. Yu. Matys, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

UDC 663.18

[Abstract] Tetracycline resistance was determined for recombinant E. coli KK2036-(pBY37) with the $pro^+CM^rTC^r$ phenotype in relation to growth rates in chemostat cultures. At a growth rate of 0.4 h^{-1} 98-100 percent of the plasmid-bearing cells were tetracycline resistant over a period of 70 generations. When the growth rate was reduced to 0.2 h^{-1} $pro^+CM^rTC^s$ clones were observed after 18 generations for the subsequent 50 generations, falling to 10 percent and increasing to 90 percent every 10-12 generations. After culture under batch conditions the $pro^+CM^rTC^s$ reverted to $pro^+CM^rTC^r$. Furthermore, plasmids isolated from the $pro^+CM^rTC^s$ clones were identical to those isolated from the parental $pro^+CM^rTC^r$ clones. A similar pattern was observed with a growth rate of 0.6 h^{-1}, but with a periodicity of 15 generations and amplitude of fluctuations in the 50-100 percent range. These findings indicate that fluctuations in tetracycline resistance were due to physiological factors related to conditions prevalent in a chemostat. Accordingly, assessment of plasmid status of recombinant cultures in a chemostat on the basis of phenotype may give erroneous results. Figures 4; references 8: 4 Russian, 4 Western.

Transformation of Lycopersicon Esculentum Bachtemir Tomato Plants

927C0008C Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 7 Feb 90) pp 16-18

[Article by G. Ye. Norova, A. B. Kaliyev, V. M. Andrianov and E. S. Piruzyan, Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

UDC 631.523.11

[Abstract] Several techniques were tested for production of transgenic Lycopersicum esculentum var. Bechtemir tomato plants. The essential approach relied on infection with recombinant Agrobacterium tumefaciens (9pGV 3850 Neo), A. rhizogenes ($pGKSG_2$) and A. tumefaciens (pGV 3850 Neo-xyl). Successful techniques consisted of the use of cotyledon and hypocotyl explants as targets for infection and subsequent plant regeneration under conventional conditions, whereas attempts at leaf disk transformation were unsuccessful. The transgenic nature of the regenerated plants was demonstrated by acquisiion of the ability to grow on kanamycin medium, expression of appropriate enzymatic activity, or Southern-blot hybridization. Figures 3; references 14: 1 Russian, 13 Western.

Preparation and Characterization of Monoclonal Antibodies Against Vibrio El Tor Enterotoxin

927C0008D Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 3 May 90) pp 19-21

[Article by T. A. Slavyanskaya, V. I. Mareyev, T. M. Lesnykh, Ye. F. Kirillova, L. V. Ivanova, N. B. Nepomnyashchaya, A. F. Alimov and I. G. Gamleshko, Antiplague Institute, USSR Ministry of Health, Rostov-on-Don]

UDC 57.089.33:579.843.1

[Abstract] Monoclonal antibodies (MA) were generated against Vibrio El Tor enterotoxin in the conventional manner, using 16-18 g BALb/c mice for immunization and subsequent splenocyte fusion with murine X63-Ag8.653 plasmacytoma cells in a ratio of 2:1. Subsequent intrasplenic implantation of the hybridomas into recipient mice resulted in ascites formation and isolation of the MAs. Nine stable hybridomas were obtained, eight of which produced IgG-2b antibodies and one yielded IgM. All MAs were specific for toxin derived from Vibrio El Tor 1310, failing to react with toxins derived from strains 569B and 569B (Calbiochem). The MAs were

active in conventional testing techniques, including ELISA, Craig neutralization, Ouchterlony diffusion, and toxicity neutralization on CHO cell line. Tables 2; references 10: Western.

Induction of L-Amino Acid Oxidases by Bacterial and Fungal Biostimulants

927C0008E Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 1 Aug 90) pp 25-26

[Article by I. P. Smirnova and O. L. Potapova, Peoples Friendship University imeni P. Lumumba, Moscow]

UDC 663.152

[Abstract] Trichoderma sp. were employed as a target species to determine whether its production of L-amino acid oxidases could be enhanced by incubation in media enriched with 1 percent culture medium used for cultivation of bacterial and fungal amino acid producers. The results demonstrated significant enhancement in the case of Brevibacterium sp. NITIA-86, Br. flavum 32-D and Br. flavum AP-111, and less pronounced enhancement with culture fluid from the fungi Ulocladium sp. and a Trichoderma sp. Increasing the concentration to 2 percent did not result in a corresponding increase of L-amino acid oxidases. These findings suggest that similar factors are produced by amino acid producing microorganisms which act to induce amino acid oxidases. However, it remains to be determined whether individual oxidases were induced or a single enzyme with a wide spectrum of action (L-lysine, L-phenylalanine, L-tyrosine, L-arginine, L-methionine, L-histidine, D,L-leucine). Tables 3; references 9: 4 Russian, 5 Western.

Clarification of Coal Mine Waters by Microalgal Associations

927C0008F Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 13 Dec 89) pp 53-56

[Article by I. A. Zolotukhin, K. I. Yeropkin, V. P. Shekhovtsov, L. V. Strakhova and L. I. Ovchinnikova, All-Union Scientific Research and Engineering Institute for Environmental Protection in the Coal Industry, Perm]

UDC 628.163

[Abstract] A novel device was tested for its efficacy in clarification of the type of waters prevalent at coal mines in order to assess the suitability of microalgal associations for such applications. The device consisted of a 200 cm^3 glass and plastic cylindrical container supporting successive changes in an algal population which, after three to four months, was largely represented by filamentous blue-green algae (90 percent). Aeration was maintained by constant air percolation and 24 h/day illumination was provided from LB-40-1 lamps with an intensity of 5000 to 7000 lux. Preliminary trials showed that introduction of a coal-suspension water to such an association for 0.5 h reduced the sediment concentration from 1000 mg/dm^3 to 20-50 mg/dm^3, and after 1 h to 5-25 mg/dm^3. This method for clarification avoids problems with chemical flocculation or coagulation which leaves water polluted with chemical agents. Changes in water consisted of a reduction in pH from 8.13 to 7.7, calcium concentration fell from 120 to 113 mg/dm^3, magnesium from 24 to 19.5 mg/dm^3, ash content from 706 to 689 mg/dm^3, and carbonates from 87 to 43 mg/dm^3. A key feature of this system is that it is self-regenerating and environmentally innocuous. Figures 4; references 10: 5 Russian, 5 Western.

Ecologic Monitoring of Hydrocarbon-Utilizing Candida

927C0008G Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 22 Feb 90) pp 57-60

[Article by N. B. Gradova, S. A. Zaytsev and V. I. Gadzhiyeva, All-Union Scientific Research Institute of Biosynthesis of Protein Substances, Moscow; Microbiology Section, Azerbaijan SSR Academy of Sciences, Baku]

UDC 663.14

[Abstract] Environmental dissemination of Candida maltosa, which utilizes n-paraffins and is used for the production of protein-vitamin concentrates, was monitored at small and large biotechnology plants. Analysis of air samples revealed C. maltosa cells at a distance of 200 m from the small plant and 1000 m from the large plant. However, the cells were completely inactivated within 40-50 min by irradiation with 310 nm and longer-wavelength light characteristic of the solar spectrum. Special determinations also showed complete elimination of C. maltosa from the rhizoplane and the rhizosphere within two weeks, while analysis of soil samples revealed 10- to 100-fold decrements after a week. Accordingly, monitoring showed that C. maltosa did not pose an environmental threat since it was rapidly eliminated under the pressure of environmental physical, chemical and biological factors. Figures 4; tables 1; references 15: 13 Russian, 2 Western.

Energy-Dependent Concentration of Au(III) by Microalgae

927C0008H Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 13 Feb 89) pp 65-68

[Article by V. I. Karamushka, Z. R. Ulbert, T. G. Gruzina, N. V. Sukhoviy and P. M. Tsarenko, Institute

of Botany imeni N. G. Kholodnyy, Ukrainian SSR Academy of Sciences, Kiev]

UDC 579.695

[Abstract] An analysis was conducted on the mechanisms involved in the accumulation of Au(III) by prokaryotic (blue-green) and eukaryotic (green, red) algae from chloride solutions. The results showed that only Porphyridium sordidum, P. cruentum, Anabaena cylindrica and Anacystis nidulans failed to accumulate Au(III), whereas the mechanism of accumulation was active in all other species tested and dependent on electron transport since it was inhibited by sodium azide. Detailed studies on Chlorella vulgaris UA-1-1, using a variety of metabolic inhibitors, led to the conclusion that, following primary electrostatic attraction, incorporation of Au(III) was dependent on plasma membrane ATPase activity. Figures 4; tables 2; references 16: 8 Russian, 8 Western.

Influence of Design of In-Line System for Cell and Virus Production on Productivity

927C0008I Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 18 Sep 89) pp 69-72

[Article by E. I. Kozhushko and A. G. Bachinskiy, All-Union Scientific Research Institute of Molecular Biology, "Vektor" Scientific Industrial Association, Koltsovo, Novosibirsk Oblast]

UDC 579.083.13

[Abstract] Description is provided for the application of the Monte Carlo method to the design of multifermentor in-line systems for large-scale production of animal cells and viruses. Such computational algorithms facilitate design of efficient production systems responsive to any in-line changes and capable of immediate adjustment. The net effect is enhanced efficiency of the entire production process and greater control over quantity and quality of the product. Specialized algorithms of this type are particularly crucial in biotechnological processes dealing with the processing and production of labile animal cells and viruses. Figures 2; tables 3; references 3: Russian.

Bioluminescent Determination of Long-Chain Aliphatic Alcohols

927C0008J Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 13 Feb 89) pp 78-81

[Article by Ye. G. Kiseleva, A. D. Ismailov and V. S. Danilov, Moscow State University]

UDC 577.152.153:57.08:579.843

[Abstract] Bacterial luciferases derived from Photobacterium fischeri and Beneckea harveyi were used for design of bioluminescent assays for long-chain aliphatic alcohols. Studies with the P. fischeri-based system showed threshold sensitivities of 10E-8 M for decanol, 10E-9 M for dodecanol, 5 x 10E-11 M for tetradecanol, and 5 x 10E-10 M for cis-6-hexadecenol and cis-11-hexadecenol. Greater sensitivities were obtained with the B. harveyi system: 5 x 10E-12 M for decanol, 10E-12 M for dodecanol, 10E-11 M for tetradecanol and cis-6-hexadecenol, and 5 x 10E-13 M for cis-11-hexadecenol. Accordingly, the bacterial luciferase-based systems were ca. 100-fold more sensitive than gas-liquid chromatography in the analysis of these alcohols. Figures 6; references 12: 6 Russian, 6 Western.

Hybridoma Growth Kinetics in Serum-Free Medium

927C0008K Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 91 (manuscript received 13 Feb 89) pp 86-90

[Article by Ye. V. Gusev, A. Ye. Vinogradov, N. S. Nikolayenko, Yu. M. Rozanov and G. P. Pinayev, Institute of Cytology, USSR Academy of Sciences, Leningrad]

UDC 57.086.83

[Abstract] Flow-fluorimetry was utilized in monitoring growth kinetics and viability of mouse hybridomas (lines 262/2, 268/2/10, 218/15) producing monoclonal antibodies against human α_2-interferon in a serum-free culture medium [Murakami et al., PNAS USA, 79: 1158, 1982]. The following growth and metabolic maxima were observed: maximum intracellular protein concentration at 30-40 h; maximum antibody concentration/cell in the medium determined by enzyme immunoassay at 45-50 h; maximum percentage of proliferating cells at 2.5 days; and maximum viability on the fourth day. These criteria, particularly intracellular protein concentration and time of maximum division, may be used as rapid indicators of cellular viability and as criteria for selection of optimal growth conditions. Figures 4; tables 2; references 11: 5 Russian, 6 Western.

Long-Term Prediction and Computer Simulation of Epizootic Plague

927C0161A Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 3, Mar 91 pp 28-29

[Article by M. A. Dubyanskiy, L. D. Dubyanskaya, V. M. Stepanov, A. V. Sudbin, S. K. Bogatyrev, and O. A. Baytanayev; Central Asian Anti-plague Institute, USSR Ministry of Health (Minzdrav SSSR)]

UDC 559.32:619.9-036.2

[Text] Plague is a disease which is especially dangerous to man. Wild rodents represent the reservoir of infection of the plague microbe. Very powerful epizootics break out among them from time to time. The risk of human infection is especially great precisely at those times, particularly to shepherds living in direct proximity to these animals. Active epizootics do not unfold simultaneously throughout the entire epizootic territory: alongside areas in which the contagiousness of rodents reaches dimensions which threaten the infection of humans, there is usually an extensive territory in which the microbe is not found at all at that particular period of time. If one knew several years in advance when and where an active epizootic would appear among rodents, measures could be prepared in advance which could reduce the risk of people becoming infected, the population could be advised, changes could be made in the distribution of cattle drives to range, special measures could be taken for the earliest possible diagnosis of cases of the plague, enhanced observation of the course of the plague could be set up, etc.

As one of the principal research areas of our Institute, the prediction of epizootics has achieved successes in the field of the generation of short- and middle-term forecasts, i. e., for a year and a half [1]. With regard to a longer-term prediction, until recently such forecasts did not exist. At the present time a qualitative leap has been mapped out along these lines: Methods have been developed for the forecasting of the most probable periods (a year, a number of years) of the activation of epizootics. At the same time, the territory covered by the forecast can be of varying magnitude—from large regions of 500,000 ha to small squares 40 km to the side.

The invariable condition for the development of a forecast is the presence of uninterrupted observations over the course of many years, and the population of carriers of the microbe for not less than 30 years. The notion which underlies forecasting are the cycles of natural phenomena, including epizootic activity, that are built up of waves with periodic recurrence. In this connection, these periods represent, with respect to length, a series of simple sequential numbers, the specific magnitude of which is determined by the essential nature of the object and the specific character of its life rhythms. The most frequent length of periods for the epizootic activity of the plague, judging by the intervals between peaks in various foci, should be three to 10 years.

This implies that a quantitative flareup in the process under study follows every three, four, and 10 years, but is imperceptible due to the superimposition of periods of various lengths, which lead to the intensification of some flareups and the attenuation of others. For example, a three-year flareup may be compensated (camouflaged) by the minimum of a four-year period, etc. It is natural that flareups with different periods can occur in different years, but sometimes they coincide. Then they produce a powerful quantitative shift in the course of the process which is in fact recorded in the form of a peak in the cyclical phenomenon. It is clear that coincidences of periodic flareups can recur. Thus three- and four-year flareups, having coincided once, will coincide again in 12 years, etc. Minima should obviously be confined to years with a minimal number of superimpositions of flareups.

Incubation periods can be identified. Thus a three-year period becomes evident after the following manipulations. Take a series of successive yearly measurements and add each of them with several measurements from a retrospective series, but selected with a three year interval. Then calculate the average for each of the samples formed. The new series of average values, which corresponds by years to the initial series, will manifest a three-year periodicity of maxima. In addition, the place of each of the selected annual measurements in the three-year periodic fluctuation of the process under study will be determined. Similarly determined are the presence and confinement to specific years of flareups and a different length of periods. The calculation of the number of coincidences of flareups in fact underlies long-term prediction: if there are many coincidences, an intensification of the process must be expected; if there are few, attenuation must be expected. Not only can the number of coinciding peaks of the periods be used as prognostic indicators, but the number of high values which overshoot the median or other pre-set values can be used as well. In this case, however, the term of the forecast is limited to the length of the minimal period of those selected, for example, to three years. The values of the averages can also be compared with the analogous ones of the preceding year, and the commencement or absence of an extremum of the process to be predicted can be judged on the basis of the quantity (number) of overshooting instances.

This method has been tested and statistically validated during a trial prognostication of three to 11 year epizootic activity of plague for 25 areas of the Kara-Kalpak Kyzylkum, for the part of the Kyzylkum investigated by the Aral Sea antiplague station, for the Bakanas lowland of the South Balkhash region, and for the Aral-Karakum region focus as a whole. In addition, it has been tested and approved in the prognostication of the population of great and midday gerbils in the areas indicated.

Two forecasts were arrived at for each of the areas—epizootics and the population of the principal carriers of the microbe; it was possible, by comparing these, to ascertain that they were not in contradiction. After this,

the periods of the activation of epizootics were determined. In this connection the forecasts did not contradict one another in the following instances: 1) if a high degree of epizootic activity was expected, and the population of rodents showed a tendency to decline with the level still high; 2) if the epizootic activity was expected to be moderate, and the population of carriers showed a tendency to increase or was very low. Contradictions were possible when an extremum was expected for an epizootic, but the population of rodents was very low or in a sharp upswing.

The following is the predictive algorithm. A series of observations of the object of many years are divided into two unequal parts: a main portion, which includes at least 30 dates, and a model portion, from 10-12 years. For example, the main portion can comprise observations during 1951-1977, and the model portion, during 1978-1988. The main series is divided into segments corresponding to the length of the proposed periods (these periods are three to 10 years for the population of rodents and the activity of the plague epizootics). Then new series are arrranged, including the values of the initial series through the assigned interval of dates. Truncated series of varying lengths are obtained. The indices of each sample are summed and the arithmetic mean is calculated from each. For example, the 1977, 1974, 1971, 1968, 1962, 1959, 1956, and 1953 values are selected when making up a series with a three-year interval from the initial 1951-1977 series. The average will be referenced to 1980. The series of four-year samples will include 1976, 1972, 1968, 1964, 1960, 1956, 1952, and so forth, and the average will be referenced to 1980. To sum up, several averages will be taken for 1980, over the number of thinned-out series and intervals. In our case, given three to 10 [year] intervals, there will be eight such averages for 1880 [sic], as many for 1979 and 1978, but only seven for 1981, six for 1982, five for 1983, etc.

If the data on the averages not across length but across years are now considered, a maximum value can be singled out among the averages of each period. If the initial series is then lengthened, by keying in the years of the model period, the average values of truncated, thinned-out series over all periods up to 1991, inclusive, can be derived. In this case the averages will manifest the fluctuation of the data over years which corresponds to those periods, with respect to the length of which the truncated series were composed. For example, the maximal value can appear, for a three-year interval, in 1972, 1982, 1985, 1988, and 1991; for a four-year interval, in 1979, 1983, 1987, and 1891 [sic], etc. In a word, peaks of those periods are found from which the cyclicity of the processes is in fact built up. Their relative position and the possibility of formulating a long-term prediction are elucidated.

Thus, the predictive algorithm is simple, but a great deal of time is required for the performance of the uniform operations. Therefore a computer is necessary. The program for the computer analysis was designed by A. V. Sudbin. As a result, instead of performing calculations manually for many days, five to 10 minutes of work on the computer are sufficient. The initial data file is entered. After this a table of average values over the period for the model years with markers of the peak periods appears on the screen. The following frame shows the sum of the peaks not only for the model years, but also for all the preceding years in comparison with the actual data. The last program step shows the number of peaks for each year of the future (up to the year 2000) on the screen. Of course this is not yet the definitive forecast. It is then necessary, for each area of the focus separately, using statistical investigations, to determine the number of coinciding peaks, as well as the high values of the periods, which corresponds to the activation of the epizootics. This part of the study requires an additional program. But even at this point, following the manual processing of the final step of the program, recommendations can be given regarding the focal character of plague in those areas which were enumerated in the introductory section of this article.

Activation for those foci with a discontinuous course of epizootics (the Bakanas lowland, the Kyzylkum) commences when the peaks of not less than three periods coincide. For foci with a continuous course of epizootics the coincidences of two periods are sufficient in order to forecast the activation of an epizootic. The prediction is especially reliable if a group of such years is discriminated.

Effect of Intravascular Laser Irradiation of the Blood on the State of Adrenergic and Cholinergic Structures of the Small Intestine in Experimental Peritonitis

927C0110D Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 100 No 1, Jan 91 (manuscript received 16 Oct 1989) pp 19-24

[Article by N. A. Khlopov (deceased), L. S. Kochkina, and Ye. I. Sluchanko, Department of Routine Surgery with Topographic Anatomy and Department of Normal Anatomy, Karaganda Medical Institute]

UDC 616.151-085.849.19:611.839.3:611.341:616.381-002-021.6:57.08

[Abstract] Some 85 percent of cases of peritonitis involve disruption of the motor system of the intestine, with functional impassibility. In light of that and the fact that cholinergic and adrenergic mechanisms play an important role in the regulation of intestinal motor function, the researchers here chose to study the state of those structures in various sections of the small intestine in experimentally induced peritonitis and its treatment. In one series of experiments, relaparotomy was performed on dogs one day after the induction of peritonitis. For the next five days, the dogs underwent antibiotic therapy. In a second series of experiments, the antibiotic therapy was combined with five sessions of intravascular laser irradiation (LG-75-1, 0.5 mW, 632.8 nm, 60 minutes). Fourteen days after the end of the treatment, neural conductors in the animals of the second series were straighter, and there were fewer varicose enlargements, with no vacuolization. Acetylcholinesterase (ACE) activity in the cholinergic fibers of the muscular layer of the small intestine was lower. Within 21 days, the density of the cholinergic fiber plexi was elevated, ACE activity on them was considerably increased, and structural organization was normal. Response to ACE was positive in the cytoplasm of the neurons of the intestinal-muscle plexus. Within 30 days, ACE response was still positive. Density of cholinergic fibers was normal. Figures 3; references 9: 8 Russian, 1 Western.

Autohemotransfusion and the Problem of 'Safe' Blood

927C0048 Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYAin Russian Vol 36 No 2, Feb 91 (manuscript received 14 Jun 90) pp 22-25

[Article by M. K. Nazarpetyan, Yu. S. Karapetyan, and R. K. Antonyan, Armenian Scientific Research Institute of Hematology and Blood Transfusion imeni Prof R. O. Yeolyan, Yerevan]

UDC 615.381.06

[Abstract] Despite the relatively lower risk associated with blood transfusions, one out of five transfusions of homologous blood is accompanied by unwanted side effects. The risk of posttransfusion complications due to the transmission of viral hepatitis is, in fact, quite high, and recent years have witnessed the appearance of the new threat of HIV infection. Those concerns have prompted a search for safe, inexpensive alternatives to the use of donor blood, and the researchers here suggest three such alternatives, all involving autohemotransfusion, i.e., the reimplantation of the individual's own blood: (1) storage of autologous blood, (2) pre-op isovolemic hemodilution, and (3) intra-op salvage of blood. Each of the techniques has contraindications as well as indications, but the third option is felt to be the most efficient and is indispensable in operations involving large blood loss. The researchers do point out that storage of autologous blood offers the advantage, among others, of being of positive psychological value for the patient, inasmuch as it consciously brings the patient into the healing process. As for pre-op isovolemic hemodilution, the researchers voice a preference for reinfusion of washed erythrocytes over reinfusion of whole blood. References 13: 1 Russian, 12 Western.

Method of Detecting Phages in Lysogenic Strains of Cholera Vibrions

927C0091A Moscow LABORATORNOYE DELO in Russian No 2, Feb 91 (manuscript received 4 May 1990) pp 56-57

[Article by T. A. Kudryakova, L. D. Makedonova, L. R. Cherkasova, and O. V. Dudkina, Rostov-na-Donu Scientific Research Antiplague Institute]

UDC 579.843.1:578.262

[Abstract] Lysogenic cultures of cholera vibrions are a source of moderate phages whose specific properties can be used as a taxonomic criterion. Besides being employed for direct and indirect phage typing and intraspecies differentiation, such phages are used for testing lysogenic strains of cholera vibrions. The researchers here sought to simplify the method for identifying phages in lysogenic strains—normally the inactivation of the host bacterium with chloroform, with subsequent centrifugation of the phagolysate or filtration. The study material consisted of 230 strains of cholera vibrions. The researchers' method consisted of the use of a broth with 15 percent urea for growing the lysogenic strain. The cholera phage was detected in the following manner. A test tube with 2 ml of the broth is inoculated with an agar culture of the lysogenic strain. The inoculation is grown for 12-24 hours at 37°C to produce the phagolysate. Then a dense nutritive medium is prepared containing the indicator culture. For that, 0.3 ml of four- to five-hour-old broth culture of the El-Tor test strain are introduced into 4 ml of 0.7 percent Marten agar heated to 45°C, which is poured out onto the surface of of 2 percent agar plate in a Petri dish with the two-layer method. Two drops of the phagolysate are placed on dried grass. The dishes are placed into an incubator at 37°C. A zone of lysis of the indicator strain or isolated negative colonies of the phage are observed in the place where the drops were applied. The method enables, within 12-18 hours, the acquisition of cholera phages from lysogenic strains that are typical in terms of biological properties or atypical and resistant to diagnostic cholera-strain phages. References 10: 8 Russian, 2 Western.

Interaction of Anthrax Bacteriophage Z-17 and Strains of *Bacillus anthracis*

927C0092 Moscow VETERINARIYA in Russian No 5, May 91 pp 26-28

[Article by V. S. Rusaleyev, Kustanay Agricultural Institute]

UDC 619:616.981.51-076

[Abstract] The anthrax indicator bacteriophages Gamma-MVA and K-VIEV are widely used in the Soviet Union, but the presence of weakly sensitive and phage-resistant strains has made it necessary to determine the mechanisms of the interaction that takes place in the phage-cell system. The researchers here studied the effect of the phage Z-17 on capsule and noncapsule strains of *B. anthracis,* 71/12 and Shuya-15, respectively. In an examinination of how the phage sensitivity of strains is affected by the capsule, the strains of *B. anthracis* were grown on yeast, serum, and carbonate agars. Shuya-15 formed rough colonies on all three media. Strain 71/12 formed similar colonies on the yeast, but slimy colonies on the other two, with isolated rough colonies. Microscope studies revealed that the capsule around the cell was missing in the isolated colonies, indicating that the capsule forms only under certain conditions for a given strain (a function of the plasmid pXO2, according to the literature). Joint cultivation of bacterium and phage on dense nutritive media led to complete lysis of the cells of the capsuleless Shuya-15. Phagolysis of strain 71/12 was recorded only on a yeast medium (serum and bicarbonate agars inoculated with a mixture of the strain and equine serum showed slimy colonies). Spores of both strains inoculated on a yeast agar formed rough colonies that were externally similar, but were heterogenous upon reinoculation on capsule-forming media. Bacteriophage Z-17 was added to a mixture of spores to differentiate the cells; it lysed the capsuleless cells, but had no effect on the others. The resistance of the capsule cells was felt to be due to the inability of the virions to be adsorbed on the capsule. Lysis of cells of strain 71/12 by the K-VIEV bacteriophage was thought to be the result of a bactericidal effect. References 5: 4 Russian, 1 Western.

New Instruction Relating to the Handling of Narcotic and Toxic Pharmaceuticals

927C0021A Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 2, Feb 91 p 72

[Article by V. E. Akimochkin, Colonel, Medical Service; under the rubric "Military Pharmacy and Medical Technology"]

UDC 615.2.004.2:355(083.13)

[Text] A new "Instruction Relating to the Handling of Narcotic and Toxic Pharmaceuticals in the Soviet Army and Navy," replacing the "Instruction Relating to the Handling of Especially Toxic, Toxic, and Narcotic and Pharmaceuticals in the Soviet Army and Navy," put into effect by order of the Deputy USSR Minister of Defense, Chief of the Rear Services of the Armed Forces of the USSR, in 1982, was developed and put into effect by the Central Military Medical Directorate of the USSR Ministry of Defense by order of the USSR Minister of Defense from March 1, 1991. The development of the Instruction was brought about by changes in the classification and nomenclature of narcotic and toxic pharmaceuticals, by the enhancement of the responsibility of commanders of units and formations for the organization of the storage and preservation of narcotic pharmaceuticals, and by the enhancement and improvement of control over their storage and utilization.

Requirements for the equipment of facilities for the storage of narcotic and toxic pharmaceuticals are increased. These should meet the following requirements:

—provided with substantial outer walls, a solid ceiling structure and floor. The internal walls (partitions) should be equivalent in solidity to paired gypsum concrete panels, 80 mm in thickness, each with steel grating or brick wall, 120 mm in thickness and reinforced with a metal grid, interlaid between them. In buildings of old construction, partitions of boards reinforced with steel gratings are allowed;

—have two doors with solid and reliable latches; in this case the outer door is of board, not less than 40 mm in thickness, lined on both sides with galvanized roofing iron, with bending of the edges of the sheet onto the end face of the door; the inner is a slatted iron door. The framing of the door opening of the facility in which the narcotics are stored (the doorframe) is of steel molding. In previously constructed buildings, wooden doorframes, reinforced by a steel corner measuring 30 x 40 mm, not less than 5 mm in thickness, fastened to the wall by pins of rebar steel, 10-12 mm in diameter and 120-150 mm in length;

—have iron gratings on the window openings on the inside of the facility or within the window frames. The ends of the grating rods in the window openings are embedded in the wall to a depth of not less than 80 mm and are sealed with concrete. The gratings set in the window openings are made of steel rods, not less than 15 mm in diameter. The rods are welded at each imbrication, forming cells of not more than 150 x 150 mm.

The procedure for the storage of narcotic and toxic pharmaceuticals at the medical depot has been changed. Two officials responsible for their storage are designated by order of the chief of the medical depot, and provision is made for replacement in case of prolonged absence (official trip, leave, illness, etc.). The doors of the facilities (repositories) are closed by two reliable locks, the keys to which are held by the two above-mentioned officials, and are sealed with their personal seals. The opening of the facilities (repositories), safes, closets by one of the officials is categorically prohibited. After the completion of the work day the keys are handed over to the depot person on duty under seal and is kept in a separate chest (box), sealed with the two seals of the indicated officials.

A new procedure has been defined for the keeping of narcotic pharmaceuticals in reserve stocks and materials of the second group, according to which narcotic pharmaceuticals kept in pharmacies, [medical] chests, medical bags, and reserves levels are withdrawn, with the exception of military units and ships carrying an operational watch, and are to be kept in the medical depots of districts, forces groups, and fleets in specially equipped facilities (repositories) guaranteeing their safeguarding.

In all cases of theft or loss of narcotic pharmaceuticals, dispatches and reports are to be presented according to the established procedure, with notification of the appropriate military prosecutors. The results of the effort to guarantee the safeguarding and rational use of narcotic and toxic pharmaceuticals are to be analyzed, correlated, and annually announced in the Order of the general officer commanding the forces of a district, a forces group, or a fleet.

The strict and unconditional fulfillment of the requirements of the present instruction will guarantee the safeguarding of narcotic and toxic pharmaceuticals, their rational prescription, and lawful use.

Methods of Monitoring Nonionizing Radiation

927C0060A Moscow GIGIYENA I SANITARIYA in Russian No 5, May 91 (manuscript received 4 Sep 1989) pp 57-59

[Article by K. V. Nikonova, T. G. Samusenko, Scientific Research Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow]

UDC 613.648.2-074

[Text] This paper examines issues of the metrology of electrical, magnetic, and electromagnetic fields (EMF) in the frequency range up to 300 GHz, because measurement and assessment of electromagnetic radiation (EMR) of the optical range constitute an independent, albeit no less important problem that merits special analysis.

For the sake of objectivity, it should be pointed out that the situation with the metrology of the above factors has improved considerably in recent years, although not enough to provide effective monitoring of all the frequency ranges for which health norms have been approved or are being developed.

Depending on the physical characteristics of EMI of various frequency ranges that determine the conditions necessary for field formation, the intensity of electrical and magnetic fields (E and M) in the frequency range up to 300 MHz and the surface energy flux density (EFD) in the range above 300 MHz are the regulated parameters in current regulatory documents. Along with the parameters that characterize EMI intensity, the level of energy the body is exposed to in a working day is also regulated for the range of 60 kHz to 300 GHz, expressed as the product of field strength squared and time in the range up to 300 MHz ($EI_E = E^2 \times T$ and $EI_M = M^2 \times T$) or as the product of EFD and time in the range above 300 MHz ($EI_{EFD} = EFD \times T$).

Two types of instruments are used for monitoring the intensity of variable electrical, magnetic, and electromagnetic fields: instruments with antennas that require consideration of field polarization (directional) and meters with isotropic sensors (see the table). The former measure E and M in the near and far zones of radiation or EFD in the far zone, i.e., at distances (r) from the source $r \geq d^2/\lambda$, where d is the largest geometric dimension of the receiving antenna and λ is the wavelength of the radiation; in measurements from the antenna systems, $r \geq D^2/\lambda$, where D is the maximum dimension of the emitting aperture. A substantial drawback associated with the instruments is their unsuitability for metrological assessment of complex fields, including those created by several sources.

Principal characteristics of some types of instruments used for measuring intensities of radio frequency EMFs, CMFs, and SEPs

Instrument	Primary characteristics (principle of operation)	Working range of frequencies	Measurement limits	Accuracy	Remarks
NFM-1	EMF intensity meter with polarization-sensitive dipole and loop antennas	E: 50 Hz, 60 kHz-350 MHz, H: 100 kHz-10 MHz	E: 2-40kV/m (50 Hz); 2-1500 V/m (60 kHz-350 MHz); H: 1-10 A/m	+ 20%	
PZ-16 (PZ-15, PZ-17)	EMF intensity meter with isotropic sensors	E: 10 kHz-300 MHz; H: 10 kHz-300 MHz	E: 1-1000 V/m, H: 0.5-16 A/m (PZ-16); E: 1-3000 V/m, H: 0.5-500 A/m (PZ-15, PZ-17)	+ 3 dB	Measures pulsed EMR in range ≥ 100 kHz with pulse frequency train > 5 Hz, duration > 2 μs, on-off time ratio < 20
PZ-21	EMF intensity meter with isotropic sensors	E: 10 kHz-300 MHz, H: 10 kHz-30 MHz	E: 1-1000 V/m, H: 0.5-16 A/m	+ 2.5 dB	
PZ-1M	Electrical field intensity meter with polarization-sensitive antenna	E: 50 Hz	E: 0.002-100 kV/m	+ 10%	
PZ-9	EFD meter with directional, polarization-sensitive antennas	EFD: 0.3-37.5 GHz	EFD: 0.3-8600 μW/cm^2	+ 40% in frequency range 0.3-2GHz, + 30% in range > 2GHz	Measures pulsed EMR with pulse train frequency ≥ 50 Hz
PZ-20 (PZ-18, PZ-19)	EFD meter with isotropic sensors	EFD: 0.3-39.65 GHz	EFD: from 0.5-5 to 5-10 mW/cm^2 (PZ-18); from 0.5-5 to 20-100 mW/cm^2 (PZ-19, PZ-20)	+ 2 dB	Measures pulsed EMR with pulse train frequency 0.2-10 kHz

Principal characteristics of some types of instruments used for measuring intensities of radio frequency EMFs, CMFs, and SEPs (Continued)

F-4356 millitesla meter	Variable magnetic field induction meter	B: 45-1000 Hz	B: 0.01-100 mT	+ 6%	
G-79 microtesla meter	Variable magnetic field induction meter	B: 20-20,000 Hz	B: 0.02-1000 μT	+ 5%	Taken out of production
Sh 1-8	CMF intensity meter		H: 0-1600 kA/m	+ 10%	
F-4354	CMF magnetic induction meter		B: 0-2000 mT	+ 2.5%	
F-4355	CMF magnetic induction meter		B:0.01-1.5 T	+ 2.5%	
INEP-20D	SEF intensity meter (in three dimensions)		E:0.3-2500 kV/m		
IEZ-P	SEP intensity meter (surface)		E:20-60 kV/m		

The isotropic-sensor instruments do not have those drawbacks. They can be used for evaluating near and far EMFs created by single sources or by multiple sources. Domestically produced meters of that kind are intended for determining the rms value of field intensity (PZ-15, PZ-16, PZ-17, PZ-21) or the mean EFD (PZ-18, PZ-19, PZ-20). Those instruments have a rather broad range of working frequencies and measurable intensities, do not require consideration of field polarization, and enable measurement in intermittent fields with a given pulse train frequency and on-off time ratio. The shortcomings of the instruments consist in their large dimensions and heaviness, plus the absence of a direct scale readout, which makes subsequent, rather labor-intensive calculation necessary. Apparently, it is because of those very shortcomings (which, by the way, foreign instruments don't have), health monitoring usually uses the NFM-1 near-field meter (Nahefeldmesser), rather than domestic isotropic-sensor instruments. The NFM-1 was developed by GDR specialists as a modification of the Soviet IEMP-1 in the context of interinstitute collaboration between the USSR Academy of Medical Sciences Scientific Research Institute of Labor Hygiene and Occupational Diseases and the GDR Ministry of Health Institute of Labor Medicine. It is easy to use because of its small size, light weight, and direct scale readout, and it operates in a broad range of frequencies.

The USSR Ministry of Health and the USSR Academy of Medical Sciences Scientific Research Institute of Labor Hygiene and Occupational Diseases overcame some rather large difficulties in arranging the purchase of the NFM-1 in GDR. However, the absence of centralized data on need resulted in a temporary disruption of the market in the USSR of purchased instruments, and the foreign trade association Svyazzagranpostavka had not yet signed the agreement for the delivery of the instrument to the USSR as of 1989. As a result, a situation came about in which the purchased instruments were already distributed, and the many new incoming requests of organizations couldn't be met.

At present, work has been done to improve the isotropic-sensor meters (the PZ-21); nevertheless, not delivering the NFM-1 to the USSR is premature. The controlling organs of the health-epidemiological service and the corresponding departmental services must be equipped with instruments of both types, because the instruments are not currently interchangeable. In addition, the price of the NFM-1, which is capable of performing 70-80 percent of the industry's measurements, is five to seven times lower than the price of isotropic-sensor instruments.

The technical specifications of the metrological equipment listed in the table indicates that it provides measurement of electric field intensity in the frequency range of 10 kHz to 350 MHz and at 50 Hz; magnetic field strength in the ranges of 10 kHz to 30 MHz and 20Hz to 20 kHz; and EMR energy flux density in the range of 300 MHz to 39 GHz.

From the above, it follows that there are no instruments for measuring variable electric fields with frequencies lower than 10 kHz (except for industrial frequency, for which there is the PZ-1M and the NFM-1), variable magnetic fields in ranges lower than 20 Hz or higher than 30 MHz, intermittent electric or magnetic fields with pulse train frequencies of less than 5 Hz or on-off time ratio of more than 20, intermittent EMFs with pulse train frequencies of less than 50 Hz, or fields from rotating or scanning antennas on the beam pass. There are no dosimeters that assess irradiation exposure dose for personnel in the ranges 60 kHz to 300 MHz or 300 MHz to 300 GHz.

No less dramatic is the issue of metrological equipment for assessing static electric fields (SEF) or constant magnetic fields (CMF). Tesla meters (devices for measuring magnetic induction B) are used to measure CMF strength. For that, domestic instruments (Sh 1-8, F-4354, and F-4355) have a lower measurement limit at the maximum safe level (10 mT-100,E-8 kA/m), in connection with which there is a dire need for the development of instruments that are more sensitive. There is no equipment for assessing intermittent magnetic fields. As

for SEFs, the existing instruments do not provide satisfactory evaluation of them in three dimensions. Nevertheless, the developers of GOST 12.1045-84 felt it practicable to include in the regulation that the INEP-20 and the IEZ-P are the recommended meters. In practical terms, however, their use results in data that can't be compared and that, as a rule, considerably exceeds the values cited in foreign publications.

In recent years, special urgency has attached to the problem of the health-related assessment of complex EMFs from sources with a broad spectrum of emissions: displays, coronal discharges, etc. Solving that problem has been coupled with the development of systematic approaches to the assessment of such emissions and with the creation of the appropriate measuring equipment. For that, it is not enough to have instruments of a broad range of action—what are needed are selective meters and spectrum analyzers, which, as a rule, hygiene institutions do not have.

As for the prospects of the development of methods for monitoring, it should be noted that, at present, scientific research work is drawing to a close in the USSR in the investigation of the possibilities of developing a device for measuring EMR energy flux density in the millimeter range (37-170 GHz) and a device for measuring electrical field intensity in the range of 20 Hz to 20 kHz. The GDR Ministry of Health Institute of Labor Medicine is ready to modify the NFM-1 instrument. There are, however, other facts that give rise to the fear that the situation with EMR metrology may again worsen within several years: the purchase of the NFM-1 in GDR has suspended; the G-9 tesla meter has been taken out of production; and the problem of financing the development of equipment for hygiene purposes is acquiring great importance. It can be said without exaggeration that in the new economic conditions, the solution of that problem will depend entirely on whether the USSR Ministry of Health finds the necessary funds to develop measurement equipment.

Another problem that needs to be solved immediately involves our need to develop standardized procedures of measurement, without which comparable data cannot be produced. That problem has acquired special urgency in connection with the introduction into norm-making of the factor of the dose (or energy-level) approach.

In 1988, in accordance with a USSR Ministry of Health order, specialists at the institute familiarized themselves with the work of specialized EMF laboratories of a number of large health-epidemiological stations. Specialists from the Moscow and Leningrad municipal health-epidemiological stations, the Kharkov Oblast Health-Epidemiological Station, and a number of others pointed to the absence of procedural documentation as a serious hindrance to their work.

It seems advisable to back the suggestion of health-epidemiological station specialists on the preparation of a standardized document regarding procedures for measuring EMR of various ranges (from static fields to UV radiation) on the basis of the conditions that attend the use of EMR sources in various production processes. That suggestion could be implemented by creating a temporary group consisting of representatives of hygiene-related scientific research institutes and practical health-care agencies.

In conclusion, it should be emphasized that in the new economic conditions, satisfactory metrological monitoring of adverse factors of the environment requires a centralized solution of the problems associated with the creation, acquisition, and inspection of measurement equipment.

Basic Guidelines for Optimizing Laboratory Services of the State Health Inspection in BSSR

927C0060B Moscow GIGIYENA I SANITARIYA in Russian No 5, May 91 (manuscript received 25 Dec 1989) pp 71-72

[Article by V. G. Zhukovskiy, A. A. Mashtakov, and L. I. Shnayder, Republic Center for Health and Epidemiology, BSSR Ministry of Health, Minsk]

UDC 614.4(476)

[Text] The country's health-care sector as a whole and the health-epidemiology service in particular bear the responsibility for protecting and strengthening the health of the Soviet people, increasing their life spans, and enhancing their creative activity. Restoring the priority held by the preventive side of health care will help to gear the primary efforts of the health-epidemiology service toward the prevention of diseases, some of which (cardiovascular, oncological, etc.) have become epidemic. That is why determining the underlying causes of diseases and developing adequate measures for making the environment healthier are so urgent.

Realization of those tasks, however, is impossible without broad use of objective methods of laboratory inspection, proper organization of that inspection, and the transfer of the achievements of science and technology to the laboratory. The reorientation of the activity of state health inspection organs toward the study and forecasting of the state of health of the population has led to the need for a reexamination of the existing approaches to the organization of the laboratory services of the republic's health-epidemiological service and to their optimization and adaptation to actual

practice. That will take further strengthening of the material-technical base of laboratories, improvement of the structure and volume of research, and a search for and introduction of new organizational forms and methods of work.

It should be noted that measures have been taken before in the republic to strengthen the laboratory base of the health-epidemiological stations and to broadly introduce principles of centralization and specialization. All that made it possible to considerably increase the volume and nomenclature associated with laboratory research and to raise its quality.

In addition, it can be said that the quantitative indices of activity of most of the laboratories of the health-epidemiological stations of the republic have reached a level at which further build-up of the number of research studies is not only inadvisable, but also economically unjustified. Apart from the above-mentioned factors, the intensive path of development of laboratory services has also been fostered by the stereotype that has developed in the assessment of laboratory activity on the basis of quantitative indices. The tendency evinced by most of the specialists of the day-to-day component of the health-epidemiological service toward broad coverage of facilities subject to health inspection via laboratory testing in the frequent absence of any specific goals or objectives attending its implementation has led to a situation in which, with the high cost of laboratory research, the hygiene-social value of that research remains low. For example, in the structure of laboratory research involving food products, determinations that have no markedly hygienic or epidemiological value account for an average of 70 percent of those made in the republic. The absence of focus in the organization of laboratory testing does not permit an objective evaluation of the extent of the influence of adverse environmental factors on individual administrative territories; nor does it permit the implementation of sound measures to eliminate such factors.

Based on those circumstances, the principal measure aimed at optimizing laboratory testing has involved the elimination of quantitative indices as the main criterion in the evaluation of the activity of laboratories. A concept defining adequacy of health-epidemiological inspection laboratory services has been proposed whose basis consists of the principle of priorities in the determination of environmental indices that directly or indirectly affect public health.

That concept, developed by specialists of the republic Center for Health and Epidemiology of the BSSR Ministry of Health and the Belorussian Scientific Research Health-Epidemiological Institute, contains a list of health indices involving quality of food products and drinking water that must be determined in the laboratories of the health-epidemiological stations. Standardization of the health indices will then enable the formation of a bank of the laboratory data that are badly needed for a focused search of risk factors and for the study and forecasting of infectious diseases via computer.

The republic is conducting a dramatic reexamination of the approaches to the organization of the health-bacteriological testing done at environmental sites. What is made absolutely clear is the need to considerably cut back, and in some cases eliminate entirely, the regular testing of wash-offs in the public catering system, commercial establishments, and preschool and school facilities. Those tests, in our view, do not provide enough epidemiological information. What's needed is to optimize the volume of health-bacteriological tests of the quality of food products, drinking water, and other objects of the environment.

The soundness of that solution is supported by an experiment conducted by the Minsk City Health-Epidemiological Station involving the elimination of regular testing of culinary items, wash-offs at public catering facilities, commercial establishments, preschool facilities, school facilities, and pioneer camps. Without any loss in terms of the epidemiological situation, the workload for specialists in the bacteriological laboratory dropped by 65 percent because of the cut-back of those tests. The elimination of routine testing, plus the broad use of quick tests at facilities under monitoring, enabled the creation in the laboratory of a reserve of manpower and resources that was used for a substantial expansion of the volume of serological testing, for maximum use of EIA techniques, etc. Moreover, the laboratory achieved a substantial material savings. It is suggested that that experience be expanded to other administrative territories of the republic.

Since the performance of complex health-epidemiological and bacteriological tests requires modern equipment and instrumentation and highly skilled specialists, it is proposed that regional laboratory centers be created in the republic (three or four in each oblast). Those centers would be created at the laboratories of large and well-equipped health-epidemiological stations located in large settlement systems and economically developed regions. In the health-epidemiological stations in which the regional centers are to be set up, it is proposed that groups of health-epidemiological analysis be created. The principal objectives of those groups would involve the statistical processing of laboratory data and the determination of the activity of adverse factors and the zones of their influence on public health.

In connection with the fact that the health-epidemiological station of rural category III, because of its limited production potential, is incapable of handling the tasks mentioned above, the republic Center for Health and Epidemiology, which has the right to develop an optimal system for managing the health-epidemiological service, is now examining the question of the advisability of the independent functioning of laboratory subunits of those health-epidemiological stations.

The creation of regional laboratory centers and the improvement of the activity of the network of existing centralized and interrayon laboratories will enable the effective solution of the problems faced by laboratory services in rural areas.

The transition being made by laboratories in the republic to predominate execution of top-priority health-epidemiological testing conducted in the state health inspection system is raising the role of economic agreement relations in the practical activity of health-epidemiological stations. The execution on the basis of economic agreements of testing that does not have health-epidemiological significance at the request of enterprises, facilities, and agencies will help to strengthen the technical base of the laboratories and to set up a material-incentives fund for specialists.

An effective lever for raising the quality and reliability of laboratory testing remains the regular certification of laboratories. Since the positive effect of certification is evident, it is proposed that a systematic transition be made from certification of laboratories to certification of health-epidemiological stations as a whole, so as to make managers of health-epidemiological facilities and specialists of structural subunits assume more responsibility for the quality of the health-epidemiological and epidemic-control measures that are performed.

In light of what has been said above, we feel that the reorganization of state health inspection laboratory services that has been outlined for the republic will be successful in handling the main objective—the protection and strengthening of the health of Soviet citizens.

Activity of the Physician-Hygienist of the Health-Epidemiological Station at the Current Stage

927C0060C Moscow GIGIYENA I SANITARIYA in Russian No 5, May 91 (manuscript received 20 Feb 90) pp 72-73

[Article by V. M. Retnev, Leningrad Institute of Postgraduate Medicine imeni S. M. Kirov]

UDC 614.3/.4(049.2)

[Text] The administrative-command system of management, in our view, has done the greatest psychological damage to the physician-hygienist, inasmuch as he is the only specialist who, according to law, has the right to punish someone who violates health rules and regulations, including any of his colleagues, by means of measures that range from levying a fine to transferring the matter to the prosecutor's office. If one juxtaposes the grand mission of the physician as a humanist and healer and the need to punish violators of health regulations, then it becomes clear that there exists a contradiction between the many decades that students have studied (and continue to study) on health-hygiene faculties and their subsequent work as physician-hygienists.

Nearly a quarter of a century ago, a small step was made to rid hygienists of their nonmedical duties—on planning commissions—but what remained untouched were the no less complex duties involving the oversight of construction and the start-up of completed facilities. Old physicians to this day feel a loss because of their removal from planning commissions, even though they made a great many big mistakes because of their lack of technical expertise. In our view, physician-hygienists should have been freed of their duties in preventive health inspection long ago. No matter how much our comrades are offended by what we say, we will continue to reiterate that the modern hygienist cannot professionally or competently perform expert analysis or inspection of construction or oversee start-up, because his medical knowledge does not constitute the requisite technical knowledge in the architecture, construction, chemistry, physics, and mechanics on which plans are based and facilities are built. We must no longer present the physician-hygienist (in the proper sense of the word, a protector or doctor) as a specialist with a sword of retribution. And that is the very image that managers of administrative and social agencies, and even our physician colleagues, have of the hygienist today. Functioning in accordance with state health inspection law and monitoring the execution of health rules and regulations, he performs his functions, plus the punitive functions. The physician-hygienist, to the layman, is someone who "battles cockroaches and messy garbage bins and levies fines," etc.

A psychological survey of physician-hygienists that we conducted with V. P. Urvantsev and A. V. Anisimova showed a growing concern for their behavior.

What can be done?

We are deeply convinced that the functions involving the oversight of health rules and regulations and, consequently, the functions involving punishment of violators should be taken out of the hands of the physician-hygienist. It is time to focus his attention on man and to propose that he involve himself with the health of people in the direct sense of the word. We must stop camouflaging the actual situation that exists in occupational illness (11,000 cases a year!) and present the true picture, and we should reward the physician and the plant administration for every case detected early. Just as there is no criticism of workers of oncology, tuberculosis, or other dispensaries who identify early forms of disease, there must be no such criticism of physicians who diagnose occupational illnesses. Analysis of the health of the population (children, adults, women, workers, etc.) can be done now, while there are no indices for health evaluation, from the data for morbidity with temporary disability, occupational illness, invalidism, and mortality. That's not a subversion of the activity of the social hygienist, but simply use of those same materials, but for different purposes. The job of hygienists should be to establish a quantitative link between the state of health of the population, on the one hand, and working conditions, living conditions, and lifestyle, on the other. The

purpose of such comparisons, it must be felt, would be to compile a forecast of the health of, say, people living in an environmentally hazardous area or of a single individual, based on the conditions of his housing, food, and work and on his habits. The final result would be hygiene recommendations to Soviet, medical, and social organizations and to managers of facilities involved in preserving public health.

The question of whom the functions of oversight of adherence to health rules and regulations should be given to is a difficult one. Perhaps, they should be transferred to technical inspection and should be placed alongside oversight of adherence to safety and industrial health regulations.

Thus, our proposals for the reorganization of the work of the physician-hygienists of the health-epidemiological stations amount to the following: taken the functions involving oversight of health rules and regulations and punishment of violators out of the hands of the physician-hygienist, replacing them with functions such as analyzing public health (from the data of morbidity with temporary disability, occupational illness, invalidism, and mortality, until there are health evaluation criteria) and establishing a quantitative link between the extent of damage to health and working and living conditions and lifestyle; determining the forecast of health for contingents (oblasts, rayons, cities, enterprises, organizations, facilities) and for individuals; preparing on that basis for Soviet and other organs and organizations suggestions involving the long-term preservation of the health of our citizens.

There is another extremely important sphere of the hygienist—the study of the living, working, and recreational conditions of healthy people. Right now, the attention of physicians of all specialties, including hygienists, is on the sick individual. The hygiene specialist studies adverse environmental factors—what the environment is like, and to what extent it is "damaged." In the final analysis, he makes a judgement about that on the basis of how poor the health of workers, women, children, etc., is, and he uses well-known indices—frequency of visits to treatment facilities, morbidity rate, disability rate, mortality rate—all the while forgetting analysis of just what constitutes healthy people. Here's an example. We have often asked physicians involved in labor hygiene how many healthy individuals there are at the enterprises they monitor, what the working conditions are like for those people, and why those people are healthy, and not once have we received a comprehensible answer from any of them. Of course, those who are more guilty in that regard are the scientists, the instructors, and the senior, more experienced physician-practitioners who have devoted and are continuing to devote all their attention to unhealthy people and are not providing simple criteria that are useful in practical terms for evaluating a healthy body. That is why practitioners are always tracking the same thing—they are searching for violations of health-hygiene welfare that are confirmed by the degree of damage to an individual's health.

Can a hygienist obtain information on healthy individuals and on their living, working, and recreational conditions? We feel that it is possible and necessary even in the absence of a clear-cut determination of the concept of "an individual's health." For example, for hygienists, it is extremely important to know of people at the facilities they monitor who, say, haven't been sick over a period of a year, or two or three years, etc., and to determine what their working conditions are like, what their lives are like, what useful habits they have that preserve their health. If those individuals were more carefully studied by physician-clinicians, then we could, after comparing information, suggest to the organizations higher up not the usual prohibitory measures that come out of the health-epidemiological stations, but intelligent, well-thought-out recommendations for maintaining the health of an entire contingent and of every individual.

We clearly understand that the information proposed for discussion is not something for a quick response. The modern social psychology of the physician-hygienist and the medical administration is nowhere near fully prepared to solve the new problems in practical terms. Moreover, we feel that there are also some boggy places in our suggestions, if only because the author himself was educated and molded in the past.

There should be, in our view, not an abrupt, but a gradual transition to molding the physician-hygienist of the not so distant future. That transition will require a reorientation of curricula of medical institutes and the postgraduate institutes and the preparation of new official documents. We do not think that many people agree with what we have said. Even in repeated discussions of these positions with the labor hygiene physician-students of our institute, not everyone supports the abandonment of the functions that involve monitoring the adherence of health rules and regulations. In addition, some have said that the physician-hygienists would simply have nothing to do if we took their monitoring functions away from them. However, we are gratified by the fact that most of them have nevertheless given their support to the suggestions presented here about changing the functions of the physician-hygienist.

The Organization of Protection and Medical Supply in the Case of Industrial Accidents Involving the Discharge of Powerfully Acting Toxic Substances

927C0159A Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA, in Russian No 4, Apr 91 pp 13-15

[Article by N. A. Melnikova, S. S. Tazhibayeva, R. A. Narmanbetova, T. I. Veprentsova, and A. I. Kardashevskiy; Scientific Research Institute of Epidemiology, Microbiology, and Infectious Diseases, Alma-Ata]

UDC 614.8

[Text] There are about 200 facilities located on the territory of Kazakhstan which are producing or using powerfully acting toxic substances (PATS) in technological processes. The most widely used of these are chlorine and ammonia. The majority of such enterprises have been built without the observation of contemporary ecological requirements and without the separation of the industrial zone and the populated territory, often without taking account of "wind roses," as well as the safety rules for the operation of such industries. The imperfection of the technology employed, the inevitability of the "aging" of equipment, leading to a disruption of its sealing off and reliability, given the lack of timeliness of reconstruction and modernization, heightens the threat accidents involving the discharge of PATS and the mass involvement of people.

A large industrial city, Pavlodar, is an example of this. In addition to enterprises of agricultural industry, communal agriculture, which utilizes ammonia and chlorine, and chemical and petroleum processing as well as other plants, are operating here.

An extremely dangerous situation may arise in the case of an accident at a chemical plant (where many hundreds of kilograms of chlorine are kept) which is only 10 kilometers away from the residential areas of the city. Should an explosion or a leak of heated gas even from just one container (150 tons) take place, not only the workers of this facility and adjacent facilities may suffer, but also the population of the city as well. Given one of the possible directions of the wind, even if it is not the prevailing direction, and given an average rate for this locality of 4-5 m/sec, a contaminated cloud is capable of reaching the city in 33-42 minutes.

We are proposing one of the variants of the organization for the protection and medical support of workers in a chemically dangerous facility, as well as the residents of the city. In this case timely information regarding the threat or the occurrence of an emergency situation has enormous importance. However, testing has demonstrated that it is precisely at this juncture that a breakdown may occur. This is determined by a number of factors: the absence of direct communication of the on-duty dispatcher of the facility with his colleague at the emergency medical station, and in a number of cases, the absence of communication between the on-duty operator and the dispatcher; the use of industrial gas masks by workers of the most dangerous areas, instead of isolating gas masks, since the industrial gas masks do not possess communication devices, thus excluding the possibility of transmitting a danger signal.

Due to the insufficient amount of time for evacuation even in the case of timely warning, the population of Pavlodar will be housed in protective structures. However, only refuges with air regeneration installations, which only certain chemically dangerous facilities have at their disposal, provide for complete protection against PATS. The city's medical institutions have nothing of the sort. Therefore the sealing off of buildings and the use of individual protection means (gas masks, cloth bindings moistened with neutralizing solution) are envisioned for the personnel of the majority of treatment and prophylaxis institutions, as well as for other residents of the city.

The plans for sealing off have been worked out for all of the public health institutions of the city. Filtering gas masks selected for size and stored at work sites have been supplied to 77.4 percent of personnel. Monitoring of the maintenance of the quality of the gas masks is being carried out by directors of departments. The introduction of protection for personnel in the remaining public health facilities has been held up by the lack of an adequate number of gas masks and should be completed in the current year.

The actions of the on-duty physician in an extreme situation will be determined by a specially worked out instruction.

In the case of local accidents at chemically dangerous facilities involving a small number of victims, urgent aid will be provided by the personnel of the sanitary posts, sanitary brigades, and health centers. Each facility should be provided with isolating gas masks, which has not always happened. Sanitary kits should be kept at work sites or in the facilities of shops which are subject to sealing off, but not in depots, since access to them may be difficult.

The hospitalization of those afflicted in accidents of this kind will be provided by ambulances to the medical and sanitary units of factories or to municipal hospitals affiliated with these facilities (with the re-specialization of some of the treatment departments). In case of the dissemination of the cloud of PATS over the entire city, cooperation in the provision of aid to the afflicted is planned for all treatment institutions. The service will be carried out on the basis of the district principle. Physicians of the polyclinical institutions when necessary will work directly with the personnel of hospitals at an affiliated district, at previously determined primary triage centers. After the level of PATS is decreased to a non-dangerous level, victims from nearby houses identified in the course of apartment-by-apartment surveys

will arrive here or be delivered. Students, the residents themselves, and members of sanitary brigades will deal with this.

The primary triage centers are intended to be deployed in public buildings, as well as in polyclinics and in reception departments of hospitals. Here the primary medical charts will be filled out in the process of triage and the provision of emergency aid. Those injured by PATS are to be transported by ambulances, taxis, autobuses, depending on the severity of the condition, to city hospitals, and to the degree that they are ready, to hospitals deployed additionally in public buildings for specialized treatment or observation.

While high concentrations of PATS are maintained in the air, maximum discharge of patients from the municipal treatment and prophylactic institutions will be carried out in order to free up beds for victims who may arrive in massive numbers; those discharged for ambulatory treatment will leave the hospital only after the concentration of toxic substances in the air is decreased to a non-dangerous level.

The extent of the utilization of public buildings near hospitals is planned depending upon the number of losses of sanitary facilities. The capacities of the city (this refers to prophylactoria, hotels, agricultural vocational technical institutions, technicums, schools, etc.) will make it possible to house those affected without resorting to evacuation beyond the city limits. In light of a high degree of injury caused by chlorine or ammonia, the necessity of the most rapid carrying out of special treatment, and the undesirability of transport in the case of this kind of injury, this particular variant of accommodation of casualties if the most acceptable. Nurses of the municipal department's [GO] reserve, students of the medical training facility, members of sanitary brigades, as well as the personnel of the treatment and prophylactic institutions of the oblast will be drawn into the work at the deployed hospitals.

On-duty brigades of the emergency hospital, equipped with isolating gas masks, will be used during the period of greatest danger to patrol the city; after the level of PATS is decreased, they will be used to deliver casualties to hospitals while simultaneously providing them with emergency medical assistance. The staffs of vacationing brigades will arrive by ambulance to the station to obtain sanitary kits once there is a reduction in the concentrations of PATS to tolerable limits, then they will go to the primary triage center of their district to provide assistance to victims. At the same time, the capacities of the brigades are extremely limited in connection with the inadequate supply of pharmaceuticals; the contents of one kit is designed for assistance to six individuals. The supply of pharmaceuticals in the kit, as well as the number of kits (per each brigade), must also be increased. In this connection, the stores of property at the Pavlodar Socialist Youth Union [?] [SSMP] depot should be increased, taking into account the involvement of the entire personnel of the station in this effort.

The brigades and personnel of the emergency hospital at the present time are equipped with filtering IP-4 gas masks, while four outside brigades are equipped with IP-4 isolating gas masks. The schedule provides for a tour of duty of one of these brigades on each shift. The allocation in the present year of isolating gas masks for the complete equipment of all brigades is planned by the headquarters of the municipal department [GO] of the oblast.

Ambulances of the treatment and prophylactic institutions and taxis with a radio station will be used in order to maintain communication of the primary triage centers with the hospitals (in order to refine the readiness of the latter for the reception of casualties and the regulation of their enrollment).

This variant of the organization of defense and medical supply of the population of a city subjected to exposure to PATS under consideration does not claim universality. In each specific case it will be necessary to take real characteristics as the point of departure. However, its principal provisions may be used in similar circumstances.

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Patterns of the Structural Reorganization of the Myocardial Stroma of Squirrels in Adaptation to Hibernation

927C0039A Kiev PROBLEMY KRIOBIOLOGII in Russian No 1, Jan-Mar 91 (manuscript received 25 Jan 90) pp 3-8

[Article by G. Ye. Zagoruyko, Kharkov Scientific Research Institute of Therapy]

UDC 591.415:611.12:611.3/16

[Abstract] In an experimental study of the compensatory-adaptive response in the myocardial stroma in adaptation to hibernation, researchers performed electron-microscope studies of the left-ventricle myocardium of sexually mature long-tailed squirrels (*Citellus undulatus*)—five active animals (during the period of May-July) and five animals in torpor (December-January). They were able to identify the following compensatory-adaptive processes developing in the stromal component of the torporous squirrels: (1) the stroma diminishes in volume as a result of dehydration of the extracellular matter of the connective tissue and the enlargement of the muscular component of the myocardium; (2) the myocardial circulatory bed is reduced via the elimination of a given quantity of endotheliocytes, which results in the polyploidization of nuclei and the hypertrophy of the remaining endotheliocytes of the capillaries; and (3) the activation of fibroblasts and the intensification of fibrillogenesis of connective tissue collagen promotes increased rigidity and mechanical strength of the myocardium, with a dramatic increase in the functional and hemodynamic load places on the cardiovascular system when the animal wakes spontaneously. Adaptation to cold and to the lowered functional load on the myocardium during hibernation is a result of: (1) lower fluid levels in extracellular matter and higher content of flaky and filamentous material, which helps raise the viscosity and cold resistance of the myocardial connective tissue; (2) reduced capillary circulation stemming from lumen narrowing and elimination of capillary endotheliocytes; and (3) reduced blood flow rate in capillaries, which facilitates fuller diffusion of oxygen of erythrocytes from microvessels into the muscular tissue of the heart. Figures 4; references 12: 8 Russian, 4 Western.

Experimental Approach to Use of 'Accelerated Storage' Test for Predicting Shelf Life of Live Lyophilized Plague Vaccine

927C0039B Kiev PROBLEMY KRIOBIOLOGII in Russian No 1, Jan-Mar 91 (manuscript received 4 Jul 88) pp 39-43

[Article by N. V. Lopatina, A. N. Terentyev, and L. A. Natalich, Rostov-na-Donu Scientific Research Antiplague Institute]

UDC 616.981.452:615.37:57.086.132

[Abstract] In determining the optimum conditions for use of the accelerated storage test to predict antiplague vaccine shelf life, the researchers here chose a live vaccine lyophilized with a protective medium consisting of 10 percent saccharose, 1 percent gelatin, and 1 percent thiourea. Two variations of the accelerated storage test were used for shelf-life prediction. Six temperatures (27°C, 37°C, 47°C, 57°C, 67°C, and 77°C) were used to study the dynamics associated with the reduction of biological activity of the vaccine. After given time intervals microbial cells of *Y. pestis* were grown on Hottinger agar, pH 7.2. The number of viable cells counted after lyophilization served as the criterion of biological activity. Experimental results were compared with plots of Arrenius coordinates based on values of thermoinactivation rate constants for various high-temperature points. Prediction of viability with a six-point Arrenius plot provided the best agreement between predicted and experimental results. Figures 1; references 8: 5 Russian, 3 Western.

The Effect of Dalargin on the Course of Myocardial Ischemia

927C0047A Moscow KARDIOLOGIYA in Russian Vol 31 No 1, Jan 91 (manuscript received 14 Dec 89) pp 13-15

[Article by S. D. Mikhaylova, T. M. Semushkina, and N. A. Bebyakova, Second Moscow Medical Institute imeni N. I. Pirogov]

UDC 616.127-005.4-085.31:[547.95.943]-036.8

[Abstract] Ischemic damage to the myocardium is accompanied by a stress response that is typified not only by release of sympathoadrenal system neurotransmitters, but also by an increase in the production and utilization of antinociceptic substances. Evidence of that is the fact that opioid peptide levels in blood plasma are higher in myocardial ischemia unaccompanied by pain than they are in MI accompanied by pain. In light of the analgesic effect by such peptides and in light of the fact that the development of severe MI is accompanied by a lowering of the blood levels of leu-enkephalins, the researchers here set out to study the effect of the synthetic leu-enkephalin analog, dalargin, on the course of MI. Their experiments involved 74 cats of both sexes, anesthetized with nembutal (40 mg/kg intraperitoneally). The cats were placed on a Vita-1 respirator. Dalargin was injected intravenously for 15 minutes in an optimum dose of 10 μg/kg, which did not cross the blood-brain barrier, with drip infusion maintaining a constant concentration in the body. A total of 34 of the cats were subjected to experimental MI, with the dalargin introduced in 16 of them when the coronary vessel was clamped. The results of the study indicated that MI development against a backdrop of dalargin infusion is accompanied by a smoother drop in arterial pressure and less frequent development of ventricular

fibrillation. The mechanism of the protective action of dalargin seems to be based on the fact that when the dalargin is introduced in a dose that does not cross the blood-brain barrier, it acts on the nociceptic receptor substances of the heart and prevents excitation of the sympathoadrenal system, thereby preventing the ischemization of the myocardium that results from extraordinary energy expense and ensuring conditions that are more favorable to the preservation of contractile function. The dalargin may also interact with the opiate receptors of the afferent fibers of the vagus and the neurons of the nodulus ganglion. Figures 1; references 13: 9 Russian, 4 Western.

Morbidity Rate for Acute Myocardial Infarction Among Soviets Working for Lengthy Periods in the Tropics

927C0047B Moscow KARDIOLOGIYA in Russian Vol 31 No 1, Jan 91 (manuscript received 20 Mar 90) pp 43-46

[Article by A. V. Fandeyev, I. M. Korochkin, G. S. Yefremov, and Yu. P. Zhiltsov, Department of Faculty Therapy, Pediatric Faculty, Second Moscow Medical Institute imeni N. I. Pirogov]

UDC 616.127-005.8-036.11-057.56[729.1]

[Abstract] Soviets who are sent to countries in the tropics are exposed to intense, lengthy stress factors (climate, social factors, epidemiological factors) that often result in the development of noninfectious illness—principally, cardiovascular disease. The fact that little has been published on the severity of the problem or on prevention of the problem prompted the researchers to study morbidity related to acute myocardial infarction (ACI) among Soviets working in Cuba over a 10-year period (1979-1988). The researchers used elements of epidemiological research techniques developed by WHO in their study, which involved a total population of 54,765 individuals between the ages of 20 and 59. In all, 48 cases of ACI were noted. Risk factors included hypertension, hypercholesteremia, excessive body weight, lack of exercise, emotional stress, and smoking. The researchers found the morbidity rate to be 1.44/1000 among men and 0.08/1000 among women. Only two cases of ACI were recorded in the 20-29 age group. Morbidity rate increases with age and was especially high among individuals in the 40-49 age group (5-fold higher than in the 30-39 age group and 1.7-fold higher than in the 50-59 age group). Production engineers accounted for the largest group of patients (45.8 percent). Acute myocardial infarction occurred most often in the first six months of service in the tropics and approaching the end of the second year. Season had little effect on the morbidity rate. In the opinion of the researchers, prevention would best be promoted by improved medical examinations, preliminary physical training, regular health screening, early detection of individuals with adaptational disturbances, identification of individuals in high risk groups, and timely medical care. References 15: 8 Russian, 7 Western.

Effect of L-DOPA on Spontaneous Activity of Isolated Spinal Cord of 16- to 20-Day-Old Chick Embryos

927C0049A Kiev NEYROFIZIOLOGIYA In Russian Vol 23 No 3, May-Jun 91 (manuscript received 28 Dec 1990) pp 338-343

[Article by N. L. Chub, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev]

UDC 612.832:612.014.42:591.3

[Abstract] Intravenous introduction of L-DOPA, a precursor of catecholamine synthesis that is capable of reaching the brain by crossing the blood-brain barrier, induces locomotor activity in vertebrates. The pharmacological action of that substance is usually associated with increased synthesis and release of dopamine and noradrenaline from the terminals of catecholaminergic neurons of the brain, dopamine generally felt to be the first neuroactive substance in chain of catecholamine synthesis. Other notions on the action of L-DOPA, however, do exist, such as that based on lamprey research, which demnstrates the ability of L-DOPA to activate the spinal motor generator and the absence of any link between the action of L-DOPA and the activation of catecholamine-sensitive neurons. The lack of such research on higher vertebrates served as the motivating force behind the study reported here, which focused on the effect of L-DOPA on the spinal generator of motor activity in chick embryos. Specifically, the work involved cyclic oscillations of electrotonic potentials in the dorsal and ventral roots, generated by an isolated segment of the spinal cord of 16- to 20-day-old chick embryos. The application of L-DOPA in a concentration of 30-150 μmol/l was found to enhance the work of the spinal generator, whereas in large concentrations (200-1000 μmol/l), it depressed that work. In the course of subsequent washing of the preparation, the spontaneous activity was increased, and suprathreshold rhythmics appeared. 2-Amino-5-phosphonovaleric acid was found to block the L-DOPA-induced enhancement of activity. The activity generated by the neuronal network of the isolated dorsal horn grew with application of small concentrations of L-DOPA; no rhythmics were observed in the isolated ventral horn. The results suggest that the mechanism of L-DOPA's excitatory effects is not associated with activation of catecholamine-sensitive neurons of the brain, since dopamine and noradrenaline produced no effect on spontaneous activity in a concentration of 50 μmol/l, but depressed it at 100 μmol/l. Figures 3; references 16: 8 Russian, 8 Western.

Voltage-Gated Ion Channels of Inward Current Expressed in Oocytes of *Xenopus* After Injection of Brain mRNA

927C0049B Kiev NEYROFIZIOLOGIYA In Russian Vol 23 No 3, May-Jun 91 (manuscript received 25 Dec 90) pp 344-353

[Article by O. V. Gerasimenko, P. G. Kostyuk, O. P. Lyubanova, S. A. Fedulova, and Ya. M. Shuba, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev]

UDC 577.352.5

[Abstract] In demonstrating that the possibility of preserving the sensitivity to ψ-conotoxin GVIA (ψ-CgTX)—a neuron-membrane high-threshold calcium-channel peptide blocker—of calcium channels expressed in oocytes via the injection of brain mRNA, the researchers used electrophysiological techniques to identify the expression of two types of voltage-gated ion channels of inward current—fast tetrodotoxin sodium channels and high-threshold calcium channels—in the membrane of *Xenopus* frog oocytes injected with poly(A)$^+$-mRNA from the brains of 18- to 20-day-old rats. The addition of Cd^+ (200gmmol/l) to an extracellular solution was found to completely suppress the barium current through expressed calcium channels, but did not produce sensitivity to two of the calcium antagonists studied—D-600 (a phenylalkylamine representative) and nitrendipine. In a concentration of 1 μmol/l, ψ-CgTX depressed the barium current expressed in the oocytes for 20-40 minutes. The curve for the steady-state inactivation of the expressed calcium channels drops by half with a potential of $V_{1/2}$ = -50 mV and has a slope of k = 14 mV. For purposes of comparison, high-threshold inactivating calcium channels on neurons of chicken spinal ganglia have been shown to have values of $V_{1/2}$ = -61 mV and k = 12 mV. Figures 6; references 15: 1 Russian, 14 Western.

The Effect of the Tripeptide Melanostatin on the Metabolism of Phospholipids of the Rat Brain Olfactory Cortex

927C0095A Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 77 No 1, Jan 91 (manuscript received 1 Dec 89) pp 9-13

[Article by I. A. Gerasimov, T. R. Bagayeva, N. A. Yemelyanov, L. I. Pavlinova, and A. A. Mokrushin, Laboratory of Experimental Endocrinology, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

UDC 612.018+612.822.1+612.825

[Abstract] Peptide hormones, which are known to affect nervous system function, are quickly split by various peptidases when they enter tissue, after which they become oligopeptides, which themselves produce marked physiological effects. One such oligopeptide is melanostatin (MST), which forms in certain parts of the brain when oxytocin is split. The neurotropic effect produced by MST has been shown to consist primarily in the activation of synaptic transmission and in the long-term excitation of neurons. Since excitation and transmission of a nerve pulse take place on the nerve-cell membrane, long-term changes in neuronal activity may be linked to a change in membrane structure and functional properties, which are determined in large part by phospholipids. That prompted the study reported here of changes in the levels and metabolic activity of individual phospholipids in sections of Wistar rat olfactory cortex exposed to melanostatin in vitro in the same conditions in which changes in electrophysiological response are noted. Fifteen minutes after MST was introduced into the incubation section, when it had reached a concentration of 10^{-6} M, the researchers noted a curious, but consistent increase in the levels of phosphatidylcholine and phosphatidylethanolamine (39.5 percent and 35.3 percent, respectively), membrane components whose levels are generally thought to remain constant. Since those two phospholipids play an important role in the regulation of enzyme activity, hormone-receptor interaction, and transmitter activity and in the regulation of the physicochemical status of the membrane, the increase noted by the researchers has significant implications for the regulation of the functional properties of membranes by MST. In an in vitro study of the effect of MST on the rate of incorporation of 2^{14}-acetate into certain fractions of phospholipids of the olfactory cortex, the introduction of MST into the medium resulted in a consistent reduction of the metabolic rates for the two phospholipids (by 43 percent and 36 percent, respectively). A reduction in specific radioactivity indicated impeded decay, suggesting MST-driven inhibition of the activity of the phospholipases that split phosphatidylcholine and phosphatidylethanolamine. The researchers also noted a consistent increase in the specific radioactivity of sphingomyelin (by 65 percent), which suggests an amplification of metabolic rate (and of rates of synthesis and decay) and clearly points to sphingomyelin's having a functional role in nerve tissue. References 20: 10 Russian, 10 Western.

Catalepsy and Hyperkinesis Induced by Chronic Injection of Tetrapeptide Into Rat Neostriatum

927C0095B Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 77 No 1, Jan 91 (manuscript received 27 Mar 90) pp 22-28

[Article by A. F. Yakimovskiy, Laboratory of Physiology of Higher Nervous Activity, Institute of Physiology imeni I. P. Pavlova, USSR Academy of Sciences, Leningrad]

UDC 612.018:612.822+612.826

[Abstract] Little is known about the role of the subcortical complex of the neostriatum in the production of symptoms of psychopathological states, but studies involving the injection of neuroleptics suggest that catalepsy is linked to a dysfunction of the dopaminergic system of the neostriatum. Other research indicates the possibility of the involvement of the opiate system. The study reported here sought to examine the effect of chronic injection of enkephalins into the striata of 21 Wistar rats. The injection preparations were, on the one hand, a mixture of a sterile apyrogenic saline solution and leu-enkephalin and, on the other, a synthetic analog of leu-enkephalin, a tetrapeptide containing a dextra form of ornithine. They were injected bilaterally in the rostral section of the neostriatum on an almost daily basis for three weeks. During the first two days of injections, the native enkephalin, in a dose of 15 μg, lowered the accuracy of a conditioned reflex involving avoidance of an electrical current to a 50-60 percent correct response rate and lengthened the latent period of reflex. By the end of the first week, normal response had been restored. Injection of the analog, however, led to steadily increasing disturbance, primarily catalepsy, a waxylike rigidity of skeletal musculature, and hyperkinesia of the head and front paws. Conditioned reflex was totally blocked, as were simple protective adaptive responses. Four to seven minutes after injection with the analog, motor responses slowed or came to a standstill, eventually changing to a three- to six-hour cataleptic torpor similar to a neuroleptic torpor. Subsequently, the rats' movements usually became frozen, and the rats would remain in any posture into which they were placed. Their heads remained half-turned, and winking reflex was not lost. As the rats, who had been placed on their left side, came out of the torpor, they made movements aimed at clutching and tearing the paper on which they were lying. Hypersalivation was noted, and hyperkinesia grew in intensity, with abnormal head movements and chewing. The researchers concluded that local chronic address of the enkephalinergic system of the striatum leads to disruption of normal behavior, cataleptic torpor, and a complex of pathological movements. Figures 2; references 12: 8 Russian, 4 Western.

Effect of Taurine on Electrically Controlled Ion Channels of Somatic Neuronal Membrane of Pond Snail

927C0096A Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 77 No 2, Feb 91 pp 37-42

[Article by A. I. Vislobokov, V. V. Mantsev, A. G. Kopylov, and V. S. Gurevich, Laboratory of Structural-Functional Adaptations, Scientific Research Institute of Physiology imeni A. A. Ukhtomskiy; Laboratory of Biochemistry of Circulatory Systems, Scientific Research Institute of Cardiology, Leningrad]

UDC 612.822.31:612.014+577.357

[Abstract] A sulfur-containing amino acid known to have a broad spectrum of action, taurine has a markedly inhibitory effect on the CNS and is employed as an anticonvulsant, an antiarrythmic, and an antihypoxic. In light of that and recent data addressing the effect of taurine on the ion permeability of cell membranes, the paper presented here examines changes produced by a wide range of taurine concentrations (1×10^{-8} mol/l to 1×10^{-2}) on basic ion currents in isolated neurons of visceral and parietal ganglia of *Lymnaea stagnalis*. Intracellular dialysis and the voltage-clamp method were used. Inward transmembrane ion currents (sodium and calcium) were recorded, as were outward currents (fast and delayed potassium). The fast potassium currents remained virtually unchanged throughout the range of taurine concentrations, but the slow potassium and calcium currents diminished smoothly to 40 percent of baseline as the concentration rose. Sodium currents, after rising 35 percent above baseline at a concentration of 10^{-6} mol/l, diminished gradually until the taurine concentration reached 10^{-3} mol/l, at which point they dropped abruptly and disappeared completely. The researchers conclude that the broad spectrum of action of taurine on various physiological processes and the modulating action taurine on dopaminergic, GABA-ergic, glycinergic, and serotoninergic is directly linked to taurine's effects on transmembrane ion currents. Figures 3; references 20: 11 Russian, 9 Western.

Cardiovascular Effects of Endothelin in Alert Rats With Normally and Artifically Raised Blood Levels of Atriopeptide

927C0096B Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 77 No 2, Feb 91 (manuscript received 10 Apr 90) pp 73-81

[Article by Ye. R. Martynova, A. N. Murashev, S. A. Davydova, and O. S. Medvedev, Laboratory of Experimental Pharmacology, Institute of Experimental Cardiology, All-Union Cardiology Science Center, USSR Academy of Medical Sciences, Moscow]

UDC 612.13+577.15/.17

[Abstract] Endothelin, a 21-amino acid polypeptide first isolated from endothelial cells of pig aorta in 1988, is a vasoconstrictor more powerful than angiotensin II, vasopressin, and neuropeptide Y by an order of magnitude. Its effects are a function of Ca^{2+} content and diminish in the presence of calcium antagonists. Atriopeptides produce diametrically opposed effects—namely, they depress Ca^{2+} entry into the cell interior and suppress Ca^{2+} release from intracellular storage. Both are considered functional antagonists, but the relationship between the two peptides can be complex, and some researchers report that endothelin stimulates the release of atriopeptides from isolated cardiomyocytes and from rat atria.

The paper here presents a study of the effects of endothelin on cardiac output, stroke volume, total peripheral vascular resistance, regional circulation, and vascular resistance in alert WKY rats in whom catheters were implanted into the abdominal aorta via the left femoral artery, into the left ventricle via the right carotid artery, and into the left jugular vein and in whom blood levels of atriopeptide II (Ser_{103}-Arg_{125}) were naturally or artificially raised. In one set of experiments, hemodynamics were measured four times: in baseline state, 10 minutes and 50 minutes after bolus administration of endothelin (0.1 nmol/kg) to the left ventricle, and 10 minutes after administration of 1 nmol/kg endothelin. In another set of experiments, effects on hemodynamics were studied for both doses against the backdrop of intravenous infusion of atriopeptide II, with the endothelin administered 10 minutes after the infusion of the atriopeptide began. Two measurements were made—baseline and 10 minutes after endothelin introduction. The researchers found that endothelin produced a brief hypotensive phase, followed by a longer, hypertensive phase. The extent and duration of both phases were dose-dependent. Peripheral resistance rose by as much as 120 percent (with the larger dose). The atriopeptide enhanced the hypotensive phase and attenuated the hypertensive phase. Responses to the endothelin introduction were weaked by the atriopeptide in the heart, adrenal glands, and kidneys. Figures 4; references 22: 1 Russian, 21 Western.

Effect of Kynurenine and Quinolinic Acid on Autonomic and Behavioral Responses in Dogs

927C0096C Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 77 No 2, Feb 91 (manuscript received 22 Mar 1990) pp 116-119

[Article by V. A. Pastukhov, Laboratory of Neuroses, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

UDC 612.821+612.89+577.15/.17

[Abstract] An earlier paper by the researcher determined that introduction of a metabolite of tryptophan-serotonin (5-OT) into the limbic cortex of dogs equalized conditioned reflexes. This paper continues the study by examining the effect of metabolites of a second, kynurenine pathway of tryptophan metabolism—kynurenine and quinolinic acid—on behavioral and autonomic responses (heart and respiration rates) in seven mongrel dogs. The study included the effects of intracerebral and intraperitoneal injections of those metabolites on the hippocampus. Classical Pavlovian reflexes were developed in two of the dogs. Kynurenine sulfate and quinolinic acid were administered once a week. Epileptic-type convulsions, with tonic and clonic phases, were observed with the intracerebral injections—most often several hours after administration of the metabolites—and could also be provoked by loud sounds. Post-convulsive behavior was apathetic, with the dogs slow to respond to their environment. Figures 2; references 6: Russian.

Effect of Serotonin on Functional Activity of Monocytes

927C0110E Leningrad TSITOLOGIYA in Russian Vol 33 No 1, Jan 91 (manuscript received 3 May 90) pp 81-87

[Article by A. A. Tokmakov, M. P. Kykhova, O. V. Koshkina, and V. Yu. Vasilyev, Physiological Scientific Research Institute, Leningrad University]

UDC 577.175.823.02:612.112.95

[Abstract] The biological effect of the action of serotonin—one of the most important neurotransmitters—on immunocytes is little studied. Although a number of published papers have shown that serotonin produces it's effect on cells by elevating intracellular levels of cAMP, and other researchers have established a link between serotonin and Ca^{2+} ion exchange, molecular mechanisms need further study. That prompted the researchers here to focus on the monocytes of peripheral human blood, which are involved in ensuring immune homeostasis, in their study of the effect of serotonin on monocyte functions and in their explanation of the participation of cAMP in the effects produced by amine. They found duality—inhibition versus activation—to be a characteristic feature of the effect of serotonin on cell function, with the effect dependent on serotonin concentration and duration of cell exposure to the serotonin. The source of the bimodal action of serotonin is probably the existence of alternative regulatory mechanisms. Treatment of the monocytes with concentrations of 10^{-3} and 10^{-5} M serotonin for 20 minutes lead to attenuation of zymosan-induced chemiluminescence of cells in the presence of luminol, whereas a five-minute exposure in a concentration of 10^{-5} M amplified the chemiluminescent response. Incubation of the monocytes with serotonin produced a weak activating effect on the capacity of the monocytes for phagocytosis of opsonized ram erythrocytes. A 2- to 3-fold increase in intracellular cAMP was noted with a maximum after five minutes of treatment with serotonin, as was a decrease in cAMP-binding ability of cytosol. Figures 7; references 22: 10 Russian, 12 Western.

Public Health in Uzbekistan

927C0066 Tashkent MEDITSINSKIY ZHURNAL UZBEKISTANA in Russian No 3, Mar 91 pp 3-7

[Excerpt from article by S. M. Bakhramov, which was taken from a paper given at the First Congress of Physicians of Uzbekistan, part I]

[Text] [Passage omitted] The main objective of the health care service is the proper organization of the protection of public health.

In recent decades, medical care was rendered to individuals primarily in hospitals. Annually, fixed assets were used for treating one-fourth of the population of the republic (nearly 5 million people) in hospitals. As a result, construction of new outpatient clinics and polyclinics ceased, and even those existing were not equipped with modern diagnostic or treatment apparati. The capacity of the outpatient clinics and the polyclinics dropped to 50 percent of the norm. Radical changes are needed in the organization of the medical service. Raising the medical service to a higher level will make it possible to effect the transition in terms of rendering primary medical and health care to the population right in their places of residence and work.

The decisive points for making a fully complemented medical service are as follows:

—presence of budgetary, material-technical funds and personnel (no less than 40%);

—training of physicians, nurses, and social-service specialists;

—strengthening of authority of medical workers;

—raising wages;

—organization of primary paramedic-obstetrics medical stations; rural medical outpatient clinics; medical treatment stations of a new type, servicing 8,000-10,000 individuals; territorial polyclinics (servicing 30,000-40,000 people; emergency medical stations and their subunits.

In large cities, plans call for the opening of home-care medical centers. General therapists and pediatricians will work there. The district principle will be kept, but the patient will continue to have the right to choose his physician.

The next stage in that work will be the transition to the family physician.

Plans calls for the organization of the work of physicians within the framework of teams, leased contingents, and grouped contingents.

The team of physicians that today consists of a therapist, a pediatrician, and an obstetrician-gynecologist will be made up in the future of a general physician and a stomatologist.

Measures are under development that will materially stimulate the interest of every individual in the preservation and strengthening of health—a month's salary to workers who are healthy and seldom sick.

In the Kara-Kalpak ASSR, in oblast centers, and in large city and rayon hospitals, plans call for opening consultational polyclinics or consultation-diagnostic centers.

One of the innovations introduced into practice is represented by the day hospital and the home-care hospital. Sociological studies have established that 95 percent of patients support the new forms of medical service; 99 percent prefer the day hospital, which is more convenient for families with many children; and 48 percent of those surveyed feel that a long stay in a hospital has a negative effect on the psyche.

Among the measures conducted by the UzSSR Ministry of Health in the 12th five-year plan in the improvement of specialized medical care was the change in norms for treatment and surgical beds according to profile. For example, of the 53,200 treatment beds, 45 percent are specialized; of the 31,200 surgical beds, 56 percent are specialized. As a result, the number of beds provided for the treatment of cardiovascular patients grew by 2,700, and the number of beds for gastrointestinal pathology grew by 1,800. For the treatment of endocrinological, allergic, rheumatic, and pulmonary diseases, an additional 2,500 were arranged for.

One of the most urgent problems of medicine is the prevention and treatment of oncological diseases. A great deal of work is also being done in that area. The prevalence of that pathology in the republic is three times lower than in the rest of the country. Despite that, there are 16,000 oncology patients a year, with an average mortality rate among them of 34 percent. In that connection, it should be noted that disease is being diagnosed in late stages, which is why practical measures must be geared to early diagnosis of disease and prevention.

Living in the republic are 81,700 veterans of the Great Patriotic War, 49,500 disabled individuals, and 39,300 internationalist veterans. Every year, 92.0 percent of them are treated in specialized hospitals, in departments in hospitals, and in wards (accounting for a total of 4,000 beds).

The specialized Spasitel center has been set up at the hospital of the UzSSR Academy of Sciences for the 6,000 people who took part in the cleanup at Chernobyl.

The most pressing medical, political, and social problem involves protecting the health and rehabilitating pre-draft-age adolescents. Every year, thousands of youths are called into the Soviet Army.

In rayon and oblast military commissariats, there are 186 special medical commissions in operation (more than 2,000 physicians and 1,700 nurses). According to an ukase by the president of the republic, I. A. Karimov,

the additional positions of UzSSR deputy minister of health and deputy head of the oblast health department have been created to improve that work, and they are being filled by highly skilled specialists.

Newly created commissions are screening youths for the service in the army in a manner that is more thorough from a medical standpoint.

Protecting the health of mothers and children is a central concern of society. Over the past five years, the UzSSR Ministry of Health has done a great deal of work to strengthen health and to reduce mortality among mothers and children.

Specialized scientific-practical centers for the treatment of genetic and somatic diseases are in operation in the republic.

The material-technical base of maternity hospitals and children's facilities has improved considerably. Built or put into operation in the 12th five-year plan alone were maternity hospitals with a total of 4,900 beds, children's polyclinics capable of handling 3,400 visits per shift, and children's health recovery centers and women's clinics capable of handling 5,300 visits. Some 45-60 percent of the material resources for the total budget allotted for the construction of health care facilities was spent on the construction of those structures.

Dear Doctors! In the republic, out of every 1,000 women in the latter stages of pregnancy, 291 are anemic. Children are being born prematurely, with congenital defects, and in most cases they die. The job of medical workers is to educate the public properly in such a manner that they see the acceptability of two to three year intervals between pregnancy, since the fate of mothers and children depend on such education.

Maternal mortality stems primarily from blood loss during childbirth and as a result of aggravation of extragenital disease. Thus, in 35 percent of cases, death is related to extragenital disease; in 17.2 percent, viral hepatitis; in 14.5 percent, cardiovascular disease; in 6 percent, pulmonary disease; and in 3 percent, diabetes mellitus.

We need to invigorate the activity of women's clinics, reinforce assistance for internists and other specialists, and set up an emergency service to stop hemorrhaging in women in the latter stages of pregnancy.

The first ukase of the republic president—the State Program for Handling Social Problems—was geared to ensuring the health of mother and child. To that end, some 101 million rubles (R) were allotted. Free food is allocated to pregnant women from poor families, and free treatment is given to pregnant women who are suffering from anemia.

Spending to secure food products for children two years of age or under has grown 15-fold since 1987 (to R13.5 million in 1990). Despite that, we have only 79 percent of the milk formulas and concentrates that we need, only 26 percent of the natural formulas, 16.7 percent of the fruit and vegetable canned foods, and 58 percent of the potted meat products.

The UzSSR Ministry of Health is devoting a great deal of attention to medical science. NIU [not further expanded] sectors are in operation in 11 of 14 medical programs of the USSR State Committee for Science and Technology, and scientific research institutes and medical vuzes are participating in the execution of six comprehensive USSR Academy of Sciences and USSR Academy of Medical Sciences programs of scientific research called "Fundamental Sciences for Medicine." The first discovery has been recorded: "The properties of the kidney to split exogenous proteins in the absorption from the small intestine into the blood in the early postnatal period of the structural-functional formation of the digestive organs of mammals" (Academician UzSSR Academy of Sciences K. A. Zufarov et al.).

A great deal of significance is given to the field of biotechnology (Scientific Research Institute of Oncology and Radiology) in the development of techniques for producing monoclonal antibodies to the alphafetoprotein and to cancer-embryonal antigen and in the creation on their basis of diagnostic and therapeutic radioimmunological sets.

Together with the UzSSR Academy of Sciences Institute of Biochemistry, we have begun studies involving the creation of biologically active additives (growth factors for nerve cells) for pediatric nutrition.

Continued development of medical science in the republic depends on additional financing of extremely urgent scientific-technical programs, strengthening of the influence of academy science, and improvement of the system for introducing the newest medical technologies.

Special attention is required by the development of scientific research involving medical genetics and proper nutrition among healthy individuals and sick individuals on the basis of local food products and raw materials, as well as by the proper organization of treatment and rehabilitation for people suffering from oligophrenia, neuroses, and psychopathization of personality.

No less important, from the scientific standpoint, are the problems of viral hepatitis, acute intestinal infections, AIDS, maternal and child mortality, oncological diseases, tuberculosis, nonspecific pulmonary diseases, etc.

Our task in the near future is to create a national program for medical science (a Proryv [breakthrough] program) that involves intraunion and regional cooperation, adequate financing, and an adequate material-technical base. To effect that program, we need the support of the government in the allotment of nonconvertible currency for the acquisition of modern scientific-laboratory equipment and in the increase of financing of medical science to 1 percent of the sector

budget. Execution of the program will help to increase the life span of the republic's population.

The Physiotherapy Service in Uzbekistan and Prospects for Its Development

927C0068A Tashkent MEDITSINSKIY ZHURNAL UZBEKISTANA in Russian No 3, Mar 91 pp 12-14

[Article by R. T. Sultanov, K. Yu. Yuldashev, and M. Kh. Yuldasheva; UzSSR Ministry of Health (Minzdrav UzSSR), N. A. Semashko Scientific Research Institute (NII) of Medical Rehabilitation and Physical Therapy]

UDC 615.8(575.1)

[Text] The Physiotherapy Service in Uzbekistan was represented in 1919 by a single physiotherapeutic institution, a private clinic with a single physiotherapy room and six-bed hospital.

At the present time 23 physiotherapeutic hospitals are in operation, including four "Mother and Child" hospitals (an 80-bed hospital in the Kara-Kalpak Autonomous Soviet Republic [KKASSR], an 80-bed hospital in Dzhizak Oblast, a 100-bed hospital in Syr Darya Oblast, and a 50-bed hospital in Samarkand Oblast), 25 sanatoria for children (3,400 beds), 140 sanatoria-preventoria (11,643 spaces), and 11 sanatoria for adults (4,871 beds).

Natural and preformed (mechanotherapy) physical methods are used in the specialized physiotherapeutic hospitals and health centers, sanatoria-preventoria, and sanatoria and health resorts; these have become an integral part of comprehensive treatment.

The majority of physiotherapeutic hospitals are based at sources of mineral waters; there are departments at general practice hospitals, three physiotherapeutic health centers (two in Tashkent and one in Samarkand), 1,562 physiotherapy rooms, 368 exercise therapy [LFK] rooms, and 129 acupuncture rooms. These are all equipped with modern treatment equipment; these total 28,097. The norms require 31.1 beds per 10,000 people; the actual supply of physiotherapy beds throughout the republic is in fact 2.21 per 10,000 population. In Tashkent this figure is 3.4. Among the oblasts, Dzhizak Oblast (365 beds), Kashkadaryin Oblast (310 beds), and Surkhandarya Oblast (300 beds) have the largest number of beds at their disposal. Less well supplied are Khorezm Oblast (60 beds) and Kara-Kalpak Autonomous Soviet Republic (80 beds). There are no physiotherapy beds in Navoy Oblast.

Natural agents are utilized in specialized institutions, sanatoria-preventoria, and sanatoria for comprehensive treatment: mud, mineral waters. Twenty-seven wells have been exploited, including five in 1988, in Namangan, Navoy, and Syr Darya Oblasts.

Our region is rich in sources of mineral waters. These include sodium bicarbonate (Tashkent), sodium chloride and bicarbonate (Gallyaaral, Dzhizak Oblast), iodide and bromide (Chartak, Namangan Oblast), sodium chloride and sulfate (Mubarek, Kashkadaryin Oblast), hydrogen sulfide (Chimion and Dzheyrankhane), sodium chloride and bicarbonate (Fergana Oblast), and sodium chloride and sulfate (Samarkand Oblast). The bottling of mineral waters is being carried out on the basis of the recommendation of the N. A. Semashko Scientific Research Institute (Tashkent, Fergana, Samarkand, Chartak).

Sanatorium and health resort care has been provided to children with nontuberculous diseases in boarding homes, in sanatoria-preventoria, and in year-round and seasonal specialized sanatorial Pioneer camps, in sanatorial boarding schools, and in sanatorial preschool institutions for children, in 25 sanatoria of the UzSSR Ministry of Health, of which four are bronchopulmonary sanatoria (780 beds), one neurological (150 beds), one gastrointestinal (80 beds), and 18 cardiorheumatological (2,170 beds). There are children's departments in balneophysiotherapeutic hospitals: the 25-bed Nagornaya hospital (Samarkand Oblast), the 45-bed Tashminvody hospital affiliated with the Sverdlov collective farm [kolkhoz] (Tashkent Oblast), the department affiliated with the 100-bed Tashsovet physiotherapeutic hospital, and the departments affiliated with two clinics of the Institute of Balneology and Physiotherapy, 120 beds each; in Payaryskiy region of Samarkand Oblast, 25 beds, in Dzhizak Oblast, 40 beds, in Syr Darya Oblast, 50 beds, and in Kara-Kalpak Autonomous Soviet Republic, 40 beds. The supply of physiotherapeutic beds is 0.8 per 1,000 children.

In Chartak, 78 children were brought back to health, 250 in Chimion, and 574 in Zaamin in 1988 in the Uzbek Council of Health Resorts [Uzsovetkurort] system. In Chartak, in the three months of school vacation alone, 50 teenagers were brought back to health, 100 in Chinabad, 50 in Botanika, 15 in Aktash, and 50 in Sitora-Mokhi-Khos.

The training of physician cadres and mid-level medical personnel is being carried out at the N. A. Semashko Scientific Research Institute, at institutions of advanced training of physicians, and at specialty departments of medical institutes. There were 850 physician-physiotherapists (in 1924 there were only three), 380 exercise therapy physicians, and 217 medical board [VK] physicians. The staffing level of physician cadres in the republic's physiotherapeutic hospitals is 87.8 percent, and mid-level medical personnel, 90.2 percent. The most unfavorable situation is in Kara-Kalpak Autonomous Soviet Republic, 43 percent; in Syr Darya Oblast, 51.6 percent; in Syr Darya Oblast, 59 percent; and in Bukhara, Tashkent, and Surkhandarya Oblasts, 61.0-65.6 percent.

Seventy-four physiotherapists, 27 pediatricians, 13 exercise therapy physicians, and 18 exercise therapy instructors were trained in 1988. Special attention was devoted

to the training of pediatricians (seven physicians were trained in 1987, 24 in 1988).

Exercise therapy is the basis of the medical rehabilitation of patients after infarct, chronic diseases of the lungs, spine, and joints, and following stroke, operations, and traumas. At the present time 263 exercise therapy rooms for adults and 144 for children are equipped and operating. However, there are not enough physician-methods specialists in the treatment and prevention institutions. Ninety-one physician-physiotherapists and 31 exercise therapy physicians have achieved qualified status, i. e., 16.1 and 29.9 percent.

There are difficulties in obtaining equipment. Thus, in 1988, requisitions for 9,241 named items were placed with the Uzbek Medical Technology Administration [Uzmedtekhnika] for the city of Tashkent and the oblasts; 5,977 (63.4 percent) were filled. The monitoring and timely elimination of defects in the operation of physiotherapeutic equipment are poorly organized in the oblasts. Unsatisfactory supply of spare parts has been noted. For example, out of 1,268 pieces of physiotherapeutic equipment in Tashkent Oblast, 150 are not working, and in Bukhara Obast, 32 out of 670.

The N. A. Semashko Scientific Research Institute of Medical Rehabilitation and Physical Therapy is a medical rehabilitation and physical therapy center at which restorative treatment techniques are developed and introduced for childhood, cardiological, neurological, gynecological, and other diseases.

Research is being carried out along three lines: the principal health resort agents, their resources, and prospects for treatment and preventive application; the mechanism of action of physical agents and exercise therapy, their effectiveness in diseases of the internal organs; and the scientific organization of health resort-sanatorial and physiotherapeutic care in the UzSSR.

A study of the mechanism of action of bischofite is planned for the first time in experimental conditions using rheumatoid arthritis as the model.

Patients who have received hospital treatment (70 percent) continue treatment in physiotherapeutic hospitals. The following represent restorative treatment subdivisions in the oblasts: Yuzhniy Alamyshik (Andizhan Oblast), in Yangier (Syr Darya Oblast), "Chimion" (Fergana Oblast), "Kamashinskaya" (Kashkadaryin Oblast), "Kzyl-Tepe" (Fergana Oblast), "Mubarek" (Kashkadaryin Oblast), in Shakhrisyabzskiy region (Kashkadaryin Oblast), "Lenin Yuly" (Bukhara Oblast), "Karabag" (Namangan Oblast).

The following have been opened: departments of restorative treatment at health centers and a neuropsychiatric hospital, exercise therapy departments for restorative treatment, a Rehabilitation Center at the Institute of Pediatrics, and rehabilitation departments for postinfarct patients in the "Lunacharskoye" and "Chartak" sanatoria. The training of specialists in restorative treatment is being carried out at the Institute for Advanced Physician Training.

One of the forms of preventative work is the sanatoria-preventoria, where workers are restored to health without interruption of work activity. There were 90 sanatoria-preventoria in the republic in 1979 with 6,685 places (140 with 11,643 places in 1988).

Personnel of the N. A. Semashko Institute are affording health resort assistance to all treatment and prevention institutions, sanatoria-preventoria, and child sanatoria for diseases of nontuberculous etiology.

Medicine of the future will follow the path of perfecting the defensive powers of the organism, the prevention of diseases, and the maximal use of physical methods of strengthening and rehabilitation of the organism.

The rational use of the bed resources of physiotherapeutic hospitals, sanatoria, and sanatoria-preventoria is planned, as are the improvement of the work of physiotherapeutic hospitals based at sources of mineral waters, the use of physical methods of medicosocial rehabilitation of patients and disabled individuals, the improvement of scientific research to identify the mechanism of action of various agents at the intracellular and molecular level, with the closer examination and expansion of indications and contraindications.

December 6, 1989.

Health of Adolescent Population Assessed

927C0102 Moscow ARGUMENTY I FAKTY in Russian No 43, 1991 p 5

[Interview with USSR Academy of Medical Sciences Academician G. Serdyukovskaya, director of the USSR Ministry of Health All-Union Scientific Research Center of Hygiene and Disease Prevention for Children, Adolescents, and Youths, and with Col G. Filchenkov, deputy chief of the USSR Ministry of Internal Affairs Administration for the Prevention of Rights Violations Among Minors and Youths, conducted by ARGUMENTY I FAKTY correspondents I. Konchakova and V. Romenenko: "Do We Have a Future?"; first two paragraphs are source introduction; callout reads, "Only 12-15 percent of those called up (into the service) are healthy"]

[Text] **Many of today's problems will have to be solved by a future generation. But will we have that future?**

The problems we are finding among adolescents served as the topic of a conversation between ARGUMENTY I FAKTY correspondents and USSR Academy of Medical Sciences Academician G. Serdyukovskaya, director of the USSR Ministry of Health All-Union Scientific Research Center of Hygiene and Disease Prevention for Children, Adolescents, and Youths, and Col G. Filchenkov, deputy

chief of the USSR Ministry of Internal Affairs Administration for the Prevention of Rights Violations Among Minors and Youths.

ARGUMENTY I FAKTY: According to the data of the USSR Ministry of Health, some 1.1 million children (14 years of age or under) and some 350,000 adolescents (15-18) suffer from serious neuroses or mental illnesses; nearly 1,500 children and adolescents have syphillis; 68,000 have gonorrhea; 1,024 are listed as drug addicts; 2,419 are listed as toxic substance abusers; nearly 1,500 are listed as chronic alcoholics; and a total of 66,428 adolescents are listed on the preventive rolls in connection with alcohol abuse. But those are extreme cases of child pathology. What is the general state of health of our adolescents?

Serdyukovskaya: A total of 8.5 percent of all schoolchildren in grades 1-10 are harmoniously developed—with good constitution and proper relationship of weight to height. A total of 25-30 percent are essentially healthy, i.e., they have no health problems. A total of 40-45 percent have problems at the level of functional disorders, which could, in adverse conditions, lead to serious illnesses. A total of 25-35 percent have chronic illnesses. The situation is truly catastrophic.

ARGUMENTY I FAKTY: We familiarized ourselves with the research your center has been doing over the last 30 years. It doesn't offer much optimism for the future, either.

Serdyukovskaya: The rise in prices and the shortage of food products resulted in 90 percent of the children in 1990 suffering from avitaminosis. In rayons with poor ecology, morbidity among children is 1.5-2 times higher than among children in rayons with better ecology.

Physicians are focusing more of their attention on children one year of age or younger and on individuals with chronic diseases, which means that schoolchildren are not getting the proper attention. Such a system for the organization of treatment-and-preventive care needs revision, and that doesn't take any extra money—it just means that something needs to be changed in the organizational structure itself. Our center has done work in that area, and we had good results.

As for the health of our young people who are being called up into the ranks of the Soviet Army, only 12-15 percent are healthy. As you can see, there's nobody to serve in the army.

ARGUMENTY I FAKTY: How many adolescents are in detention centers?

Filchenkov: Adolescents between the ages of 14 and 16 can be held criminally responsible for serious crimes only; adolescents 16 or over can be held criminally responsible for all violations of the criminal code. At present, nearly 30,000 minors are being held in such colonies.

In 1990, nearly 1 million adolescents were brought in to internal affairs agencies, and one-fifth of those adolescents were brought in for crimes. In the first half of 1991, crime among minors was up by 8.1 percent over the first half of 1990. In addition, nearly 70,000 crimes were committed by children 14 or under. Some 7 percent of the minors who committed crimes were females. Some 19 percent of the crimes were committed by inebriated individuals.

ARGUMENTY I FAKTY: What percentage is constituted by mentally disturbed adolescent criminals?

Filchenkov: According to certain data, 20 percent of the violators between 14 and 18 are mentally disturbed. However, the country doesn't have a single treatment-education facility for such adolescents. Unfortunately, all our attempts to bring that problem to the attention of the State Committee for Public Education and to the Ministry of Health have been fruitless.

ARGUMENTY I FAKTY: Parents who are alcoholics, drug abusers, or other such things have a pernicious effect on their children. No measures help, including the removal of parental rights. Do you think sterilization of malicious alcoholics and drug abusers is possible as an extreme measure?

Filchenkov: But that's a violation of human rights! I've never heard of the problem being solved anywhere in that fashion.

In 1991, various measures were adopted to deal with some 400,000 adolescent violators, as well as with 94,000 parents who were having a negative influence on their children; those measures included official warnings to 50,505 individuals that antisocial behavior was unacceptable and to 8,960 individuals that their parental rights could be taken away; 3,144 individuals were sent for mandatory treatment for alcoholism or drug abuse. As a result of those measures, of the 870,000 adolescents under the supervision of inspectorates for minors, 814,000—or 94 percent—did not commit any crimes.

Crime among adolescents is affected by more than 100 social, economic, demographic, political, medical, and legal factors. More than 50 state and social organizations involve themselves in the problems of children and adolescents and have the funds for that. The result, however, is lamentable.

[ARGUMENTY I FAKTY comment] **Just who will protect the interests of our children and, consequently, our future? There is no answer today to that question.**

Health Ministry Proposes Reduction in Staff

927C0103A Moscow TRUD in Russian 1 Nov 91 p 4

[Article by I. Anishchenko, under the rubric "Medicine and Life": The RSFSR Mininstry of Health Warns..."; first paragraph is source introduction]

[Text] **The leadership of the RSFSR health ministry sent a letter to I. S. Silayev with a suggestion to cut the staff of the USSR Ministry of Health to 30-40 people, remove all the Union ministry's management functions, and instruct it to engage primarily in statistics and in the development of procedural recommendations.**

A conversation with the RSFSR health minister V. Kalinin turned this up: Russian health care organizers acknowledge that the most efficient distribution of roles would be one in which one set of management staff would be responsible for providing leadership and for financing measures on an oblast scale, another set would be responsible for leadership and financing on a republic scale, and a third set would be responsible for those things on a Union scale. But at the same time, he announced efforts to solve Union-wide problems on the basis of interrepublic agreements, without the participation of a center of any kind. A centralized power structure in health care, he says, would only hurt things, as it has done in the past.

The question arises, What role did the USSR Ministry of Health play for regional leaders? V. Kalinin answers that question himself: It was always a kind of higher office from which one had to submissively ask for money, equipment, and personnel and then listen to "valuable instructions."

In a word, the totalitarian structure is going to the scrap heap! But say we still manage to sort things out, can interethnic issues of health protection be solved without a centralized authority? The Russian minister admits this: If we don't want to put the other republics in a pinch, we must send some of the manpower and resources of treatment facilities located in the RSFSR territory to help solve their innate problems. That especially applies to the head institutes that until now were under Union jurisdiction.

In short, there has to be some kind of "common cauldron," some sort of agreed-upon obligations. But who will monitor adherence to the agreements, and who will resolve disputed questions? The interested parties? That's hardly advisable—you have to have arbitrators. And because of the specific nature of most medical issues, the arbiters would best be medical people, rather than lawyers.

But that's one question. Here's another: Is the USSR Ministry of Health really some sort of totalitarian "monster" that, in its desire for too much, is suppressing any reasonable inception?

"We have long understood," says A. Moskvichev, deputy USSR health minister, "that it's bad for Moscow to decide how much money to allot for the construction of a polyclinic somewhere in Kemerovo or how many patients a district internist should see. The ministry's employees have never been advocates of empty norm-making or petty tutelage. During the years of stagnation, policies forced us to do that. Now we see our job as implementing as quickly as possible Union-wide medical and social programs, upholding a unified health-epidemiological strategy, and performing international duties."

For example, ailments such as a cancerous tumor, injury to vital organs, and certain cardiovascular diseases often force the physician to merely accept the inevitable. The discovery of effective techniques for curing them requires the highest concentration possible of scientific potential and material resources. But developing a new method and performing several successful operations, that's only half the battle. To bring the discovery to the main mass of patients requires having an adequate number of skilled physicians, and additional resources are needed to create local material bases. I would think that only Ukraine and Russia have all that, although not as much as the country as a whole has.

But what about the other republics? No matter how you look at it, if we want to achieve success in organ transplants, if we're serious about the battle against grave illnesses, and, finally, if we want to pull the service for protection of health of mother and child, psychoneurological care, and stomatology out of the breach, we can't do it without Union-wide programs. Or without a centralized system for administering them.

A Union-wide agency is also needed to deal with imported medications. Otherwise, for example, Turkmeniye would almost be "working just for drugs," paying 10-20 times more for each of them than if they were purchased centrally. That republic doesn't have its own pharmaceutical industry.

The advisability of combining the efforts of medical people is acknowledged even at the level of the world community. It applies to our country especially, where the close contact between populations of various regions and the similar working and living conditions indicate a single social space that has existed not quite a century, independent of political perturbations. A very high level of integration is needed here, and a single health-protection strategy for all. We can't limit ourselves to a consultative agency like WHO—we need a Union agency that has specific authority.

"The Union ministry of health need not be an all-enveloping monster," says V. Malakhov, head of the department of health care and social policy for the Russian government. "But at the same time, its functions should be pared down to nothing. The USSR Ministry of Health shouldn't be involved in distribution or in duplicating the work of regional agencies. It should have the manpower, money, and authority needed to implement top-priority programs of import to the entire Union."

The arguments seem quite reasonable. Will they be considered? That's the question.

[signed] I. Anishchenko

P.S. The article was in press when the RSFSR Ministry of Finances issued an order to close the account of the USSR Ministry of Health. That could mean that patients from other republics who are at the clinics of the head institutes of the country may have to gather their things very soon. After all, aren't they "foreigners" to the RSFSR Ministry of Health? That's just one question. How many other questions will there be?

US-Soviet Joint Enterprise to Introduce Surgical Equipment

927C0103B Moscow SOVETSKAYA ROSSIYA in Russian 1 Nov 91 p 2

[Article with no byline, with a dateline of Moscow: "USSR-USA: The Medical People Combines Efforts"]

[Text] A Soviet-American joint enterprise created by the Soviet association Soyuzintermed and the American firm United States Surgical Corporation is under way. Its purpose is to introduce modern surgical technologies and the newest equipment for complex operations and to train personnel.

"The creation of this joint enterprise is the result of a successful collaboration with our American colleagues from the co-founding firm," said the joint enterprise's vice president, Aleksandr Ganin, in a conversation with a TASS correspondent. "In May of this year, they acquainted us with a new, virtually bloodless technique for gallbladder surgery—a laparoscopic technique. That's also when they first demonstrated for us new, nontraumatic suturing devices that had not yet been tested in Europe."

International Public Health Conference in Southern Urals

927C0103C Moscow SOVETSKAYA ROSSIYA in Russian 14 Sep 91 p 1

[Article by Ye. Tkachenko: "Consultation in a City of Smog"; first paragraph is source introduction]

[Text] **Statistics show that every fourth patient in our country's hospitals is being treated for problems with respiratory organs. Those same illnesses account for the largest number of temporary disability slips. How can we lower such inauspicious figures? How can we improve the treatment, diagnosis, and prevention of those illnesses. Those and many other questions are to be answered by the All-Union Congress on Disease of the Respiratory Organs, in which foreign specialists will participate, and which will open 16 September, in Chelyabinsk.**

Ya. Nesterovskiy, RSFSR Meritorious Physician, doctor of medical sciences, and chief phthisiopulmonologist of Chelyabinsk Oblast, has been named president of the congress. At the request of a TASS correspondent, he speaks about the forthcoming event:

"Leading scientists and physician-practitioners from the entire country are coming to the Southern Urals (so far, only Armenia and Georgia have failed to give us confirmations). Among them are the prominent USSR Academy of Medical Sciences academicians A. Chuchalin, M. Perelman, A. Khomenko, and B. Velichkovskiy, as well as specialists from Austria, Great Britain, France, and other countries. The purpose of the forthcoming congress is to combine our efforts to achieve one main goal: to improve people's health. That's why we will have internists and oncologists, surgeons and tuberculosis specialists, ecologists and immunologists."

The topics of the forthcoming symposia are varied: "Catastrophic Medicine," for example, and "Pulmonary Pathology in Newborns" and "Ecological Pulmonology." There will be an exchange of experience and scientific achievements in the diagnosis, treatment, and prevention of diseases of the respiratory organs.

An exhibition of medical equipment and pharmaceuticals from nine foreign firms will open on the eve of the congress.

The ecological state of the industrial regions of the country—a typical region being the Southern Urals—is having an aggravating effect on the worsening of public health. But Chelyabinsk was chosen as the place for conducting such a representative congress not just because of that, but also because of the very valuable work that has been done on those problems, Nesterovskiy noted. The oblast pulmonology center that was built here has performed surgery, has had an emergency aviation unit, and has conducted dispensary observation, and it has demonstrated the possibility of markedly improving the care rendered to individuals. Last year alone, some 15,000 individuals received treatment.

Mystery Illness Among Students Harvesting Potatoes in Sverdlovsk

927C0105A Moscow KOMSOMOLSKAYA PRAVDA in Russian 21 Sep 91 p 2

[Article by V. Sanatin, Sverdlovsk, under the rubric "Investigation": "New Victims of the Krasnoufimskiy Fields"]

[Text] For the third year now, the epidemics that cut down Sverdlovsk students who go out every year to harvest potatoes and onions are still enveloped in the fog of an unsolved mystery.

In 1989, at the kolkhoz, the chief physician of the oblast hospital, S. Sibirtsev, encountered by chance a student whose illness was unknown and unclear. The student complained of weakness throughout the body, but especially in the extremities. One foot hung limp, so to speak. Had the oblast hospital not been handling rayon matters and had Sirbirtsev not, by chance, dropped in on the students in the harvesting contingent, the kids who were ill would have been taken quietly back to the city.

After the first sick individual found by Sibirtsev, there was a second, and a third. And by the end of the harvesting season, he had to assign 30 individuals into the neurological department of the oblast hospital.

Two years passed. Five of the 30 students were unable to recover and remained invalids. But the tragedy repeated itself! On the fields of that same Krasnoufimskiy sovkhoz, near the village of Pridannikovo. And again, among those who became ill were students of that same state university. At first, there were 11 of them. Then, to the injured (or infected?) were added students from the institute of the national economy. Again, it was bitter sadness with Sibirtsev. Of 70 beds in the neurological department, 23 were occupied by carriers of the horrible, puzzling disease.

They're promising snow for the Urals soon. Half of the harvest may perish on the fields of the Krasnoufimskiy Rayon. But the Ural State University has called back most of the contingents. You just have to choose: it's potatoes or your life.

The association of physics students of Russia is demanding criminal proceedings against the sovkhoz officials. But let's not be too hasty. What's the main thing here: to punish the sovkhoz people, or to figure out the potato phenomenon? The fact is that such an illness is not encountered in civilian medical practice—there's no recidivism. Don't worry, it's not AIDS, of course; but the suddenness of the discovery of the Ural "potato illness" can be compared with the shock of the discovery of that damned virus. The "potato illness" is neither fatal nor, judging from everything, infectious. But the main question—What in heck is the source of the injury?—has already upset not only domestic medicine, but also foreign medicine. At any rate, it recently became known that scientists from Italy are traveling to Sverdlovsk to study the illness.

Only when the "agent" of the illness becomes known will we understand what it is: improper use of agricultural chemicals, a new type of country home brew, sabotage by extraterrestrials, or provocation by beings that are entirely of this Earth?

You could throw on a hundred fantastic versions, but they all have to be sorted out by the specialists. Right now, in Sverdlovsk, there is a commission of the RSFSR Ministry of Health that consists of toxicologists, immunologists, neuropathologists, epidemiologists, and on and on. In this, the third year, the only thing surprising is that neither the oblast prosecutor's office nor the criminal experts, nor the forensic medicine experts nor the guys in the gray suits from the KGB, for that matter, have gotten seriously involved in the "potato illness." After comparing who was, who forgot, and who left, and when and why, they could provide a completely Earth-bound, definite answer to the matter.

In addition to the Moscow and international experts, the Komsomolka [KOMSOMOLSKAYA PRAVDA] is also in on the investigation of the "potato illness" affair. Without fail, we will keep our readers informed on the course of the investigation and on its findings.

'Sverdlovsk Syndrome' Studied

927C0105B Moscow IZVESTIYA in Russian 26 Oct 91 p 2

[Article by A. Tarasov, special correspondent for IZVESTIYA, filed in Yekaterinburg: "The Battle to Get the Harvest In Ended With Victims: Once More About the Mystery of the Ural Fields"; first paragraph is source introduction]

[Text] **After another massive poisoning of students at the Krasnoufimskiy sovkhoz (see details in IZVESTIYA, No 221), the harvest contingents from Ural University abandoned the fields. But the chain of tragic and as yet unexplained incidents was not broken: soon after, new victims of the potato fields were hospitalized.**

Ten of them were students from Sverdlovsk Institute of the National Economy. They had been gathering potatoes at the Chatlykovskiy sovkhoz, several dozen kilometers from the fields in which, in 1989, the phenomenon of the poisonous phantom was first officially recorded and about the same distance from the fields the unusual event had happened with the university students that fall. Two more stricken—students from Ural Polytechnical Institute. One had been doing a "working semester" in Kamenskiy Rayon of the oblast, the other in the Beloyarskiy Rayon. Cases of the illness had also been noted in the Sysertskiy and Polevskiy rayons.

There are a great multitude of versions of the cause of the incident. Among them are these: the sickness is the result of violations in the procedures for use of pesticides; the result of a complex of chemical compounds; acid rain; technogenic pollution formed in the course of the decomposition and interaction of a poison unknown to science. And then there are these: the cause is an anomaly of geological structure of those territories; the specific composition of the soil; the mafia blocking the harvest of the potatoes in order to spiral up the prices for a "second bread"; intrigues of UFOs; poisonous mosquitoes. Not a single one of the suggestions has been proven, but none has been refuted.

Such an array of versions is remarkable in and of itself. After all, many of them, except for perhaps only the last few, are not at all far-fetched, and there's some basis for most of the suggestions. It's ridiculous, of course, to blame weakened immunity or avitaminosis of the city people as the main cause of the group's injuries to the peripheral nervous system. But the USSR Ministry of Health commission, in investigating the circumstances of one of the unusual incidents, could not help but note the acute deficiency of vitamins B and C and the weakened state of the bodies of those stricken. Some specialists indicate that isolated incidents of the strange ailment were noted long before 1989. And maybe the

worsened supply of fruits and vegetables to the Ural people of recent years played a role of its own in the outbreak of the illness.

Or how about the entirely improbable "hypotheses" voiced "in a delirium," which bring into play the military, radiation, or some sort of natural anomalies? Were those versions born on arid soil? Issue No 162 of IZVESTIYA wrote of the Krasnoufimskiy storage facilities, where behind plank fences are kept ore that contain thorium—and the unusual incidents are occurring just a few kilometers from those facilities. The version about the military? The outbreak of anthrax in Sverdlovsk in 1979 is not forgotten, and that's why the attitude toward the military is particularly suspicious. What goes on behind the "postal box" fences is known to only a small circle of people. (It wasn't until 16 September of this year that the oblast executive committee allowed the oblast health-epidemiological station to visit, for "reasons of environmental protection," the facilities of the Ministry of Defense and the Ministry of Internal Affairs.) Natural anomalies? They exist, too. Above the fields of the village of Pridannikovo, where the students suffered the paralysis, local people observed a "tipsy" rainbow several weeks before the arrival of the city people—the ends of the arc rested not on the ground, but above, in the clouds.

But the most mysterious thing about the "potato" detective story is the position taken by the people in power. It remains unchanged, even though the people who formulated it have changed more than once. The people in power continue to fight for the harvest with the same valor. Two years ago, the number of those sent away could not stop the flow of new harvest contingents to the front with the unknown illness. It's the same today—the place where losses were taken and university students were demoralized on the Krasnoufimskiy fields has been filled with amazing persistence with students from the Institute of Railroad Engineers, local schoolchildren, and tank crews from the Volga-Ural Military District.

Two years ago, the Uralenergochermet enterprise refused to pay for the sick leave of Nadezhda B., a Uralenergochermet engineer who became ill after five and a half hours of work at the Khramtsovo sovkhoz, despite the diagnosis made for her—the same one made for all the victims of the Ural fields, toxic polyneuropathy. Despite the note made on the sick leave chart ("production accident") and despite the paperwork, signed by the sovkhoz director, which named the cause of the poisoning as combined action of pesticides. Today, Nadezhda is working at a different facility, but when we were talking with her about meeting her, she asked that we not call her at work and not use her name in the newspaper—"people who are sick aren't needed in the workplace, especially people like us." Just as in 1989, the state is still doing what it can to make Nadezhda herself feel guilty for the illness.

The unusual incident of this year happened on fields where the health-epidemiological station has yet to find any traces of toxic substances. That's why, in the words of the chief neuropathologist of the oblast, Prof Ye. Krupin, a fairly difficult struggle lies ahead in the attempt to prove that the students aren't dragging their feet out of capriciousness.

So, in the "Sverdlovsk syndrome," besides what's unique, there's also something that's standard, even hateful.

By the way, Krupin, who has seen those stricken with the mysterious sickness, has advanced his own version for the cause of the illness: the mystery lies in the incomprehensible use of a new generation of imported pesticides—pyrethroids. According to the professor's data, they have lost their ability to walk on the very farms in the oblast that have such toxins—particularly the neurotropic compounds tsimbush and sumicidin.

Indirectly supporting Krupin's version is this fact: in letters to IZVESTIYA about the mystery of the toxic fields, some readers have described in detail the symptoms they suffered after working in a field—and those symptoms are very similar to the symptoms of the Ural sickness. What's noteworthy is the return addresses on the letters—Belarus, Ukraine, the Volga region. There, as in the Urals, the use of pyrethroids has been sanctioned to control the Colorado beetle and other pests.

Krupin says this: there are influential officials who are actively obstructing the search for the causes of the tragedy, and powerful pressure is being exerted for the pesticides by the foreign firms that supply the pyrethroids. At the same time, people abroad can't even imagine exactly how the Soviet field managers can apply such powerful toxins. (In Khramtsov, for example, a concrete mixer is used to prepare the pesticide solutions.)

Obviously, the method chosen by the visitors from Moscow to study the problem—in assaults after each unusual incident—is ineffective. A systematic, comprehensive study is absolutely necessary. Leading specialists have to be involved. They have to have highly sensitive equipment. But what are the people supposed to do now, wait until next summer or fall? After all, there's no barrier at all today to protect against misfortune.

Whatever version about the cause of the poisonings turns out to be correct, this much can be said right now: The two-year drama on the fields is a drama about the Soviet state's stubborn neglect of the individual.

POSTSCRIPT: While this article was in press, a commission of the Russian Ministry of Health prepared a report on the results of work done in Sverdlovsk Oblast. The cause of the illness was said to be the combined action of a number of factors. The principal factors involved working conditions. Then there was weakened immunity, and adverse weather conditions. The pesticides were acquitted. Meanwhile, the "greens" don't agree with the conclusions of the medical people—they

feel that the country's agroindustrial complex is a criminal organization, and they are getting ready to take it to court.

The commission's report did not bring any clarity to the matter—it failed to even comment on a number of things. What now? To a recent remark on the "Sverdlovsk syndrome" made by IZVESTIYA, the RSFSR State Committee for Health and Epidemiological Inspection answered this: "a temporary inspection committee is being formed....a temporary science group is being formed for further study....a letter has been sent with a request that an international group of experts be set up....being created in Sverdlovsk is a toxicological center equipped with modern imported equipment..." Those are all promises. They make people happy. But the enterprises that are supposed to buy the instruments for the toxicological center for hard currency are spending it for the time being primarily for sugar and meat.

Could this really be us, who have jabbered so much in the past about the importance of values common to all mankind?

The Medical-Demographic Situation in the Ukrainian SSR at Its Contemporary Stage

927C0108A Kiev VRACHEBNOYE DELO, in Russian No 9, Sep 91 pp 105-107

[Article by A. R. Uravenko, doctor of Medical Sciences, A. P. Kartysh, L. A. Chepelevskaya, candidate of Medical Sciences; Kiev Scientific Research Institute of Social Hygiene and Public Health Administration; under the rubric "Public Health Organization"]

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[Text] The task for the maintenance and strengthening of the health of the population can be accomplished by combining the forces of state organs, labor collectives, social organizations, as well as through the genuine interest of each citizen in the maintenance of his own health.

The average life span and birth rate are the most informative of the demographic indices, as are the overall mortality, infant mortality, the natural movement of the population, and the age-sex structure of the population. Thus, the birth rate began to fall after some stabilization in the 1970s to the 1980s at the level of 14.5-15 births per 1000, and was 13.3 per 1000 in 1989 [1]. The mortality rate has a tendency towards increase: from 1970 through 1989 it increased by 32 percent, amounting to 11.6 per 1000 residents. Given such dynamics of the birth rate and mortality rate, the rate of the natural increment of the population, which amounts to the difference between them, shows a marked tendency to decrease: it has decreased by a factor of 3.8 as compared with 1970, and was 1.7 per 1000. Positive values of the population are determined mainly by the urban population; the rural population, on the other hand, starting in 1980, shows a negative natural growth.

Such a tendency of the principal demographic indices has naturally exerted an influence on the average anticipated life expectancy, which over the course of three decades has been 70-71 years, with a difference of seven to nine years between women and men; this difference is eight years in the cities and 11 years in the villages.

The highest average life expectancy at the present time is in Japan (more than 79 years); followed by Switzerland, 77.5 years; Iceland, 77.4 years; Sweden, 77.2 years; Spain, Greece, Canada, and the Netherlands, 76.5 years [2].

The most favorable tendencies in the demographic indices are noted in infant mortality. It decreased from 1970 through 1989 by more than a third, and is 13 per 1000 throughout the Ukraine as a whole; the difference between the urban and rural population is insignificant. As compared with the USSR and other republics, the infant mortality figures in the Ukraine are rather low; there are lower figures than these only in the Baltic republics and in particular years in Belorussia [3, 4]. However, as compared with economically developed countries, they are 2-2.5 times higher. Thus, infant mortality in the USA is 10, in Great Britain 9.1, in Switzerland 6.8, in Finland 5.8, and in Japan 5.2 per 1000 births [5]. It should be noted that this difference may be even more significant when international criteria of recording infant mortality are introduced in our country.

The republic differs significantly from the economically developed countries with respect to the indices of total mortality. Beginning in the 1950s, the mortality figures stabilized in these countries at relatively low levels, or show a tendency to decrease. For example, in Great Britain, this figure is distinguished by its stability and is 11.8 per 1000; in the USA it has decreased from 9.6 to 8.7 per 1000; in Finland from 10.1 to 9.4 per 1000; in France from 12.8 to 10.2 per 1000, and in Japan from 10.9 to 6.4 per 1000; i. e., apparently, the species threshold has been reached [2]. Mortality in the Ukraine has increased from 10.7 percent in 1978 to 12.2 percent in 1985, and then decreased insignificantly in 1986 (the decline was determined by a decrease in the number of deaths associated with the use of alcohol), and then began to increase again.

The mortality of man in the economically developed countries exceeds the mortality of women. For example in Australia these figures are 9.9 and 6.0 per 1000, in Belgium 11.7 and 6.9 per 1000, in Japan 8.2 and 4.9 per 1000, in Sweden 9.7 and 5.8 per 1000 and in the USA. 15.1 and 8.7 per 1000, respectively, while in the Ukraine they are 11.2 and 11.3 percent [2].

By analyzing the total mortality figures for the population of Ukraine, we reached the conclusion that they are increasing, especially significantly among men of

working age, starting from 40 years of age. Circulatory diseases occupy first place among the principal causes of death, followed by malignant neoplasms, accidents, poisonings, and trauma; diseases of the respiratory organs occupy a relatively high position. The mortality rates with respect to the principal causes of death have a tendency to increase; however, the number of malignant neoplasms is increasing most markedly; in the last 10 years these have reached 30 percent. The aging of the population undoubtedly influences the increase in oncological morbidity and mortality. A similar tendency is observed in the economically developed countries.

Of those classes of diseases which occupy a relatively high rank in the total mortality structure, our attention is drawn to a 2-fold increase in mortality from endocrine diseases and a marked tendency toward an increase in mortality from diseases of the musculoskeletal apparatus and the genitourinary system. The relative proportion of infectious and parasitic diseases continues to fall in the mortality structure. The relative proportion of cancer of the stomach is decreasing in the class of malignant neoplasms, and cancer of the respiratory organs and cancer of the breast are increasing.

When the total mortality figures are analyzed with respect to the regions of the republic, significant differences are noted. Up to the present time the medical-demographic division of Ukraine into central, southeast, south, western, and northeastern regions has been generally accepted. The arbitrariness of this division is clear, since it does not take into account the peculiarities of the contamination of the territory of the republic as the result of the catastrophe at the Chernobyl NPS. This problem demands further detailed study.

The greatest growth in total mortality from 1978 through 1988 from all causes has been observed in the northeastern (from 12.5 to 14.1 per 1000) and southeastern (from 10.8 to 12 per 1000) regions. In the former this was determined by an increase in the relative proportion of the older age population; in the latter, evidently, by ecological factors. The relationship of the mortality level to the age of the population is confirmed by the figures for mortality from diseases of the circulatory system. Thus, in the northeastern region, in which the average age of the population is 38.4 years, the highest mortality from diseases of the circulatory system has been observed, 9.1 per 1000. Such a relationship is also observed in the central region, in which the average age is 36.9; the mortality rate from diseases of the circulatory system is 8.5 per 1000. In the western and southern regions, where the population is younger, this figure is significantly lower and is 6.1 and 6.5 per 1000, respectively. The high level of mortality of the population in the southeastern region is associated with unfavorable ecological factors. Mortality from malignant neoplasms in this region is highest, and is 2.1 per 1000, including deaths from malignant neoplasms of the respiratory organs, a rate of 0.55 per 1000.

The level of mortality from traumas, accidents, and poisonings is highest in the southern region; at the same time a tendency toward its decrease should be noted. However, it still significantly exceeds the corresponding figures in the economically developed countries, by a factor of 2.5 as compared with the USA.

Mortality from diseases of the respiratory organs has a tendency toward decrease on the whole. At the same time its increase is observed in the case of chronic bronchitis; the highest level is in the western (0.9 per 1000) and northeastern (0.8 per 1000) regions.

The mortality figures for diabetes mellitus show a pronounced tendency toward increase; at the same time, regional peculiarities are not noted. Apparently, factors of a socioeconomic character are of significance in this case. Differences are also not identified in the levels of mortality from infectious and parasitic diseases (with an overall tendency toward their decrease), or from diseases of the genitourinary system.

Thus, analysis of the level of mortality of the population of the Ukrainian SSR attests to its dependence on an unfavorable ecological situation, regional climatic conditions, the age composition of the population, and other factors. The predictive data of the principal medical-demographic indices show that a radical reorganization of the protection of the population's health is necessary, since unfavorable tendencies will be maintained to the end of the century, and will be manifested in the first decades following the year 2000. The tendency toward an increase in mortality will slow somewhat; the average life expectancy will increase insignificantly. The most favorable prognosis relates to the infant mortality figures.

Thus, the contemporary medical-demographic situation in the Ukrainian SSR is unfavorable; this is suggested by a decrease in the birth rate following its prolonged stabilization, the growth in total mortality, the decrease in the natural increment of the population, which has reached a negative value among the rural population, and finally, the anticipated low average life span as compared with the economically developed countries. The infant mortality rate has shown a tendency to decrease over the course of many decades. As compared with the other republics, with the exception of the Baltic republics, infant mortality is significantly lower in Ukraine.

The principal causes of death of the population are as follows: diseases of the circulatory system (61.2 percent), malignant neoplasms (16.1 percent), diseases of the respiratory organs (8.4 percent), accidents, trauma, and poisonings (7.6 percent). Regional peculiarities in the mortality rate of the population have been identified. The highest mortality from diseases of the cardiovascular system are observed in the northeastern region; the highest level of mortality from malignant neoplasms are observed in the southeastern region, in particular of the respiratory organs. The unfavorable prognosis of the

medical-demographic situation in the regions subjected to contamination as a result of the accident at the Chernobyl NPS dictates the necessity for a review of the regional medical-demographic division of Ukraine.

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Principal Objectives in the Field of Automation Confronting the Pharmaceutical Service of the Soviet Union

927C0112A Moscow FARMATSIYA, in Russian Vol 40 No 3, Mar 91 pp 1-6

[Article by A. D. Apazov and L. V. Moshkova; "Soyuzfarmatsiya" All-Union Association Affiliated with the USSR Ministry of Health (Minzdrav SSSR) and All-Union Scientific Research Institute (VNII) of Pharmacy, Moscow]

UDC 615.12+614.27]:681.31

[Text] The systematic use of the computer within the framework of the automated control system (ACS) makes it possible to markedly accelerate information collection and processing and the development and discovery of optimal plan-related solutions, and thereby increases the efficiency of social production.

All of the above has a bearing in complete measure on the pharmaceutical service as well, in which definite experience has been accumulated in the use of computer technology resources and in the creation of an ACS.

In analyzing the ACS which are operating and being developed in the pharmaceutical service, it has been revealed that the supply systems make up the bulk of them.

There are several versions of model project solutions. In this case more than 90 oblasts use the Gomel and Minsk projects as standard. In the RSFSR, a project developed by the Leningrad Oblast Medical Information-Computer Center, "Management of the Movement of Medical Goods in the Pharmaceutical Network" [UDMAS-1], is being used in 50 oblasts.

The assemblage of interconnected objectives "The Planning of Pharmaceutical Supply and Management of Pharmaceutical Management" [ASMO], which is already at the stage of experimental exploitation was in need of substantial reworking, and in this connection was not put into use in the pharmaceutical service of the republic, was accepted as a standard project for the purposes of perfecting the above-named project in 1988 in the RSFSR.

The recording of the movement of pharmaceutical supplies in the depot is currently being carried out in practically all of the republics. At the same time, automated recording of the movement of pharmaceutical supplies in the depot has not been arranged in particular republics (the Turkmen, Kirgiz, and Tadzhik SSR). Even in the RSFSR not all of the depots have been automated.

The above-enumerated objectives have been implemented mainly on the ES type of computer, but at the present time a clear-cut tendency to shift to personal computers (PC) has been noted in the pharmaceutical service. Neither special facilities, nor the equipment appropriate to them, nor a large amount of service personnel are required for the use of this class of computers; the cost of computer time on the personal computer is on the average of 3-5 rubles; on the ES computer, 75-100 rubles. It has been established that the use of the IBM-compatible personal computers makes possible a decrease in production costs by a factor of 20-40.

As a rule the exploitation of the objectives related to taking stock of the movement of pharmaceutical products and materia medica is being carried out in the territorial computer centers, and the costs for this exploitation run on the average from 100,000 rubles to 300,000 rubles. These expenses are enormous throughout the republics. Thus, in 1988 in the RSFSR they were 11.3 million rubles; in the UkSSR, 2.5 million rubles, etc. Overall, they run to about 50 million rubles throughout the country.

As can be seen from the above, the expenses are enormous, while the results are thus far insignificant. The real product of the ACS comprises the amount of tabulations involving stock-taking, report and other data which should, according to the plans of the developers, substantially facilitate decision-making, but which in actuality facilitates this process only a little. The user needs not only data but knowledge; the information to be obtained should be minimal, and should approximate the hypotheses for decision-making.

In addition to the model project solutions, there is a large number of individual plans relating to the various aspects of the activity of the pharmaceutical service.

In all, at the present time there are upwards of 30 individual developments with respect to the problems of

pharmaceutical supply which have been tallied in the country, and which do not differ in any fundamental way. Thus, individual projects in the RSFSR relating to the recording of the movement of pharmaceuticals and materia medica are being placed in operation in 17 oblast production associations, and approximately 2 million rubles have been spent on their development. A similar pattern has been noted in other republics.

These expenses relate to pure delays in circulation, the increase in which is leading under the new conditions of management to a curtailment in cost-accounting income, and this in its turn will decrease the resources for the development of the pharmaceutical network and the solution of social problems. Thus, individual development, which does not provide for programmatic and technical compatibility with other projects, leads to large expenditures, duplication of efforts, and frequently to low quality and incompatibility of the automated systems introduced, as well as to the impossibility of creating a unified automated system of management of the pharmaceutical service.

The departmental approach, the fragmentation of resources, when there are never enough of these, all of this leads to the fragmentary character of the automation of facilities, and as a result, has a minimal influence on increasing the productivity of work, savings in raw material and energy.

This effort is on a high level in a number of regions, and, in addition to the traditional tasks relating to supply, plan-financial, bookkeeping, personnel, and information-directory tasks are being resolved, as well as tasks relating to the production activity of pharmaceutical enterprises. Economic-mathematical methods and contemporary scientific approaches are being used to solve many problems. There are examples of this in the UkSSR, BSSR, Lithuania, Latvia, Leningrad, Ryazan, Kishinev, etc.

Work has begun in Moscow to create an automated system of the control of the city's pharmaceutical management.

The tying of tasks of varied levels of management into a unified system is being carried out in the BSSR and the UkSSR: these levels include the republic, the oblast, and the city levels of management. The "Farmfabrika" ACS is being developed on an SM-1420 computer in the Kazakh SSR. Efforts are being carried out in the Georgian SSR to create local networks on the basis of personal computers.

When this work is analyzed it can be noted that the pharmaceutical service is thus far taking only timid steps.

Abroad, however, there is a considerable experience (more than 10 years) in the use of personal computers in the pharmaceutical service; this has been proceeding along two lines. The PCs are used, on the one hand, to reduce labor expenditures, to improve the conditions of work, and to free up specialists from routine work, and on the other hand, to create data banks regarding various aspects of pharmaceuticals.

It should be noted that it is not the management but the production component (drugstores, depot, etc.) which serves as the basis of computerization abroad. Thus, a computer system is used in Australia to process prescriptions, to form various types of reports, to draw up the profiles of patients, to record drug interactions, to print information on labels, and leaflets with instructions for patients, to take stock of depot supplies, as well as to take stock of the standardization of the reserves of drugstores, etc. Great savings in time is achieved through the filling out of forms for the release of the pharmaceuticals in the social welfare system. This work is similar to the processing of free and benefits prescriptions in our country, the volume of which amounts to 14.4 percent of the total, and 21.6 percent of the ambulatory-polyclinic prescription writing.

Special software has been developed for the purpose of managing the economic activity of pharmacies for various brands of computers, including, the above-mentioned tasks, and the issuing of requisitions for the depot, analysis of defects in pharmaceuticals, oversight of the current price levels, and the determination of the efficiency of personnel [5,7].

Computers are widely used in the USA in the work of the production personnel of pharmacies occupied in the preparation of pharmaceutical formulations. Mathematical calculations necessary in plan-financial activity, as well as in the preparation of pharmaceuticals (the calculation of doses, the necessary volumes of the solutions), the marking of single doses of solutions for injections, liquid pharmaceutical formulations, etc. are being performed with the use of PCs.

An interhospital data base relating to pharmaceuticals and to patients is being used on an IBM PC in the USA to describe the parameters of the consumption of pharmaceuticals, for example, the cost of pharmaceuticals per patient, or the number of pharmaceuticals prescribed [1, 10].

At the present time programs for use in the pharmacy practice have been developed in the FRG; these permit the introduction of all necessary information regarding goods arriving at a pharmacy into microcomputers, by carrying out a scan with respect to any combination of their characteristics (supplier, shelf-life, etc.).

The monitoring of pharmaceuticals to be delivered, checking their correspondence to the quantities ordered, analysis of the condition and structure of depot reserves, etc., are being accomplished using PCs [8].

Such objectives as the determination of need for pharmaceuticals, the calculation of the optimal reserve of pharmaceuticals in a pharmacy, the automated worksites of specialists, are being accomplished by means of small

computer technology in many pharmacies of Czechoslovakia, Hungary, and Germany [2, 3, 6, 9, 11].

At the present time these developments in the Soviet Union are experimental in character.

PCs are widely used abroad; in the process, an assessment of the effectiveness of this use is constantly being carried out.

Such an analysis in Australia showed that in 71 percent of cases, due to the use of PCs, relationships with suppliers improved; in 89 percent, the time used for the delivery of pharmaceuticals prescribed by physicians decreased; in 70 percent, the time for the performance of secretarial work decreased; and the amount of time involved working with patients increased in 84 percent of cases. In addition, the monitoring of reserves of pharmaceuticals improved in 46 percent of cases.

The computerization of the division for the preparation of sterile pharmaceuticals in the pharmacies of clinics has made it possible to eliminate many manual operations in the preparation of documentation when pharmaceuticals are prepared in large amounts for internal consumption (the printing of labels, the selection of the principal solution, as well as additives, the introduction of additives to the syringe, etc.) [11].

Thus, both our slight experience and experience abroad make it possible for us to delineate the principal directions of the computerization of the pharmaceutical service at the contemporary stage of development.

First, the need for an economic analysis of operations involving computers in our country is growing, in connection with the transition to market relationships. Up-to-date information regarding various aspects of economic activity of the pharmaceutical institutions is extremely necessary under these conditions with the aim of taking optimal decisions, making the creation of automated systems especially urgent.

The relationships within the pharmaceutical system between the various levels of management, and with the organizations of other departments will be structured on a contractual basis; therefore, pharmaceutical institutions at any level must know the current status of the pharmaceutical markets in the USSR and abroad, the needs of the consumer, the characteristics and purposes of pharmaceuticals, comprehensive information regarding them, the result of the analysis of financial-economic activity, and other questions.

Second, it is impossible to survive in the market conditions and conditions of competition and innovation which confront us without the creation of automated worksites [ARM] which assure the automation of the functions of users, that is of workers involved in planning, specialists in the field of goods at the pharmaceutical warehouse, bookkeeping workers, and other specialists of the sector. The ARM is the point of departure in the conception of the further development of automated systems of information processing in the pharmaceutical service.

Third, the development, creation, and mass production of automated systems of the operational management of the pharmaceutical service and the stock-taking of the supply of pharmaceuticals to be delivered "under key" are priority directions in the field of the computerization of the pharmaceutical service. Local computer networks which carry out the exchange of information between facilities at distances of tens of meters up to tens of kilometers should become the basis of the creation of such systems.

Fourth, the creation and introduction of integrated ACS which insure broad information exchange both within an enterprise (institution), as well as with the external milieu (suppliers, consumers, banks, etc.) is an important line of development under the conditions of the constant development of management and economic connections.

The general purpose computer, equipped with components of artificial intelligence and knowledge base systems should become the basis of such systems.

Fifth, the development and improvement of existing ACS by facilities of all levels of the management system should remain in the center of attention of developers; the introduction of the new information technologies and the incorporation of expert systems and knowledge basis for the making of administrative decisions should be incorporated into the ACS.

Such lines of development as the scientific planning of the need for pharmaceuticals, up-to-date stock-taking and monitoring of the condition of supply, the increase in the quality of production processes in pharmaceutical institutions, and of the work activity of specialists and their professional training, etc., also remain priority directions.

The placement and operation of automated systems for pharmaceutical information services of large cities, the solution of plan-economic and bookkeeping problems, as well as the monitoring of the indices of income and profitability of pharmaceutical institutions in order to take up-to-date management decisions are taking on special significance under the new economic conditions.

It is necessary to create a unified informational basis, to use software which support unified system software for the pharmaceutical service at various levels, to work out the terminological aspects of indices of information support and software both of individual ACS and of the integrated "Pharmaceutical Service" automated information processing system [ASOI], as well as the fundamental principles of the construction of a state system for the transmission of pharmaceutical information are necessary for the realization of the above-enumerated lines of development. At the same time, the oblast level of management will remain a principal component in the

"Pharmaceutical Service" automated information processing system. Automation should impact, in the first place, on the wholesale component and the central regional pharmacies which supply the pharmaceuticals to the sub-departmental network as well as to the municipal pharmacies. The use of personal computers at the oblast level will permit not only the accomplishment of the recording of the movement of pharmaceuticals, but also the carrying out of automated monitoring of the fulfillment of contracts, the regularity of deliveries, and the analysis of the financial-economic activity and a large number of other problems. Introduction of the economic conditions of regional cost-accounting for the assurance of informational interaction of the "Farmatsiya" associations of various levels also requires the use of a uniform system of classification and information coding. In this connection it is necessary to activate work on the transition to nationwide codes, to organize a system of their management for maintenance under the current state of affairs (the responsibility for this work is borne by the All-Union Center of Scientific Pharmaceutical Information [VTsNFI]). A great deal of work lies ahead to recode the nomenclature numbers in connection with the transition to the new system of price fixing.

The introduction of codes and names of pharmaceuticals into the personal computer is rather time-consuming work, and in this connection, a system of bar coding and reading devices (scanners) is being widely used abroad. This is a very urgent and complicated question for us, which still remains to be resolved by us.

Each system software is run through the use of IBM-compatible PCs (of the ES-1840, 1841,1842 types, the Iskra 1030 type, etc.).

The problem of the creation of data banks at the territorial level which will interact in a network with the systems of the pharmaceutical service of lower levels and with the sector data bank of the union level is a no less important line of development within the framework of the computerization of the pharmaceutical service.

Information is of the highest value, a principal product, and a fundamental commodity in contemporary society. The information potential of society is accumulated in the form of data bases, and in the future, will accumulate in the form of knowledge bases. In this connection the creation at the union level of an automated data bank for collective utilization, regarding various aspects of pharmaceuticals, is an extremely pressing problem, and its solution must be accelerated (responsibility for this work belongs to the All-Union Scientific Research Institute of Pharmacy and the All-Union Center of Scientific Pharmaceutical Information).

The need to integrate and to assure the interaction and interdependence of "Farmatsiya" production associations of different levels with respect to the principal functions of their supply and plan-financial activity is an increasing necessity under the conditions of the shift of the union and autonomous republics, oblasts, and krays to regional cost-accounting. In this context the task of accelerating the development and introduction of the priority lines of development into the pharmaceutical service stand before us.

The acute necessity for new methods and forms of coordination of efforts in the field of automation has come to a head.

Above all an organ is required which assesses the level and quality of developments in the fields of the ACS in the pharmaceutical service. A coordinating council, consisting of the leading scientists and developers of the country, should probably be created. A data bank of project solutions relating to the ACS, a bank of algorithms and programs relating to pressing problems of the pharmaceutical service, with the preservation of the inventors' rights of the developers, must be created.

In order to increase the effectiveness of the developments of the ACS it is necessary to specify several developers in relation to each line of development, to choose the base institutions for implementation, to equip them with the necessary equipment and personnel, and to carry out the development of the ACS for various management levels on a competitive basis.

Thus, the responsible task of shifting to a qualitatively new level of the management of pharmaceutical supply through the creation and putting into effect a unified automated system of management of the pharmaceutical service on the basis of data banks and a dialogue system stands before the pharmaceutical service of the country.

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Eyeglasses Developed for Psychiatric Treatment

917C0601D Kiev RABOCHAYA GAZETA in Russian 13 Aug 91 p 4

["Relax, You're Wearing Glasses"]

[Text] Rehabilitative glasses designed by a group of specialists under the direction of A. P. Chuprikov, director of the Chair of Psychiatry at the Luga Medical Institute and doctor of medical sciences, have enjoyed widespread recognition.

The desired effect is achieved by a set of specially selected variegated pieces of glass. They are used to stimulate the retina with light, which in turn has a calming effect on the brain, and thus improves the patient's condition. The procedures for improving the mood and achieving emotional equilibrium are also suitable for healthy individuals.

"There has been interest from abroad in our technique for treating neuroses," noted UKRINFORM correspondent A. P. Chuprikov. "It is patented in 23 countries. But we still do not have the resources to introduce it into our country. We must rely on help from organizations interested not only in commercial profit, but also in health protection."

Use of Polyvinylpyrrolidine as a Stabilizer in Brucella Lyophilization

927C0091B Moscow LABORATORNOYE DELO in Russian No 2, Feb 91 (manuscript received 9 Apr 90) pp 62-63

[Article by O. D. Zakhlebnaya, I. V. Laukner, Irkutsk Scientific Research Antiplague Institute of Siberia and the Far East]

UDC 579.841.93.086.132:[615.384:547.745

[Abstract] Lyophilization of microorganisms is one of the most effective methods for storing them for lengthy periods. Negative temperature and subsequent drying, however, damage the cell. Although a saccharose-agar-gelatin (SAG) medium is often used to protect brucella against such adverse factors, little is known about the effectiveness of PVP, or polyvinylpyrrolidine. The two media were compared in their use as stabilizers for 20 strains of brucella from four species—*B. melitensis, B. abortus, B. suis,* and *B. rangiferi*—which were stored for three years in a lyophilized state. A total of 48.1 percent of the cells in the strains lyophilized with PVP were alive right after drying; that figure was 27.5 percent for those lyophilized with SAG. For PVP, the figure dropped to 41.8 percent after two years and 35.1 percent after three years. The survival rate varied with the species, *B. abortus* being the most stable, at 70.9 percent right after drying; the number of viable cells after three years dropped by an average factor of 1.3. Biological properties showed no evidence of change over the three years of storage, regardless of the stabilizer used. References 10: 8 Russian, 2 Western.

Coordination of Biological Research in the Department of General Biology of the USSR Academy of Sciences

927C0020 Moscow ZHURNAL OBSHCHEY BIOLOGII in Russian Vol 52 No 1, Jan-Feb 91 pp 130-135

[Article by L. P. Rysin, S. P. Kalinovskaya]

[Text] One of the most important factors in the process involving the perestroyka of the scientific and organizational activity of Academy institutions is better organization of scientific research. It must provide a clear-cut, well-thought-out system of actions for a large number of scientific research, higher education, and design institutes, and it must help to eliminate redundancy, to focus manpower and resources on the development of basic scientific problems, to promptly solve pressing problems, and to strengthen ties with industry. Addressing an out-of-town session of the USSR Academy of Sciences Presidium of the Council for Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics in November 1986 in Vladivostok, USSR Academy of Sciences President G. I. Marchuk named as one of the basic directions to be taken in the perestroyka of the Academy sciences the radical improvement of the coordination of scientific research on the basis of large-scale Union-wide programs. No one disputes the need for coordination; the problem is how to do it as efficiently as possible.

As we know, the functions of the USSR Academy of Sciences departments were recently expanded substantially. Specifically, the departments themselves have been called upon to effect, as leading coordination centers, scientific-procedural guidance for the scientific institutions of the country in their respective areas of science. In the five-year plan that is ending, according to a USSR Academy of Sciences Presidium decree, the Department of General Biology of the USSR Academy of Sciences coordinated the activity of nearly 85 Academy institutes. In addition to those institutes, a large number of VUZ and sector institutions participate in the programs curated by the department.

In April 1987, the Council for the Coordination of Scientific Activity was created in the Department of General Biology of the USSR Academy of Sciences. At that time, the very first meeting took place. A program was outlined for the near future, and it was decided to focus attention specifically on the coordination of scientific research in top priority areas after the appropriate comprehensive long-term programs were developed.

The council is headed by the academician-secretary of the Department of General Biology of the USSR Academy of Sciences, Academician V. Ye. Sokolov, and his deputies, Academician V. N. Bolshakov, Academician L. P. Tatarinov, and Corresponding Member L. M. Sushchenya. The council itself includes more than 60 of the country's leading biologists, who represent the academies of sciences of all the Union republics; the Ural, Siberian, and Far Eastern departments of the USSR Academy of Sciences; and the major science centers.

The next session of the council took place in November of that same year, in Ashkhabad. The main topic of discussion involved the programs for basic research developed in the Department of General Biology of the USSR Academy of Sciences. In addition, discussion also included a list of problems that needed priority analysis and were being recommended as possible topics for doctoral dissertations (the proposals were submitted by scientific councils). Also examined were proposals for the training of science personnel under the guidance of the leading biologist-specialists.

The other half of the session was devoted to becoming familiar with the scientific activity of the biology institutes of the Turkmen SSR. Leading scientists, as well as young research associates, gave reports and communications.

According to a decision that had been adopted, the next session of the council was held in Yurmala (LaSSR) in April 1988.

Again, the status of the programs under development was examined, with the representatives of the scientific councils curating those programs reporting on them.

Evoking a great deal of interest was a communication about the status of personnel of higher qualifications (doctors of sciences) at the country's biology institutes. As is known, in recent years the question of the level of Academy science has come up repeatedly at general meetings of the USSR Academy of Sciences and at sessions of the USSR Academy of Sciences Presidium. One index of that level is felt to be the presence of doctors of sciences, i.e., specialists, in a given institute. Their absence makes it difficult to train young personnel, since, as a rule, only doctors of sciences can be advisers to them. The communication attempted to analyze the distribution of doctors of sciences among the various institutes, among the large regions of the country, and in individual republics. From the data at the disposal of the Department of General Biology of the USSR Academy of Sciences, it is obvious that the growth of the number of doctor of sciences/biologists is extremely unsatisfactory in many Union republics. More and more often, doctors of sciences with a great deal of scientific experience become consultants, but there are no replacements for them. That is why one of the tasks of the Council for Coordination is to actively monitor the status of the personnel with higher qualifications in every institute.

A report on biology journals published by the academies of sciences of the Union republics was prepared for the council's session; the work was done by a competency commission that had analyzed the quality of the articles in those journals. The targets of the examination were GIDROBIOLOGICHESKIY ZHURNAL [Journal of Hydrobiology] (UkSSR Academy of Sciences), VESTNIK ZOOLOGII [Journal of Zoology] (UkSSR

Academy of Sciences), UKRAINSKIY BOTANICHESKIY ZHURNAL [Ukrainian Botanical Journal], TRUDY AN LitSSR [Transactions of the Lithuanian Academy of Sciences] (Biology Series), IZV. AN ESSR [Reports of the Estonian Academy of Sciences] (Biology Series), IZV. AN LatvSSR [Reports of the Latvian Academy of Sciences], IZV. AN MSSR [Reports of the Moldova Academy of Sciences] (Biological and Chemical Sciences Series), IZV. AN BSSR [Reports of the Belorussian Academy of Sciences] (Biological Sciences Series), BIOLOGICHESKIY ZHURNAL AN ArmSSR [Biology Journal of the Armenian Academy of Sciences], IZV. AN GSSR [Reports of the Georgian Academy of Sciences] (Biology Series), IZV. AN AzSSR [Reports of the Azerbaijan Academy of Sciences] (Biological Sciences Series), UZBEKSKIY BIOLOGICHESKIY ZHURNAL [Uzbek Biology Journal], IZV. AN KazSSR [Reports of the Kazakh Academy of Sciences] (Biology Series), IZV. AN TadzhSSR. Otd. biologicheskikh nauk [Reports of the Tajik Academy of Sciences. Department of Biological Sciences], IZV. AN TSSR [Reports of the Turkmen Academy of Sciences] (Biological Sciences Series), IZV. AN KirgSSR [Reports of the Kirghiz Academy of Sciences] (Chemical Technology and Biological Sciences Series), and PRIRODA ESTONII [Nature of Estonia]. The expert analysis ended with the preparation of remarks on each journal. Quite frequently, the desire was expressed to enlist the leading specialists of the country's scientific institutions to review the articles under publication; to invite scientists from the central scientific research institutes as authors more often; to regularly publish reviews; to improve the structure of the journals, avoiding narrow specialization in the process; to make it a rule to publish author subject indices at the end of the year; to speed up the handling of submitted manuscripts; and to enlarge the space given to chronicles.

As in the previous session (in Ashkhabad), the members of the Council for Coordination devoted a great deal of time to becoming thoroughly familiar with the republic academy institutions—the Institute of Microbiology, the Institute of Biology, and the Botanical Gardens of the Latvian Academy of Sciences. Reports were given by lead research associates who detailed the major achievements. Special attention was devoted to the need to quickly solve the ecological problems of the Baltic Sea. Junior scientists gave some interesting poster reports. Environmental protection in Yurmala was examined jointly with the USSR Academy of Sciences Scientific Council for Problems of the Biosphere and representatives of public organizations and organs of Soviet authority; as a result, the decisions that were made had great public resonance and were referred to repeatedly by the local press.

At the fourth session of the council, which was held in Kishinev in July 1989, attendees heard a report on the International Program of Collaboration Among the Academies of Sciences of the Socialist Countries on the Problem of Ecology—i.e., on its scientific concept, its organizational structure, and the participation in the program of institutes of the USSR Academy of Sciences and the academies of sciences of the Union republics. Special attention was devoted to the problem of the development of a cadastre of territories with ecological problems.

The meeting ended with familiarization with the biology institutes of the Moldovo Academy of Sciences: the Institute of Ecological Genetics, the Institute of Physiology and Zoology, and the Botanical Gardens. The meeting's participants were particularly impressed by the originality of the research done at the Institute of Ecological Genetics in recombinogenesis, ontogenetics, and gamete and cellular selection and by the excellent equipment supporting that work.

May 1990 saw in Minsk the next (fifth) session of the council, which centered on the problem of preserving biological diversity. As we know, a great deal of importance is being attached to that problem in many countries. In the latter part of last year, the All-Union Botanical Society made an appeal to the USSR Supreme Soviet and the USSR Council of Ministers in which it pointed out the need to adopt emergency measures to preserve biological diversity as the foundation for ensuring the strength and stability of the biosphere and the survival of mankind. We must solve that problem at all levels of organization of the biota (organism, population, species, ecosystem, biosphere), acting together in the process: the Academy institutes must collaborate with higher educational institutions and departmental organizations under the common guidance of the USSR Academy of Sciences and the USSR State Committee for the Environment [Goskomprirody SSSR]. That position was also recorded in a decree of the session of the council. It was decided to propose to the State Committee for Science and Technology that the program of basic and applied research "Preserving Biological Diversity" be adopted and that a number of financed scientific-technical state programs be included in it. The session's participants emphasized that a genetic-diversity study performed on the basis of new procedural approaches developed by molecular biology and genetic engineering must be a component of the research done in that area. At present, development of that research is being hindered by a shortage of equipment and by a lack of well-trained specialists. It was decided to ask the Presidium of the USSR Academy of Sciences to examine the extremely unsatisfactory material-technical base of the biology institutions of the USSR Academy of Sciences and the academies of sciences of the Union republics: the shortage of modern instruments, equipment, and high-quality reagents will result in biological research to fall farther and farther below the world level.

The most pressing problem facing Belorussia is the reduction in intensity of the radioecology situation associated with the Chernobyl accident. That topic was discussed a great deal at the council's session. Reports by

Belorussian scientists assessed that situation and provided a prognosis for the future. The session's participants noted the high level of research; a decision that was adopted pointed out that institutes of the Department of General Biology of the USSR Academy of Sciences and biology institutes of the corresponding departments of the academies of sciences of the Union republics must provide the needed help in solving that problem; in this case, coordination of efforts is especially important.

According to an established tradition, one day of the session was devoted to familiarization with the republic's biology institutes. A scientific excursion was taken in the Bereza Biosphere Reserve.

At present, under development in the Department of General Biology of the USSR Academy of Sciences are 11 Union-wide programs of basic research. Holding a special place among them is the program-commission of the Presidium of the USSR Academy of Sciences, "Optimizing the Use and Expanding the Reproduction of Biological Resources." The chairman of the scientific council for the program is Academician V. Ye. Sokolov, whose deputies are USSR Academy of Sciences Corresponding Member D. S. Pavlov and L. P. Rysin, doctor of biological sciences; the science secretary is L. M. Nosova, candidate of biological sciences. The principal divisions of the program are as follows:

—development of methods for the comprehensive assessment of the status and levels of the most important and promising types of the country's biological resources

—development of ecological bases and methods for raising the productivity of biological resources and for expanded reproduction of them

—development of ecological bases and methods for building the country's bioresource base on Union-wide and regional levels for the purpose of optimizing environmental use

—development of methods for restoring the biological resources of degraded regions

—development of the scientific bases for a Union-wide system for protecting the gene pool of species of plants and animals and for protecting especially valuable sites of our country's biological resources.

A special place in the program is held by the section "Genetics for the Economy," in which the principal areas are as follows:

—development of the genetic bases of the selection of plants and animals

—development and introduction of genetic methods of biological control of agricultural pests on the basis of insect population and gender control

—development of methods of controlling the gene pools of natural and agricultural populations of species

—study of genetic effects of radiation and chemical contamination of the biosphere, and development of methods for protecting the genetic systems of organisms from damaging effects.

In late 1989, a plenum of the scientific council was held, and discussions involved aspects of the planning, coordination, and financing of research; in addition to that, results were presented which pointed to the great promise held by the program. New data were obtained on the composition, structure, organization, and functioning of ecosystems of the northern seas (Zoological Institute, USSR Academy of Sciences; Murmansk Marine Biology Institute, Kola Science Center, USSR Academy of Sciences). Monitoring was set up of the condition of the biological resources and forest ecosystems in areas of large industrial centers, in Taymir and the Central Urals; principles and methods were developed for zoning degraded territories (Institute of Plant and Animal Ecology, Ural Division, USSR Academy of Sciences), etc.

The remaining programs are tasks of the Department of General Biology of the USSR Academy of Sciences.

The program "The Plant World: Study, Protection, and Intelligent Use" (chairman of the scientific council for the program, Academician A. L. Takhtadzhyan; science secretary, Ye. A. Troitskaya, candidate of biological science) calls for the following:

—study of the diversity of species of plants and fungi, their structural and functional characteristics

—development of scientific bases for the comprehensive study and intelligent use of plant resources

—development of theoretical bases and methods of ecological monitoring and protection of plant resources, etc.

The program "Problems of Forest Management" (chairman of the scientific council for the program, Academician A. S. Isayev; science secretary, L. N. Savelyeva, candidate of biological science) is geared to the following:

—study of natural properties, composition, reserves, and location of forests

—development of scientific bases of intelligent forest use; development of ecological-forest management bases of raising productivity of forests

—development of theoretical bases and methodology of ecological monitoring of forests.

The program "The Animal World: Study, Protection, and Intelligent Use" (chairman of the scientific council for the program, Academician V. Ye. Sokolov; science secretary, I. T. Abramova, candidate of biological science) contains the following major divisions:

—development of scientific bases for the intelligent use and expanded reproduction of animal resources of the USSR

—protection of resources of the animal world and organization of the monitoring of their status.

The program "Problems of Hydrobiology and Ichthyology" (chairman of the scientific council for the program, USSR Academy of Sciences Corresponding Member D. S. Pavlov; science secretary, I. Yu. Feneva, candidate of biological science) has the following purpose:

—study of the composition, reserves, and locations of biological resources in USSR water bodies

—study of principal patterns underlying biological cycling of matter in water bodies, as well as the structure, functioning, and productivity of water ecosystems

—development of genetic and selection methods of raising the productivity of economically important species of the biological resources of water bodies

—development of theory and methods of engineering water ecosystems

—development of theory and methods of creating and managing aquacultures

—development of theoretical and methodological bases of ecological monitoring of biological resources of water bodies and ecological prediction of the status of ecosystems of water bodies in connection with exposure to anthropogenic factors.

In the program "Problems of Ecology and Anthropogenic Dynamics of Biological Systems" (chairman of the scientific council for the program, USSR Academy of Sciences Corresponding Member I. A. Shilov; science secretary, L. M. Nosova, candidate of biological science), the research is focused in the following areas:

—structural-functional organization and stability of biological systems; patterns of their anthropogenic changes

—principals of the control of biological systems as they are used

—protection of biological systems or natural laboratories for study of populations and ecosystems.

The main sections of the program "Problems of Genetics and Selection" (chairman of the scientific council for the program, USSR Academy of Sciences Corresponding Member S. V. Shestakov; science secretary, L. A. Suykova, candidate of biological science) are as follows:

—structural-functional genome organization

—hereditary variability

—population, evolutionary, and ecological genetics

—human genetics and bases of medical genetics

—genetic engineering

—genetic bases of selection.

In the program "Problems of Developmental Biology" (chairman of the scientific council for the program, USSR Academy of Sciences Corresponding Member N. G. Khrushvhov; science secretary, Ye. V. Chulitskaya, candidate of biological science), the main areas of research are among the following:

—gametogenesis, techniques for multiplication and sex regulation

—molecular-biological and genetic mechanisms of the regulation of the activity of genes in embryonal development and cellular differentiation

—histological and cytological mechanisms of morphogenetic, regeneration, proliferation, and growth

—effect of external factors on ontogenetic processes.

Top-priority areas of basic research in the program "Problems of Paleobiology and Evolution of the Organic World" (chairman of the scientific council for the program, Academician L. P. Tatarinov; science secretary, A. F. Bannikov, candidate of biological science) are given as the following:

—microevolutionary processes and species formation

—anthropogenic evolution

—macroevolution

—molecular evolution

—mathematical modeling of evolution

—evolutional parasitology

—evolutional etiology

—biological aspects of the problem of the origin of man

—history of evolutional learning.

In the program "Introduction and Acclimation of Plants" (chairman of the scientific council for the program, USSR Academy of Sciences Corresponding Member L. N. Andreyev; science secretary, V. G. Bolychevtsev, candidate of biological science), the main areas of research are the following:

—development of theoretical bases of introduction and acclimation of plants

—identification and study of plant species that are promising for introduction on the basis of an analysis of natural and cultivated flora of various regions of the USSR and foreign countries

—maintenance and study of gene pool of natural and cultivated flora on the basis of living collections

—development of scientific bases for the protection and reproduction of rare and disappearing species of plants in cultivation

—study of the features of plants in introduction, development of methods of reproducing plants introduced into cultivation

—study of morphological and physiological-biochemical patterns of adaptation of plants when they are introduced into cultivation

—genetic-selection study of bases of raising resistance and productivity of plants being introduced; study of forming processes in remote hybridization

—optimization of medium via phytomelioration; development of scientific bases of industrial botany.

The program "Problems of Biological Damage" (chairman of the scientific council for the program, Doctor of Biol Sci V. D. Ilichev; science secretary, R. I. Fedorova, candidate of biological science) coordinates the actions of a large number of not only Academy institutes, but also sector institutes.

The urgency of this program stems from the fact that in recent years, the negative effects of organisms have increased on technical structures and assemblies, construction materials, oil and petroleum products, skin, and paper; very valuable works of art are being damaged more and more often and, sometimes, destroyed. The program calls for the study of the biology of destructive organisms, the study of mechanisms of damaging action, the determination of the bioresistance of materials, and the development of means and methods of protecting against biological damage.

An important form of coordination of scientific research consists in conducting conferences, meetings, symposia, etc. The Department of General Biology of the USSR Academy of Sciences is organizing no fewer than 30 scientific gatherings of every possible scale; their initiators, as a rule, are scientific councils and societies. Suffice it to say that last year alone, 31 All-Union conferences were conducted. Among them were the 10th Congress of the All-Union Entomological Society; the All-Union conference "Helminthology Today: Problems and Prospects"; the conference "Ecological Problems of the Caspian and the Volga-Ural Basin"; and the meetings "Ecology, Morphology, Use, and Protection of Wild Animals," "Ecological-Genetic Consequences of Exposure of the Environment to Anthropogenic Factors," "Interaction of Organisms in Tundra Ecosystems," and "Ecological Bases of Recultivation of Technogenic and Degraded Land." We should make special mention of the scientific-practical conference "Ecological Research in Moscow and the Moscow Oblast," which evoked a great deal of public interest.

Analog Biophotometer for Comparative Analysis of Reflectivity of Biological Objects

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[Article by M. I. Gayduk, V. V. Grigoryants, and I. V. Chernousova, Institute of Radioengineering and Electronics, USSR Academy of Sciences, Moscow]

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[Abstract] Many areas in medicine are making use of diagnostic techniques that are based on measurement of the optical characteristics of biological objects. Photometric diagnosis is one such technique, this differentiates pathological tissue from healthy tissue by measuring reflectivity, transmission, and absorption. This paper reports the development of an analog biophotometer that measures reflectivity. The instrument's principle of operation is this: one of two identical sensors is placed on the tissue under study, the other is placed on a reference point (i.e., a distant, healthy area of tissue). Signals from the two sensors travel to two identical precision amplifiers and then on to a total-difference processing unit that contains a Σ adder and a Δ subtracter. From that unit, the total and difference signals are fed to analog and analog-digital dividers that operate in parallel and independent of each other. From the output of the analog-digital channel, the signal travels to a digital indicator that reads the result out in percent. At the output of the analog channel is the result of the voltage division, the value of which is described either by an equation for a standardized relectivity coefficient for pathological tissue or by an equation for a standardized relectivity coefficient for healthy tissue. The main components of the electrical circuitry are the precision amplifier, the subtracter and the adder, and the analog-digital divider. Quartz-polymer light guides with a lumen diameter of 200-600 μm and a length of 2-3 m are used with the photometer in fiber-optic diagnostics. The photometer can also be used to measure absolute reflectivity. The operational error of the analog is 5 percent or less. The instrument was successfully tested in a study of the recovery of maxillofacial tissue in eight individuals suffering from odontogenic phlegmons of moderate severity. Figures 1; references 7: 3 Russian, 4 Western.

Use of Protective Clothing by Pathoanatomists and Forensic Medicine Experts Working With Especially Dangerous Infections

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[Article by V. V. Buyanov, Ye. N. Yelkin, V. G. Kolmykov, Yu. V. Kaplunov, N. A. Malyshev, Ye. I. Kelli, N. I. Dombrovskiy, and I. P. Solomko (Moscow), All-Union Scientific Research Institute of Biology Instrument-Making, Infectious Clinical Hospital No 1]

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[Text] At present, the problem of diagnosing and preventing viral diseases that are at the top of the list of especially dangerous infections is an urgent one.

The epidemiological situation regarding those infections continues to be severe in a number of countries of Asia, Africa, Latin America, and Europe. With the expansion of trade and cultural ties, the threat of the rapid spread of those infections in our country is also very real. Moreover, the existence of active natural foci of the plague does not permit the exclusion of the possibility of the population becoming infected.

The work done with AIDS virus carriers and patients is of the greatest urgency. The number of individuals infected with that virus is growing in a geometric progression throughout the world as well as in our country.

The most epidemiologically dangerous contact is among medical personnel performing pathoanatomical and forensic-medicine studies on the bodies of individuals who have died of especially dangerous infections or from AIDS infection, many of whom had not been examined when they were alive.

WHO has developed a system that can be used when disease is detected to confirm the suspicion of the presence of HIV infection in a patient (under 40) or in someone who has died (pneumocyctis pneumonia, generalized fungal infections, Kaposi's sarcoma, etc.).

At present, for an autopsy performed on someone who has died of an especially dangerous infection or of HIV infection, a USSR Ministry of Health instruction calls for the use of a type I plague protection suit (PChK-I), which is a set of clothing that consists of pajamas, a special robe, a face mask, three-ply cotton-gauze dressing, safety glasses, a rubberized apron, a towel, and rubber boots. The principal shortcomings of that set of special clothing consist in the multiple layers of the clothing, which impairs the normal removal of excessive heat and the prevention of the fogging of glasses (as a rule, homemade or adapted) that occurs 10-20 minutes after the work begins.

By order of the USSR Ministry of Health, autopsies of all individuals who die of especially dangerous infections or HIV infection in Moscow are done in the pathoanatomical department of the Infectious Clinical Hospital No 1.

The objective of this investigation consisted of a comparative study of the changes that occur in certain physiological functions in the use of the standard PChK-I outfit and in the use of the SKB (special biological suit) at the pathoanatomical department of the Infectious Clinical Hospital No 1. The following physiological indices were assessed: arterial pressure, pulse frequency, skin temperature at two symmetrical points on the body, and speed of simple visual-motor and auditory responses that enable indirect evaluation of the changes occurring in the CNS in the process of a given work activity. All those indicators were studied with a Medicor (Hungary) ROK-I Baryer portable diagnostic complex before and after the performance of two hours of work in the autopsy room. In addition, subjective evaluations of the work in the two types of suits were assessed.

As demonstrated by the data from our study of teams of physician-pathoanatomists (12 individuals), those who worked in the PChK-I outfit showed changes in the cardiovascular system, the heat regulation system, and simple sensomotor response, which were manifested as a consistent rise in arterial pressure, pulse, and skin temperature at the two points (the armpits), as well as by an increase in the temperature differential, which indicates stress in the temperature regulation system. Noteworthy is the number of mistakes observed (with 16 being the maximum possible) in our study of the speed of response to light and sound stimuli. Although all the enumerated changes were within the limits of physiological variations, they were all nonetheless related to the use of the special protective clothing, especially the PChK-I.

Moreover, among the most frequent subjective complaints made by the physician-pathoanatomists concerning the use of the PChK-I outfit were the following: dramatic drop in efficiency, more perspiration, fogging of the glasses and worsened visibility, feeling of being restricted, and headache. Thus, in terms of the use of the type I plague protection suit, that special protective clothing was found to have a negative effect on the activity of physician-pathoanatomists.

In connection with that, we suggested protective clothing developed at the All-Union Scientific Research Institute of Biology Instrument-Making and recommended for use at enterprises of the medical and microbiological industry. A combined pneumatic suit, the hose-fed SKB for protecting the respiratory organs and skin surfaces of the individual, with ventilation of the space beneath the hood and an independent air-supply system were selected. Laboratory and production tests that had been conducted earlier showed that the pneumatic suit does not impair the performance of job operations and does not have an additional negative effect on the individual's health.

The pneumatic suit (see the figure) consists of a protective shell, a system for supplying air, and a filtered system for independent breathing. The protective shell of the suit consists of overalls made of viscous polyester fabric (TU 17 RSFSR 18-11725-83), with a hood affixed around the throat (with a window) and made of 51-183 rubberized fabric (TU 38-705-493—82). The overalls have an opening in front that runs from the middle of the hood down the left side to mid-thigh—it is closed with a zipper, which is covered with a flap that is closed with a fabric fastener—and the individual gets into or out of the suit through that opening.

The air-supply system consists of a pliable air duct located in the hood, an oblique, plastic union nipple that

SKB pneumatic suit (All-Union Scientific Research Institute of Biology Instrument-Making)

is fixed onto the pliable air duct, and a flexible tube that links the distributor and the oblique nipple.

Traveling through the air hose that is connected to the stationary source of clean air, through a filtering element, the distributor, the flexible tube, the nipple, and the pliable air duct, clean air enters the hood space at 250 + 10 l/min and is then filtered off through the lower part of the suit. That provides a normal heat, gas, and moisture exchange for the worker's body. The system for independent breathing is designed to provide air to the worker in the event that the air feed is suddenly cut off and during the movement from one location to another; it consists of a V-0.05 (OST 94-780) filter or an FTO-I Kaktus filter, a flexible tube, a distributor, and a valve box with a mouthpiece in a pocket in the hood space.

The SKB pneumatic suit is disinfected in several stages: the first stage consists in wiping the shoes and rubberized parts of the suit with disinfectant; the second stage, in spraying the entire suit with an aerosol consisting of a 3 percent solution of chloramine or a 6 percent solution of hydrogen peroxide, with air provided from an air hose (amount of disinfectant, 0.5 l per suit); the third stage, in heat treatment at 60°C for six hours. In addition, after the autopsy, all the instruments are treated with a 3 percent solution of chloramine, and the autopsy room is sprayed with a 3 percent fine-mist aerosol solution of chloramine, which helps to provide complete treatment of the premises and all the equipment.

The combined SKB pneumatic suits were experimentally tested for three months in the pathoanatomical department of the Infectious Clinical Hospital No 1. The air was supplied to the SKB suit from a stationary air hose consisting of a VPP4/1.5 pneumatic pump installed in a clean space and KSh-20 hoses linking the clean space and the autopsy room. In the autopsy room, a manifold was used to feed the incoming air to three suits. Stretched along the anatomy tables, at a height of 2 meters, were guide cables on which loosely hanging KSh-20 hoses were attached with rings; that enabled the medical personnel to move freely along the working table. A team (physicians and an orderly) worked for two hours in a room temperature of 22-25°C, relative humidity 50-75 percent. The temperature of the air being fed into the hood space was 20-22°C.

The tests done before and after the work that was performed in the SKB pneumatic suits (see the table) did not identify any significant changes in the physiological functions of the medical personnel. For example, the skin temperature at the two symmetrical points rose an average of 0.4°C, and in two cases, it remained at the baseline level of 35.3°C (the before-work temperature); during the work in the PChK-I suit, however, the temperature rose an average of 1.5°. Negligible changes were recorded in arterial pressure and pulse. Before the work, arterial pressure was, on average, 125/65 mm Hg; right after the work, it was 135/70. With the PChK-I, pressure rose, on average, to 140/80. Pulse after work in the SKB was, on average, 76 bpm; after work in the PChK-I, it was 82. The number of errors involving simple visual-motor response averaged eight after work in the SKB (baseline = 5) and 13 after work in the PChK-I (baseline = 6); involving simple auditory-motor response, 8 and 12, respectively (with respective baselines of 6 and 7).

Comparative physiological-hygienic assessment of the PChK-I suit and the SK8 [sic]

	PChK-I plague protection suit		SKB pneumatic suit	
Physiological indices	Before work	After work	Before work	After work
Systolic pressure, mm Hg	125	140	125	135
Diastolic pressure, mm Hg	70	80	65	70
Pulse per minute	64	82	61	76
Temperature, °C	35.2	36.7	35.3	35.7
Response time to light (number of stimuli, 16), ms				
minimal	160	185	145	180
maximal	365	374	296	320
average	282	295	245	256
threshold	210	210	210	210
Number of deviations from threshold	6	13	5	8
Response time to sound, ms				
minimal	140	155	136	150
maximal	370	385	280	295
average	215	236	197	220
threshold	210	210	210	210
Number of deviations from threshold	7	12	6	8

In addition, it should be noted that the medical personnel did not have subjective complaints about the use of the SKB pneumatic suit, and their efficiency remained high throughout the entire time spent in the autopsy room. Those who took part in the experimental wearing of the suit remarked upon the comfortable working conditions that prevented overheating. The design features and the ergonomic characteristics of the pneumatic suit did not have any effect on the quality of the work performed.

Such small changes in the physiological functions during the work in the SKB pneumatic suit are associated with the good ventilation of the space inside the suit, which prevents the overheating of the body.

Conclusions

1. The comparative physiological and hygienic assessment of the standard type I plague protection suit and the SKB combined pneumatic suit (special biological suit) revealed a whole array of advantages offered by the latter during two-hour periods in which teams of physicians worked in the autopsy room of the pathoanatomical department of the Infectious Clinical Hospital No 1.

2. The tests conducted in the study of the two types of protective clothing enable us to recommend the SKB pneumatic suit as clothing that protects the skin and respiratory organs during work in pathoanatomical departments of infectious hospitals and during forensic medicine work.

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