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CONTENTS

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Agricultural Science

- Effect of Cytoplasm on Vulnerability of Wheat Plants to Brown Rust at Early Stages of Ontogenesis
[A. N. Palilova, Ye. A. Voluyevich, et al.; GENETIKA, Vol 25 No 7, Jul 89] 1

Biochemistry

- Interaction of Erythrocyte Plasmatic Membranes with "Solid" Liposomes (Neutral and Negatively Charged)
[N.V. Belitser, M.G. Anishchuk, et al.; BIOLOGICHESKIYE MEMBRANY, Vol 6 No 9, Sep 89] 2

Biophysics

- Possibility of Occurrence of Bisoliton State in All-Trans Retinal Molecule
[R. G. Yefremov, D. S. Chernavskiy; BIOFIZIKA, Vol 34 No 4, Jul-Aug 89] 3
- Photocycle and Electrogenesis of 13-Desmethylbacteriorhodopsin
[S. V. Danshina, A. L. Drachev, et al.; BIOFIZIKA, Jul-Aug 89] 3
- Fibrinogen Adsorption on Silicon Oxide With Controlled Hydrophobic/Hydrophylic Properties
[V. Y. Razumas, Yu. Yu. Kulis, et al.; BIOFIZIKA, Jul-Aug 89] 3

Epidemiology

- Update on Chernovtsy Alopecia Cases *[A. A. Baranov; MEDITSINSKAYA GAZETA, 17 Sep 89]* 4
- AIDS in Volgograd *[A. Lebedinskiy; MEDITSINSKAYA GAZETA, 12 May 89]* 6
- AIDS Vaccine Claim Rebutted *[I. Lalayants, I. Neklyudov; MEDITSINSKAYA GAZETA, 17 Sep 89]* ... 7
- Infectious Disease in Kazakh SSR
[T. A. Izmukhambetov Interview; KAZAKHSTANSKAYA PRAVDA, 24 Sep 89] 10
- Epidemiological Conditions Fostering Spread of Ischemic Heart Disease Among Adult and Child Male Population of Various Regions of USSR
[R. G. Oganov, G. S. Zhukovskiy, et al.; KARDIOLOGIYA, Vol 29 No 5, May 89] 12
- Register of Acute Myocardial Infarction in Yerevan
[K. G. Adamyan, A. F. Kazanchyan; KARDIOLOGIYA, Vol 29 No 5, May 89] 17
- Relative Five-Year Survival Rate in Patients with Primary Forms of Malignant Neoplasms
[D. P. Berezkin, V. N. Filatov; VOPROSY ONKOLOGII, Vol 35 No 5, May 89] 19
- Rural and Urban Incidence of Chronic Non-Specific Lung Diseases
[Sh. U. Ismailov, Sh. M. Akhmedov, et al.; MEDITSINSKIY ZHURNAL UZBEKISTANA, No 9, Sep 89] 20

Genetics

- RecA-independence of Amplification Process, Determined by Cholera Vibrio RS1-Sequences
[S. L. Filkova, T. S. Ilina, et al.; MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA, Jun 89] 22
- Transcriptional Map of Recombinant Plasmid, Carrying Genes of Synthesis of Pesticin I and Protein for Immunity to Pesticin I of Plague Microbe
[V. M. Sorokin, Ye. K. Goncharov, et al.; MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA, Jun 89] 22

Laser Bioeffects

- Future Laser Applications in Cancer Diagnosis, Therapy *[A. Maslov; PRAVDA UKRAINY, 13 Sep 89]* . 23

Medicine

- First Soviet Automated Diagnostics System *[V. Kalata; MEDITSINSKAYA GAZETA, 14 Jun 89]* 25
- New Quinoline Preparation for Rheumatism, Lupus *[S. Tutorskaya; IZVESTIYA, 6 Oct 89]* 25
- Eye Microsurgery Branch Opens in Irkutsk *[N. Semenova; SOVETSKAYA ROSSIYA, 15 Aug 89]* 25
- Conductometric Diagnostic Instrument Developed
[V. Kucherenko; VECHERNYAYA MOSKVA, 12 Aug 89] 25

| | |
|---|----|
| Intensive Care and Mass Injuries [A. I. Vorobyev; <i>TERAPEVTICHESKIY ARKHIV</i> , Vol 61 No 7, Jul 89] | 27 |
| New Ultrasound Atomizer [M. Melkonyan; <i>MEDITSINSKAYA GAZETA</i> , 6 Oct 89] | 32 |
| 'Eksdis' System for Computer Diagnosis [V. Rodionov; <i>MEDITSINSKAYA GAZETA</i> , 6 Sep 89] | 32 |
| New Device for Stimulating Respiration [I. Yevsikova; <i>MEDITSINSKAYA GAZETA</i> , No 103, 27 Aug 89] | 32 |
| Specific Features of Effect of Different Erythrocyte-containing Media on Central Hemodynamics, Microcirculation and Oxygen Regime of Organism in Treatment of Massive Blood Loss [A. V. Gorkun, A. D. Dolgushina, et al.; <i>VESTNIK KHIRURGII IMENI I. I. GREKOVA</i> , Vol 142 No 6, Jun 89] | 33 |
| Hemosorption During Treatment of Infectious Pathologies [V. I. Pokrovskiy, G. G. Radzivil, et al.; <i>TERAPEVTICHESKIY ARKHIV</i> , Vol 61 No 5, May 89] | 33 |
| Clinical and Laboratory Diagnosis and Treatment of Q Fever [A. F. Ulyanov, M. S. Syzdykov; <i>ZDRAVOOKHRANENIYE KAZAKHSTANA</i> , No 7, Jul 89] | 33 |
| Treatment of Patients With Multiple and Associated Fractures of Long Bones [M. Ya. Baskevich, N. Ya. Prokopyev, et al.; <i>ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE</i> , No 6, Jun 89] | 34 |
| Use of Robotics in Realization of External Perosseus Osteosynthesis [I. M. Pichkhadze, A. T. Rakhimov, et al.; <i>ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE</i> , No 6, Jun 89] | 34 |
| Experience in Use of Carbon Fixing Rods in Treatment of Aftereffects of Traumas [T. E. Ungbayev; <i>ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE</i> , No 6, Jun 89] | 34 |
| Highly-Automated Expandable System for Studying Vestibular Apparatus and Performing Medical Experiments [T. S. Mostovaya, A. I. Katyushin; <i>VESTNIK OTORINOLARINGOLOGII</i> , No 4, Jul-Aug 89] | 35 |
| Our Experience in Treating Patients With Acute Neurosensory Hearing Loss With Aid of Hyperbaric Oxygenation [N. M. Guseynov, N. P. Konstantinova; <i>VESTNIK OTORINOLARINGOLOGII</i> , No 4, Jul-Aug 89] | 35 |

Microbiology

| | |
|---|----|
| New Producers of Site-specific Endonucleases From Bacillus Genus Microorganisms [V. M. Kramarov, N. A. Skrypina, et al.; <i>MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA</i> , Jun 89] | 36 |
|---|----|

Molecular Biology

| | |
|--|----|
| Study of Intracellular Fate of Recombinant Human Interleukin-2 in Escherichia Coli [A. B. Meriin, V. A. Ivanyushina, et al.; <i>MOLEKULYARNAYA BIOLOGIYA</i> , Jul-Aug 89] | 37 |
| Characteristics of Transgenic Animals Genome Region, Adjacent to Integrated Sequences of Allogenic DNA [V. Z. Tarantul, Ye. D. Kuznetsova, et al.; <i>MOLEKULYARNAYA BIOLOGIYA</i> , Jul-Aug 89] | 37 |
| Determination of Substrate Specificity of Restrictase Bru101 With Unusual Recognition Region [S. Kh. Degtyarev, P. A. Zhilkin, et al.; <i>MOLEKULYARNAYA BIOLOGIYA</i> , Jul-Aug 89] | 37 |
| Paths in Graphs and Selection of Oligonucleotide Linkers [P. A. Pevzner, V. P. Veyko; <i>MOLEKULYARNAYA BIOLOGIYA</i> , Jul-Aug 89] | 37 |

Nonionizing Radiation Effects

| | |
|---|----|
| Biological Action and Hygienic Standardization of Constant Magnetic Fields as a Factor of the General and Working Environment [Yu. P. Paltsev; <i>GIGIYENA I SANITARIYA</i> , No 10, Oct 89] | 38 |
| Protection of the Population From Electromagnetic Radiation as a Hygienic Problem [Yu. D. Dumanskiy; <i>GIGIYENA I SANITARIYA</i> , No 10, Oct 89] | 42 |

Physiology

| | |
|---|----|
| Decrease of Immunoreactive Alpha- and Gamma-endorphins Level in Blood and Suppression of Their Hypersecretion by Dexamethason During Emotional Stress in Monkeys [A. D. Dmitriyev, S. K. Chirkova, et al.; <i>BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY</i> , Vol 107 No 5, May 89] | 47 |
| Hypothalamic Acetylcholine Metabolism in Emotional Stress [I. N. Semenenya; <i>ZDRAVOOKHRANENIYE BELORUSSII</i> , No 7, Jul 89] | 47 |

Public Health

| | |
|--|----|
| Drug Addiction Incidence, Treatment [MEDITSINSKAYA GAZETA 25 Jun 89] | 48 |
| Shortage of Medicines [A. Levin; TRUD, 16 Aug 89] | 48 |
| "Zdorovye" Computer System in Studying Effect of Pollution on Health [Yu. Korneyev; SOVETSKAYA ROSSIYA, 11 Aug 89] | 50 |
| Characteristics of Groups of Drug and Toxic Substance Users in Belorussia [V. V. Ivanov; ZDRAVOOKHRANENIYE BELORUSSII, Jul 89, pp 37-39] | 52 |
| Medicine Shortage in RSFSR Nonchernozem Zone [V. Kurasov; IZVESTIYA, 22 Oct 89] | 54 |
| Alopecia at Ukrainian Military Base Linked to Pollution [V. Novikov; KRASNAYA ZVEZDA, 3 Dec 89] | 55 |
| Chazov Interviewed on Health Issues [Ye. Chazov; PRAVDA, 20 Nov 89] | 56 |
| Hospital, Polyclinic Construction Figures [Ye. Yampolskiy, I. Lichagina; STROITELNAYA GAZETA, 15 Nov 89 p 1] | 60 |
| Use of an Automated Screening System to Reveal Pulmonological Patients [A. B. Nikitin, A. M. Studenko, et al.; ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII, Jun 89] | 61 |
| Semipalatinsk Health Statistics, Prognosis by Physicians [F. Podkolodnyy; MEDITSINSKAYA GAZETA, 1 Oct 89] | 63 |
| Insurance-Based Health Care Advocated [Yu. Belenkov; PRAVDA, 4 Jan 90] | 63 |
| Child Mortality Statistics [A. Levin; RABOCHAYA TRIBUNA, 31 Jan 90] | 65 |
| New Healthcare Structure Proposed [M. Krylov; TRUD, 11 Jan 90] | 66 |
| Chernobyl Workers Protest Health Care [A. Dzhapakov; TRUD, 13 Feb 90] | 67 |
| Institute for Juvenile Oncology Created [L. Durnov Interview; SOVETSKAYA ROSSIYA, 29 Aug 89] | 69 |
| Isolation of Viruses of Antigen Complexes of California Encephalitis and Bunyamvera (Bunyaviridae, Bunyavirus) From Mosquitoes in Northeastern Asian Continent [S. D. Lvov, V. L. Gromashevskiy, et al.; VOPROSY VIRUSOLOGII, Vol 34 No 3, May-Jun 89] | 69 |

Radiation Biology

| | |
|---|----|
| Mutations May Not Be Chernobyl-Related [T. I. Buzhiyevskaya Interview; PRAVDA, 12 Dec 89] | 70 |
|---|----|

Veterinary Medicine

| | |
|---|----|
| Study of Effect of Allogenic Tumors Extracts on Development, in Calves, of Experimental Infection by Bovine Leukemia Virus [R. A. Kukayn, L. I. Nagayeva, et al.; EKSPERIMENTALNAYA ONKOLOGIYA, Vol 11 No 3, May-Jun 89] | 71 |
|---|----|

Virology

| | |
|---|----|
| Effects of Immunomodulators on HIV-1 Production In Vitro [S. L. Nesterchuk, I. F. Barinskiy; VOPROSY VIRUSOLOGII, Vol 34 No 2, Mar-Apr 89] | 72 |
| Biosynthesis of Encapsulated Protein of Acquired Immunodeficiency Syndrome (HIV) Virus With Remote Hydrophobic Region in E. coli Cells [A. I. Starov, P. M. Rubtsov, et al.; MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA, Jun 89] | 72 |

Conferences

| | |
|---|----|
| International Conference on Laser Therapy Held in Tashkent [V. Konov; POISK, 23-29 Nov 89] | 73 |
| International Symposium on Lasers in Surgery and Medicine [S. I. Leonovich, Yu. M. Gain; ZDRAVOOKHRANENIYE BELORUSSII, No 7, Jul 89] | 73 |

Miscellaneous

| | |
|---|----|
| Exhibit of Western Medical Devices in Moscow [Yu. Bliyev; MEDITSINSKAYA GAZETA, 8 Sep 89] ... | 74 |
|---|----|

UDC 575.153:633.1

Effect of Cytoplasm on Vulnerability of Wheat Plants to Brown Rust at Early Stages of Ontogenesis

907C0198 Moscow *GENETIKA in Russian* Vol 25 No 7, Jul 89 pp 1239-1247

[Article by A. N. Palilova, Ye. A. Voluyevich and V. V. Levanskaya; Institute of Genetics and Cytology, BSSR Academy of Sciences, Minsk]

[Abstract] An analysis of the character of resistance to brown rust in a series of alloplasmatic lines of wheat with the genome of the Chinese Spring variety by cytoplasm of 14 species of *Aegilops* and *Triticum* after infection of populations of the pathogen and an individual clone showed variability of the relationship of phenotypes of different classes of resistance to this pathogen as a function of the cytoplasm donor, the age of the seedling and the type of inoculum. Figures 2; references 14: 11 Russian; 3 Western.

UDC 577.352.2:576.314:612.111+57.086

Interaction of Erythrocyte Plasmatic Membranes with "Solid" Liposomes (Neutral and Negatively Charged)

907C0282a Moscow *BIOLOGICHESKIYE MEMBRANY in Russian Vol 6 No 9, Sep 89* (manuscript received 10 Oct 88) pp 955-965

[Article by N.V. Belitser, M.G. Anishchuk, Institute of Biochemistry imeni A.V. Palladin, UkSSR Academy of Sciences, Kiev, A.A. Bogdanov, and V.P. Torchilin, Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] The interaction of human erythrocytes with synthetic liposomes formed from dipalmitoylphosphatidyl choline (DPPC), or N- glutaryldipalmitoylphosphatidyl ethanolamine (GDPPE):DPPC 1:9 was investigated. Incubation for five minutes at 30°C with DPPC was shown by electron microscopy to produce structural defects in the cellular membrane. Thirty minutes incubation caused cell swelling. Some stage I echinocytes were seen. The structures of the adsorbed liposomes varied from spherical vesicles to multilamellar aggregates. After 60 minutes echinocyte levels reached 30-40 percent. When the negatively charged "solid" liposomes containing DPPC and GDPPE were used, erythrocyte morphology was markedly changed after five minutes of incubation, with all cells forming stage I-III echinocytes.

After 30 minutes some echinocyte spicules became thinner and began to release isolated cellular particles. Small spherical liposomal vesicles predominated, with some flat lamellae. Intercell membrane contact increased. After 60 minutes of incubation liposomes adsorbed on the cell surface were not found. Small local membrane outgrowths and membrane evagination were observed. When the erythrocytes were subjected to preliminary treatment with the crosslinking agent glutaraldehyde, the erythrocytes did not later morphology on incubation with the liposomes, even though adsorption of liposomes was observed. No membrane rupture was noted. After preliminary treatment with the bis-dimethyl amide of azocarbonic acid, all erythrocytes formed spherochinocytes with surface liposome vesicles. Fragments of liposomal membrane were generally absent. Comparison of results obtained on erythrocytes with previous work on epithelial cells indicates that erythrocytes lack the receptor-like binding sites found in epithelial cells. One may conclude that the nature of cellular membrane interaction with "solid" liposomes depends on the features of the plasmatic membrane. Introduction of negative charge into the liposome sharply increased adsorption and elicited more rapid morphological disturbances. The gradual saturation of the cellular surface with exogenous lipids is involved in the mechanism of the changes observed. The data indicate that negatively charged "solid" liposomes behave in a similar fashion to "liquid" liposomes. Figures 4; references 26: 4 Russian, 22 Western

UDC 577.3

Possibility of Occurrence of Bisoliton State in All-Trans Retinal Molecule

907C0199A Moscow *BIOFIZIKA in Russian Vol 34*
No 4, Jul-Aug 89 pp 533-535

[Article by R. G. Yefremov and D. S. Chernavskiy, Institute of Information Transmission Problems, USSR Academy of Sciences]

[Abstract] The paper described a demonstration of the theoretical possibility of formation of solitons in the all-trans retinal molecule and an assessment of the conditions required in order for this to occur. Quantum chemical calculations of the all-trans retinal molecule showed that the excited state (the state with separated charges) occurred under conditions that the shift of the proton of the Schiff base is at a distance ΔR greater than but almost equal to 0.2-0.5. Angstrom and that the order of alterations of the polien chain between the charges is changed. These results are important for interpretation of primary stages in the bacteriorhodopsin cycle. Figure 1; references 13: 4 Russian; 9 Western.

Photocycle and Electrogenesis of 13-Desmethylbacteriorhodopsin

907C0199C Moscow *BIOFIZIKA in Russian Vol 34*
No 4, Jul-Aug 89 pp 623-626

[Article by S. V. Danshina, A. L. Drachev, L. A. Drachev et al., Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University, Institute of Biological Physics, USSR Academy of Sciences, Pushchino (Moscow Oblast), Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov]

[Abstract] The study showed that the low effectiveness of proton transport of 13-desmethylbacteriorhodopsin was caused by the predominance of the functionally inactive 13-cis-isomer and the significant slow-down of the photocycle of its all-trans form. No fundamental changes of the photon transport mechanism were seen in this analog. The photocycle of the 13-cis-isomer includes at least 2 long-wave intermediates (rate of formation of the first is γ of the second is in the long-wave range of milliseconds at room temperature). Figures 3; references 11: 7 Russian; 4 Western.

Fibrinogen Adsorption on Silicon Oxide With Controlled Hydrophobic/Hydrophylic Properties

907C0199B Moscow *BIOFIZIKA in Russian Vol 34*
No 4, Jul-Aug 89 pp 557-560

[Article by V. Y. Razumas, Yu. Yu. Kulis, G. Elving, A. Askendal and I. Lyundstrem; Institute of Biochemistry, LiSSR Academy of Sciences, Vilnyus, Laboratory of Applied Physics, Leningrad Technological Institute, Linkoping, Sweden]

[Abstract] A study of the pH-dependence of the kinetics of adsorption of human fibrinogen on a silicon oxide plate with a hydrophobicity gradient was described and discussed. The amount of fibrinogen irreversibly adsorbed on the silicon oxide did not exceed 3.6 pmole/cm² and depended upon the protein concentration, the pH of the solution and the hydrophobic/hydrophilic properties of the surface. The rate of fibrinogen adsorption was determined by electrostatic interactions. Partial denaturation of the fibrinogen occurred during its adsorption from diluted solutions with pH below the isoelectric point of the protein. Figures 5; references 9: 1 Russian; 8 Western.

Update on Chernovtsy Alopecia Cases

907C0004 Moscow *MEDITSINSKAYA GAZETA*
17 Sep 89 pp 1, 4

[Article by A. A. Baranov, deputy USSR minister of health: "Chernovtsy—One Year Later"; first two paragraphs are source introduction]

[Text] In August-November 1988, a total of 165 children in Chernovtsy and adjacent regions were stricken by a disease, the chief manifestation of which was total or virtually total loss of hair on the head. Prominent specialists in various fields and many scientific research institutes of our country worked on determination of the causes of this disease. All of the stricken children were examined and treated in the leading pediatric clinics of Moscow and Kiev, as well as sanatorium and resort institutions. Soviet and foreign specialists arrived independently at the conclusion that these children are essentially in good health at the present time. There has been no recurrence of the disease since November of last year.

Nevertheless, there is concern in Chernovtsy. A petition is being circulated for assistance from the USSR Supreme Soviet, the World Health Organization, and the League of Red Cross Societies. What's it about? A correspondent of *MEDITSINSKAYA GAZETA* asked A. A. Baranov, deputy USSR minister of health, to answer this question.

The chief cause of anxiety is that, in spite of the numerous commissions and investigations, the specific source of the disease has still not been determined. Of course, this gives rise to a lack of confidence. At the same time, it should be noted that mass media played and continue to play a rather large part in the increasing tension."

What did actually happen in Chernovtsy?

As already reported, an outbreak of an unknown disease was recorded among children 2-7 years of age. It began with an mucosal inflammation of the upper respiratory tract, sometimes associated with fever or an obstructive syndrome, and there was a change in behavior: the children grew irritable, sleep was impaired, they were fearful, and some had hallucinations. Two to three weeks later, they suddenly lost all or virtually all their hair in a matter of 1-3 days. However, their eyelashes, eyebrows and lanugo remained intact."

The situation developed in the following manner: while there were three cases of the disease in August and no others occurred until 16 September, by the beginning of October there were 20 sick children. The physicians at Kolos Hospital, where the children were hospitalized, sounded the alarm. Pediatricians, dermatologists, toxicologists, radiologists and other specialists were called from Kiev and later from Moscow.

One of the first assumptions—that it could be due to radiation—was ruled out as early as the beginning of October, on the basis of an investigation of background levels of radioactivity. Moreover, the children's disease

had nothing in common with the symptomatology of radiation injury. Jumping ahead of my story, it should also be stated that this version was rechecked again and again in November and December and was ruled out entirely. Concurrently, as early as October, assumptions were voiced about a bacterial, viral or chemical origin of the disease. For the sake of fairness, it should be noted that the Chernovtsy pediatricians were the first to suggest a chemical cause. And that was not by chance: after a thorough examination of patients they found reduced levels of serum sulfhydryl groups and the unitiol they prescribed produced a distinct therapeutic response.

In addition, studies were pursued of all the other versions. The disease, however, continued to gain strength, and by early November there were 93 recorded cases. For that reason, a commission of the USSR Ministry of Health consisting of specialists from Moscow, Kiev, Leningrad, Baku and other cities (pediatricians, hematologists, dermatologists, mycologists, infectious disease specialists, epidemiologists, virologists, radiologists, clinical toxicologists and chemical toxicologists, physicians specializing in sanitation and hygiene, and forensic medicine experts) traveled to Chernovtsy on 4 November. In the course of investigations in 20 directions, studies were made of the possibility of bacterial and viral infection, fungal diseases, and diseases caused by fungal toxins, the toxic effects of heavy metals, organometallic compounds, chelates, food additives, biostimulants, organic substances, pesticides and insecticides, fertilizers, fuels, detergents, industrial waste, and toxic precipitates. In organizing such extensive and technically complicated investigations, the commission sought the help of 27 scientific research institutions of the country.

Gradually, the possible causes of the disease were ruled out, one after another. As early as 5 November, there remained three main possibilities: the disease was of an infectious nature (with a greater probability of a mycotic nature), a chemical nature (with possible involvement of the metal thallium), or a combination of those two. Accordingly, preventive measures were developed and, via the mass media, disseminated to the public. The measures pertained to personal and public hygiene, including washing down the city, digging up the top layer of soil, and prescribing activated charcoal (or other enteric sorbents), calcium lactate, and multiple vitamins for children. The preventive measures were begun in the city on 6 November, and there were no more cases of the disease after 20 November.

In the course of studying the disease, the researchers found it to be a distinct function of age: as I have already stated, it was, primarily, children 7 years of age or younger who were stricken, and most often, they were 2- to 4-year-olds. There was a predominance of children who were fair-haired, blue-eyed, and often sick with respiratory diseases. Their work-up included urinalyses and blood tests; biochemical studies of liver tests and renal function; biochemical assays of blood iron, protein, cholesterol and glucose and of humoral and cellular

levels of immunity; serotonin, catecholamines and acetylcholine responses. In addition, there was a neurophysiological examination of the heart and central nervous system; ultrasound scanning of internal organs; microscopic examination of the hair and a single biopsy of the scalp; and bacteriological, mycological and virological examinations.

The researchers found reduced levels of sulfhydryl groups in the blood serum, a negligible elevation of alkaline phosphatase, reductions in concentration of albumin and elevations of beta-globulins, moderate reductions of C₃, which is a complement component, and a tendency toward elevation of immunoglobulins M and E, as well as transient diffuse changes in deep structures of the brain. All this was indicative of nonspecific poisoning in the children (more likely chemical than biological), and it almost completely ruled out causes that were microbial or physical. Typically, the changes were transient and disappeared within 2-3 weeks.

A complete mycological examination, microscopy of the hair—including ultramicroscopic scanning—and testing for fungal toxins made it possible to rule out fungus involvement. In order to rule out viral involvement, blood and nasopharyngeal washings were taken from sick children in November, i.e., in the acute period of the disease. Also, experimental animals and Vero E6 cell cultures were infected. However, attempts to isolate viruses from blood came up negative.

The indirect immunofluorescence method was used to demonstrate arbovirus antigens, and it also yielded a negative result. Lanthanide immunofluorescence and indirect immunofluorescence revealed a variegated pattern of respiratory viruses (parainfluenza, respiratory-syncytial, influenza B, adenovirus), which reflected the seasonal picture of outbreaks of respiratory illness. Carriers of Hbs antigen and enteroviruses were also found. The findings completely ruled out viral disease—at any rate, any known virus or any virus identifiably with existing techniques.

Examination of the trace element contents of urine, saliva, nails and hair of sick and healthy children and their parents revealed elevated excretion in the urine of aluminum, boron, chromium and sodium. Some of the hair and nail samples revealed high concentrations of aluminum, chromium and thallium. Thallium was found in the urine, but it did not exceed the normal levels.

In summarizing its findings, the commission of the USSR Ministry of Health arrived at the following conclusion on 10 November: the illness was caused by combined chemical factors. Since the symptomatology had much in common with thallium poisoning, and thallium levels were elevated in the hair and nail samples, that metal was identified as one of the active sources of the effects. At the same time, the commission noted that the clinical picture "gives reason to assume a chemical disease that is, however, not entirely consistent with the literature's description of acute and chronic

thallium poisoning due to doses exceeding the maximum permissible levels." For that reason, the initial findings of the studies were rechecked more than once. Tests made in different research laboratories and by different techniques often yielded results that not only failed to agree, but were even contradictory to one another. For example, expert evaluation of biological samples and environmental samples organized again by two major research institutions revealed that the children did have the above-described uniform changes in trace element composition. In six out of 24 cases elevated thallium content was demonstrated in the hair and nails, whereas thallium in the urine did not exceed the normal levels.

That does, of course, cause us to question the leading role of thallium in the combined chemical effect. However, it cannot be entirely disregarded either, since demonstration of trace elements of this metal in increased amounts in the hair and nails of some patients is indicative, if only indirectly, of its effect in a high dose on the body.

The assumption of exogenous chemical etiology of the disease is not questioned by specialists. In its favor is the transient, nonspecific nature of the identified changes, the uniform nature of trace electrolyte shifts, the distinct therapeutic effect of unithiol, and the equally distinct effect produced by the preventive measures that arrested the spread of the disease.

We could have ended the story of the 'Chernovtsy disease' here. However, since around November or December of last year, an equally serious new problem has appeared in the city and oblast: a dramatic increase in the number of children presenting with alopecia that is not total, as it was the first time, but is focal, or, as it is still being called, alopecia areata. If, in August and September, when the public's attention was no longer focused on cases of hair loss among children, only nine individuals visited physicians for alopecia areata, as many as 24 sought care in October, 40 sought care in November, and about 50 children per month sought care in the period from December 1988 to April 1989.

It must be stated that alopecia areata is a well-known and often encountered disease. Previously, no statistics were kept on it, and for this reason it is very difficult to determine whether the true incidence of this disease has actually risen in the city and oblast, or whether it is the result of more attention being given to it by the public. Still, we do consider the possibility of atypical and discrete forms of chemical disease. After all, the number of children exposed to the harmful factor may be considerably greater than the number of those who became ill. For that reason, it was decided to examine all children whose parents were concerned about their state of health. In early April, the commission examined 411 children with and without alopecia areata. The conclusion was unequivocal: the children screened had no signs resembling disease caused by chemical poisoning. However, a rather large number of other diseases were found: adiposity, diencephalic syndrome, endocrine pathology,

diseases of the gastrointestinal tract, and infectious and hereditary diseases, which were also a cause of alopecia areata. It was understood that the deleterious factor could have had an adverse effect on the course of already existing diseases in the children, and that could have caused the rise in number of patients with alopecia areata.

Everything would seem to be clear. But, nevertheless, as before, suspicions that the physicians are concealing the truth and that alopecia areata is the very same chemical disease, just a milder form, migrate from publication to publication.

In April of this year, at the request of the USSR Ministry of Health, temporary WHO advisers B. Sangster and G. de Groot, staff members of the National Institute of Public Health and Environmental Protection (of the Netherlands), went to Chernovtsy. They reviewed the clinical, laboratory and toxicological data and examined independently a group of nine children who had sustained total hair loss and 15 children with focal alopecia. Their conclusion was that focal alopecia in all the children examined "had no connection with the patients who suffered diffuse hair loss," and it is represented "a group of patients with several different diseases of the hair, often with well-known etiology and well-known clinical course." As for the children with diffuse hair loss, "it resembles very much the hair loss observed with thallium poisoning. However, neither polyneuropathy nor elevated organ levels of thallium was found in any of the patients. Therefore, thallium poisoning can be ruled out." In the opinion of foreign specialists, the disease is related to "extensive involvement of the environment ... most probably an exogenous biological or chemical factor. This conclusion is confirmed by the link between the end of the epidemic and the clean-up of the city of Chernovtsy."

What conclusions can be drawn from the foregoing?

In the first place, we encountered in Chernovtsy a new, heretofore unknown disease that struck children primarily of a very young age, of a specific phenotype, and with a tendency toward diseases of the respiratory tract, i.e., children belonging to a definite risk group. The disease was characterized by a triad of clinical symptoms: catarrh of respiratory tract, psychoneurotic syndrome and total alopecia, rather similar changes in trace-element composition.

In the second place, the clinical signs of the disease and the results of the tests indicate convincingly that the disease is chemical in nature. We consider unconvincing the assumption of foreign specialists who also suspect a biological factor, along with the chemical one.

And last, serious changes in the ecology inevitably generate changes in the human body and new, previously unknown diseases, as happened in Chernovtsy. For that reason, along with vigorous work to keep the environment clean, it is imperative to establish a well-staffed

service for the detection, treatment and, what is very important, prevention of diseases caused by changes in the environment.

AIDS in Volgograd

907C0007 Moscow *MEDITSINSKAYA GAZETA*
in Russian 12 May 89 pp 2, 3

[Article by A. Lebedinskiy, *MEDITSINSKAYA GAZETA* correspondent, Volgograd: "A Dirty Syringe Is Again 'To Blame'"]

[Text] Lilacs bloom in Volgograd and people smile at each other—it is spring. But not for those above whom the shadow of AIDS hangs. Dramas and tragedies...

At the thoracic department of the children's building at the City Clinical Hospital No 7 HIV was found in a 1 and 1/2-year old child. All those who stayed in the department with him even 1 day were examined urgently. Out of 240 people another 6 turned out to be infected.

MEDITSINSKAYA GAZETA (No 55 of 7 May) already reported that a headquarters for the localization and elimination of infection foci was established in the city. A brigade of specialists of the RSFSR Ministry of Health headed by K. I. Akulov, deputy minister of health of the Russian Federation, the republic's chief state sanitary inspector, came to its aid on 29 April.

They worked without days off deep into the night. Diagnostic laboratories operated round-the-clock. As of 1 May a total of 2,900 people were examined. There are already 10 people on the list of virus carriers. Additional samples that have been taken are being analyzed in a specialized laboratory for AIDS diagnosis at the Central Institute of Epidemiology of the USSR Ministry of Health.

From all appearances the trouble, indeed, came from Kalmykiya. A girl from Elista was treated at the department in October-November of last year. Subsequently, a positive reaction to AIDS was found in her. And again violations of the sanitary-antiepidemic regimen were the causes of infection in Volgograd children. It turned out that not all syringes and needles were treated at the hospital's centralized sterilization department. In order to save time, nurses often "sterilized" them themselves.

Syringes and other instruments were checked. In a number of cases the tests uncovered traces of blood. Needles for inserting catheters into the subclavian vein were never sterilized properly at all. The thoracic department has only... three units. They were "boiled" at the department so that they might not be lost during a centralized treatment. Previously, all this resulted in serum hepatitis, but now, in AIDS.

Specialists at the USSR Ministry of Health noted the following: Local physicians regard the supervision of disinfection in general and the sterilization of instruments in particular as something not worthy of their skills. However, they were even more amazed that I. I.

Krayushkin, the hospital's chief physician, while waiting for the results of the commission's work, in fact, withdrew from making independent decisions. Even the organization of general cleaning and disinfection had to be done without him. While the specialists who arrived, not knowing rest, analyzed case histories and examined patients, whose condition was clinically unclear, Prof G. N. Akzhigitov, head of the hospital-based Department for Children's Surgery of the Volgograd Medical Institute, did not consider it possible to donate his days off...

Nevertheless, by common efforts all the necessary urgent—not only antiepidemic, but also disciplinary—measures were taken. I. I. Krayushkin, the hospital's chief physician, and L. A. Sarkisov, head of the thoracic department, were relieved of their posts. The executive committee of the oblast soviet of people's deputies recommended that the scientific council of the Volgograd Medical Institute examine the question of Prof G. N. Akzhigitov's conformity to the post held. Severe reprimands and warnings were given to city and oblast public health directors.

Possibly, the procuracy will also have its say. After all, what has happened is not so much Elista's echo as the long echo of our irresponsibility and lack of initiative.

Two foreigners—virus carriers—and a woman resident of Volgograd, who became infected by one of them, were detected in the city last year. What of that? To this day there are no contraceptives in the city's pharmacies. The oblast health department calculated: Four of these simple products per man are received annually. There is a tense epidemic situation in the oblast, but soap is sold by coupons—and even it has to be searched for. If there is no sufficient number of disposable syringes, ordinary nondisposable ones can be used, but everyone must have his own individual syringe. However, just try to find them even if you persuade a physician to write a prescription. It would seem that this is the simplest problem, but we cannot solve even it. Although it is time to get used to the idea that sooner or later we will have to learn to live side by side with AIDS.

In the present tragedy children suffered and willy-nilly the oblast executive committee had to return to the chronic problem of construction of children's medical institutions.

It so coincided that the issue of VOLGOGRADSKAYA PRAVDA simultaneously published an alarming report on AIDS and a notice about the birth of the millionth resident of the city—a girl. Her parents named her Nadezhda [Hope]. How one wishes to be sure that in the future neither she nor her contemporaries will have to fear the deadly virus, that scientists will finally understand this AIDS, and that an end will be put once and for all to criminal irresponsibility.

AIDS Vaccine Claim Rebutted

907C0017a Moscow *MEDITSINSKAYA GAZETA*
in Russian 17 Sep 89 p 1

[Article by Candidate of Biological Sciences I. Lalayants and Special Correspondent I. Neklyudov: "The Mekler Phenomenon, or Will the Promissory Note Be Paid?"]

[Excerpts][passage omitted] "In a large number of cases the theoretical ideas presented by L. B. Mekler in the publication NTR on the pathogenesis of AIDS, on creation of vaccines and on the ways of preventing the disease are most general in nature, and attest to the author's simplistic view of these complex problems."

From the conclusion of a meeting of the scientific council of the Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences.

"There is a need for conducting an examination of the scientific materials that should be submitted by L. B. Mekler and R. G. Idlis (and not of popular press publications) in the expert council on AIDS under the Presidium of the USSR Academy of Medical Sciences, with the participation of specialists highly qualified in these matters."

From the minutes of a meeting of the scientific council of the Institute of Polymyelitis and Viral Encephalitis of the USSR Academy of Medical Sciences. [passage omitted]

"The statements of the authors concerning the possibility of AIDS infection through the unbroken skin or by the airborne pathway in natural conditions contradict the world experience of research on the epidemiology of AIDS, although the possibility of such infection in laboratory accidents, in the case of contact with unusually high concentrations of the virus, cannot be excluded. Because the hypothesis on the natural pathways of the infection's transmission is so serious and so far-reaching, and because its publication has enormous social consequences, serious arguments in favor of this supposition should have been presented."

From the conclusion of a meeting of the scientific council of the Scientific Research Institute of Virus Preparations of the USSR Academy of Medical Sciences. [passage omitted]

Offering the Desirable in Place of the Real...

The first time the public at large heard about Mekler was 2 years ago, when an article was written about him in *MOSKOVSKIYE NOVOSTI*; later on a recording of an interview with the scientist was shown on Central Television. It was at that time that Mekler announced, for all to hear, his promise to make mankind a gift of the formula of the AIDS vaccine he discovered and a complete description of the procedures for making it. The headline of another article in the same *MOSKOVSKIYE NOVOSTI* shouted quite garishly: "A Sensation, Or a Gift of Destiny." Since that time Mekler gained a certain amount of public recognition, he began conducting a seminar for specialists, and he started a lecture course in Moscow State University's biology faculty. His book "Zhizn vo Vselennoy" [Life in the Universe] will soon be published in Russian and in English.

And then, not that long ago, a little less than 2 years later, Mekler once again appeared in the press and on Central Television; in the interview he gave, this time he demanded not \$100,000, but as much as \$3 million to create his AIDS vaccine, which would rid mankind of the "plague of the 20th century." As a rule, readers and viewers believe without knowing what Lazar Borisovich is talking about, or even understanding it.

To be honest, we are astounded by the level of these publications and statements, which have everything in them except biology. But could it be that it is precisely what is not needed? What people need is a credo. By the way, this was expressed very well in one of the letters carried this year in *NTR*, No 8: "In contrast to fruitless world medical science, our scientists L. Mekler and R. Ildis are offering at least a glimmer of hope!" So what we have here is a glimmer, at the most.

Nonetheless let's try to calmly sort out this "voice in the wilderness." It is based, from our point of view, on three factors: fear, mistrust and a fervent desire to believe in at least some hope for the future. The society's fear of AIDS is easily explained. We think the timing of the *NTR* article and Mekler's appearance on the screen was not accidental. All of this occurred after *Elista*, but in the short time that has passed since the moment of publication of the fourth issue of *NTR*, we learned about Volgograd and Rostov-on-Don!

"It is obvious to any specialist working on AIDS that development of the vaccine 'technology' requires a large quantity of modern equipment, instruments and reagents, and an enormous quantity of excessively laborious research. As far as we know, L. B. Mekler has not been doing any experimental work at all in recent years, and the assertion that he has developed the technology and the means of producing the vaccine has no basis at the moment."

From a decision of a joint meeting of the scientific council and methodological seminar of the Institute of Virology imeni D. I. Ivanovskiy of the USSR Academy of Medical Sciences.

It is truly tragic when mothers are afraid to take their children to polyclinics and hospitals in fear of AIDS. On this backdrop it is difficult to persuade anyone that there are around 300 persons infected with HIV, and not the millions about which Mekler quite confidently talks. Everything in this case is working in his favor, though it is not at all our intention to belittle the danger. We are talking, after all, about a country that lacks such elementary things as soap and preservatives, not to mention disposable syringes. Moreover Mekler validly points out the fact that even though all such things are abundant in the USA and Western Europe, AIDS is raging there unchecked.

But this is precisely where we would like to shed some light. Why are there 10 times more registered AIDS carriers in the USA? Could it be—and Mekler should know this quite well, since he gets his information from American journals—that the USA has seven first-generation diagnosticums, and second and third generation diagnosticums have appeared—for example one such as the polymerase chain reaction reported back in 1988 by *MEDITSINSKAYA GAZETA* (14 September)? Moreover we need to ask what AIDS is in general from a biological point of view. No one, after all, has yet explained reliably what genetic mechanisms block rejection (up to a certain moment of course) of a fetus developing in the uterus that is genetically half-alien to the mother's body. All of this shows how biologically complex the AIDS problem is.

It would also be pertinent to say a few words about the fact that rather than regularly informing the public and doctors about AIDS prevention, and examining this problem specifically from a biological point of view, many Soviet publications go on basically frightening the people. In one instance photographs of G. Dyug [transliteration], a steward flying with a Canadian airline who supposedly imported AIDS into the USA, suddenly appeared in *SOBESEDNIK* (the journal *SCIENCE* exposed this nonsense for what it was back in early 1988), and in another instance a rather recent *NEDELYA* interview provided an opportunity for self-glorification to an ecology professor who supposedly predicted the advent of AIDS back in the late 1960s. "We were even able to accurately predict when the first victims would appear—in the 1980s," he says in his interview (everything in it is "accurate" except for one minor detail: The first AIDS patients were documented—and this was reported by *MEDITSINSKAYA GAZETA*—precisely at the moment when the professor was making his "predictions").

What was even worse was the fear which M. Whiteside and K. McLeod of Miami's Institute of Tropical Medicine unleashed in 1985 about mosquitoes carrying HIV.

American specialists made a special analysis of this hypothesis in 1987, and they proved, as was reported by an article in *SCIENCE* published in January 1988, that all of this was rubbish.

Mekler should have been aware of this article, and he shouldn't have sown false fears. But no, that is exactly what he has been doing! Moreover he declares that AIDS virus may be found in tears, saliva and even sweat.... Does this mean, then—the inquisitive reader concludes—that the range of possibilities for HIV infection increases immeasurably? By simple contact (according to Mekler). In the meantime world science knows for certain only three pathways of infection—through blood, during sexual intercourse, and from the mother to the child during pregnancy.

Lazar Borisovich creates even greater fear when he inflates the number of AIDS patients in the world by a factor of three, and when he recalls what he said at the end of last year about his "hypothetical vaccine" at the same time that the first AIDS vaccine has already been in existence for a year and a half. Why is he doing this? In order to emphasize that only he, Mekler, can offer an effective vaccine capable of saving mankind from the malevolent virus.

Mekler is also playing with the mistrust of some Soviet people toward medical science. This is not surprising after the flow of publications that quite recently invaded our consciousness. Moreover everything they say about the poor situation of Soviet medical science very often turns out to be true.

The hope of a certain Messiah who would come and dispel the people's woes by a sweep of the hand has always been alive, even in the most difficult times. And suddenly such a person comes and says, utilizing numerous incomprehensible—and consequently even more attractive—words such as "determinants," "activators," "palindromia" and "second genetic code," when people don't even know what the first code is, that everything will be all right—just give him three million and a little time.

And no one gives any thought to the fact that Mekler's demands have increased thirtyfold in 2 years and that he has no desire to meet not only with Soviet but also foreign experts (this was noted back in 1987 by *MOSKOVSKIYE NOVOSTI*). Nor is anyone troubled by the fact that "there are plans to test the obtained peptide vaccines 'jointly with collectives of appropriate foreign laboratories and clinics'." Why foreign? What would make foreign laboratories and clinics begin pushing Soviet goods in their own market, which is already stuffed to capacity with bioengineering products?!

It is easy to understand the negative reaction of Mekler's "proponents" to what USSR Academy of Medical Sciences Academician V. I. Pokrovskiy said in a letter to the editor of *NTR*: "I feel that the premises of the interview are harmful and wrong—they aren't even worthy of time spent on their detailed refutation." USSR Minister of

Health Ye. I. Chazov expressed himself a little more gently in *PRAVDA*: "A special commission was created to check out Mekler's and Idlis's developments, and...it was forced to admit them to be groundless." We should add to this that 85 doctors and 57 candidates of sciences, scientists from five scientific institutes of the USSR Academy of Medical Sciences, examined and discussed Mekler's theory.

The Other Side of the Advertisement

The letter from our Kharkov reader S. Levin, cited at the beginning of this article, contains the following lines: "Perhaps Mekler's work should be forwarded to the World Health Organization? He wouldn't dare object to such a thing, while our country would still maintain priority. Ambitions, after all, are not only harmful but even criminal in this matter (read 'in the struggle against AIDS.'—Author)."

What priorities is he talking about? And what ambitions, for that matter....

We have before us the opinion of G. Mann, the most prominent AIDS specialist, and the general director of WHO's global AIDS control program. He is precisely the foreign specialist to whom Mekler intends to transfer his perfected peptide vaccines.

On acquainting himself with the articles in *NTR*, Mann wrote the following in his letter to USSR Deputy Minister of Health A. I. Kondrusev: "The article 'First Chance?!' does not represent any serious research at all when it comes to understanding the biology or epidemiology of HIV and AIDS. The article is full of numerous errors, groundless hypotheses and naive conclusions. I have attached a number of commentaries prepared by our scientific associates pertaining to some points that are in absolute confrontation with universally recognized and tested data of modern biology in general and of AIDS biology in particular.

"The approach and the ideas stated in the article not only appear as a poor contribution to the goals of monitoring and preventing AIDS, but also in many ways are inferior to the level of scientific research conducted by many Soviet scientists who have made and continue to make an important contribution to the world struggle against AIDS. The paragraph discussing the difficulties 'Western scientists are having in realizing that Soviet scientists have overtaken them by at least 30 years' is incomprehensible."

We add to this that the above-mentioned commentaries discuss 38 points. In them, the premises offered by Mekler and Idlis are analyzed concretely. And almost every point begins as follows: "This assertion is wrong," or "This is not new, it is not original," "This is wrong"....

There was good reason why Mann made a reference to modern biology. We already mentioned that it is extremely complex, but that its successes are undisputed. And had it not been for these successes, we would not

have been able to reach an understanding of the AIDS problem so quickly. At the same time the mass media, which offer space to Mekler and which publicize his ideas, do not want to let biologists in close enough to be able to speak their piece. This is graphically evident at least from an analysis of the letters that have been published, particularly by the NTR. Even this year's July issue of ZHURNALIST, which discussed Mekler and Idlis in a long article titled "Collision," cited only the positive responses of scientists, at the same time that no discussion of the essentials was offered.

"Mekler's and Idlis's creative initiative is doubtlessly based on the noble dream of ridding mankind of the gravest ailments. And it could be that the offer of inordinate promissory notes and the super-universality and super-simplicity of the interpretations are but a publicist's trick, a means of emotional influence upon an unprofessional audience.

"The transcript of the interview lacks any concrete data on experimental development of the proposed conception. In the meantime the proposals of L. B. Mekler and R. Idlis for capitalizing on certain antigenic determinants require concrete experimental verification, primarily using the methods of peptide chemistry and peptide synthesis."

From the conclusion of Academician-Secretary O. G. Andzhaparidze of the USSR Academy of Medical Sciences Department of Hygiene, Microbiology and Epidemiology

One of the authors of the present article applied to the editor of NTR twice with an offer to explain the real AIDS situation, and what is being done in the world in this area. He cited the scientific, popular scientific and publicistic articles of his that have appeared in the press. But without avail. After his second application, made when he sent the editor of NTR this year's 23 April issue of MEDITSINSKAYA GAZETA, which reported infection of medical workers and laboratory assistants by AIDS, the standard rejection was sent in reply: "Thank you for your attention to the bulletin. We will take the ideas you stated into consideration when preparing a survey of responses to the AIDS article."

And one last thing. Almost every article on Mekler contains the sacramental phrase: "This cannot be, because it can never be." This is precisely what article authors use as their primary argument supporting the "reluctance" of specialists to understand and analyze Mekler's theory and code. Supposedly they are "complex, difficult, incomprehensible." Incomprehensible to whom, may we ask? To the lay reader unfamiliar with the knowledge that has been acquired in genetic engineering and with the secrets of molecular biology? Without a doubt.

But since when has it been that scientific hypotheses and new, ultracomplex theories are brought up for wide discussion not in the conference halls of congresses and conferences, but right on the pages of popular illustrated weeklies and sociopolitical publications? Among the many millions of spectators sitting in front of their television screens? Who was it that confirmed dilettantes as the arbiters of scientific debates, and when?

G. Mann is right a thousand times over when he expresses bewilderment in his letter: "I am astounded by the fact that two scientists prefer to print in an ordinary newspaper what is characterized as a scientific article. This is contrary to the practice existing in the entire scientific world: that of publishing such articles in scientific journals, where they can be read and discussed by the scientific community."

We think that a special, comprehensive and deep examination of the theories and code of L. Mekler and R. Idlis by the USSR Academy of Sciences jointly with the USSR Academy of Medical Sciences could provide a final and competent opinion on the scientific strength of the theory and code. Such an examination could also finally explain to the disturbed public whether or not the promissory note so generously offered by L. Mekler and, we add, zealously advertised by certain mass media not all that concerned about establishing scientific truth, is worth anything.

Infectious Disease in Kazakh SSR

907C0065a Alma-Ata KAZAKHSTANSKAYA PRAVDA
in Russian 24 Sep 89

[Interview with Talapkali Abishevich Izmukhambetov, KaSSR minister of health, by KAZAKHSTANSKAYA PRAVDA correspondent N. Shchukin, under the rubric "On the Eve of an Event": "Attacking Infection"; first paragraph is KAZAKHSTANSKAYA PRAVDA introduction]

[Text] The 18th Congress of the All-Union Scientific Society of Microbiologists, Epidemiologists, and Parasitologists imeni I. I. Mechnikov begins its work on 26 September in Alma-Ata; well-known USSR scientists and their foreign colleagues will convene here to participate in it. Together with the scientists and practicing physicians of the KaSSR, they will discuss the most important problems of the status of infectious morbidity and ways to reduce it. This future event is the topic of a conversation between our correspondent and KaSSR Minister of Health T. A. Izmukhambetov.

[Question] Talapkali Abishevich, are there objective reasons for the capital of our republic being chosen as the meeting place, or was it chosen merely by dint of circumstance?

[Answer] That Alma-Ata is gathering the scientific community in microbiology and epidemiology is not all by accident. Above all, one must keep in mind the special natural conditions of Central Asia and Kazakhstan: here

are found the foci of some of the most dangerous infectious diseases. One cannot at all say that we do not have our fair share of attention from scientists: definite scientific developments exist, and from time to time, leading medical figures come to us. But the forthcoming conference will bring us nearer to a solution for many problems, will make it possible for us to be included more actively in the process of the perestroyka of medical science, and undoubtedly will leave its mark on the republic.

The existence I mentioned of natural foci of very dangerous diseases, the work that has been done on the prevention of epidemics and on the lightning-fast pinpointing of outbreaks of diseases (every year, we register one or two cases of plague, leprosy, or some other infection, and we even have our own leprosarium)—all this had made it possible for the republic to accumulate certain amount of experience in combatting infectious diseases. Thus, this is also the basis for holding the meeting in Alma-Ata.

Our sad leadership in tuberculosis has long been no secret. The opinions of very prominent scientists and the practical advice of specialists will be valuable to scientists and practicing physicians of the republic—in a word, serious discussions on this subject are badly needed. Kazakhstan scientists also have something to say about it, inasmuch as we have had positive experience: solid scientific staffs have been brought into existence in the republic, there is a strong scientific research institute of epidemiology and infectious diseases, and we have many of the country's prominent scientists doing successful work here, such as senior scientific figures of Kazakhstan like doctors of medical science I. K. Karakulov, N. D. Beklemishev, and Ye. Kh. Shuratov.

[Question] We are talking now of the achievements of scientists and practicing physicians in combatting the spread of dangerous infectious diseases, but meanwhile news and official communications about the outbreak of dangerous infections here and there keep on alarming the man in the street. Hemorrhagic fever, for example, appeared very recently in a number of regions.

[Answer] That disease is not new to us, and in regions of intensive livestock-raising, we are fighting it year after year. Another thing is that, previously, information about outbreaks of such infections was kept, so to speak, within the family by the press, but now, with glasnost, it is published. This is also the case with information about the appearance of foci of plague and cholera.

[Question] Medical workers are correctly criticized in the event of an outbreak of dangerous diseases. But the physicians alone are not responsible for the spread of infectious diseases.

[Answer] The outbreak and especially the spread of certain forms of infection are, to no small degree, related to the social and cultural level of life of the people, housing conditions, and problems associated with water

supply, sewerage, and the provision of high-quality products. And their solution depends primarily on the efficiency of the work done by local authorities and farm directors—in a word, on a large number of people and, in the final analysis, on joint efforts with the public.

[Question] Alas, it is no secret that these efforts do not always mesh. We know of more than a few instances in which, because of the fundamental irresponsibility of farm managers and directors charged with overseeing the performance of needed social and cultural measures, we had to pay with people's health and the selfless "shock" work of epidemiologist physicians.

[Answer] Worse than that, there are cases in the republic in which, in the pursuit of favorable economic indicators, the true status is concealed concerning the morbidity among livestock due to tuberculosis and brucellosis, and the official statistics do not reflect the actual epizootic status. In examinations of carcasses at meat combines, up to 8-9% of the animals were found to have tuberculosis; but on farms which have reported the health recovery of livestock, we are diagnosing brucellosis in people—a true sign that the recovery is a "sham." On 62 farms in the Alma-Ata Oblast, for example, which is considered to be safe in that regard, 193 livestock breeders suffer from brucellosis, and 91 other people suffer from it on farms in the Lenger Rayon of the Chimkent Oblast.

By concealing the true picture and by producing sick cattle, farm managers are contaminating health all the way down the line. And this is really a crime against healthy people. In that regard, we need still greater joint work with the Gosagroprom of the republic and with other ministries and departments. The attention focused on it by the government of the republic indicates the extreme importance of the problems touched upon, which also will be raised at the meeting.

Attention should also be paid to still another important problem. It is painful, upon hearing the reports about the successful execution of the Zhilye-91 program, to acknowledge that fifteen hundred of our patients with tuberculosis—active bacillus carriers—are in need of improved housing conditions. That the housing that is provided for them is extremely unsatisfactory. In Alma-Ata, apartments have been obtained for only 7.7 percent of sick people needing them, and in Guryev, only 8.8 percent. The situation is bad in the East Kazakhstan, Karaganda, and Pavlodar oblasts.

Speaking of the importance of many problems to be raised at the meeting and of the social significance of microbiology and epidemiology for the welfare of society, we note the weakness of the material-technical base of sanitary-epidemiological institutions, and this hinders timely solution of scientific and practical problems.

We still have a lot to do in the struggle against infections. New methods of work are now being introduced in the

republic, in particular systems of epizootological-epidemiological inspection; in seven oblasts, tests of a new brucellosis vaccine are being conducted. A great amount of work lies ahead in terms of a comprehensive study and development of diagnostic tests for infections such as hospital-acquired infections, AIDS—which is now here—and others.

In addition to the problems already mentioned, the congress program includes a discussion of problems of ecology, and conversation about our sore spot—Aral and Balkhash—and about the Semipalatinsk Proving Ground. Discussion of many of them will intimately concern the spectra of problems of a social and economic nature. Great attention is planned to be paid to drawing up recommendations for preventing illness and making treatment effective.

Having set a goal of making the work of such a representative meeting a contribution of the whole republic, we tried to bring to it as many practicing physicians as possible, including those from remote areas. Therefore, we expect from this measure not only new scientific developments, but also practical results.

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Epidemiological Conditions Fostering Spread of Ischemic Heart Disease Among Adult and Child Male Population of Various Regions of USSR

907C0191A *KARDIOLOGIYA* in Russian Vol 29 No 5, May 89 (manuscript received 20 May 87) pp 56-61

[Article by R. G. Oganov, G. S. Zhukovskiy, V. V. Konstantinov, N. V. Perova, and I. B. Tubol, Scientific Research Institute of Preventive Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Text] Epidemiological studies of various populations over a broad range of ages are very important to the planning and implementation of measures for the control of cardiovascular disease in our country. To date, epidemiological studies have been carried out in several regions of our country, mainly among the middle-aged and elderly male populations.¹⁻⁵ However, most of these studies were carried out separately and not on the same standard basis. With the establishment of the Institute of Preventive Cardiology of the All-Union Cardiological Research Center, USSR Academy of Medical Sciences, it has become possible to plan, coordinate, and perform large-scale epidemiological studies that use the same standardized methods among populations of different regions of the country.

We were faced with the following tasks: (1) to investigate the incidence of IHD [ischemic heart disease] and its risk factors for men who are 20-54 years of age and reside in different regions of the country; (2) to produce a comparative description of the child population for ages 11 and 14 in various regions, as related to incidence of precursors of atherosclerosis; (3) to determine whether

differences in level of IHD risk factors among men residing in different regions were attributable to similar differences in boys residing in the same regions.

Material and Methods

We submit here some of the results of one of the most important cooperative epidemiological studies carried out in the USSR within the program "Epidemiology of IHD and atherosclerosis in different regions of the country," in which about 20 research centers participated. This cooperative epidemiological study was designed to last 10 years. Its first stage (simultaneous research) studied the incidence of the main forms of IHD and risk factors among the male population aged 20-54 and not affiliated to any organization. The material studied consisted of random representative samples of the male population of the indicated age range in one district per city. The samples were formed on the basis of a list of voters and the use of random numbers. At each center, 2,500-3000 men were screened, and there was a 70-78% response.

In order to obtain data that could be compared, the participants from all the cities underwent a centralized standardization of epidemiological investigative methods. In the course of the study, the program coordinating committee constantly monitored the quality of epidemiological and biochemical methods used.

The screening program consisted of the following: (1) A standard survey using the WHO questionnaire for detection of stress-related angina pectoris. (2) An ECG recorded at rest with the 12 standard leads, followed by coding with the Minnesota code (MC). (3) Anthropometry (measurement of height in centimeters to within 0.5 cm and weight in kilograms to within 0.1 kg). Evaluation of weight was made according to Quetelet's rule (weight, kg/height, m²). A Quetelet index equaling or exceeding 29.0 kg/m² was indicative of an overweight (OW) condition. (4) Measurement of arterial blood pressure [BP] with an ordinary sphygmomanometer, with the patient seated, on the right arm, twice at a 5-minute interval. BP was calculated on the basis of the average values of two readings for both systolic BP (BP_s) and diastolic BP (BP_d). A BP_s or BP_d level equal to or exceeding 160/95 mm Hg was considered to be arterial hypertension (AH). (5) Assay of total serum cholesterol (Ch), triglycerides (TG), and α -cholesterol (α -Ch) of high-density lipoproteins (HDL) using a Tekhnikon-AA automatic analyzer. Hypercholesterolemia (HCh) corresponded to a serum Ch concentration equal to or exceeding 260 mg/dl, hypertriglyceridemia (HTG)—to a TG level equal to or exceeding 200 mg/dl and hypoalphacholesterolemia (HACH)—to a serum α -Ch level equal to or below 34 mg/dl. (6) Survey of smoking. Males who needed to smoke even one cigarette per day were considered smokers.

Incidence of IHD was studied on the basis of criteria, according to which definite and possible IHD were distinguished.

Definite IHD (DIHD) included the following: (1) prior definite myocardial infarction (DMI) with MC categories 1-1 (all) and 1-2-1 (without 1-2-8); (2) stress-related angina pectoris (SA) identified on the basis of survey with the WHO questionnaire; (3) silent IHD (SIHD) with MC categories 4-1.2 and 5-1.2, without 3-1 or 3-3.

Possible IHD (PIHD) included the following: (1) MC categories 1-2-8, 1-3 (all), 4-3 and 5-3; (2) MC categories 4-1.2 and 5-1.2 with with 3-1 and 3-3, 6-1, 7-1, as well as 8-3 for individuals over 40 years of age only; (3) possible history of myocardial infarction (history of severe retrosternal pain lasting 30 minutes or longer).

One of the purposes of the study was to obtain an answer to the question of whether the differences in level of IHD risk factors in adults residing in various regions were attributable to such differences in children. In other words, when are differences in levels of IHD risk factors formed in populations of various regions: in childhood, adolescence, youth, or later?

For this purpose a combined analysis was made of the screening results for the adult male population 20-54 years of age and for children 11 and 14 years of age in Moscow, Novosibirsk and Tallin. According to the program for the cooperative study, the group of 11- and 14-year-old boys was selected by the random sampling method from secondary schools in specific districts of Moscow, Novosibirsk and Tallin. The class served as the sampling unit, and the sample was formed in stages: in the first stage, district schools were chosen; and in the

second stage, the 5th and 8th grades were chosen by the method of random numbers. After that, a list of the 11- and 14-year-old boys to be screened was compiled. In 1984-1985, a simultaneous epidemiological study was made of boys in Moscow, Novosibirsk, and Tallin. In Moscow, 322 and 289 boys, 11 and 14 years old, respectively, were screened; in Novosibirsk, 282 and 172; and in Tallin, 288 and 297. There was an 88.3% response in Moscow, 92.0% in Novosibirsk, and 87.2% in Tallin.

The screening included survey with a standard questionnaire; two BP measurements with the method advanced by N. S. Korotkov, in accordance with WHO recommendations; anthropometry (measurement of height and weight); a scaled evaluation of sexual development; and assay of total Ch, TG, and HDL Ch in serum of venous blood taken on an empty stomach after a 12-hour fast.

Study Results

Table 1 lists the incidence of various forms of IHD among populations of males 20-54 years of age and residing in various cities of the country. The incidence of IHD standardized according to age was highest in male populations residing in the European and Siberian regions of the country—Kiev, Kaunas, Novosibirsk, Yakutsk, Moscow, Tallin—as well as in the male population of Baku (8.4-12.5%). At the same time, the incidence of IHD was 2-3 times lower (3.9-6.6%; $p < 0.05$) in male populations of the Central Asian region and Nalchik.

Table 1. Incidence of various forms of IHD among 20- to 54-year-old men residing in various cities, per 100 individuals screened (indicator standardized according to age)¹

| City | Number of men screened | DMI | SA+ECG variations | SA based on WHO questionnaire | SIHD based on ECG | Total DIHD | PIHD based on ECG | History of MI | Total PIHD | Total IHD |
|-------------|------------------------|-----|-------------------|-------------------------------|-------------------|------------|-------------------|---------------|------------|-----------|
| Novosibirsk | 2378 | 2.2 | 0.4 | 3.4 | 0.7 | 6.6 | 4.0 | 0.6 | 4.6 | 11.2 |
| Baku | 2850 | 1.4 | 0.8 | 5.0 | 1.6 | 9.0 | 3.0 | 0.4 | 3.8 | 12.5 |
| Kiev | 2393 | 0.9 | 0.4 | 3.3 | 0.8 | 5.4 | 3.1 | 2.1 | 5.1 | 10.6 |
| Kaunas | 2027 | 1.2 | 0.6 | 1.5 | 1.5 | 4.8 | 4.7 | 0.6 | 5.4 | 10.2 |
| Yakutsk | 2492 | 0.0 | 0.7 | 1.6 | 1.7 | 4.0 | 5.4 | 0.4 | 5.7 | 9.8 |
| Moscow | 2770 | 1.2 | 0.4 | 1.8 | 0.7 | 4.2 | 3.5 | 0.8 | 4.5 | 8.7 |
| Tallin | 2477 | 1.4 | 0.3 | 2.2 | 0.7 | 4.7 | 3.5 | 0.2 | 3.7 | 8.4 |
| Tbilisi | 2609 | 0.1 | 0.6 | 3.0 | 0.8 | 4.5 | 1.8 | 1.0 | 2.7 | 7.2 |
| Norilsk | 2646 | 0.4 | 0.2 | 1.7 | 0.4 | 2.7 | 3.2 | 0.8 | 4.1 | 6.7 |
| Frunze | 2732 | 1.0 | 0.1 | 2.4 | 1.3 | 4.8 | 1.2 | 0.6 | 1.8 | 6.6 |
| Alma-Ata | 3000 | 0.7 | 0.8 | 2.2 | 1.0 | 4.7 | 1.2 | 0.3 | 1.6 | 6.3 |
| Tashkent | 2500 | 0.5 | 0.2 | 1.1 | 1.4 | 3.2 | 2.8 | 0.0 | 2.8 | 6.0 |
| Nalchik | 2740 | 0.3 | 0.3 | 1.4 | 0.04 | 2.1 | 1.7 | 0.1 | 1.8 | 3.9 |

¹The standard is the age structure of urban male population in the country in the age range of 20-54 years.

Table 1 shows that the populations studied differ in incidence of both IHD as a whole and of its different

forms. Thus, a history of MI (HMI) was found more often among the men of Novosibirsk, Baku, Tallin,

Moscow and Kaunas (1.2-2.2 per 100 screened); whereas HMI was encountered 3-4 times less often (0.1-0.5%, $p < 0.05$) among the male populations of Yakutsk, Nalchik, Norilsk and Tashkent.

The incidence of SA was considerably higher among men in Baku, Novosibirsk, Kiev and Tbilisi than among men in other cities (3.0-5.0%). SIHD was recorded 2-3 times more often among men in Yakutsk, Kaunas and Tashkent (from 1.4% to 1.7%) than among men in other populations.

The incidence of DIHD as a whole (HMI + SA + SIHD) was found to be highest among male populations in Baku, Novosibirsk, Kaunas and Tashkent [sic], ranging from 4.8 to 9.0 per 100 screened; whereas DIHD was encountered 2-3 times less often (2.1-3.2%) in Nalchik, Norilsk and Tashkent.

The incidence of PIHD in the various populations was attributable mainly to ECG variations and, to a lesser extent, possible history of MI. A higher incidence of PIHD was noted in male populations of Yakutsk, Kiev, Novosibirsk and Moscow (4.5-5.7%); whereas it was

encountered 1.5-2 times less often (1.6-2.7%) in male populations of Alma-Ata, Frunze, Tbilisi and Tashkent.

The ratio of DIHD to PIHD in the incidence of IHD as a whole varied considerably in the various populations. For example, this ratio was approximately 1:1 in populations of Moscow, Kiev and Tashkent; whereas in Yakutsk and Norilsk, the incidence of IHD depended more on the percentage of men with PIHD. In the other cities, the incidence of IHD among male populations was attributable mainly to those with DIHD.

The incidence of IHD as a whole among the various age groups of men was as follows: 0.5-3.4% in the 20-29 and 30-39 age groups; it was 2-2.5 times higher in the 40-49 age group, ranging from 13.0% to 18.3%; and in the 50-54 age group it ranged from 16.6% to 25.5%. This is indicative of the positive relationship between IHD and age among the men in various cities of the country.

Table 2 lists the incidence of the risk factors studied among men 20-54 years of age in various cities. The highest incidence of AH was observed in Kaunas, Tallin and Moscow (23.0-31.1%), whereas it was 2-3 times lower (6.5-13.0%) among the male populations of Yakutsk, Tbilisi, Alma-Ata and Kiev. In the rest of the cities, incidence of AH ranged from 15.2% to 18.3%.

Table 2. Incidence of IHD risk factors (in %) in populations of 20- to 54-year-old men in various cities (indicator standardized according to age)

| City | Number of subjects screened | Borderline arterial hypertension (BAH) | Dyslipoproteinemia (DLP) | | | | | OW | Smoking |
|-------------|-----------------------------|--|--------------------------|------|------|------|----------------|------|---------|
| | | | AH | HCh | HTG | HACH | Total with DLP | | |
| Moscow | 2781 | 14.9 | 23.0 | 19.0 | 4.9 | 6.8 | 25.8 | 10.9 | 55.1 |
| Kiev | 2393 | 11.1 | 13.1 | 10.8 | 8.5 | 5.7 | 15.5 | 13.6 | 51.1 |
| Tallin | 2477 | — | 28.3 | 13.5 | 8.3 | 8.0 | 23.9 | 15.4 | 53.0 |
| Frunze | 2732 | 21.8 | 16.3 | 15.1 | 15.6 | 5.4 | 38.7 | 12.8 | 49.9 |
| Nalchik | 2755 | 17.9 | 17.8 | 5.1 | 9.6 | 9.9 | 19.5 | 13.4 | 57.0 |
| Tbilisi | 2609 | 3.5 | 11.0 | — | — | — | — | 17.2 | 64.5 |
| Kaunas | 2027 | 37.4 | 31.1 | 13.4 | 6.0 | — | 34.8 | 20.4 | 48.7 |
| Baku | 2850 | 12.7 | 16.3 | 23.0 | 18.9 | 24.6 | 48.2 | 14.8 | 65.0 |
| Tashkent | 2500 | 29.7 | 18.3 | 9.6 | 7.3 | 15.4 | 27.6 | 18.2 | 56.8 |
| Alma-Ata | 3000 | — | 11.2 | 5.5 | 5.9 | 2.8 | 14.2 | 9.4 | 61.0 |
| Novosibirsk | 2378 | — | 22.5 | 11.5 | 8.7 | 14.8 | — | 13.3 | 60.4 |
| Yakutsk | 2492 | 18.0 | 6.5 | 4.3 | 0.5 | 0.4 | 4.7 | 10.8 | 57.9 |
| Norilsk | 2609 | — | 15.2 | — | — | — | — | 19.9 | 61.7 |

The age-standardized indicator for the incidence of HCh among men in Baku, Moscow, Frunze, Tallin and Kaunas ranged from 13.4% to 23.0%, whereas it was 3-5 times lower (4.7-5.5%, $p < 0.05$) in Yakutsk, Nalchik and Alma-Ata.

A higher incidence of HTG was noted among the men in Baku and Frunze (18.9% and 15.6%, respectively); whereas HTG was encountered 4-5 times less often

(0.5-4.9%) in populations of Yakutsk and Moscow. In the rest of the cities, the incidence of HTG ranged from 6.0 to 8.7%.

The incidence of HACH was higher in male populations of Baku, Tashkent and Novosibirsk (14.8-24.6%), and 3-5 times lower (0.5-5.7%, $p < 0.05$) in Yakutsk, Alma-Ata and Frunze.

Table 2 also lists data on incidence of dyslipoproteinemia (DLP) as a whole (all three parameters—Ch, TG and α -Ch levels—were taken into consideration). The highest incidence of DLP was noted among the men of Baku, Frunze, Tashkent and Moscow (25.8-48.2%), whereas it was 2-4 times lower (4.7-14.2%, $p < 0.05$) in male populations of Yakutsk and Alma-Ata.

The incidence of OW, evaluated according to Quetelet's index, was highest in male populations of Kaunas, Norilsk, Tashkent and Tbilisi (17.2-20.4%), and it was 1.5-2 times lower (9.4-10.9%, $p < 0.05$) in Alma-Ata, Yakutsk and Moscow. In the rest of the cities, the incidence of OW among men ranged from 13.3% to 17.0%.

The highest incidence of smoking (60.0-65.0%) was observed among men in Baku, Tbilisi, Norilsk, Alma-Ata and Novosibirsk; it was somewhat lower in Kaunas and Frunze (48.7% and 49.9%, respectively). In the male populations of the other cities, the age-standardized incidence of smoking was also high, ranging from 50.0% to 58.0%.

Thus, the populations of men 20-54 years of age in various regions of our country differed considerably in both risk factor level and incidence of IHD. The following features were identified in incidence of IHD: it was higher in male populations in which the risk factors under study were encountered more often. Thus, DLP and smoking were prevalent among the men in Baku; DLP and AH, in Kaunas; AH and HCh, in Moscow; and AH, HCh and smoking, in Novosibirsk. At the same time, in male populations characterized by a low incidence of IHD, the levels of the risk factors were lower (Nalchik and Alma-Ata).

Table 3 lists data on incidence of DLP among 11- and 14-year-old boys in three cities located in different regions of the country (Moscow, Tallin, Novosibirsk). The incidence of HCh (total serum cholesterol of 200 mg/dl or higher) was consistently higher among the 11- and 14-year-old boys from Tallin than among those from Moscow and Novosibirsk. Using a stricter criterion of HCh (total blood cholesterol of 230 mg/dl or higher), HCh incidence among the 11-year-old boys was found to be consistently higher in Tallin than in the two other cities; whereas among the 14-year-old boys, the incidence of HCh was virtually the same in the three cities studied (3.3-5.6%, $p < 0.05$).

Table 3. Incidence of DLP (in %) among boys in Moscow, Tallin and Novosibirsk as a function of age

| Age, in years | City | Number screened | HCh | | | | Number screened | HTG | | Number screened | HCh | |
|---------------|-------------|-----------------|------------------------|------|------------------------|------|-----------------|-----------------------|------|-----------------|-----------------------|----|
| | | | Ch 200 mg/dl or higher | | Ch 230 mg/dl or higher | | | TG 95 mg/dl or higher | | | HDL Ch 40 mg or lower | |
| | | | absolute | % | absolute | % | | absolute | % | | absolute | % |
| 11 | Moscow | 303 | 34 | 11.6 | 19 | 6.3 | 303 | 23 | 7.6 | 302 | 27 | 8 |
| | Tallin | 262 | 100 | 38.2 | 39 | 14.9 | 262 | 18 | 6.9 | 253 | 29 | 11 |
| | Novosibirsk | 262 | 50 | 19.1 | 9 | 3.4 | 262 | 44 | 16.8 | 259 | 27 | 10 |
| 14 | Moscow | 272 | 34 | 11.4 | 10 | 3.3 | 272 | 32 | 11.4 | 278 | 65 | 23 |
| | Tallin | 285 | 62 | 21.8 | 16 | 5.6 | 285 | 42 | 14.7 | 280 | 58 | 20 |
| | Novosibirsk | 156 | 26 | 16.7 | 8 | 5.1 | 156 | 38 | 24.5 | 151 | 32 | 21 |

The incidence of HTG (with blood TG levels of 95 mg/dl or higher) among 11- and 14-year-old boys was consistently higher in Novosibirsk than in Moscow and Tallin ($p < 0.05$).

The incidence of HCh (concentration of serum α -lipoprotein cholesterol of 40 mg/dl or lower) fluctuated negligibly among the three cities studied for both 11-year-olds (8-11 mg%) and 14-year-olds (20-23 mg%, $p < 0.05$).

In addition to incidence of DLP, the cooperative program included the study of other risk factors in 11- and 14-year-old boys: high BP (HBP), OW, smoking. Table 4 lists the incidence of HBP based on recorded values with consideration for age. Among 11- and 14-year-old boys, the highest incidence of high BP_s and BP_d was found in schoolboys of Moscow and Novosibirsk, and the lowest incidence, among those of Tallin. The differences between Moscow and Novosibirsk, on the one hand, and Tallin, on the other, are statistically significant only for the incidence of HBP_d.

Table 4. Incidence of HBP_s, HBP_d, OW and smoking among 11- and 14-year-old boys in Moscow, Tallin and Novosibirsk

| Age, in years | City | Number of boys screened | | | | | | | | | | | |
|---------------|-------------|-------------------------|------------------|-----|------------------|------|---------------------------------------|-----|-----------------|------|-------|----------|------|
| | | Total | HBP _s | | HBP _d | | HBP _s and HBP _d | | OW ¹ | | Total | Smokers | |
| | | | absolute | % | absolute | % | absolute | % | absolute | % | | absolute | % |
| 11 | Moscow | 322 | 4 | 1.2 | 14 | 4.3 | 0 | 0 | 60 | 19.4 | 322 | 6 | 1.9 |
| | Tallin | 288 | 2 | 0.7 | 4 | 1.4 | 1 | 0.3 | 47 | 16.3 | 288 | 6 | 2.1 |
| | Novosibirsk | 282 | 3 | 1.7 | 12 | 4.3 | 2 | 0.7 | 40 | 14.2 | 263 | 22 | 8.5 |
| 14 | Moscow | 289 | 6 | 2.0 | 36 | 12.4 | 0 | 0 | 67 | 19.5 | 289 | 49 | 17.0 |
| | Tallin | 297 | 3 | 1.0 | 5 | 1.7 | 0 | 0 | 53 | 17.9 | 296 | 63 | 21.3 |
| | Novosibirsk | 172 | 4 | 2.3 | 13 | 7.6 | 1 | 0.6 | 27 | 15.8 | 172 | 32 | 18.6 |

¹Weight index is 20 or more for 11-year-old boys, 22 or more for 14-year-olds.

Analysis of data for other risk factors revealed that the incidence of OW (see Table 4) for 11-year-old boys was lowest (14.2%) in Novosibirsk and highest (19.4%) in Moscow. Among 14-year boys, there was little difference in incidence of OW among the cities studied. As can be seen in Table 4, the incidence of smoking for 11-year-old boys was highest in Novosibirsk—8.5%. The incidence of smoking increases considerably by the age of 14, reaching 17.0-21.3%.

Analysis of the data established that differences between adult populations residing in the above-mentioned cities with respect to TG and smoking are formed in childhood. For example, the incidence of HTG was highest in both adults and children 11 and 14 years of age in Novosibirsk, and the incidence of smoking was highest among adults and 11-year-old children of the same city. Consequently, the differences between men 20-54 years of age in the three cities with regard to incidence of HTG and smoking were, to a significant extent, already established at the age of 11.

At the same time, differences between adult populations residing in the three above-mentioned cities, with respect to incidence of AH, OW, HCh and HAcH are not predetermined in childhood, but are formed at a later time. Thus, the incidence of AH was highest in Tallin men; whereas among 11- and 14-year-old children, it was lower in Tallin than in the other two cities. The highest incidence of HCh in children was found in Tallin; whereas among the adult male population, the highest indicator was found in Moscow. The incidence of HAcH among men was highest in Novosibirsk, whereas it was virtually the same among the boys in the three cities studied. Incidence of OW among the adult male population was highest in Tallin, and among the child population, in Moscow.

Conclusions

1. The incidence of definite ischemic heart disease among the male population 20-54 years of age in various parts of the country fluctuates over a rather wide range, from 2.1% to 9.0%.

2. Most of the cities with a high incidence of ischemic heart disease, as a rule, had the highest indicators for incidence of all or some of the main risk factors: arterial hypertension, dyslipoproteinemia, smoking. At the same time, there was a lower incidence of these factors in populations with low incidence of ischemic heart disease.

3. The differences between adult male populations living in different parts of the country with respect to incidence of hypertriglyceridemia and smoking are probably formed at the age of 11; whereas in the incidence of arterial hypertension, hypercholesterolemia and excessive weight, the differences are apparently formed after the age of 14.

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Register of Acute Myocardial Infarction in Yerevan

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[Article by K. G. Adamyan and A. F. Kazanchyan, Scientific Research Institute of Cardiology, Armenian Ministry of Health, Yerevan]

[Text] The importance of epidemiological studies of acute myocardial infarction (MI) for the purpose of lowering the morbidity and mortality levels due to this disease is unquestionable.¹⁻¹⁴ The epidemiological investigation, "Register of Acute MI," proposed by WHO in 1970, makes it possible to obtain comparable data on morbidity and mortality due to acute MI and to assess prehospital and in-hospital care and the efficacy of posthospital rehabilitation.⁶⁻¹³

The study entitled "Register of Acute MI in Yerevan" has been in progress since 1 January 1983. Because the city is situated at different altitudes above sea level (from 800 to 1400 m) and because of the dissimilar distribution of major industrial enterprises and housing, the study covered the entire population (over 1.2 million people). In compiling the register, we adhered to the criteria recommended by WHO.^{6, 8} Original charts were developed for primary and repeat studies, as was a computer program in the PL-1 language for data processing, and a data bank was created. All levels of the cardiological service were involved in the study: first aid

(including cardioresuscitation teams), intensive care units of cardiology departments of city clinics, and cardiology offices at all the polyclinics in the city. Cases of sudden death were recorded by the forensic medical expert office of Yerevan with a method developed together with the department of pathological morphology (headed by Professor I. D. Shperling) of the Scientific Research Institute of Cardiology, ArSSR Ministry of Health. In this article, we submit register data for 1983-1985. The data were recorded on magnetic tape with a YeS-9002 unit. They were processed at the Republic Data Processing and Computer Center of the ArSSR Ministry of Health with a YeS-1033 computer.

According to data in the register, 975, 989 and 1,037 cases of acute MI and sudden coronary death were recorded in 1983, 1984 and 1985, respectively. "Definite" MI was encountered 3.6-4 times more often than "possible" MI was encountered. Table 1 presents the distribution of cases of acute MI and morbidity indicators for different age groups for the years of the study. We see that there were 5.8-7 times more cases of acute MI among men than among women. First occurrence of acute MI among men was observed in the 20-29 age group; among in women, in the 30-39 age group. With increase in age, there was concurrent rise in morbidity among both men and women. The indicators of overall morbidity due to acute MI per 1000 population (1.48-1.52) and morbidity among women (0.38-0.45) were stable. Morbidity among men rose from 2.65 in 1983 to 2.7 and 2.73 in 1984 and 1985, respectively; however, this trend was statistically unreliable. By comparison with the data of other registry centers, morbidity among women may be considered low, and among men, average.

Table 1. Morbidity due to acute MI in Yerevan for the years of the study as a function of age and sex

| Mor- bid- ity | Age, in years | | | | | | | | | | | | | | | | | |
|---------------------|---------------|---|------------|-------|------|------------|-------|------|------------|-------|------|------------|-------|------|------------|-------|------|------------|
| | 20-29 | | | 30-39 | | | 40-49 | | | 50-59 | | | 60-64 | | | 20-64 | | |
| | M | F | Both sexes | M | F | Both sexes | M | F | Both sexes | M | F | Both sexes | M | F | Both sexes | M | F | Both sexes |
| Total cases | 7 | — | 7 | 46 | 8 | 54 | 202 | 19 | 221 | 429 | 77 | 506 | 136 | 51 | 187 | 820 | 155 | 975 |
| Per 1000 population | 0.06 | — | 0.03 | 0.7 | 0.1 | 0.37 | 3.2 | 0.28 | 1.7 | 8.5 | 1.2 | 4.8 | 13.9 | 3.4 | 7.5 | 2.65 | 0.45 | 1.49 |
| Total cases | 10 | — | 10 | 45 | 4 | 49 | 223 | 24 | 247 | 423 | 61 | 484 | 154 | 45 | 199 | 855 | 134 | 989 |
| Per 1000 population | 0.08 | — | 0.04 | 0.6 | 0.05 | 0.3 | 3.6 | 0.36 | 1.9 | 8.2 | 1.07 | 4.5 | 14.3 | 2.6 | 7.1 | 2.7 | 0.38 | 1.48 |
| Total cases | 3 | — | 3 | 60 | 7 | 67 | 202 | 21 | 223 | 453 | 64 | 517 | 170 | 60 | 230 | 885 | 152 | 1037 |
| Per 1000 population | 0.03 | — | 0.01 | 0.74 | 0.08 | 0.39 | 3.4 | 0.32 | 1.8 | 8.67 | 1.13 | 4.76 | 13.4 | 3.16 | 7.24 | 2.73 | 0.43 | 1.52 |

A study of the incidence of acute MI by month established that the distribution of cases of acute MI was the same in 1983 and 1984: peak morbidity was in April and March, and lowest morbidity was observed in June and July (Table 2). At the same time, these trends did not

persist in 1985, when maximum morbidity was recorded in July (1.48 per 10,000 population). The study of morbidity by season revealed that peak incidence of acute MI in 1983 and 1984 was in the spring ($p < 0.001$), whereas in 1985 it was in the summer ($p > 0.05$).

Table 2. Incidence of acute MI by month (both sexes) per 10,000 population

| Month | 1983 | | 1984 | | 1985 | | p_1 | p_2 | p_3 |
|-----------|----------------|------------|----------------|------------|----------------|------------|--------|---------|---------|
| | Total MI cases | per 10,000 | Total MI cases | per 10,000 | Total MI cases | per 10,000 | | | |
| January | 90 | 1.38 | 89 | 1.3 | 86 | 1.26 | unr | unr | unr |
| February | 73 | 1.12 | 70 | 1.05 | 74 | 1.09 | unr | unr | unr |
| March | 108 | 1.66 | 114 | 1.7 | 70 | 1.03 | unr | < 0.001 | < 0.01 |
| April | 107 | 1.64 | 114 | 1.7 | 84 | 1.23 | unr | < 0.05 | < 0.05 |
| May | 75 | 1.15 | 89 | 1.3 | 98 | 1.44 | unr | unr | unr |
| June | 75 | 1.15 | 73 | 1.09 | 79 | 1.16 | unr | unr | unr |
| July | 53 | 0.96 | 68 | 1.02 | 101 | 1.48 | < 0.05 | < 0.05 | < 0.001 |
| August | 44 | 0.68 | 67 | 1.0 | 85 | 1.25 | < 0.05 | unr | < 0.001 |
| September | 71 | 1.09 | 71 | 1.06 | 76 | 1.1 | unr | unr | unr |
| October | 81 | 1.24 | 77 | 1.15 | 90 | 1.32 | unr | unr | unr |
| November | 83 | 1.28 | 82 | 1.23 | 94 | 1.38 | unr | unr | unr |
| December | 106 | 1.63 | 75 | 1.1 | 97 | 1.42 | < 0.01 | unr | unr |

Notes

p_1 —reliability of differences between 1983 and 1984 indicators; p_2 , between 1984 and 1985; p_3 , between 1983 and 1985; unr—unreliable.

The distribution of 245 cases of acute MI over 24-hour day was as follows: The greatest number of cases of acute MI (25.3%) occur between 0000 and 0259 hours ($p < 0.01$), and the fewest, between 0300 and 0559 hours. A study of incidence of acute MI by day of the week revealed that MI developed most often on the weekend (19.2% of the cases on Sundays), and least often early in the week (11.02% on Mondays). The difference is unreliable. Of the 245 acute MI cases entered in the register, the heart attack developed at home in 168 (68.6%), at work in 40 cases (16.3%), outdoors in 21 (8.6%), and while visiting friends or in public recreation facilities in 7 cases (2.9%). MI developed during hospitalization in 9 patients (3.7%). The largest number of cases developed while the individual was resting ($p < 0.001$), as well as while sleeping ($p < 0.05$).

The register program included a study of mortality due to acute MI. By comparison with the data of other register centers, mortality among women due to acute MI may be characterized as very low. The mortality rate was also low among men. In studying mortality due to acute MI during the three years of our study, we observed an unreliable trend toward a decline of this indicator among women.

If the mortality rate due to acute MI by the end of the year of illness constituted 30.8% in the first year of our study and 27.2% in 1984, it was 26.2% in 1985. The difference between data for the first and third years of the study is reliable ($p < 0.05$). In-hospital mortality due to acute MI over a 28-day period of illness remained

stable and low in the years of this study (4.44-6.79%). In all instances of in-hospital death, its causes were investigated. It was found that acute cardiovascular insufficiency is encountered consistently more often ($p < 0.01$) among the causes of hospital death than are myocardial rupture, arrhythmia, thromboembolisms, etc.

Thus, the data obtained in the course of compiling the register are indicative of low incidence and mortality due to acute MI in Yerevan. In the years of this study there was reliable decline in mortality rate due to this illness. In-hospital mortality is not high. Cases of death due to acute cardiovascular insufficiency are encountered consistently more often in the structure of hospital deaths.

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UDC 616-006.04-036.8

Relative Five-Year Survival Rate in Patients with Primary Forms of Malignant Neoplasms

18402155 Leningrad VOPROSY ONKOLOGII in Russian Vol 35 No 5, Jul 89 (manuscript received 21 Mar 88) p 583-585

[Article by D. P. Berezkin, V. N. Filatov, Order of the Red Labor Banner Scientific Research Institute for Oncology imeni Professor N. N. Petrov, USSR Ministry of Health, Leningrad; first paragraph is author abstract]

[Text] This article presents data from the All-Union Center for the Evaluation of the Effectiveness of Treatment of Malignant Tumors (VTsIEL) on the five-year survival rate of patients with primary forms of malignant tumors in the USSR during 1974-1980. These data are compared with those from a similar program, SEER [Surveillance, Epidemiology and End Results] in the United States.

Materials in population and hospital cancer registers or special programs can be sources of information for studying the survival rate of oncology patients. The main requirement made upon these materials is that they be representative of the actual situation in the country. Because there is no nationwide system of cancer registers containing information on the survival rate of patients, for the USSR at present it is preferable to recognize the special program by VTsIEL, functioning at the Scientific Research Institute for Oncology imeni Professor N. N. Petrov. It is based upon data on patients hospitalized during 1974-1980 in 36 cancer institutions in the USSR, sent there mainly by dispensaries in various regions. In

general, the VTsIEL materials adequately reflect the state of specialized cancer treatment in the USSR.³

All computations of the relative five-year survival rate are based upon actuarial methods and tables for the life expectancy of the healthy population in the USSR and meet international standards.^{1,2,7}

Table 1 presents data on the resulting indicators for the five-year survival of patients with primary forms of malignant tumors in the USSR.

Table 1. Five-year Relative Survival Rate of Patients with Malignant Tumors in the USSR, in percent (VTsIEL Program, 1974-1980)

| Localization | Males | Females | Both Sexes |
|--------------|-------|---------|------------|
| Esophagus | 4 | 6 | 5 |
| Stomach | 13 | 14 | 13 |
| Colon | 35 | 36 | 36 |
| Rectum | 21 | 29 | 28 |
| Lungs | 8 | 20 | 10 |
| Breasts | — | 55 | — |
| Cervix | — | 66 | — |
| Uterus | — | 78 | — |

Even though various countries' information on the survival rate of cancer patients has several specific features and, as a rule, is not easily compared⁵ in view of differences in sources of information and methods of its acquisition and processing, etc., it is possible, for the purpose of evaluating treatment effectiveness, to compare indicators with those in other countries. For the USSR it is most suitable to compare this material with that in the SEER Program in the United States.^{4,6} This is due to the similarity of the methodologies, the information sources of SEER and VTsIEL, sizes of the countries, the levels of their socioeconomic development, etc. Data on the SEER Program are presented in Table 2.

Table 2. Five-year Relative Survival Rate of Patients with Malignant Tumors in the United States, in percent (SEER Program, 1973-1979, White Population)

| Localization | Males | Females | Both Sexes |
|--------------|-------|---------|------------|
| Esophagus | — | — | 5* |
| Stomach | 12 | 14 | 13 |
| Colon | 47 | 49 | 48 |
| Rectum | 44 | 47 | 46 |
| Lungs | 10 | 14 | 11 |
| Breasts | — | 72 | — |
| Cervix | — | 66 | — |
| Uterus | — | 87 | — |

*1974-1976⁴

Unfortunately, the lack of published information on the age-sex distribution of the population, the spread of tumors and the treatment methods during the period of the SEER Program prevents its use as a comparison with similar parameters in VTsIEL data to identify the causes of the existing differences in survival rate indicators. For example, the SEER sample has quite a high percentage of information from leading highly specialized cancer centers in the United States, while VTsIEL material mainly concerns oncology dispensaries, that is, the practical component of the USSR oncology service.

Nevertheless, a general evaluation is quite proper and indicates that survival indicators are similar for patients with cancer of the esophagus, stomach, lungs and cervix, while for cancer of the colon, rectum, breasts and uterus the survival rate rates are markedly higher in the United States.

Another circumstance deserving of attention is that generally the difference in indicators is noted in tumors with relatively favorable courses, while for cancers with poor prognoses, in which treatment continues to be ineffective, the results are practically the same.

Although, as already stressed, this comparison should be considered only approximate, it nevertheless should be the basis for serious reflection.

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UDC 616.24-036.2

Rural and Urban Incidence of Chronic Non-Specific Lung Diseases

907C0386A Tashkent *MEDITSINSKIY ZHURNAL UZBEKISTANA* in Russian No 9, Sep 89 pp 13-4

[Article by Sh. U. Ismailov, Sh. M. Akhmedov, I. V. Liverko, and A. M. Ubaydullayev, Scientific-Research Institute for Tuberculosis imeni Alimov, UzSSR Ministry of Health]

[Text] Data on the frequency of patient requests for medical assistance, autopsy data on cause of death, and the results of special mass health screenings represent the principal sources of information about the incidence of chronic non-specific lung diseases (CNLD) both abroad and in our country. However, the information received from those sources is not equivalent, which is probably due to the lack of universal nomenclature and the lack of universal research methods.¹

In recent years, there has been an increase in patient visits to treatment facilities for CNLD.

Our comparative analysis of morbidity and morbidity reate based on patient visit data over a five-year period (1982-1986) shows that they have increased in the city of Tashkent and the Tashkent Oblast. For example, CNLD morbidity increased by 41% for Tashkent over the five years and by 84% for Tashkent Oblast. The morbidity rate increased by 80% for both areas. According to report data, the morbidity rate for CNLD was 651.9 per 100,000 inhabitants in the Tashkent Oblast and almost twice as high — at 1,192.6 per 100,000—in the city of Tashkent. Chronic bronchitis had the highest incidence in both the urban and rural areas (988.7 and 500.0 per 100,000 inhabitants, respectively).

In order to obtain more precise data on CNLD affection among the rural and urban population, study the CNLD structure, and identify the persons at high risk among the examined contingent, we screened 4,714 urban and 2,201 rural inhabitants through the use of special questionnaires, auscultation of the lungs, fluorography, and pulmonary function tests on a Pnevmoskrin-P [Pneumoscreeen-P] apparatus (Erich Eger company, FRG). Questionable cases were sent to the pulmonology division of the UzSSR Ministry of Health Scientific-Research Center for Tuberculosis for a confirmatory diagnosis.

The examinations indicated that the CNLD affection rate was 12.2 +/- 0.5% for the urban contingent and 10.9 +/- 0.7% (P > 0.05) for the rural contingent, i.e., the rate of affection was somewhat higher for urban inhabitants. These results agree with the data of other investigators^{2,3} that indicate that the CNLD affection rate among urban residents was higher than that of the rural inhabitants (9.0% and 8.1%).

The risk group that included individuals with "smoker's cough," individuals with coughing due to industrial and

environmental pollutants, individuals with frequent (two or more times a year) acute respiratory illness or otorhinolaryngological pathology, and individuals with allergic tendencies and latent disturbances of the bronchial patency without clinical manifestations was shown to be reliably greater (37.0 +/- 0.7%) among the urban residents than among rural inhabitants (24.3 +/- 0.9%, $P > 0.01$).

Sex and age factors were shown to be rather important factors in the onset and development of CNLD. The overwhelming majority of investigators have recognized that the incidence of CNLD is greater among men than among women. According to our data, the CNLD affection rate among both urban and rural men is 1.5 times greater than among women (13.7 +/- 0.6 and 9.4 +/- 0.5%, $P > 0.01$). Men are somewhat more predominant than women in the risk group (33.9 +/- 0.8 and 31.7 +/- 0.8%, $P > 0.05$).

The incidence of non-specific bronchopulmonary pathology is clearly dependent upon age. For example, both in the urban and rural areas the frequency of CNLD steadily increases from the teenage years to the segment 50-59 years of age (to 21% from 4% and to 27.8% from 1.9% for the two respective age groups). An unquestionable relationship to age is also observed among the risk groups: 17.3% for juveniles and 42.3% of persons aged 40-49 in the cities, and 8.2% for juveniles and 32.3% for persons aged 30-39 years in the rural areas.

There was also a relationship between the incidence of CNLD and social status of the examined persons. For example, the highest incidence among urban dwellers was found among blue-collar workers (13.6%), which was 1.3 times higher than the rate among office workers (10.5%, $P > 0.05$). Risk-group individuals were found rather frequently among blue-collar workers (37.4%), office workers (37.1%), and students (33.3%). In the rural areas, the greatest number of CNLD patients and risk-group individuals was found among blue-collar workers and office workers directly engaged in agricultural production (13.6% and 35.2%). These statistics were reliably higher than the corresponding indices in the social groups of "blue-collar worker," "office worker," and "student."

Chronic bronchitis patients in the urban and rural areas account for 94.8% and 87.6% of patients, and 54.3% and 58.8% suffer from obstructive bronchitis. Chronic non-obstructive bronchitis (CNB) is encountered reliably more frequently (5.3 +/- 0.3%) among urban dwellers than among rural inhabitants (3.9 +/- 0.2%, $P > 0.05$).

Chronic obstructive bronchitis (COB) is detected almost twice as often among rural women than is CNB, i.e., 4.5% and 2.5%, respectively ($P > 0.05$). Urban women exhibit the opposite relationship between non-obstructive and obstructive bronchitis frequency: 5.0% and 4.0%. Among urban males, COB is more frequent than is CNB (8.0% and 5.5%, $P > 0.01$). Among rural men, there is only a statistically unreliable tendency toward COB (6.6% and 5.2%).

Conclusions

1. There was a steady growth in CNLD morbidity in both the rural and urban areas, as indicated by patient visit data during the period 1982-1986.
2. Comprehensive expedition examinations represent the optimal method of achieving vigorous, early detection of chronic non-specific lung diseases.
3. The overall CNLD affection rate in both the urban and rural areas is about the same and is rather high.
4. The frequency of CNLD in both the urban and rural areas is higher among men than among women, higher among blue-collar workers than among office workers, and higher among persons 50-59 years of age than among persons aged 15-17.
5. The number of CNLD patients and the number of risk-group persons in the rural areas is higher among blue-collar workers and office workers directly employed in agricultural production.
6. Among rural women, chronic obstructive bronchitis is detected twice as often as chronic non-obstructive bronchitis. The reverse is true among urban women.

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UDC 579.843.1:579.25].08

RecA-independence of Amplification Process, Determined by Cholera Vibrio RS1-Sequences

907C0204A Moscow MOLEKULYARNAYA

GENETIKA, MIKROBIOLOGIYA sb

[Article by S. L. Filkova, T. S. Ilina and G. B. Smirnov, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, Academy of Medical Sciences USSR, Moscow]

[Abstract] The study showed the RecA-independence of RS1-stimulated amplification in *E. coli* K12 cells and demonstrated that loss of amplification copies may occur by a RecA-independent pathway. The effect of the RecA-function of the host-cell on amplification determined by cholera vibrio RS1-sequences was studied by use of recombinant plasmid, forming as a result of RS1 determined cointegration of 2 plasmids, pOX38 and pCT105. A molecular-biological demonstration of the presence of amplification of the pST 105 segment in cointegrates, isolated from RecAS and RecA⁻ with high resistance to TC, showed that the RecA-function of the *E. coli* K12 cells did not affect the level nor frequency of amplification determined by specific sequences of cholera vibrio RS1-chromosome. Loss of amplified copies of pCT105 may proceed independently of the function of the RecA-gene of the *E. coli* cell. Figure 1; references 12: 5 Russian; 7 Western.

UDC 579.252.5:577.214

Transcriptional Map of Recombinant Plasmid, Carrying Genes of Synthesis of Pesticin I and Protein for Immunity to Pesticin I of Plague Microbe

907C0204C Moscow MOLEKULYARNAYA

GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA

in Russian No 6, Jun 89 pp 39-42

[Article by V. M. Sorokin, Ye. K. Goncharov and B. N. Mishankin; Rostov-na-Donu Scientific Research Anti-plague Institute]

[Abstract] DNAs of plasmid pBR322 and pRD17, isolated from *E. coli* cells, were compared. Electron microscopy with use of transcription R-loops visualization used to study DNA of vector pBR322 confirmed the well-known data concerning the transcription map of pBR322 described in the literature. Recombinant plasmid pRD17, which determines synthesis of pesticin I and protein for pesticin I immunity was constructed on the basis of plasmid pBR322 by substituting Bam HI-EcoRI fragment of pBR322 for Bam HI-EcoRI fragment in the 5.1 kb fragment of the pesticinogenicity plasmid pYP1. Construction of the recombinant plasmid pRD17 transcriptional map revealed 5 promoter regions on the cloned fragment which determines the traits of pesticin formation and immunity to this bacteriocin. The direction of transcription on the fragment was determined and relative effectiveness of transcription in vitro was assessed. Location of the promoters and determination of the direction of transcription makes possible a detailed study of the structural and functional organization of the promoters themselves and of genes of the pesticinogenic plasmids playing major roles in plague microbe virulence. Figures 2; references 13; 3 Russian; 10 Western.

Future Laser Applications in Cancer Diagnosis, Therapy

907C0073b Kiev PRAVDA UKRAINY in Russian
13 Sep 89 p 4

[Article by A. Maslov: "Surgery, Treatment and Diagnosis—Such Are Today's Possibilities of the Medical Laser, But They Are Steadily Expanding"]

[Text] The attentive reader might reproach me for violating the commonly accepted order when I listed today's possibilities of laser medical technology: Diagnosis should be first, he might say, with everything else following. And he would be right. But the fact is that it is precisely the unique possibilities of a laser beam as a cutting tool that opened its road into medicine a quarter of a century ago.

In the early 1960s L. Goldman in the United States and A. Vishnevskiy in our country used a laser to cut living tissue for the first time. And in that same year, 1964, the center for study and development of laser technology was moved from Moscow to Kiev. There were two reasons for this: It was precisely in Kiev that apparatus usable in biomedical research was created, and it was precisely a citizen of Kiev—Rostislav Yevgenyevich Kavetskiy, a prominent scientist and academician—who began this persistent research effort in the former Scientific Research Institute of Experimental and Clinical Oncology (presently the Problems of Oncology Institute imeni R. Kavetskiy of the Ukrainian SSR Academy of Sciences). And it was in Kiev's Oncology Institute, UkSSR Ministry of Health, that Doctor of Medical Sciences I. R. Lazarev became interested in practical use of laser systems to treat seriously ill patients. It was he who insisted on establishing a special clinical department. Today this department—laser surgery—is under the management of V. I. Gordiyenko.

What was it about this unusual knife, consisting of an ultrathin beam of light energy, that sold itself to cancer surgeons? It has several advantages. When cutting is done with light, vessels are cauterized simultaneously, which make the surgery essentially bloodless. Another effect important to oncology is the ablastic effect, where cancer cells in interstitial fluid die. In addition when surgery is performed with an ordinary scalpel or with the electric scalpel traditional to oncology, nerve trunks remain in a state of shock for several days. This means that metabolic processes are blocked in the tissue. With laser treatment these processes continue, and the signs of tissue recovery are clearly evident with the very first dressing change. Besides the decrease in recovery time, there is also an important cosmetic benefit—traces of surgery become unnoticeable after a certain time. It must be said that such surgery may also be performed both over a rather extensive surgical field, and literally at the cellular level.

"As far as skin cancer is concerned—both benign and malignant, there is generally no competition for the laser," says Vladimir Ivanovich. "For example while

with cryosurgery (cryo—cold), our alternative, the results are just as good, the time of postoperative recovery is significantly longer. We are already using lasers against various forms of cancer that can still be stopped—for example in gynecology to treat so-called background diseases of the cervix."

"Low energy lasers are already being used today to stimulate hemopoiesis and the immune system, which suffer the most in our patients," V. I. Gordiyenko continued. "This method of stimulation—internal laser irradiation of blood—was developed in the Institute imeni Kavetskiy, in Doctor of Biological Sciences N. F. Gamaleya's laboratory. It makes it possible to achieve recovery of hemopoietic organs within shorter time and with a better therapeutic result. This "laser" method—it is used after a course of radio- and chemotherapy—does not even require additional blood transfusions. This biostimulatory direction has already become a major one. Low energy lasers—helium-neon, helium-cadmium—also intensify vitally necessary metabolic processes, which has been found to be important not only to oncology but also neurology, to therapy, and to suppurative and vascular surgery. It is being used successfully in otolaryngology by Doctor of Medical Sciences G. Ye. Timen, and in cardiology by Candidate of Medical Sciences V. N. Zaleskiy. Although there are still many questions to be answered in this area, it is already obvious that this is a promising method of both treating and rehabilitating patients."

Let's think about what the surgeon said. Yes, what we are talking about is rehabilitation—that is, restoration of the health and capacity of people to work. Those same patients for whom a doctor's message that cancer is present was equivalent just recently to a death sentence. Numerous articles suggesting that a universal medicinal miracle cure will lead to victory in the struggle over the terrible ailment are still within our memory. But alas, such a cure has not been found, and apparently it will never be found, inasmuch as science, which has been exploring the cell and learning about its structure and the processes occurring within it, has now become certain that the diversity of cellular abnormalities and the causes of these abnormalities and the "unplanned" division of these cells require a diversity of approaches to treating cancer. What is very important here is to detect the pathological process as soon as possible and to characterize it completely as soon as possible—that is, to make an absolutely accurate diagnosis. Is this possible? Yes, it is, including with the help of laser systems. One such method, which was quite recently patented, was proposed jointly by a group of Kiev doctors and physicists including V. I. Gordiyenko.

"This is an entirely new direction in the use of medical lasers," the surgeon said. "This is the topic of my dissertation, by the way. It deals with so-called laser fluorescent spectroscopy. What happens is that certain substances artificially introduced into the body accumulate in tumors. In this case these substances are fluorochromes. When they are excited to fluorescence by a

laser, we can perform spectral analysis and use the characteristics of the spectrum to answer the question as to whether a tumor exists, and if it does, the sort of tumor it is. Spectra obtained from different tumors possess different characteristics. It is fundamentally important that we employed a fluorochrome that does not exist in the body. This provided a guarantee against interference from the spectra of substances natural to the human body, and consequently a guarantee against mistakes. A group of scientists from Kiev State University under the leadership of Academician V. G. Baryakhtar is providing us enormous assistance in studying the spectra, in creating their mathematical models and in accumulating a computer databank."

Some fluorochromes, by the way, have one other property of interest to oncologists. They are capable of raising the sensitivity of a tumor to particular wavelengths of light. These waveform emissions may be used to cause release of tumor-killing oxygen in tissues. As far as the method itself of laser fluorescent spectroscopy is concerned, it is fully possible that it will find application in cardiovascular surgery as well in diagnosis of the places of accumulation of atherosclerotic masses. And a laser will also be used to treat them. Technically this is already fully possible.

Incidentally, when Lenin and Nobel Prize laureate A. N. Prokhorov, one of the creators of the laser, visited Kiev in order to acquaint himself with medical lasers, he did not conceal his sincere amazement in regard to such wide possibilities of his brainchild.

It may be possible that after reading all of this, someone might ask this question: It's all well and good that these miracles, which were even unimaginable yesterday, have

become a reality in the capital's institute, but is this tool available to the doctor of a peripheral hospital? It is. Vladimir Ivanovich himself toured many cities of the republic, opening up laser treatment offices. In the last 4 or 5 years over 30 cancer surgeons have been trained just in his small department. Romashka, Romashka-2, Skalpel, Raduga and Yaranga lasers will be their tools. And in his own surgical room Vladimir Ivanovich works with a Sayany surgical laser, produced here, in Kiev.

Just 15 years ago the Sayany was designed and perfected as an industrial model by a talented designer from Kiev's Kvant, Viktor Leonidovich Isakov. Because of red tape this apparatus did not go into large-scale production, though it was competitive on the world market. This is what surgeon Gordiyenko told Second Secretary of the Ukrainian Communist Party Central Committee V. A. Ivashko when he toured the oncology institute and visited the laser surgery department. Steps are now being taken to achieve major production of Sayany lasers in various modifications both for the domestic market and the foreign market. The question as to precisely how a defense industry enterprise will manufacture this needed medical apparatus is being resolved.

When we learn of cases in which our discoveries and major engineering concepts were frozen for many years, we experience feelings of some complexity. On one hand we are disappointed with the powers that be, while on the other hand such Sayany permit some skepticism in relation to the presently popular assertion that we have "fallen behind 'them' forever." There are many people in our country capable of generating and materializing the most surprising ideas and maintaining science and production at the highest level after all. The only obstacle is the extremely serious flaws in our economic mechanism. But much has already been said about this.

First Soviet Automated Diagnostics System

907C0003a Moscow *MEDITSINSKAYA GAZETA*
in Russian 14 Jun 89 p 1

[Article by V. Kalata, *MEDITSINSKAYA GAZETA*
correspondent, Kiev: "'Mediana' Diagnoses"]

[Text] The first domestic base multifunctional complex automating diagnosis and investigation of a patient's functional status, the Mediana, has been developed by a collective of an interbranch experimental laboratory headed by B. Sh. Lazaretnik, doctor of medical sciences and professor. Scholars from the Kaunas medical and polytechnic institutes and specialists from a number of the country's other scientific institutions and industrial enterprises took an active part in its creation.

Within minutes, the Mediana can produce an estimate of a number of indicators characterizing the activity of the heart and the respiratory and other systems.

New Quinoline Preparation for Rheumatism, Lupus

907C0064a Moscow *IZVESTIYA* in Russian 6 Oct 89
Morning Edition p 6

[Article by S. Tutorskaya: "Korchagin Might Still Be Alive"]

[Text] An event of importance which will be understood by all who suffer from rheumatism recently occurred. A group of scientists headed by professors V. Nasonova, Ya. Sigidin and N. Kuzmina discovered a new, effective preparation, salazopyridazine, and introduced it into the clinic.

Anyone who has read the book "How Steel is Tempered" at least once can remember how heroically the main hero fought an extremely serious malady. How disease gradually froze joint after joint, and medicine was no help.

But had Korchagin fallen ill right now, seven out of ten he could have been put on his feet and back in action.

Until the most recent times, rheumatic diseases responded poorly to treatment. And in the meantime one out of every five who comes to the aid of a doctor is rheumatic. Before, serious patients were prescribed hormone treatment as a rule, which brought out an entire "bouquet" of new complications. But then quinoline preparations attracted the attention of scientists and doctors of the Scientific Research Institute of Rheumatology. These are not hormonal preparations, and therefore they do not elicit serious side effects. And their effectiveness was found to be by far greater than that of hormones.

Heart failure occurred in a large group of rheumatic children taking the preparation 2.5 times more rarely than is usually observed in the same kind of group undergoing previous forms of treatment. Eighty-five percent of children stricken with rheumocarditis recovered after taking the preparation.

And now let's return to salazopyridazine. This preparation was used for the first time by Soviet physicians to treat rheumatoid arthritis. The preparation is tolerated well. Development of the new method was recognized as an invention.

Systemic lupus erythematosus has always been one of the fatal problems of medicine. Patients stricken with it often felt themselves to be doomed, and women could not have children. Now, with a new system of treatment, some forms of this disease have turned out to be curable, while in other cases its course is by far milder.

Great forward strides have been made in the treatment of such patients using hemosorption—a modern method of purifying harmful complexes from the blood. Another entirely new procedure, in which medicines are injected locally in particular combinations, made it possible to dramatically reduce the number of preparations that have to be taken internally. This practice makes it possible to achieve sharp improvement in 70 percent of patients suffering diseases of joints and connective tissue.

All of this research is a world first. It has evoked considerable interest among colleagues abroad.

Eye Microsurgery Branch Opens in Irkutsk

907C0064b Moscow *SOVETSKAYA ROSSIYA*
in Russian 15 Aug 89 First Edition p 4

[Article by N. Semenova: "Recovered in Good Health"]

[Text] One more affiliate of the "Eye Microsurgery" Intersector Scientific-Technical Complex—the ninth in the RSFSR—has opened in Irkutsk.

By the day of the official ceremonies, as many as 650 operations were carried out here to remove cataracts, treat glaucoma and correct nearsightedness. Built by Finland's Polar, the complex is designed for a capacity of 300 patients. It is intended for ophthalmological assistance to inhabitants of an enormous region—Eastern Siberia and the Yakut and Buryat ASSR. The doctors are using a procedure developed by Professor Svyatoslav Fedorov.

Conductometric Diagnostic Instrument Developed

907C0064c Moscow *VECHERNYAYA MOSKVA*
in Russian 12 Aug 89 p 4

[Article by V. Kucherenko: "The Story of One Sensation"]

[Text] There was a sensational report in early August that Muskovites—Candidate of Medical Sciences V. Tsvetkov and engineer V. Bashlykov—created an instrument having no analogues in world practice. In a quarter of an hour this instrument can diagnose almost all serious illnesses—even in their earliest stage. Our

readers asked for more details about it. And so it was that I went to the home of one of the inventors, Vladimir Semenovich Tsvetkov.

I must admit that I expected to see something unusual. The ARIK-01, which in the words of the inventors could do everything, would fit inside the housing of an ordinary Spidola receiver.

"Well known principles are utilized here," said Vladimir Semenovich. "Even a child knows that microbes can become the cause of many diseases. Entering the human body, they release the products of their vital activities—antigens. In turn the human body generates an antidote in its defense—antibodies, which react with the antigens to neutralize them."

At the same time, chemists and physicists have long been using conductometers—instruments that measure fluctuations of electrical conductivity and the resistivity of fluids in which chemical reactions are occurring.

And so we decided to utilize sensitive conductometers to detect reactions between antigens and antibodies.

Just one analysis is sufficient for a patient. Of what—of blood, urine or saliva—is unimportant. After this, the sample is diluted, and antibodies are added to it—antibodies to detect tuberculosis, salmonellosis, or for example dysentery—depending on the test. The electrodes of the apparatus are placed in the test tube simultaneously. And if a reaction begins in the test tube, the ARIK immediately records the result on paper tape.

Almost all serious diseases may be diagnosed in this way, even cancer. And in the last year we tried testing a preparation to control AIDS—it worked!

What are the advantages of the new method in comparison with what is available today? First there is its efficiency. Second, its high accuracy. Mistakes by medical personnel are excluded. A sample may be diluted a million times, and still the diagnosis will be accurate. This is a guarantee that the disease may be detected at its very inception, and that effective treatment could be started. Third, its economy. The new method makes use of test preparations currently employed in medicine—imported ones, but in very small quantities.

And fourth, this method is completely safe to the patient. You see, it makes it possible to make a diagnosis with urine or saliva, meaning that the subject's blood need not be sampled. These days, in which AIDS is becoming a menacing reality, and disposable syringes are scarce, this advantage can become decisive. Transfer of infection by poorly sterilized instruments is completely precluded at anonymous diagnostic stations. Wide use of the apparatus would help to economize millions of disposable syringes. Last week the USSR Ministry of Health's Committee for AIDS Control appealed to all to contribute their hard currency for their purchase. But perhaps it might be better to seek reserves—like the ARIK?

The possibilities of the instrument are considerable. The inventors have already found ways of making an early diagnosis of cardiovascular diseases that have taken thousands of lives. Further research is required in this area. In principle, with the right electrodes the ARIK could also be used as a nitrate meter. This, one would think, is a monumental discovery of Soviet public health. But it did not come about right away. Why? Let me tell the story as it happened, from the very beginning.

It was 4 years ago that the doctor and the engineer began collaborating. The Central Institute for Advanced Training of Physicians (the TsOLIUV), where V. Tsvetkov worked, asked the Medical Equipment Testing Institute (the VNIIMT), where engineer V. Bashlykov worked, to design an instrument by which to assess the condition of patients. And so an interinstitute work group containing the future coauthors was created.

The inventors quickly found an original solution to the problem, and assembled an experimental model of the instrument. By as early as 1986 the success of laboratory and clinical tests on the new method was confirmed by the signature of TsOLIUV's prorector for scientific work, B. Shevrygin. This was, from all appearance, a triumph.

But the research results were met with clear disbelief by Vladimir Semenovich's associates. They seemed a little too fantastic to them. Moreover there was nothing to check the apparatus against—neither the Americans nor the Japanese had anything of the kind. And although the validity of the conclusions of the inventors had been confirmed by experiments and documented, the management of the VNIIMT decided to halt further work, and to disband the research group. USSR Academy of Medical Sciences Academician K. Kashkin, who was the rector of the TsOLIUV at that time, did not support the inventors either. Soon after that, Vladimir Semenovich left the institute because of friction with the board in this matter.

But the work went on—unrecognized and unfunded, taking up all holidays and days off. The inventors wrote letters to the State Committee for Science and Technology, to the Ministry of Health and elsewhere.

Last spring, it seems, light was seen to flicker at the end of the tunnel. The two friends read in the journal *KHIMIYA I ZHIZN* that a competition on promising developments was announced by the USSR Academy of Medical Sciences. They decided to enter—and they were successful!

Vladimir Semenovich handed me a copy of a document sent to the VNIIMT on 6 April 1988. The expert council on molecular biology of the Presidium of the Academy of Medical Sciences granted 65,000 rubles to continue the work.

"I'm certain that what science officials fear the most is the self-interest of inventors," V. Tsvetkov laughed bitterly. "That's why in accordance with the terms of the

competition the money was given not to us but to the VNIIMT, where V. Bashlykov was still working. I had already retired by this time. The institute management disposed of the money in its own way. We were able to receive from it a sum total of 600 rubles. God knows where the rest went."

There was but one course of action—to protect the invention with an author's certificate, and if things went right, to patent it. You see, such an apparatus could be developed abroad at any moment, and then our country would have had to subsequently purchase it for hard currency. There was the danger that several years' work would go down the drain. And yet, two claims submitted by Tsvetkov and Bashlykov to the All-Union Scientific Research Institute of Patent Expertise (VNIIGPE) became entangled in red tape.

Could it be that authoritative confirmations of the validity of the claim were lacking? No, the inventors had positive responses from the Saratov Medical Institute, the TsOLIUV and the Biotekhnologiya Scientific-Production Association.

An article in IZVESTIYA turned everything around. Now the telephone in V. Tsvetkov's apartment knows no rest. People are calling from all corners of the country with proposals to place the ARIK in production. Moscow cooperatives are excited. Four joint ventures are interested as well. One of them is a Soviet-British-American venture.

"The main thing now is to maintain priority," Vladimir Semenovich feels. "This is why I was happy to get a telephone call from the State Committee for Science and Technology. They promised to help us patent the ARIK. If the committee keeps its word, great prospects will open up for our brainchild, including at the international level."

This should be a time for joy, but in my heart I feel unsettled. One thing is clear—we need a new law on invention activities. There's no time to waste. We shouldn't have to be floundering all the time at the tail end of the scientific and technical revolution!

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Intensive Care and Mass Injuries

907C0074A Moscow TERAPEVTICHESKIY ARKHIV
in Russian Vol 61 No 7, Jul 89 (manuscript received
4 Apr 89) pp 3-8

[Article by A. I. Vorobyev, All-Union State Scientific Center, USSR Ministry of Health, Moscow]

[Text] The number of accidents involving mass injuries is increasing in the world today. The notion of mass injuries is arbitrarily defined as injuries to 50-100 or more people involved in chemical accidents associated with toxic exposure to parenchyma organs; in poisonings by various poisons, known and unknown; in intoxications; in burns; or in traumas incurred in transportation

accidents, including railroad and aviation accidents. Mass injuries also include injury of 10 or more people in a radiation accident. Unforeseen ecological catastrophes involve still greater numbers of human victims.

The task of medicine when mass injuries occur is to save the lives of the victims. It is primarily the intensive care service who performs this task. Intensive care has made considerable progress in the last decade: now there is a possibility of saving the lives of many people who previously would have been considered fatally injured. And these possibilities are steadily expanding; in other words, the boundary between life and death is shifting in the direction of life. This characteristic of intensive care was clearly demonstrated in the aid given to the victims of the earthquake in Armenia.

Obstructed blood flow plays a very important role in the mechanism of the expiration of a human being or any organ or part of the body. But the irreversibility of this obstruction arises as the result of coagulation of non-flowing blood. Thrombi have not been dissolved, and therefore local or general death has been irreversible. Repeated attempts have been made in recent decades to lyse thrombi and to stop the moving thrombosis. Indirect anticoagulants, heparin, streptase, urokinase, streptodectase, and, recently, tissue plasminogen activator (TPA) help, to one or another degree, either to control a limited thrombosis (coronary, lung and other arteries, and veins) or to prevent the formation of new thrombi. To some degree, they avert the danger of thrombogenesis in pronounced hypercoagulation. But with prolonged shock, with severe local or general injuries of blood vessels, with the circulation in the blood of proteolytic enzymes and products of tissue breakdown and of the breakdown of fibrinogen, the anticoagulants mentioned (except TPA) either have proved to be useless or have aggravated the general process: increased bleeding has occurred, etc. Only since the early 1970's, when foreign researchers and, in our country, Z. S. Barkagan and members of his school began using freshly frozen plasma, has hope arisen for eliminating the irreversibility of a rather large number of pathological conditions which previously seemed to be incurable. An excellent characteristic of freshly frozen plasma is the retention in it of a balanced sum of coagulation and fibrinolysis factors. We are far from understanding the whole combination of processes in the coagulation system which make it possible to maintain blood in the liquid state, to form loose clots during stasis, and to break up these clots with acceleration of bleeding. However, it is precisely the action of freshly frozen plasma which makes it possible to presume that the composition of plasma determines its amazing effect on the disseminated intravascular coagulation syndrome (DIC), an effect that is especially marked in the hypocoagulation phase, when blood begins to flow not only from incisions when they are made, but also from incisions made the day before. Two liters of freshly frozen plasma rapidly infused into a vein "cuts off" the bleeding.

Gangrene of the lungs and meningococcal sepsis with distal necroses, compression syndrome and acute hepatic insufficiency, so-called fibrinolytic hemorrhage in childbirth and hemolytic-uremic syndrome—such is the range of the use of freshly frozen plasma. In these situations, it is more effective than other treatments. In actual fact, in the majority of cases, plasma is used in combination with plasmapheresis.

Plasmapheresis for DIC syndrome and for conditions accompanied by DIC syndrome is known to perform, to some degree, the function of cleansing plasma of coarsely dispersed complexes of broken-down tissue suspended in it; plasmapheresis drains tissues, frees blood vessels infiltrated by immune complexes, removes the thrombocyte aggregation factor and thrombocyte-activating factor from plasma, activates fibrinolysis, increases macrophage activity, and restores the anticoagulating function of the endothelial cell.

A comparison of the pictures of various catastrophes—the aftermath of combat in Pirogov's time and, in our days, Hiroshima and Nagasaki destroyed by the explosion of an atom bomb, and Leninakan and Spitak transformed into ruins by the earthquake—may convince us of the similarity of the impression of horror and the feeling of fear and depression such disasters produce, as well as of the nature of the injuries caused to people. Victims of the collapse of stone buildings have mechanical traumas and blood vessel ruptures. People who were found under debris or under avalanches in the mountains had prolonged compression of the blood vessels of the extremities and different parts of the torso, disturbance of circulation in those vessels, and injury to the endothelium. Infection agents, endotoxins, chemical toxic factors, and burns result in damage to the endothelial cell, disturbance of the production of antithrombotic factors by it, and an increase in the production of procoagulant factors.

Consequently, in accidents and in ecological catastrophes, injuries leading to the death of large numbers of people are caused by the same nodal mechanisms: disturbance of blood flow; damage to the cell and plasma composition of the blood, which leads to organ stasis; microthrombosis and hemorrhages; a drop in blood pressure; and the manifestation of shock organs—all of which function in any pathological process. Therefore, in "accident" illnesses, one could expect a positive effect from the use of freshly frozen plasma and plasmapheresis.

Although no two accidents are alike, the circumstances surrounding accidents have, by and large, a typical character, and a working plan can be developed in advance for trained personnel. In particular, when more than 200 people were admitted with acute radiation sickness to the clinic of the Institute of Biophysics of the USSR Ministry of Health at the end of 1986, it became clear that the accident bore a global nature, which would require the assistance of the whole world's medical community if patients with this illness were to be saved

by means of transplantation of bone marrow. For Soviet doctors, in addition, it was clear that, beginning with the eighth or ninth day after irradiation, a very large amount of thrombocytic mass would be required—at 4 doses every other day from a single donor to a single patient with a serious form of the illness (actually, the amount was somewhat different because of the varying times of entry into bone marrow aplasia of the patients with different doses of irradiation: the lower the dose, the lower the aplasia; but the planned provision of thrombocytes was calculated for 30 persons daily). All the work with patients with acute radiation sickness in Moscow was conducted by adequately trained personnel. Also, the general conclusion that was made from this accident was that transplantation of bone marrow for radiation accidents is useless because of the necessarily nonuniform irradiation. R. Gail did not transplant bone marrow in Brasilia for heavy irradiation from a spilled cesium source (in any case, he did not write about it). There were no major errors at the Moscow clinic in the treatment of patients with acute radiation sickness as the result of Chernobyl catastrophe. But they were in clinics in which physicians encountered this pathology for the first time.

The admission of patients with acute radiation sickness makes it absolutely necessary that there be supervision by specialists who are familiar with this sickness and who are familiar with cystostatic disease. Therefore, patients with acute radiation sickness must be evacuated to specialized hospitals only, and if there are not enough such hospitals, then the patients should be taken to hospital centers that have even just one specialist to supervise treatment.

Another set of circumstances unfolds in catastrophes of the type of the earthquake in Armenia in 1988. There was virtually no one anywhere capable of giving emergency, on-the-spot medical assistance to the victims. The victims were brought to the nearest hospitals in all kinds of vehicles, including dump trucks. But, then, there could not have been specialists there. The victims with fractures of the extremities, compression of extensive parts of the body, open wounds, and damage to the spine and skull needed qualified care before evacuation, which for them frequently was mortally dangerous. In the past, one had to tolerate this. But now, other means of transport have appeared, and the possibility of rapidly opening a fully equipped hospital in any locality has appeared. The deciding factor of the work of such a hospital is the participation of true specialists who are well prepared and equipped for everything necessary and are not paralyzed by mental stress at the very moment of the catastrophe. In other words, today we must strive for the following situation: the wounded are not transported to the physician and the hospital, but the physician and the hospital are transported to the wounded. Such an attitude contradicts the established policies, but it should not be forgotten that these policies were formulated in the nineteenth century. Back then, they undoubtedly were progressive, because before that the

injured remained in the kindness and care of the vicinity's citizens. Now, however, inflatable hospital units with independent power supply and heating systems can be delivered to the site of the catastrophe at the same time with personnel. All this makes it possible to save patients who previously would have been considered completely hopeless. In the liver surgery unit (headed by Candidate of Medical Sciences V. S. Petrosyan) of the branch of the All-Union Scientific Center of Surgery in Yerevan (whose director is Corresponding Member of the ArSSR Academy of Sciences A. L. Mikayelyan), a team of specialists of the All-Union State Scientific Center and the First Moscow Medical Institute imeni I. M. Sechenov worked according to a previously established plan for treating compression syndrome: they performed early, repeated, massive plasmapheresis and the transfusion of large amounts of freshly frozen plasma. At the site, in addition to this, they began to use hyperbaric oxygenation. All the physicians in the unit, together with visiting physicians, worked according to the same plan. What conclusions can be made from the results of the work of this group of physicians? What are those results?

The same kind of patients arrived at this hospital center in the first few days as at other hospitals in Yerevan. Later, patients with compression syndrome were concentrated at the branch of the All-Union Scientific Center of Surgery, and patients with suppuration at the Erebus Hospital in Yerevan.

Eighty patients came through the unit of the branch of the All-Union Scientific Center of Surgery beginning on 7 Dec 1988 (all figures are relative, because sometimes patients were transferred to other units, to other hospitals, or to Moscow). For all the inaccuracies in the statistics, it is important to note that in this unit, from the moment of arrival of the Moscow team on 8 Dec 1988, not one amputation of an extremity was done, and no one died from renal insufficiency. In spite of the categorical objections of many specialists who adhere to indications which are accepted today for amputations for open and closed fractures of the extremities, surgeon A. E. Mirzoyan performed osteosynthesis on 47 patients against a background of compression syndrome and other injuries by means of Ilizarov and Volkov-Oganessian apparatuses. Several patients of this group—but not the most serious—were then transferred to other hospitals and were out of observation. But the fate of the majority of the victims was tracked, and all of them kept their extremities. At the same time, at the Erebus Hospital, with roughly the same number of patients, amputations were performed, but not one osteosynthesis operation was performed.

In 1942, Nikolay Nilovich Burdenko wrote: "Now I have already refined those amputations which everyone come to call primary, which are done in the case of imminent certain loss of an extremity: when there is massive damage to soft parts, serious bone fractures, damage to blood vessels and nerves, and extensive losses of skin integument.

"Above, I used the term 'imminent certain loss of the extremity,' and this was done deliberately—the surgeon deciding the question of indications for amputation must be guided by this.

"There was a broad range of indications for amputation as far back as in the war of 1914-1918: amputations were done in connection with wounding of the major arterial trunks, frequently without sufficient grounds, in particular, for secondary hemorrhages and for injuries of the bones and large joints. The question of a strictly conservative approach was posed in turn in the middle of and toward the end of the war. During all the ensuing wars, surgeons tried to put this requirement into practice. The use of this requirement was made easier by progress made in treating gunshot fractures and wounds to the joints, by the achievements made in vascular surgery, and, mainly, by the widespread use of the primary treatment of wounds."¹

The patriarch of our surgery believed in a strictly conservative approach almost 50 years ago, when there was virtually nothing except achievements in the field of primary treatment of wounds. The extremity was amputated because there were no hopes of saving it in the future and because inevitable thrombosis of the blood vessels that were kept would lead to the obstruction of the blood supply. What exactly has happened in that area of medicine since that time? Antibiotics play an enormous role in the prevention of suppurations and sepsis. In addition, it has just now become possible to stop thromboses, restore microcirculation in the extremities via transfusion of large amounts of freshly frozen plasma, prevent microthrombosing with tissue breakdown products by means of plasmapheresis, and provide the necessary level of tissue respiration by means of hyperbaric oxygenation.

Thus, the results of the combined use of plasmapheresis, transfusion of large amounts of freshly frozen plasma, and hyperbaric oxygenation indicate that another step has been taken on the path of fulfillment of the requirement bequeathed to us of a strictly conservative approach. Indications for amputation of the extremities are substantially reduced; in particular, amputation can be avoided it in the majority of cases of prolonged compression syndrome.

However, what has been said here relates not only to the problem of amputation. As it has already been said, the loss of any organ is, in one way or other, related to a local or general thrombotic process. In this regard, the problem of kidney damage from compression syndrome should also be examined. Indeed, anuria in this case is always secondary, i.e., at least theoretically, it does not have to happen. And what are the facts? It was not possible to produce reliable statistics, even in the working conditions in Yerevan in December 1988. However, treatment of compression syndrome was checked before the earthquake in Armenia for individual cases of positional compression (a man in a drunken state squatted for several hours). It turns out that early—as

early as possible—use of plasmapheresis (always with the substitution of freshly frozen plasma) plays a decisive role under any conditions in unblocking the kidneys. In the treatment of victims of the earthquake in Armenia, in 105 cases of marked compression syndrome, plasmapheresis was done 2-3 days after they were freed from the debris, under which they had been trapped for from 6-120 hours. The anuretic stage generally did not develop in these patients. Analysis of fatal outcomes showed that plasmapheresis either was not done at all in the patients who died, or it was done once and late. Several victims who were already in the anuria stage had urine, albeit in small amounts, just hours after the first plasmapheresis session. After additional plasmapheresis sessions, the patients later steadily emerged from the anuria stage completely. But if for any reasons (ordinarily subjective) the plasmapheresis sessions were interrupted, anuria returned.

Currently, the most effective method for treating chronic or acute DIC syndrome with any process is plasmapheresis with transfusion of large amounts (1-2 liters) of freshly frozen plasma. The deep-seated mechanisms of both treatments have been poorly studied.

One can imagine above all that the endothelial cell is the point of application of both therapeutic methods. In the first place, the endothelial cell is always affected in the most varied of illnesses, infections, toxic effects, and accidents and is subjected to mechanical, radiation, toxic, hypoxic, or other harmful effects. In the second place, the functional characteristics of the normal and damaged endothelial cell are such that it turns out to be a triggering component for the disturbance of microcirculation, the development of DIC syndrome, shock, etc., i.e., it is a starting point of the nodal mechanism and pathogenesis which leads to death in a great number of different pathological processes (see above). What, then, are the functional characteristics of the endothelial cell?

The endothelial cell is the source of the production both of antithrombotic and procoagulant factors. The endothelial cell is the producer of prostacyclin, which is one of the basic factors determining the fluidity of the blood, which activates fibrinolysis, which suppresses thrombocyte activity, and which possesses a property that expands blood vessels and a factor that protects cells of different organs from hypoxia. The production of prostacyclin by the endothelial cell has a clear-cut relationship to age. A reduction in its production with age, with an increase in the level of low-density lipoproteins and the development of atherosclerosis can play a substantial role in the rise in thrombogenic activity with age, which determines the frequency of thrombotic processes in the elderly. In addition, plasmapheresis increases the production of prostacyclin by the endothelial cell. The endothelial cell also produces TPA, which directly affects the resorption of thrombi. The endothelial cell has such a product as the so-called relaxation factor, which possesses the property of nitrates. All these factors (and a number of others) appear to determine the antithrombotic potential of the endothelial cell and of

the vascular wall as a whole. When the endothelial cell and the vascular wall are damaged, the production of these factors is reduced, and the production of the opposite factors—of procoagulant activity—increases. These include the TPA inhibitor factor, which activates thrombocytes and which also increases the production of thrombocytes, fibroblasts, and smooth muscle cells, plus the aggregation of thrombocytes and their adhesion to the endothelium. Many effects in various forms of vasculitis (hyperthrombocytes, vascular sclerosis) and the development of DIC syndrome when there is a change (damage, inflammation, etc.) in the endothelial cell are related to the production of this very factor. This factor triggers the internal mechanism of blood coagulation (activates factor XII) in sepsis and when endotoxins act on the endothelial cell. Simultaneously with blood coagulation through activated factor XII, fibrinolysis is also activated, but then becomes depleted, which is characteristic of septic DIC syndrome and other forms of DIC syndrome. This same route of hemostasis leads to accumulation of kinins not suppressed by kininase and to the development of shock. Freshly frozen plasma suppresses the procoagulant factors of the endothelial cell. Both plasma and plasmapheresis promote restoration in the endothelial cell (when the compression of blood vessels is removed in crush syndrome) and an increase in the cell's antithrombogenic properties.

Experience in modern treatment for prolonged compression syndrome indicates the danger of applying a tourniquet and a tight bandage to the injured extremity, because they intensify the circulatory and metabolic changes in tissue and lead to the development of life-threatening toxemia after their removal. Consequently, these measures cannot be recommended when large numbers of people are injured, although in the past the application of a tourniquet was the principal instruction given for aiding a victim suffering from crush syndrome.

Let me say a few words about the organizational problems associated with the provision of aid to massive numbers of injured.

A high level of readiness to render aid when mass injuries are involved is based on the assumption that accidents should be considered—as are outdoor traumatic injuries—as systematic phenomena anticipated by a specific group of people trained beforehand to give various kinds of assistance.

Therefore, teams of intensive care service specialists must exist, each of which consists of a therapist who has mastered the methods of therapy enumerated above; a nephrologist who is capable of using techniques for treating acute kidney and hepatorenal insufficiencies and the techniques of plasmapheresis and hemodialysis; a specialist in resuscitation and anesthesiology who is familiar with methods of intensive care for injuries sustained in accidents and catastrophes, as well as in "peaceful" pathology, and who, however, is completely prepared also for giving anesthesia attending all necessary forms of aid; a laboratory group providing complete

analysis of blood and urine, biochemical studies, analysis of electrolyte composition, and analysis of the blood coagulation system; where necessary (practically always when large numbers are injured), the team must have a specialist who is strictly from the blood service and who sees to it that blood is drawn from donors and separated into components (freshly frozen plasma, erythrocytes, and thrombocytes). The number of specialists in an intensive care team must be chosen on a per 100 patients (injured) basis for work in two shifts per 24-hour work day. For all accidents, one team of specialists must work almost exclusively in one institution or one collective.

The types of such teams must correspond to the types of possible accidents and the nature of the mass injuries sustained in them: (a) mass surgical traumatism (accidents of the type which occurred in Arzamas); (b) mass traumatism with compression syndrome—earthquakes, a nuclear explosion, or an avalanche; (c) poisoning by gases with damage to the lungs; by chlorine with damage to the bronchi; and by carbon tetrachloride with damage to the liver and kidneys; (d) poisoning from an unknown cause; (e) burns and frostbite; and (f) infections such as cholera, plague, influenza, hepatitis, and hemorrhagic fever.

Inasmuch as no single institution can deploy several such teams, list of teams should be drawn up at all institutions, most of all in Moscow. The teams must conduct annual meetings that convene at a different institution every year in order to improve interactions and the standardization of medical approaches.

A team working at the site of an accident must be provided with the necessary transfusion resources for a minimum of five days, and it must bring those resources with it.

Based on experience gained in the treatment of compression syndrome in victims of the 1988 Armenia earthquake, 1 liter of freshly frozen plasma is needed per patient per day (in practice those figures are maximal for all mass toxic injuries and mass cases of the development of various kinds of DIC syndrome); the erythrocyte mass is collected in amounts equalling 0.25 liter per injured patient per day; and the thrombocyte mass is not stocked beforehand (except for strategic reserves in liquid nitrogen for special cases) and, when necessary, is prepared on the spot. Other resource amounts include albumin (0.25 g), saline solutions (1 liter), colloid solutions, (1 liter)—all figures are per patient per day.

Saline solutions are especially important. The basis of the first aid given by paramedics, which must be begun even before the arrival of specialists, as the victims are being transported to tent shelters, must consist of the administration of large amounts of saline solutions.

Saline solutions are necessary for prolonged compression syndrome, in particular with regard to hypovolemia, which develops because of the loss of fluid from the blood channel to the compressed area, and have decisive importance also in any type of hypovolemic shock. Our foreign colleagues brought with them large reserves of saline solutions packaged in plastic containers.

The general task on which the supply of transfusion solutions and the equipment for teams going to an accident site are based is to give assistance to victims of a 9-10 magnitude earthquake in a city of 500,000 people who do not have earthquake-resistant structures. In addition to the provision of medical assistance, which includes a large volume of transfusion resources, there must be equipment ready for dismantling debris and searching for victims under rubble; a detailed system for the provision of heat to the healthy and the victims during winter as quickly as possible, so as not to lose victims in freezing temperatures; and also a system of tent shelters which can be concentrated in seismically-hazardous areas in warehouses which are guaranteed to be earthquake- and fire-proof no matter what the conditions.

Analysis of the organization of aid to victims of accidents dictates the necessity to write down instructions for giving assistance to victims in the first days of a specific accident; the instruction should take into consideration the characteristics of the accident and measures to be planned. The development of such instructions in the first days of the radiation accident in Chernobyl (they were confirmed by the USSR Ministry of Health on 2 May 86) made it possible in Kiev to reduce the number of those hospitalized for presumed radiation sickness and radiation injury from 15,000 to 250 in a matter of several days. Instructions were prepared for treating prolonged compression syndrome of victims of the Armenia earthquake also on the spot at the All-Union Scientific Center of Surgery at Yerevan in the middle of December.

All blood-component treatments media, plasmapheresis, hemodialysis, and other extracorporeal methods for purifying blood, plus saline solutions in plastic packaging, have to be prepared for rapid loading onto and transport by an aircraft of a certain type or with a certain hatch size, or for loading onto certain types of railroad cars. A blood-donor station module that houses centrifuges and a refrigerated chamber must also be transported.

Footnote

1. N. N. Burdenko. "Amputatsiya kak neyrokhirurgicheskaya operatsiya" [Amputation as a Neurosurgical Operation]. Moscow, 1942.

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New Ultrasound Atomizer

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in Russian 6 Oct 89 p 2

[Untitled report by *MEDITSINSKAYA GAZETA* correspondent M. Melkonyan, Baku]

[Text] OKTLIR is the name of a group of medical instrument designers at the Azerbaijan Center for Methodology and Inventions. The group has been credited with 15 patented instruments and technical devices. Among those devices is an ultrasonic directional atomizer for liquid medications. According to specialists, the device increases efficiency, shortens the treatment period, and decreases the amount of expended medication. The ultrasonic atomizer method can be used in stomatology, surgery, traumatology, ophthalmology, and gynecology. But, as is often the case, there are only a few experimental samples of the device available, and they are being used only by the very inventors themselves, i.e., associates at the Department of Pediatric Stomatology of the Azerbaijan Medical Institute.

But if the device has already been recognized, why has it not been put into general use? One cannot always count on the medical equipment enterprises. Their production capacities are strained. This has compelled the inventors to open a cooperative which has taken upon itself the task of producing the devices, even if only in small batches. The cooperative—called Tabib—is bound by contractual commitments to the Baku Nord Scientific Production Association, which provides standardized models of the instruments. Three Tabib associates—two stomatologists and an engineer—make the necessary adjustments to the instruments and put them in working order.

'Eksdis' System for Computer Diagnosis

Moscow *MEDITSINSKAYA GAZETA* in Russian
08 Sep 89 pp 3

[Article by V. Rodionov, Chief of the Clinical Division, HBO Department, USSR Academy of Medical Sciences All-Union Scientific-Research Center for Surgery, Candidate of Medical Sciences, under the rubric "News Briefs": "'Eksdis' Renders Diagnosis"]

[Text] Associates at the Moskva scientific-production association for automatic control systems, in concert with leading specialists from Moscow clinics, have designed a computer system called Eksdis for helping physicians make diagnoses.

The system contains information on the symptoms of the more than 300 internal diseases and pathological syndromes that are most commonly encountered in general practice. The system allows the physician to obtain a complete list of possible diagnoses (from those available in the system) ranked from most probable to least probable for each set of symptoms entered. This reduces the time required for making a correct diagnosis and decreases the number of errors. At the same time the

system can be used to obtain information about symptoms for each of the diseases and pathological syndromes contained in it. As a rule, the time required to obtain a single diagnosis does not exceed 10 minutes.

The Eksdis system is helpful in obtaining a preliminary diagnosis during the patient's first visit to a treatment institution and can be used to decide which particular specialist the patient should be referred to, and to select the tests necessary for refining the diagnosis. This makes for a more efficient control of patient flow.

The list of symptoms described in the system (there are more than 500) includes only those that are easily identifiable in the initial questioning and examination of a patient without the use of percussion or auscultation, and in the absence of laboratory, clinical-instrumental or other test results. This in particular makes it possible to use the system at medical stations that are far removed from a developed clinical base as well as when the necessary medical specialist is not available (e.g., an epidemiologist during AIDS testing).

Persons interested in the Eksdis system should know that the diagnostic system can be used on personal computers using the MS-DOS system, and in particular on IBM-compatible machines, as well as on machines such as the YeS-1840, Iskra-1030, Neyron, and SM-1810 computers.

The medical portion of the system was designed by a team of experts that included USSR Academy of Sciences Corresponding Member S. F. Yefunin as well as other specialists at the all-union scientific centers of surgery and cardiology.

The Eksdis system is being distributed on a contractual basis by the Zdravookhraneniye Collective-Use Computer Center (Moscow, Tel. 201-07-14).

New Device for Stimulating Respiration

907C0248B Moscow *MEDITSINSKAYA GAZETA*
in Russian 27 Aug 89 pp 1

[Article by I. Yevsikova, in Chuvash ASSR, under the rubric "Pulse": "Without Parallel"]

[Text] The serial production of the ESD-2P portable electric respiratory stimulator has been set up at the production association Cheboksarskiy elektroapparatnyy zavod [Cheboksary Electric Equipment Plant].

The new medical apparatus, which is without parallel in either our country or abroad, is designed for the recovery of patients from such pernicious maladies as tuberculosis, chronic pneumonia, and bronchial asthma. The first 100 instruments have already reached therapeutic institutions.

UDC 616-005.1-08 : 615.381 : 612.1

Specific Features of Effect of Different Erythrocyte-containing Media on Central Hemodynamics, Microcirculation and Oxygen Regime of Organism in Treatment of Massive Blood Loss

907C0081A Leningrad VESTNIK KHIRURGII IMENI I. I. GREKOVA Vol 142 No 6, Jun 89 pp 96-100

[Article by A. V. Gorkun, A. D. Dolgushina, N. I. Kochetygov and Ye. A. Selivanov, Leningrad Scientific Research Institute of Hematology and Blood Transfusion: "Specific Features of Effect of Different Erythrocyte-containing Media on Central Hemodynamics, Microcirculation and Oxygen Regime in Treatment of Massive Blood Loss"]

[Abstract] A study of the microcirculation with simultaneous recording of the central hemodynamics, oxygen regime and acid-base state of the organism during infusion-transfusion treatment of massive blood loss in rats provided a more precise definition of the mechanism of action of different erythrocyte-containing media. Significant impairment of central hemodynamics and the microcirculation caused blood loss in 30 white rats (weight 170-270 g), anesthetized by sodium thiopental. Transfusion of a suspension of erythrocytes in a modified deionized gelatin medium normalized microcirculation and produced a more pronounced therapeutic effect than that produced by whole autoblood and autoerythrocyte mass. Use of donor blood and a suspension of donor erythrocytes in modified deionized gelatin in the clinic showed more pronounced difference from use of the latter preparation since it differs from whole blood by the greatly reduced titer of natural hemagglutinins and by a 50 percent reduction of the number of leukocytes and 80 percent reduction of the number of platelets which causes low immunological reactivity of the medium. The use of a suspension of erythrocytes in the modified deionized solution in infusion-transfusion programs of treatment of massive blood loss and in treatment during other states in which use of erythrocyte-containing media is required, was recommended. Figure 1; references 6 (Russian).

UDC 616.9-036.17-085.38.015.2:615.246.2

Hemosorption During Treatment of Infectious Pathologies

907C0081B Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 61 No 5, May 89 pp 130-134

[Article by V. I. Pokrovskiy, G. G. Radzivil, A. V. Zmyzgova, N. B. Shalygina, V. B. Beloborodov, Yu. V.

Bronyakin, P. M. Baryshev and D. B. Krivulis; Central Scientific Research Institute of Epidemiology (director—academician Academy of Medical Sciences USSR professor V. I. Pokrovskiy), Ministry of Health USSR, Moscow: "Hemosorption During Treatment of Infectious Pathologies"]

[Abstract] A study of the therapeutic effect of hemosorption and its effect on clinical, biochemical, immunological, rheological and electrophysiological indicators was conducted in an attempt to improve treatment of grave infectious diseases. Hemosorption was used in 217 complex therapy sessions on 152 patients with meningitis, sepsis complicated by shock, virus hepatitis or terminal icterohemorrhagic leptosporosis. A study of the clinical state of patients before hemosorption, immediately after it and in the dynamics of the disease indicated the effectiveness of hemosorption. Hemosorption proved to be a pathogenetically sound therapeutic measure during treatment of complicated courses of these diseases with accumulation, in the blood, of high molecular substances which worsen rheological properties of the blood and produce gross microcirculatory disturbances. Hemosorption removed microcirculatory disturbances in organs by mobilizing rheological properties of the blood due to partial removal of high molecular compounds of microbic and endogeneous nature. Perfusion of a small volume of blood controlled the infection process adequately. Use of larger volumes of perfusion should be substantiated and be controlled by clearance of metabolites removed in the process. References 15 (Russian).

Clinical and Laboratory Diagnosis and Treatment of Q Fever

907C0081C Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 7, Jul 89 pp 39-41

[Article by A. F. Ulyanov and M. S. Syzdykov, Karaganda Medical Institute: "Clinical and Laboratory Diagnosis and Treatment of Q Fever"]

[Abstract] Clinical observation over the last 4 years of 167 patients ranging in age from 13-70 years provided material for a study of Q fever. Use of I. K. Kasatkin's classification of Q fever showed that 108 persons had the typical form of the disease. A severe course of Q fever appeared in 20.7 percent of the cases, a course of medium severity appeared in 48.5 percent and a mild form was found in 30.8 percent of the cases. Patients underwent complex therapy, including use of etiotropic agents. Preference was given to preparations of the tetracycline series and levomycetin. Treatment continued throughout the febrile period and 4-5 days after temperature returned to normal. A slow temperature drop (accelerated by lysis) reduced the temperature to normal on the 3d day. Headache diminished and then

disappeared; sleep was restored and appetite improved. Pathogenetic therapy supplemented the etiotropic therapy. Difficulties in differential diagnosis of Q fever were discussed. The importance of care in the rehabilitation period was emphasized. References 3 (Russian).

UDC 616.71-001.5-031.13.-089.84-0-89.168-036.868

Treatment of Patients With Multiple and Associated Fractures of Long Bones

907C0096A Moscow ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE in Russian No 6, Jun 89 pp 10-13

[Article by M. Ya. Baskevich, N. Ya. Prokopyev and Yu. N. Dorofeyev; Chair of Traumatology, Orthopedy and Field Surgery (head—professor M. F. Durov) and Chair of VK and LFK (head—docent P. G. Koynosov) of Tyumen Medical Institute; "Treatment of Patients With Multiple and Associated Fractures of Long Bones"]

[Abstract] Observation from 1976-1987 of 266 persons with multiple and associated injuries, including 31 persons who underwent one-stage osteosynthesis on several segments of the extremities was described and discussed. A method of closed intermedullary osteosynthesis, developed since 1985, was used in fractures of the femur (5 persons) and of the crus (5 patients). Radical surgery in treatment of multiple and associated fractures should be performed only after complete restoration of homeostasis and elimination of local inflammation. One-stage functionally stable closed intramedullary osteosynthesis was preferred in treatment of diaphyseal fractures of all locations. Closed intramedullary osteosynthesis was preferred in treatment of contralateral and double diaphyseal fractures of the lower extremities. Prevention of pulmonary and thromboembolic complications should be given special attention in the pre-surgery period while special attention should be given, in the post surgery period, to functional treatment of local injuries in order to restore muscle tonus and joint function. References 14: 13 Russian; 1 Western.

UDC 616.71-089.84:681.31

Use of Robotics in Realization of External Perosseus Osteosynthesis

907C0096B Moscow ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE in Russian No 6, Jun 89 pp 42-46

[Article by I. M. Pichkhadze, A. T. Rakhimov, N. N. Roy, L. B. Rubin, N. I. Tankovich and Yu. A. Chekushin; Central Institute of Traumatology and Orthopedics imeni N. N. Pirogov (director—professor Yu. G. Shaposhnikov), Institute of Nuclear Physics Moscow State University imeni M. V. Lomonosov, branch of the

Atomic Energy Institute imeni I. V. Kurchatov, Moscow: "Use of Robotics in Realization of External Perosseus Osteosynthesis"]

[Abstract] Elaboration of an algorithm for diagnosis and implimentation of optimal versions of rod insertion in treatment of different kinds of fractures of the extremities was carried out on the domestic PK-8020 (Korvet) personal computer, complete with memories on magnetic disks, color and black and white TV monitors, a "Mouse" type manipulator and digitizer from an Apple-II computer was described and discussed. The method of adaptation of the algorithm to a specific fracture according to its biomechanical characteristics was discussed. The procedure for realization of the program of rod insertion was described. Reposition can be made along the axes of fragments, along contours of bones and from a point. These methods are described and discussed. This method of external perosseus osteosynthesis permits more efficient and cheaper treatment of persons with bone injuries.

UDC 617-001+617.3]-089.843

Experience in Use of Carbon Fixing Rods in Treatment of Aftereffects of Traumas

907C0096C Moscow ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE in Russian No 6 Jun 89 pp 46-47

[Article by T. E. Ungbayev, Uzbek Institute of Traumatology and Orthopedics (director—Doctor of Medical Sciences T. E. Ungbayev), Tashkent: "Experience in Use of Carbon Fixing Rods in Treatment of Aftereffects of Traumas"]

[Abstract] Operations were performed on 117 persons (ranging in age from 16-78 years) with diaphyseal or epimetaphyseal fractures of long bones and, for the most part, with aftereffects of trauma, including ununited fractures, slowly knitting fractures and false articulations. Elapsed time since the fracture occurred was from 3 months to more than 1 year. Sterilized carbon implants were used in the form of pins, screws and transplants of different thickness and length, according to the method of use. Assessment of the effectiveness of such treatment on 96 patients showed satisfactory results in 92.8 percent of patients and unsatisfactory results in 7.2 percent of patients. The carbon implants did not cause any disturbances of the general condition of the patients nor any rise of subjective sensations in the proximate or remote period after surgery. The carbon implants with a porous structure can absorb and impregnate contrast agents and show contrast images on X-ray plates. This makes it possible to monitor the dynamics of changes of the carbon implant for up to 3 months. Use of carbon implants and immobilization of the affected extremity promotes acceleration of callus formation, does not

harm the organism and can replace metal fixing rods and reduce the length of incapacity and disability. References 9 (Russian).

UDC 615.471.03:616.281-07

Highly-Automated Expandable System for Studying Vestibular Apparatus and Performing Medical Experiments

907C0097A Moscow VESTNIK
OTORINOLARINGOLOGII in Russian No 4,
Jul-Aug 89 pp 4-7

[Article by T. S. Mostovaya, Doctor of Medical Sciences, and A. I. Katyushin, Institute of Neurosurgery (director—active member of the USSR Academy of Medical Sciences A. P. Romodanov), UkSSR Ministry of Health: "Highly-Automated Expandable System for Studying Vestibular Apparatus and Performing Medical Experiments"]

[Abstract] A computerized system for diagnosing and studying vestibular reactions consists of a rotating chair, for the patient, with an electric drive, controlled by a computer. The chair is equipped with angular velocity and position gauges and electrodes for attachment to the patient. The structural diagram of the system is illustrated and described in the text. The system records readings from the rotating chair with the patient according to different laws of change of angular acceleration: sinusoidal, cupola-shaped and trapezoidal. Standard curves (nystagmograms, spectra calculated by the Fourier or Berg method, histograms or autocorrelation functions) which are typical of different pathologies and can be used to make a rapid diagnosis can be stored on disks. Specially trained personnel are not required to operate the system. Figures 3; references 3: 2 Russian; 1 Western.

UDC 616.281-008.1-092:612.825.55

Our Experience in Treating Patients With Acute Neurosensory Hearing Loss With Aid of Hyperbaric Oxygenation

907C0087D Moscow VESTNIK
OTORINOLARINGOLOGII in Russian No 4,
Jul-Aug 89 pp 76-79

[Article by N. M. Guseynov, N. P. Konstantinova, V. L. Lukich, L. N. Melnikova and E. B. Vernekin, Chair of Ear, Nose and Throat Diseases (head—professor Yu. M. Ovchinnikov) and Interclinical Laboratory of Hyperbaric Oxygenation (head—professor V. L. Lukich) 1st Moscow Medical Institute imeni I. M. Sechenov: "Our Experience in Treating Patients With Acute Neurosensory Hearing Loss With Aid of Hyperbaric Oxygenation"]

[Abstract] An attempt to increase effectiveness of medicinal treatment of acute neurosensory hearing loss of vascular genesis with the aid of hyperbaric oxygenation while eliminating side effects of hyperbaric oxygenation involved 30-minute exposure of patients to 0.7-1.0 ata. Decompression lasted at least 10 minutes. Treatment continued for 10-12 sessions with accompanying medicinal therapy including drugs which improve the microcirculation (Rheopolyglucine, Trental or Cavinton) vascular dilators (Papavarine, Sho-shpa) and drugs affecting tissue metabolism (Cocarcboxylase, group B vitamins). Patients (40, ranging in age from 24-52 years) suffering from the disease from 3 days to 1 month received daily hyperbaric oxygenation sessions with drug usage after the sessions (group 1, 20 persons) or hyperbaric oxygenation immediately after drug injection (group 2, 20 persons). Hearing improved in 8 patients in group 1; it returned to the initial level in 4 patients and remained unchanged in the others. Hearing was completely restored in 10 patients in group 2; it improved in 9 patients and was unchanged in one. Case histories of 2 patients were presented. References 17: 10 Russian; 7 Western.

UDC 579.852.11:579.222:577.152.277

**New Producers of Site-specific Endonucleases
From Bacillus Genus Microorganisms**

907C0204D Moscow MOLEKULYARNAYA
GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA
in Russian No 6, Jun 89 pp42-45

[Article by V. M. Kramarov, N. A. Skrypina, V. V. Smolyaninov et al.; All-Union Scientific Research Institute of Applied Microbiology, Obolensk, Moscow Oblast, Protein Institute, Academy of Sciences, USSR, Pushchino-na-Oka, Moscow Oblast, Institute of Microbiology and Virology imeni D. K. Zabolotniy, Academy of Sciences, UkSSR, Kiev]

[Abstract] New producers of site-specific endonucleases are sought in order to enlarge the collection of enzymes and in order to obtain new producers with a higher level of enzyme, which are more practical. Some strains of

Bacillus subtilis, *Bacillus licheniformis* and *Bacillus cereus* have been checked for the presence, in them, of site-specific endonucleases, some of which provide cultures with a high level of the enzyme. Strains used in the study were obtained from the Institute of Microbiology and Virology, AS, UkSSR or isolated at the All-Union Scientific Research Institute of Applied Microbiology in Obolensk. Site-specific endonucleases were found in 37 of 52 strains checked. Five different specificities were found. From cultures containing the highest quantity of the enzyme, it was isolated on a preparative scale and purified to a degree suitable for determining cleavage sites. The enzymes included (isoshizomers in brackets): Bce 7511 (BamHI), Bli86I (ClaI), Bli7I (PpaI), Bsu22I (BspMII) and Bsu687I (PstI). All of these enzymes are true isoshizomers of the known enzymes. The strains have a high level of site-specific endonucleases, are readily cultivated and isolated from their enzymes and may be used as producers of these enzymes. References 8: 2 Russian; 6 Western.

UDC 577.17.051

Study of Intracellular Fate of Recombinant Human Interleukin-2 in Escherichia Coli

907C0201B Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian Vol 23 No 4, Jul-Aug 89
pp 996-1006

[Article by A. B. Meriin, V. A. Ivanyushina, A. I. Dobkin and V. I. Ogarkov, deceased; All-Union Scientific Research Institute of Influenza, USSR Ministry of Health, Leningrad]

[Abstract] A study of expression of the recombinant gene of human interleukin-2 in E. coli cells involved an investigation of physico-chemical processes determining the fate of the product during thermal induction of expression. The experiment provided data concerning formation of its aggregates (inclusion bodies) and polymers and concerning their location. Temperature greatly influenced the kinetics of processes occurring in interleukin-2 in the producer cells and its stability. The cell membrane state had a decisive effect on these processes by mediating the temperature effect. Formation of inclusion bodies described for some producers based on E. coli may be associated not only with the properties of the recombinant polypeptide but also with conditions of interaction with the cell. Figures 7, references 19 (Russian).

UDC 577.216:578.52

Characteristics of Transgenic Animals Genome Region, Adjacent to Integrated Sequences of Allogenic DNA

907C0201C Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian Vol 23 No 4, Jul-Aug 89
pp 1036-1040

[Article by V. Z. Tarantul, Ye. D. Kuznetsova and K. G. Gazaryan, Institute of Molecular Genetics, USSR Academy of Sciences]

[Abstract] Transgenic mice (3 with bovine growth hormone genome and 4 with fragments of DNA of adenovirus SSA7) and one transgenic rabbit with human growth hormone realizing factor genome were analyzed. DNAs of the animals were fractionated according to reassociation kinetics and GC-couples level. Moderate and (or) frequent (reverse) repeating sequences of the

genome appeared in the vicinity of the transgens in these animals in all cases. High-molecular DNA fragments containing transgens differed in mean level of GC-pairs in different animals. Figures 2; references 25: 8 Russian; 17 Western.

UDC 577.152.314

Determination of Substrate Specificity of Restrictase Bru101 With Unusual Recognition Region

907C0201D Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian Vol 23 No 4, Jul-Aug 89
pp 1036-1040

[Article by S. Kh. Degtyarev, P. A. Zhilkin, G. G. Prikhodko, N. I. Rechkunova and V. Ye. Repin; All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] A new restrictase Bru101, isolated from strain Bacillus pumilus 10 by the Green et al. method, is not an isoschizomer of any known restriction endonucleases. A search for possible recognition sequences was conducted in sequences ABCN_iDEF (i=0.6) by modelling the picture of hydrolysis of DNA of phages λCI857 and T7 and plasmid pBR322. Restrictase Bru101, isolated from Bac. pumilis 10 has a recognition sequence of CCTNAGC and splits DNA between GGANTCG C and T and T and C. Figures 3; references 8: 3 Russian; 5 Western.

UDC 577.116:519.176

Paths in Graphs and Selection of Oligonucleotide Linkers

907C0201E Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian Vol 23 No 4, Jul-Aug 89
pp 1075-1079

[Article by P.A. Pevzner and V. P. Veyko, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] Construction of a universal linker of minimal length containing all restriction endonucleases recognition sites was discussed. Reduction of the problem to a search for Euler's and Hamilton's paths in the graphs permitted the use of discrete optimization and construction of a linker with a length as close as possible to the minimum. Figures 2; references 10: 4 Russian; 6 Western.

UDC 613.647+613.168

Biological Action and Hygienic Standardization of Constant Magnetic Fields as a Factor of the General and Working Environment

907C0511A Moscow GIGIYENA I SANITARIYA
in Russian No 10, Oct 89 pp 55-59

[Article by Yu. P. Paltsev, Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman]

[Text] The solution of hygienic problems brought about by man's exposure to external natural and manmade constant magnetic fields (CMFs) is closely associated with a knowledge of the mechanisms and the general laws governing their action upon biological objects.

The geomagnetic field is a natural environment serving as the backdrop to evolution and current animal and human life. The earth's magnetic field undergoes periodic changes, but its magnitude is, on average, 0.05 mT. It has been established that the human body perceives and reacts to weak manmade CMFs created experimentally or in the workplace, as well as to changes in the natural geomagnetic field. Certain functional changes registered in this connection obviously cannot be interpreted as being harmful. They can be categorized as perceptive responses of the body,³¹ in contrast to more profound changes such as adaptation, compensation, prepathology and pathology, which could possibly develop as CMF intensity increases. The degree of harmfulness of CMFs to human health may be assessed only if these responses of the body which replace one another successively are present and the degree of their expression is unfaillingly documented.

Modern science has delved rather deeply into the essence of magnetic phenomena and revealed their basic physical laws. That has made it possible to place this remarkable force of nature in the service of humankind. CMFs are enjoying increasingly wider application in science, technology and medicine. Practically all electrical engineering, radio engineering and electronics are based on the use of weak magnetic fields (under 50 mT). CMF sources are employed in magnetic treatment of aqueous systems, which hastens coagulation of suspensions, adsorption of surfactants, and crystallization and dissolution processes. Magnetic-suspension transportation stock are being developed and tested; in this case, the CMF levels at the floor of the passenger compartment and in the operator's cab reach 50-100 mT.

Occupational exposure to CMFs is associated with work near equipment that uses strong constant currents or is outfitted with powerful permanent magnets. Such equipment includes devices for separation of isotopes and for electrolysis, devices that may expose workers servicing them to CMFs of up to 50 mT. Powerful magnetic systems are used in studies of the magnetic, electric and optical properties of matter and in experiments on plasmas, atomic nuclei and elementary particles. Fundamentally new possibilities for creating ultrapowerful

magnets are opening up with superconductivity. Such magnetic systems, which are able to create a strong CMF in large spaces, will be used in magnetohydrodynamics (current generators, pumps, separators, accelerators, plasma engines, etc.) and thermonuclear reactors (tokamaks). The magnetic induction generated by these magnetic systems reaches 7-10 T or more. Therefore, despite the rapid drop in the intensity of a CMF with increasing distance from the magnet, it will reach substantial levels within the zone frequented by personnel servicing such devices.²⁶

CMFs may have an effect on medical personnel and patients arises when nuclear magnetic resonance is used for diagnostic purposes and when permanent magnets with parameters from 0.3 to 2.5 mT are used for therapeutic purposes.³³

Obviously, as the sphere of use of CMFs expands and the intensities of CMFs to which humans are exposed increase, their biomedical significance becomes increasingly important. It is no accident that the problem of the biological action of CMFs has recently elicited renewed interest among scientists of different specialties, including hygienists. Moreover, there has not been enough study of a whole array of problems associated with the mechanisms of action, the nature, and the special features of whole-body responses and the responses of various functional systems to CMF exposure within a wide range of intensities and exposure times or with the possibility of an unfavorable effect on health in occupational exposure.

It should be noted that the number of organizations studying the biological effects of CMFs has increased considerably in recent years, as has the volume of published material on the subject.^{1,2,3,17,27,28} Research aimed at hygienic assessment of the working conditions associated with the production of new magnetic materials and with the industrial use of powerful permanent magnets has enjoyed further development at the Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman.^{4,19,22,23}

CMFs are among those few physical factors whose biological role is still being debated today. At the same time, the theoretical possibility that CMFs can have a biological effect does not raise any doubts in principle. There is disagreement as to the possible limits of the biological action—that is, on the physical parameters of a CMF that determine such action and on the degree of expression of the possible effect of this action on biological objects.² The divergent points of view are associated primarily with the absence of a universally recognized theory of the primary—that is, physicochemical—mechanism of the biological action of CMFs. However, it is commonly assumed that diverse biophysical processes lie at the basis of the functional changes observed in biological objects exposed to CMFs and that the mechanisms of interaction between them and living tissue involve electrodynamic or magnetomechanical effects. Thus, when CMFs are applied to biological

processes involving electrolytic currents, they create magnetically induced electric potentials. The existence of magnetically induced potentials in the circulatory system in response to CMFs is confirmed by an increase in the amplitude of the T spike on the ECG that is due to pulsations of blood flow in the aorta.³⁵ Other biological processes that involve ionic currents and are in response to CMFs may include electric impulses in nerve tissue, membrane currents, and intracellular ionic currents.³⁴ Magnetomechanical effects may also appear in biological macromolecules—especially in aggregates of them—that change their orientation in magnetic fields, which is due to summation of the diamagnetic anisotropies of individual molecules.³⁷ It has also been hypothesized that CMFs may affect the dielectric properties of cells by way of nuclear spin-spin interaction.³²

These data permit the conclusion that three basic forms of physical effects may arise in living systems in response to CMFs: magnetohydrodynamic inhibition of the circulation of blood and other fluids; elastic vibrations of nerve and muscle fibers in response to propagation of bioelectric impulses along them; and orientational and concentrational changes of biologically active macromolecules in solutions—changes that are reflected in the kinetics of biochemical reactions.

Clarification of cybernetic mechanisms that entail registration of a biosystem's output responses to exposure to a CMF of prescribed parameters has important significance to the solution of hygienic problems in addition to physicochemical mechanisms as the basis of biological effects. As for general biological mechanisms, they do not relate uniquely to electromagnetic effects, and they should be considered from the standpoint of general pathophysiology, on the basis of the theory of energetic and information interaction.

It was demonstrated by a large number of experimental studies that CMFs can have opposite effects on biological objects.^{1,17,36} Such substantial differences in the nature of the responses of biosystems to CMFs show how cautiously we need to be in our evaluation of results and our selection of the physical parameters of this factor and the methods of studying it. We also need to consider the possibly wide range of individual sensitivities of objects under study to CMF exposure.¹ According to data from a number of authors,^{1,14} the CMF gradient also has a noticeable influence on the degree of expression and the nature of biological responses.

The sensitivity thresholds of biological objects in relation to CMFs have exceptionally important significance for the solution of the problems of hygienic standardization of this factor, although opinions regarding this matter are rather conflicting. For example, reliable research showed that the minimum intensities at which changes in the indicators in question are identified are in the tens of milliteslas.^{1,15,17} On the other hand, therapeutic application of CMFs of the same levels has revealed a distinct therapeutic impact.^{1,6} At the same time, there are indications in a sizable number of studies

that CMFs of low and extremely low intensities—less than 1 mT—can have an influence on biological objects,^{7,28} as may be judged, for example, from man's sensory responses, from the change in cerebral enzymatic activity, from the change in corticoid function of the adrenal glands of healthy people, and so on.^{9,30}

It should be emphasized that the small magnitude of effects revealed in response to CMF exposure imposes especially strict requirements on the procedures of experiments in terms of raising their accuracy with relation to the monitoring of the external and internal parameters of the systems in question and the characteristics of the acting field; especially strict requirements are also imposed on the set-up of control experiments with regard to making the temporal and spatial conditions as close as possible to those of experiments involving a field.¹⁸

The influence of strong magnetic fields on the whole body is a problem deserving of serious attention. It is all the more important because the need for creating super-powerful permanent magnet systems for scientific and technical purposes has arisen in recent years. The task of ensuring working conditions for maintenance personnel that would exclude harmful exposure to intense CMFs has arisen under these conditions.

Research aimed at studying the influence of CMFs on functions of the human body and health is of special interest as a means of revealing the role of CMFs as an occupational hazard.

It has been established that in the workplace, CMFs reduce the rate of oxidative processes and enzymatic reactions; this is reflected in tissue oxygenation.^{1,13} Change has been noted in the activity of adrenergic and cholinergic structures of the body in response to CMFs; the change is expressed in activation of the sympathico-adrenal system and cholinesterase.¹¹ A number of authors^{17,20,25} have demonstrated a relationship between changes in lipid peroxidation and the electrical properties of lipid membranes, on one hand, and the action of CMFs, on the other.

Experimental studies revealed a decrease in the level of immunological response as determined by phagocytosis and antibody-forming indicators and by the course of infectious processes elicited by bacteria and viruses of dermal autoflora.¹⁰ CMFs are noted to have more often a stimulatory influence on the indicators of immunological response in the case of one-time exposures. However, the effects of CMFs on the body's immune system have not yet been studied adequately, especially in relation to the lymphocyte system. Moreover, systematized information on the significance of particular intensities of CMFs and the conditions of their influence in regard to development of specific changes in the body's immune system is lacking in published sources. Difficulties arise in this connection in interpreting the possible influence of CMFs on the level and structure of morbidity among workers exposed to CMFs on the job.

The effect of CMFs on the nervous and cardiovascular systems was studied in a number of works.^{2,5,12,24} A relationship was demonstrated between the degree of expression and the direction of the responses of these systems, on one hand, and the intensities, exposure times, and conditions of CMF exposure, on the other. The responses of the body that were revealed are interpreted as the result of development of compensatory-protective mechanisms, the basis of which are neuroendocrine changes, tissue hypoxia, and dysfunction of biological membranes.

The action of CMFs upon biological processes and body functions may be the product of both direct and indirect physicochemical reactions leading to change in the rate of synthesis and breakdown in metabolic processes. Because of the greater lability of these processes in the central nervous system, the CNS is more sensitive to CMFs, especially the cortex of the dominant hemispheres and the hypothalamus.^{5,12} Reflex disorders may arise in the cardiovascular system as a result of changes in the central nervous system in response to CMF exposure. However, of greater significance, perhaps, are changes in the reactivity of the autonomic nervous system resulting from exposure of the hypophysis, hypothalamus and other endocrine glands to CMFs, which leads to a change in the hormone level in the brain and the blood.^{8,9} These changes may be expressed as dilation of vessels in the myocardium, as focal hemorrhaging, and as swelling of muscle fibers.

Thus, the central nervous system plays the leading role in the mechanisms responsible for change in cardiac activity regulation resulting from CMF exposure. One of the manifestations of the complex of responses is stimulation of the sympathetico-adrenal and hypophyseal-adrenal systems in response to a decline in the function of the insular apparatus and development of tissue hypoxia, which bring about diverse biochemical and functional changes, including disturbances of vascular permeability and in the structure of mitochondria, leading to compensatory activation of glycolysis.

Consequently, changes of neuroendocrine origin, tissue hypoxia and disturbance of membrane function are the dominant responses of the body to CMF exposure. All of this suggests that the body's response to CMFs with an intensity greater than 8 kA/m is polypathogenic in nature. These data must be considered when making hygienic assessments of the harmfulness of CMFs and when interpreting these changes in the state of the worker's body revealed in clinical studies and in physical research conducted in the workplace.

Data accumulated on the therapeutic effects of CMFs of low intensity^{1,16,21,29} may be utilized, following some correction, as the characteristics of CMFs as an occupational factor. Attention should also be turned to studying the nature of the effect that CMFs have on medical personnel during operation of therapeutic and diagnostic equipment, in order to prevent possible unfavorable effects in time.

Thus, the published data attest to a diversity of manifestations of the body's general response to different intensities of CMFs, which indicates that many functional systems are involved in this response. Systems that perform regulatory functions—namely, the nervous, endocrine and circulatory systems—have been found to be the most reactive to CMFs. Embryonic tissues and the most intensively functioning organs of adults are especially sensitive to CMFs. Responses to CMF exposure may be divided into two categories—those in which a return to normal occurs quickly, and those which persist for a long period of time. The former involves bioelectric processes in the brain, while the latter involves changes in the morphological composition of peripheral blood and spermatogenic epithelium.

The data on CMF values reflecting physical processes and the biological effects they elicit are acquiring importance in the hygienic evaluation of working conditions and in the development of requirements on protection from and permissible levels of CMF exposure. The physical values commonly used to evaluate the effect of CMFs on biological objects are the intensity of the CMF and the duration of its action, which are determined by measurement and calculation.

We cannot say that the action of CMFs on the health of the individual has been studied sufficiently. An analysis of clinical and physiological research conducted in recent years by associates of the Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman shows that the body of a worker responds to CMFs of significant intensity by nonspecific functional changes and by symptoms of worsening health depending on individual features. The observed changes are extremely diverse, and they are interrelated. They constitute the symptom complex of the neurasthenic syndrome, coupled with various autonomic dysfunctions and neurocirculatory disorders, the persistence and profoundness of which are determined by the area of CMF exposure, its intensity and duration, and the periodicity of exposure.^{4,19,22,23}

Isolated publications on the influence of CMFs on the health of workers are also encountered in the foreign literature. However, the information available as of this date does not allow the advancement of a sound hypothesis concerning the degree of influence of CMFs on human health. Moreover, such papers often have the following deficiencies: a small number of groups surveyed, which affects statistical reliability; the absence of a carefully selected control group, inaccuracy of dosimetric data, description of coincident occupational factors that is not comprehensive enough, and so on. Nonetheless, the data that have been accumulated on the mechanisms of the biological action of CMFs and on their influence upon the functional state of a number of human organs and systems suggest the need for developing differentiated hygienic standards and systems of preventive measures. Filling this need is all the more important because existing hygienic standards regulate only the intensity of CMFs in the workplace, irrespective of exposure site (whole-body or local) and time. Such an

approach cannot satisfy neither practical health care, nor the needs of industry, nor the requirements of hygienic science today.

Foreign safety standards allow for the short-term exposure of an individual to a CMF of considerably greater intensity than 8 kA/m, which is taken as the maximum permissible level in our country. Unofficial standards in the USA limit the exposure of an individual to a 0.5-1 T CMF to one hour; when only the hands are exposed for a short-term, the magnetic induction can be 2 T.

All of this attests to the urgency of improving the hygienic standards on CMFs now in effect in our country, and to the need for taking a differentiated approach to regulating this factor based on the time and nature of action upon the human body.

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Protection of the Population From Electromagnetic Radiation as a Hygienic Problem

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[Text] The problem of preserving and optimizing the environment in the the context of the scientific and technical revolution, with its powerful means of transforming nature, is acquiring increasing importance with every year, inasmuch as the environment is being subjected to the influence of various factors associated with man's practical activity. Electromagnetic fields (EMFs) of a wide range of frequencies occupy a certain place among these factors. The rapid development of radio broadcasting, television, and radar and the expansion of the network of high-voltage and superhigh-voltage power transmission lines are making the influence of this factor on human health increasingly more tangible. Health-and-hygienic research conducted at the sites of radio engineering equipment and power lines has not only revealed the range of fluctuations in the levels of EMFs within the territory of population centers, but has also made it possible to establish their relationship to the intensity of the EMF source, its structural features, and topography, as well as the nature of an EMF's effect on man and animals.^{9,29}

Methodological approaches to determining and regulating EMFs in the environment were developed in the USSR in the course of this research.^{11,35,36}

In view of the fact that EMFs may have a harmful effect on the human body under certain conditions, standards²⁶ regulating the level of EMFs and the time an individual may remain within the zone of their action have been introduced in a number of the world's countries (USA, France, England, Japan). This factor is also regulated by the corresponding standards in the CEMA countries. Sanitary Norms and Regulations (SN-1823-78 and SN-2963-84) were introduced as of 1978 in the USSR with the purpose of ensuring safe living conditions for the population in zones containing electromagnetic radiation sources. These norms involve not only standardization of EMFs in populated areas, but also hygienic rules for locating and operating radio engineering devices and rules governing the location and build-up of residential tracts or individual dwellings in a zone containing operating radio engineering facilities.^{4,28}

However, the urgency of the problem is not limited to that, since a number of hygienic, engineering, technical, urban construction and other problems have recently arisen which the currently effective documents standardizing EMFs in populated areas cannot solve alone. Their solution requires new scientific developments of a hygienic and biomedical nature as well as an engineering and urban-construction nature; these developments need to be included in the plans for the scientific research conducted by the CEMA countries.

Because EMF sources differ in their purpose, their radio engineering parameters and the nature of the fields they create, it would obviously be suitable to present the hygienic issues as they relate to specific types of radio engineering equipment.

Radio broadcasting stations. Radio broadcasting is acquiring increasingly greater scale with every year both in the USSR and in CEMA countries. The network of stations operating with long, medium and short waves is expanding. Considerable attention is being devoted to the renovation of existing radio stations, expansion of the range of working frequencies, and elevation of the power of radio stations. One should note that radio broadcasting stations with power greater than 100 kW must be located outside of population centers, according to the construction norms. However, this requirement is not always adhered to today. Many high-power radio broadcasting stations have found themselves right in the middle of a residential development as a result of rapid residential construction, on one hand, and the absence of the relevant hygienic requirements prior to 1978, on the other. This has served as one of the causes of the possible effect of EMFs on the population. In this connection, the USSR conducted hygienic research aimed at determining EMF levels at the sites of radio broadcasting stations operating with long, medium and short waves. The research results showed that the level of EMFs in

these places is within 150-2 V/m, and that it depends on the power of the radio station, the range of working frequencies, the type of antenna systems, their height above the ground, the distance from the radiation source (antenna), topography, and a number of other factors. Biomedical research was conducted on the basis of the obtained data. It revealed that long, medium and short-wave EMFs are a biologically active factor that should be subject to hygienic regulation.^{5-7,19,23} Methodological approaches to determining and standardizing long, medium and shortwave EMFs in the environment were developed in the course of this research. These approaches may be used to develop new hygienic standards and update existing ones.

Special attention must be devoted in the future to refining the calculation and instrumental methods of determining EMFs generated by broadcasting stations in the near zone of emissions, and to differentiating hygienic standards on their intensities in the environment in relation to frequencies.

Television stations. The development of television broadcasting in the USSR and in CEMA countries is currently taking the form of construction of new television stations and renovation of existing ones. Much attention is being devoted in this case to increasing the power of the transmitting apparatus, to raising the efficiency of emitting antenna systems, to increasing the number of television programs, and to expanding the working range of frequencies, especially in the direction of decimeter waves.^{3,25}

As a rule, television transmitting facilities are located within city limits, where high population densities are encountered.

Under certain conditions, the electromagnetic energy emitted by television centers may have an unfavorable influence upon public health as a biologically active factor. Research aimed at developing methods and determining the intensities of EMFs at the sites of television centers has been conducted in the USSR in this connection.^{16,21,22} The research results showed that the level of EMFs created by television centers is within 3-0.2 V/m, and that it varies depending on the power of the television center, the type of antenna, the height of their installation, the beam pattern in the vertical plane, the distance from the EMF radiation source, frequency, and a number of other factors.^{15,21} The materials of this research served as the basis of biomedical research¹⁸ that made it possible to develop a hygienic standard for the population. However, this standard can no longer completely satisfy practical needs, because it was developed only for 50 MHz, while modern television utilizes frequencies from 50 to 960 MHz.

In the course of the research indicated above, methodological approaches to determining and standardizing EMFs generated by television broadcasting were developed. These approaches may be used in the future to

refine calculation and instrumental methods of determining EMFs in the environment, to model EMFs in experimental conditions, and to develop frequency-differentiated hygienic standards.

The research results obtained in the USSR give a general idea of the effect of radio-wave EMFs on man and animals. These results need to be systematically supplemented to refine the procedures for determining EMFs in the environment and to study the influence of EMFs not only upon individual systems of the body, but also on general condition of the body as a function of field frequency, time of exposure, intermittence, and modulation.

Radar stations. Radar has been used the most in civil aviation and the weather service, as well as in the marine and river transport sectors. Radars are a source of emission of UHF electromagnetic radiation into the environment. As we know, such energy has a pronounced biological effect.

A radar site creates certain electromagnetic conditions that may be unfavorable to the population. Research aimed at studying the electromagnetic conditions at radar sites was conducted in this connection both in the USSR and in CEMA countries. The results showed that the intensity of EMFs at the locations of radar stations fluctuates within wide limits—between 1 and 1,500 $\mu\text{W}/\text{cm}^2$.^{14,24,30} These data were subsequently used to conduct biomedical research directed at developing hygienic standards for exposure of the population to UHF energy.^{12,15,17,33,39} Such standards have now been developed. But this is still not enough, because as a result of continual technical improvement of radar equipment, a number of hygienic issues that cannot be resolved by the existing standards have already arisen. In particular, we need more than just differentiated standards; because several radars working on different frequencies are employed simultaneously at airports and seaports, standards accounting for the combined action of several EMFs of different frequencies must be developed for such a situation. Moreover, we also need new methods of determining the intensities of EMFs in the environment.

Alternating current power transmission lines. Exceptionally high rates of development involving the growth of both the voltage and the length of power lines are typical of the present stage of electric power engineering in the USSR and the CEMA countries. For example, prior to 1920, there were only 200 km of 10, 35 and 70 kV power lines in Russia, which did not present a danger to the environment in view of their low voltage; in the period from 1976 to 1980, however, the length of 110, 200, 330, 400, 500 and 750 kV power lines in the USSR was 796,000 km. Power lines carrying 330 kV and more have already become something of a menace to the surrounding population because of the level of the EMFs they generate.

Thus, the power line network and the voltage it carries continue to grow. In particular, we have already begun

installing 1,150-kV power lines, and the possibility of creating overhead power lines carrying alternating current of 1,500 kV or more is opening up. Consequently, the effect of the EMF created by a power line upon the population is a problem of growing importance both in the USSR and in the CEMA countries.

To solve this problem, the USSR has completed hygienic research aimed at studying the biological action of an EMF created by a power line. It was established that high-voltage power lines (330, 500 and 750 kV) create an electric field intensity of 5-20 kV/m, which may be a danger to human health.^{27,31} Special biomedical research was conducted in this connection^{1,2,8,10,13,20,32,34,37,38}; the results permitted establishment of the relationship of biological effects to the level and duration of action of an EMF. The Sanitary Norms and Regulations for Protection of the Population From an Industrial Frequency Alternating Current Electric Field (SN-2971-84) was developed on the basis of research conducted in the USSR.

The current SN-2971-84 is the first document regulating the magnitude of 50 Hz EMFs in population centers; however, it cannot solve certain problems that have arisen in connection with the introduction of superhigh-voltage power lines. In particular, neither SN-2961-84 [sic] nor research data provide a possibility for regulating the action of the discharge currents of stray charges generated by power lines upon man, they do not reveal the mechanism of action of a 50 Hz EMF on the body, and they offer little in terms of solving a number of other important problems.

In order to protect the population from the unfavorable effects of EMFs generated by radio, television and other broadcasting stations, radars, and high- and superhigh-voltage power facilities, we need to develop a complex of measures directed at improving the methods of determining EMFs in the environment, creating new hygienic standards and updating existing ones, studying the electromagnetic conditions in populated areas, and studying the effect of electromagnetic radiation on public health. The following objectives must be met in this connection.

1. In order to protect the population from the unfavorable effects of EMFs generated by radio, television and radar stations, and in order to evaluate the existing and predicted electromagnetic conditions and solve urban construction problems associated with regulating such conditions in populated areas, we need to develop standardized methods for the CEMA countries for determining the intensities of EMFs in the high-, ultrahigh-, microwave-, and low-frequency ranges. These procedures already exist both in the USSR and in the CEMA countries, but they require reworking and coordination with specialists of the CEMA countries.

2. In order to ensure the necessary health-and-hygiene living conditions for the population at the areas affected by electromagnetic energy emission sources, we should

continue the efforts to scientifically substantiate hygienic EMF standards differentiated with respect to frequency and time.

The standards that have been introduced in the CEMA countries do not yet encompass all EMF frequency ranges; moreover, they differ depending on the country developing the standard. The reason for this obviously lies in differences in the methodological approaches both to modeling fields under experimental conditions and to the criteria by which the obtained results are evaluated and the assessment indicators (biological tests) are selected.

3. Since the population is subjected most often to the combined action of EMFs of different frequencies, we need to provide for the development of standards on combined EMFs. This will require development of new methods of modeling such EMFs in experimental conditions, and new methods of determining combined EMFs in experimental conditions and in the environment.

4. Because people in populated places are exposed to EMFs of different intensities, the electromagnetic load experienced by different population groups should be determined on the basis of the nature of their work, their age and their sex. Later on, this will provide a possibility for approaching the development of hygienic standards on a sounder basis and for establishing the maximum load of electromagnetic energy for the population.

5. Study of the mechanism of action of EMFs at the molecular, cellular, organ, and whole-body levels will continue to be one of the important directions in the future. Special attention should be devoted to evaluating the adaptive possibilities of the body in response to EMFs.

6. In order to regulate the level of electromagnetic radiation in cities and other population centers, we need to study and then make allowances for the current and predicted electromagnetic conditions. In this case, circumstances may arise requiring establishment of maximum permissible emission levels for individual radio engineering facilities. The electromagnetic conditions must be mapped so that the effect of EMFs on the population's health can be studied. Research devoted to public health as related to EMFs should occupy an important place.

7. Study of the influence of low frequency EMFs and discharge currents of stray charges on the human body will be continued as a result of the introduction of 300, 500 and 750 kV high-voltage power lines and in connection with their influence on ecological processes and public health. Special attention will be devoted in this case to the mechanism of action of a low-frequency electric field.

8. In order to provide for hygienic standardization of EMFs in populated areas and for sensible use of land adjacent to existing radio engineering facilities, urban

construction measures by which to protect the population from EMFs will be developed. They will be included in the "Handbook of Regulations for the Layout and Development of Zones Adjacent to Electromagnetic Energy Emission Sources."

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Decrease of Immunoreactive Alpha- and Gamma-endorphins Level in Blood and Suppression of Their Hypersecretion by Dexamethason During Emotional Stress in Monkeys

907C0026E Moscow BYULLETEN
EKSPERIMENTALNOY BIOLOGII I MEDITSINY
in Russian Vol 107 No 5, May 89 pp 572-574]

[Article by A. D. Dmitriyev, S. K. Chirkova, O. F. Dmitriyeva, A. V. Tennov, deceased, M. R. Shchurin and A. M. Chirkov, All-Union Scientific Mental Health Center, Academy of Medical Sciences, USSR, Moscow, Institute of Experimental Pathology and Medicine, Academy of Medical Sciences, USSR, Sukhumi]

[Abstract] A study of the effect of repeated injections of dexamethason and acute emotional stress on alpha- and gamma-endorphins level in blood of sacred baboons involved experiments on 14 pubescent male, 8-9 year-old baboons (27-31 kg weight). Animals underwent 2-hour immobilization in 3 groups. Group 1 was the control group. Group 2 baboons received an injection of 4 mg of dexamethason daily and group 3 baboons received 12 mg daily. Control baboons and those receiving 4 mg of the drug daily showed no changes in cortisol level in the plasma and the alpha- and gamma-endorphin level remained unchanged. Increase of the daily dose of the drug to 12 mg decreased the cortisol level in the blood as early as the 4th day of injection. The alpha-endorphin level decreased to 35 percent below the initial level. Gamma-endorphin decreased similarly but was significant only on the 7th day. Two-hour immobilization produced a significant cortisol level increase in all 3 groups, with a peak at 6 hours, but this level decreased later. A similar trend appeared for alpha- and

gamma-endorphins in control baboons and in those injected with 4 mg of dexamethason. Baboons receiving 12 mg of the drug daily for 10 days experienced significant suppression of alpha-endorphin after 2 hours of immobilization stress. Under these same conditions, gamma-endorphin level increased 1.9 times but, during this, the level of both alpha- and gamma-endorphins was 2-3 times lower than that in the control group after 6 hours from the start of immobilization stress. Concentrations of alpha- and gamma-endorphins in the blood returned to initial levels on the 2d-3d day from the beginning of the effect of stress. References 13; 5 Russian; 8 Western.

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Hypothalamic Acetylcholine Metabolism in Emotional Stress

907c0108A Minsk ZDRAVOOKHRANENIYE
BELORUSSII in Russian No 7, Jul 89 pp 29-31

[Article by I. N. Semenenya, Minsk Medical Institute]

[Abstract] Outbred and Wistar female rats (180-200 g) were immobilized in the prone position for up to 1 hour to assess the effects of this form of stress on acetylcholine metabolism in the anterior and posterior portions of the hypothalamus. Determinations of acetylcholine transferase activity showed a decrease of 32.8% in the anterior hypothalamus after 1 hour, and a concomitant increase of 53.6% in the posterior hypothalamus. Histochemical determinations of acetylcholinesterase activity revealed a 37.4% decrease in the anterior and a 29.3% increase in the posterior hypothalamus. These observations indicate diminution of cholinergic mechanisms in the anterior hypothalamus and their enhancement in the posterior hypothalamus in response to immobilizations, and raise into question the rationale of m-cholinolytic management of such conditions. References 9: 7 Russian, 2 Western.

Drug Addiction Incidence, Treatment

907C0001 Moscow *MEDITSINSKAYA GAZETA*
in Russian 25 Jun 89 pp 4, col 6

[Article under the rubric "Briefing at USSR Ministry of Internal Affairs": "In Union With Medicine"]

[Text] The country has 130,000 narcotics users and 70,000 suffering from drug addiction. V. V. Kapustin, lieutenant-colonel of the militia and deputy department head of the Main Administration of the Criminal Investigation Department presented these data at a briefing. In his opinion, however, the official statistics do not fully reflect the true picture of the prevalence of this social evil. A study of public opinion conducted by researchers confirms a higher level of drug addiction among the population, particularly in the republics of Central Asia, Kazakhstan, and Belorussia; in the Northern Caucasus; and in a number of oblasts in the Ukraine, the land along the Volga, and Western Siberia.

Speaking of the prevalence of addiction to pharmaceuticals, V. Kapustin noted that in some regions of the country it has recently assumed menacing proportions. Work to bring order to the use, storage, and sale of narcotics has permitted a 32 percent reduction in the number of thefts of narcotics from pharmacies, bases, and other medical institutions as well as a 36 percent reduction in the number of incidences of obtaining them by forged prescriptions as compared with an analogous period last year.

All of this has forced those addicted to pharmaceuticals to resort to all-possible contrivances, for example, to the bootleg manufacture of narcotics from various medicines. In this context, the incidence of narcotics poisonings has recently become more frequent.

Question by MEDITSINSKAYA GAZETA: How satisfied are you today by your contacts with medical personnel in matters related to fighting drug addiction?

"I think we must conduct our work with drug addicts on a very individual basis, differentiating the use of educational, legal, and medical measures we use with them. In the past few years, up to 70 percent of those suffering from drug addiction completed a voluntary treatment course, and about 1,000 persons were sent to medical and labor preventive clinics for treatment. In our opinion, however, the efficacy of treatment at them still remains very low.

Shortage of Medicines

907C0063A Moscow *TRUD* in Russian 16 Aug 89 p 2

[Article by Candidate of Economic Sciences A. Levin: "A Life-Threatening Shortage"]

[Text] The shortages that have encompassed almost all of our economy now include medicines as well. This shortage is especially alarming. It is terrifying in its

consequences, inasmuch as it not only means worsening of the health of millions of people, but it also frequently results in premature death.

According to a quick survey conducted by organs of the State Statistical Administration in a number of pharmacies of the Russian Federation, all of them were lacking certain cardiovascular drugs and preparations to treat dysbacteriosis, and interruptions in the supply of analgin, korvalol, valokordin [transliterations] and anti-influenza drugs were noted. This regrettable list can be continued on and on. We have all become hostages of the medicine shortage. Is a solution visible?

Public health executives and officials of other departments have already named several deadlines by which this medical shortage was to have been at least significantly alleviated, if not surmounted. But time passes, and even Moscow's pharmacies are not feeling any improvement yet. The situation in other cities, and all the more so in rural areas, is simply catastrophic. How long will our comrades responsible for supplying medicines to the population continue to be so irresponsible in keeping their promises? And what are people who cannot live without medicine to do?

When I took on this urgent topic, it was not at all my intention to pose "angry" questions. They are being posed by life itself, and it would be nice to receive some concrete answers. But it is much more important to reveal the causes of the present medicine shortage.

One of them is the poor work of Soviet pharmaceutical industry. One figure presented at the Congress of USSR People's Deputies was that industry is satisfying the country's demand for medicines by only 45 percent. This alone says something about the quality of the sector's work. Here are a few more facts. According to reports from the RSFSR State Statistical Committee, enterprises of the Ministry of Medical and Microbiological Industry (now the Ministry of Medical Industry) are continually failing to fulfill their contract obligations. Statistics are being reported on 40 types of chemical and pharmaceutical products. Last year for example only 25 quotas were filled.

The former Ministry of Medical and Microbiological Industry, which was supposed to have produced around 95 percent of all Soviet medicinal preparations, reduced production of certain medicines without accounting for the real needs of public health. According to data of the RSFSR State Statistical Committee despite growth of oncological illnesses, in comparison to 1985, in 1988 this ministry's enterprises decreased production of certain preparations used the most in the fight against malignant tumors.

Other suppliers of medicines—enterprises of the former Gosagroprom—are not fulfilling their quotas either. Despite the almost 20 percent increase in the number of cases of sugar diabetes in the last 3 years, production of preparations containing insulin (which is obtained from cattle pancreas) decreased by almost 60 percent

according to data of the RSFSR State Statistical Committee. Enterprises of the Ministry of Health are also decreasing production of medicines: In 3 years of the five-year plan they lowered their production to almost half. Given such a situation, what are we to do about medicine?

Ministries producing medicinal preparations explain their poor work by the fact that equipment in enterprises subordinated to them is considerably worn (a third of this equipment has been working over 10 years), its replacement is proceeding too slowly (the replacement coefficient is just a little more than 2 percent), and so all of the blame is shifted to enterprises of the machine building complex, which are not satisfying the demand of chemical and pharmaceutical industry for modern equipment. This is of course valid to some degree. But why are enterprises of the Ministry of Medical and Microbiological Industry themselves failing to meet the deadlines for placing new capacities in operation? According to data of the RSFSR State Statistical Committee the Usolye-Sibirskoye Chemical and Pharmaceutical Combine (Irkutsk Oblast) has already taken more than 3 years (as compared to the 9 months required by the standard) to commission new capacities producing 2,200 tons of salicylic preparations per year. These capacities were only 30 percent assimilated in 1988. Introduced back in 1986 by the Kursk Chemical and Pharmaceutical Plant, production capacities with a standard commissioning time of 3 months were only 43 percent assimilated by the beginning of this year. If such a situation persists into the future, the earliest we will be able to receive medical products from enterprises to be built in the future five-year plan will be the end of this century, and perhaps even in the third millennium.

Things are even worse in our country with imported medicines, the shortage of which has also been a cause of the medicine shortage. Imports provide for a sizable fraction of our public health system's demand for medicines. But even they are being reduced on someone's wrongful orders. Why have we decreased purchases of medicines from Yugoslavia by over a fourth in the last 8 years? Someone must explain this, and answer for this! We don't even know who is to blame for reducing medicine imports. And yet it is precisely on their conscience that both the worsening of health and even the death of people due to a shortage of preparations which our country is not producing lies.

A decision was recently made (not without the pressure of public opinion) to allocate an additional 500 million rubles for the purchase of lacking medicines abroad. But the sum is clearly incomparable with the demand of sick people for medicine. Moreover the apprehension exists that the scarcest medicines purchased abroad will once again become "trapped" in "special purpose" hospitals and pharmacies (something that has already happened before), and never get to the city and rural network to which the public at large has access. For this not to occur, we need to qualify the conditions for distribution of

scarce medicines among all hospitals and pharmacies ahead of time. And only medical indications can serve as the main criterion.

But the needs of public health will not be satisfied by imports alone. It is high time to organize their production here in this country, so that it could be independent of the whims of the foreign marketplace at least in the area of medicines. But how are we to do this if the country does not have some one "caretaker" who would be responsible for supplying medicine to the population? Even now, like before, the USSR Ministry of Health is compelled to literally beg for medicines from the ministries and enterprises that produce them, even though they are simply obligated to supply them.

We need to provide the USSR Ministry of Health with more extensive rights, we need to put it in charge over other ministries working in behalf of the health of people (directly or indirectly), and concurrently we need to raise its responsibility not only for the status of treatment methods or development of the network of medical institutions, but also for supplying medicines to the population and equipment to hospitals and polyclinics.

I can foresee the objections of theoretical economists: The author, it seems, wants us to return to administrative methods of leadership. What about economic methods, what about the free market? Well, first of all could we not employ economic methods within the framework of a head ministry? The relations of the Ministry of Health with enterprises of other ministries producing medicines, preparations and medical equipment must be structured on a cost accounting basis. In other words on the basis of economic methods. Moreover the manufacturing enterprises need to pay higher penalties to institutions of the Ministry of Health for shortfalls in deliveries of medicines, for violation of delivery deadlines and for other contract violations.

When it comes to the question of a free market in medicines, and all the more so the question of a so-called retail market, in which the population would act as the purchaser, we need to study the matter more substantially. It is easy to speak about a free market and about the freedom of market relations theoretically. But how is such a market to be practically organized in the country, when it is literally "crushed" by shortages, including of medicines? And how is a retail market in medicines to operate if prices on some of them are already so immoderately high that patients from less-fortunate families are simply unable to buy them, even if they were freely available for sale? If we were to allow "complete freedom," or putting it more simply, if we were to allow this market to operate spontaneously as well, then prices on medicines will jump even higher. This is one path we cannot follow.

There is possibly a debatable alternative to this: dispensing medicines on the basis of a doctor's prescription without charge. This, by the way, has long been a practice in some countries, including capitalist ones.

Then the retail medicine market would disappear altogether. And would that really make things any worse for all of us?

"Zdorovye" Computer System in Studying Effect of Pollution on Health

907C0069A Moscow SOVETSKAYA ROSSIYA
in Russian 11 Aug 89 First Edition p 3

[Interview with Candidate of Medical Sciences Yu. Korneyev, department head, All-Union Scientific Research Center for Preventive Medicine, by O. Plakhotnikova: "Departmentally Planned Illness"]

[Text] It seems as if a shift has materialized in the mass consciousness: The old axiom that "all diseases are of nervous origin" is now being replaced by another one: "All diseases originate from environmental pollution." Is this so? Are we not going to the other extreme, now explaining all ailments by ecological woes? This is the topic of this interview with Candidate of Medical Sciences Yu. Korneyev, department head of the All-Union Scientific Research Center for Preventive Medicine.

[Korneyev] Unfortunately this assertion is not all that far from the truth. While back in the 1950s we based things on the notion that environmental pollution was responsible for only 20 percent of human illnesses, today scientists tend to say that this figure is as much as 80 percent in the ecologically most contaminated cities.

Figures provided by the "Zdorovye" ["Health"] automated system operating in our center reveal that if each substance polluting the city's atmosphere twice exceeds the maximum permissible norms, morbidity of the population rises by a factor averaging 1.7. Moreover growth of morbidity in some age groups may be even more dangerous—by a factor of 2-3.

Research demonstrating the unfavorable influence of harmful environmental factors on human health has been carried out in recent decades in many countries of the world, including ours. But all of this research has had a common shortcoming—excessive specificity. It often focused on the influence of a single pollutant on a very small population group. It is practically impossible to generalize and analyze these scattered data.

Our system was created in order to establish the real connection between environmental quality (pollution of atmospheric air and drinking water, noise pollution) and morbidity indicators. Seven years ago it covered a total of 50 of the country's cities.

Today our databank is being added to by 184 cities. In terms of the breadth of coverage of the population and the number of characteristics it analyzes, the system has no analogues in world practice.

[Plakhotnikova] What you are saying diverges from the common notions of people about their health. Even the local doctor is certain, in my opinion, that he is treating

traditional illnesses, rather than fighting the consequences of man's presence in a zone of industrial discharges.

[Korneyev] Yes, the course of general therapy is the same for everyone everywhere, but in the meantime the work appears different to physicians depending on the industrial structure of the region in which they serve.

We singled out the most unfavorable cities, in which high morbidity indicators and a significant level of pollution are recorded. Among them are Arkhangelsk, Kemerovo, Rovno, Murmansk, Chernovtsy, Gorkiy, Orsha, Lipetsk, Sverdlovsk, and unfortunately, a sizable number of other cities. But later on we found ourselves trying to answer this question: Why is the incidence of blood disease twice as great in the city of Berezniki for example than among people living in Lipetsk? Both cities, let me emphasize, are in the category of the "dirtiest" in ecological respects.

By systematizing the numerous data we were able to establish that industry dominating in the city, and consequently the dominant discharges into the atmosphere, play a special role in the morbidity structure. This conclusion completely refutes the previously accepted opinion that the structure of morbidity in different cities is more or less universal. I can say quite certainly that industrial departments create "their own" pattern of morbidity in "their own" cities.

The number of malignant tumors and the incidence of diseases of the blood and the cardiovascular system are increasing significantly where enterprises of the former Ministry of Mineral Fertilizers are located. But if nonferrous metallurgical enterprises are located in the city, skin diseases are noted among children in addition to malignant tumors. Motor transport exhausts, which are present in every city, are a unique backdrop over which different industrial discharges are superposed in different cities.

It will be a very long time before we finish paying off the penalty for a thoughtless attitude toward nature and human health. Were we to close all polluting production operations in for example Ust-Kamenogorsk right now (it contains nonferrous metallurgical enterprises primarily), the city would not be able to return to normal life until perhaps after 70 years. The entire region is stricken with heavy metals. The maximum permissible concentrations for lead are exceeded by a factor of 7-13. And as a consequence, we observe an increase in morbidity.

[Plakhotnikova] Speaking at the first session of the USSR Supreme Soviet, Academician Ye. Chazov, the country's minister of health, said that the Ministry of Health no longer keeps any information secret. In this connection it would be nice to know the morbidity situation in, for example, the Volga region. SOVETSKAYA ROSSIYA writes little about the ecological woes of this region.

[Korneyev] Unfortunately it is hard to say that the situation here is all right. In Togliatti for example, morbidity in relation to a number of diseases exceeds the average indicators for the RSFSR owing to air pollution by "specific" (such is the term that is used) substances. Their largest quantity escapes from the stacks of enterprises of the former Ministry of Mineral Fertilizers, in which over half of the treatment facilities are not working. The morbidity pattern is also contributed to by the Ministry of Power and Electrification.

A similar situation has also evolved in Gorkiy. Morbidity here is above average in relation to practically all indicators. Responsibility for this should be shared by the Ministry of Power and Electrification, the former Ministry of Nonferrous Metallurgy and the Ministry of Chemical and Petroleum Refining Industry.

Volgograd is another of the most highly polluted cities of Russia. It must be said, however, that the morbidity indicators differ significantly in different regions of the city. Illness is most frequent among residents of Krasnoarmeyskiy Rayon. And there's nothing surprising about that. The air here is contaminated by phenol, formaldehyde and fluoride compounds. The ecological situation is also worsened by the waste ponds of enterprises of the USSR Ministry of Chemical and Petroleum Refining Industry. In general, residents of Volgograd suffer more frequently from skin diseases and hypertension than does the "average statistical" urban resident.

The situation is just as unfavorable in Kazan, Rybinsk, Kuybyshev and Ulyanovsk. There is no doubt that alarming data will be received from Astrakhan, which we included in our system just recently.

[Plakhotnikova] I would like to know what practical applications your research has.

[Korneyev] First of all the purpose of information gathered by the "Zdorovye" system is to help local soviet and public organs realize a simple truth: It is simply senseless to demand active measures to improve the health of the residents of polluted cities only from public health. Were we to increase the number of hospital beds and doctors, we would only be fighting the effects, and not the cause. We need to stop the activities of polluting plants that are deleterious to human health.

For example in Nizhniy Tagil, Magnitogorsk and Novokuznetsk, where morbidity exceeds the average in relation to practically all indicators, the activities of enterprises of the metallurgy ministry should be treated as being criminal. These plants dump benzopyrene, phenol, formaldehyde, chlorine and ammonia into the atmosphere, exceeding the maximum permissible levels by 12-14 times.

Incidentally, in cities where nature protection measures have been implemented for a long period of time, the morbidity curve is beginning to fall. This is demonstrated in particular by our research in Severodonetsk.

When plants are planned today, calculations showing what quantity of substances harmful to man will be entering the environment with the enterprise's discharges are mandatorily carried out. The "Zdorovye" system will make it possible to expand this information by making predictions of changes in the population's morbidity in connection with such discharges. Without a doubt such predictions will speak much more eloquently than impersonal references to the numbers of tons of chemical substances escaping into the atmosphere.

We are pleased that local authorities have recently begun looking to us for assistance. For example we received an inquiry from the first secretary of the Novokuybyshevsk City Party Committee and the chairman of the city executive committee: We were asked to analyze how proposed construction of a complex of oil reception and processing facilities will affect the health of the population. Today, Novokuybyshevsk is among the "dirtiest" cities in ecological respects, and morbidity in the city is increasing in relation to all indicators. According to the data in our system Novokuybyshevsk is second in the incidence of oncological illnesses and third in endocrine illnesses. And do you know what is specifically to blame for this? When they were designing the city's industrial complex the planners "forgot" to account for the direction of prevailing winds, such that the principal pollutants are now carried directly to the city. Basing ourselves on our information, we answered categorically that the new complex could not be built in Novokuybyshevsk.

It must be said that many of the woes of our cities were brought about by the fact that the opinion of medical personnel regarding construction of their industrial zones was ignored. The "blessings" that the territory acquired at the price of the health of its residents—new roads, social, cultural and personal facilities—were "more important." Officially, not a single plant can be approved without the go-ahead from a public health physician, but in reality this go-ahead has been obtained by all sorts of truths and untruths. When the Soviet government finally begins to work in close contact with medical personnel, I am certain that breathing will become easier in the cities. Polluting ministries can no longer impose new operations harmful to the health of the people on them. On the other hand, knowing what discharges from existing enterprises are the most aggressive, local authorities will know what direction they will have to pursue in order to adopt the most effective preventive measures.

We also provide information to state committees for environmental protection. This information is necessary to the conduct of ecological expert examinations. Other users of our information are the administration of the USSR Ministry of Health and the USSR Supreme Soviet Committee for Ecological Problems.

In the future we hope to expand the field of our activities. The "Zdorovye" system presently has vacant blocks that can be filled, for example, with data on the quality of the people's nutrition. I think that it would be suitable

to include here other information about the health of the population as well—for example information on infectious diseases, and materials accumulated by specialists in respiratory, cardiac and endocrine diseases. Studying the health of people working directly in harmful production operations is a special task.

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Characteristics of Groups of Drug and Toxic Substance Users in Belorussia

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BELORUSSII in Russian No 7, Jul 89 (manuscript
received 15 Nov 88) pp 37-39

[Article by V. V. Ivanov, BSSR Ministry of Health; first paragraph is source introduction]

[Text] Various groups of drug and toxic substance users in the Belorussian SSR are studied. In the author's opinion, no direct link has been found between the growth in drug-related and toxic-substance-related illnesses in our republic and the cutback in alcohol sales. Stress is placed upon the ineffectiveness of measures that health organizations and institutions are conducting to prevent the illegal circulation of drugs and medications without prescriptions from physicians at pharmacies and treatment-and-prevention institutions.

The illegal use of drugs and toxic substances for the purpose of achieving a state of intoxication is found in some republics and oblasts in the USSR. Thorough epidemiological and structural study of groups using drugs and alcohol is necessary to successfully resolve the tasks facing health care organizations with regard to the prevention and treatment of drug and toxic substance abuse. Until now, such studies had not been conducted in Belorussia. The following comparative statistical analysis of groups of drug and toxic substance users is the first attempt at such a study.

In 1987, Belorussia occupied 15th place among union republics with regard to morbidity and susceptibility to illness due to drug abuse and 5th or 6th with regard to morbidity and susceptibility to illness due to toxic substance abuse. Some are of the opinion that the cutback in the volume of sales of alcoholic beverages during 1985-1987 led to an increase in morbidity due to drug and toxic substance abuse, especially among minors. In fact, in 1987 the number of those with a first-time diagnosis of drug abuse did increase 10-fold over the 1984 figure, while the corresponding figure for toxic substance abuse increased 15-fold. However, there are also facts indicating the absence of a direct link between the consumption of alcohol and the consumption of other intoxicating substances.

First, the problem of toxic substance abuse among minors was addressed at the All-Union Conference on the Study of Drug Use held in Kaliningrad back in 1983, before there was any talk of substantial cutbacks in alcohol sales. Second, considerable growth in morbidity

due to drug abuse began in some oblasts in the Ukraine back in 1976, when alcohol was comparatively cheap and accessible to the public. Furthermore, although we are talking about the growth of morbidity due to drug abuse and toxic substance abuse in Belorussia, it should be remembered that these groups number in the dozens (in four years in the republic, 263 narcotics abusers and 244 toxic substances abusers were identified with first-time diagnoses), whereas alcoholism patients number in the tens of thousands and even hundreds of thousands. Compared with 1984, the mortality rate in 1986 from the consumption of nonalcoholic poisons declined by 0.4 per 100,000 population, while it increased in 1987 by 0.1. This indicates the absence of a significant, sizable growth in the use of drugs and toxic substances.

Half of all criminal cases examined in people's courts during 1986-1987 that were linked to the illegal trade of drugs involved people who were not citizens of Belorussia, but who had come to the republic to acquire drugs.

It would seem to be more accurate to link the increase in the number of drug and toxic substance users to the beginning, in 1986, of active work by internal security organs and health care institutions to identify and investigate users of drugs and toxic substances.

At the same time, one should not underestimate the danger of the spread of drug abuse. There is a problem, and a serious one, because so far no society has developed a sufficiently effective mechanism for controlling this phenomenon. The patterns describing the growth of massive drug use are not clear, and nobody can guarantee that Belorussia will not experience an outbreak of morbidity due to drug abuse similar to the outbreaks observed in other parts of the country. According to data from anonymous surveys (conducted through a program at Belorussian State University), among pupils in Bobruysk, 4.5-16.3% of the boys and 1.7-8.2% of the girls in the senior classes used medicinal drugs and toxic substances to become intoxicated. For students at the middle vocational and technical schools and tekhnikums, the figures were 8.2-25.8% for the boys and 2.0-16.3% for the girls. Similar data were obtained from surveys of pupils in Minsk. During 1986-1988, the deaths of several minors from poisoning by toxic substances were registered in the republic.

Thus, a thorough analysis of groups of drug and toxic substance users is quite essential, as it will make it possible to work out and implement specific measures to prevent this social evil. Also, one task of this study is to raise questions requiring further study.

Materials and Methods

The study covered 395 people who use either drugs without a physician's prescription or toxic substances: 314 of them were residents of a large industrial and cultural center, and 81 were residents of rural areas and small points in a rayon. The sample consisted of more than one-fourth of the entire group under consideration, making it possible to extrapolate the conclusions to the

entire contingent. The study was conducted on the basis of sex, age, education, groups of substances consumed, criminal record, and remission.

Users of drugs and toxic substances were studied in two groups: Individuals diagnosed as drug abusers or toxic substance abusers (dispensary group) and individuals with no signs of dependence on drugs or toxic substances (preventive group). The work reported in this article did not examine the differences between the dispensary group and the preventive group. Therefore, for the purpose of simplification, all users of drugs will be classified as drug abusers, and all users of toxic substances as toxic substances abusers.

Results and discussions

Individuals 30 years old or under made up 75% of the entire sample; minors, 21%. An accumulation of older age groups does not take place, because of migration, incarceration, removal to treatment/work rehabilitation centers, and death. Only a few were taken from the list due to the length of remission, as only 14% of the sample were in remission 12 months or more.

Adult males (over 18 years of age) made up 65% of the sample, while adult females made up 14%. That is, the ratio of males to females (5:1) is different from that for alcoholics (9:1). There should be further study of the reason for this. Interestingly, the age structures of male and female age groups coincide: Individuals under 30 make up 68% in each group. Two percent of those studied have less than 8 years of education, 33% have 8-9 years, 57% have secondary or secondary specialized education, and 8% have a higher education or attended a higher education institution. The women have a higher educational level than do the men: While the percentages with secondary education are similar (71% of the men and 70% of the women), only 8-9% of the women have only 8-9 years of education, while the figure for men is 22%; some 20% of the women, as compared to only 8% of the men, have higher education.

The women are less inclined to illegal behavior (only 2% of the women have criminal records, as compared to 19% of the men). Also, women show less resistance to therapy. At the time of the survey, 20% of the women were in remission for 12 months or more, as opposed to only 10% of the men. This is of special interest, as some think that women suffering from alcoholism are more resistant to therapy than are men.

The substances used were divided into three groups: medicinal drugs and substances, drugs obtained from medicines or from natural raw materials by homemade methods, and household chemicals. Forty-nine percent of those studied (52% of the men, 70% of the women and 23% of the minors) indicated they had ingested or used medicinal drugs. This permits an important conclusion for health care practice: treatment institutions as sources for drugs and other medicinal preparations used for the purpose of becoming intoxicated remain open sources.

Seventy-one percent of the medicinal drugs are medications that contain alkaloids of opium and 22% are drugs made from preparations that have psychostimulative effects.

Of the drugs obtained from natural materials, 70% are koknar [opium derivative] and opium, while 30% are preparations containing tetrahydrocannabinol.

Among the nonnarcotic substances used for the purpose of intoxication, 52% were derivatives of benzodiazepine, and only 6% were barbiturates not classified as narcotics.

This leads to a second conclusion important for health care practice: extreme caution needs to be taken in prescribing drugs in the benzodiazepine series, especially for lengthy courses of treatment.

A comparison of drug abusers and toxic substance abusers shows that the former are somewhat older and have more education. Sixty-five percent of the drug abusers are under 30, as opposed to 84% of the toxic substance abusers. One percent of the drug abusers are minors, as opposed to 39% of the toxic substance abusers; 65% of the male drug abusers are 18-30 years old, as opposed to 76% of the toxic substance abusers.

Eleven percent of the drug abusers have 8-9 years of education, while the figure for toxic substance abusers is 54%. Among adults (over 18 years of age), 12% of the male drug abusers have 8-9 years of education, and 11% have higher education; the figures for toxic substance abusers are 39% and 2%, respectively. All of the adult female drug abusers have at least a secondary education, while 17% have higher education; among adult female toxic substance abusers, 20% have 8-9 years of education and 24% higher education.

Adult males in both groups are approximately equal in their use of all the forms of drugs mentioned: 56% of the drug abusers use medicinal drugs, and 50% use drugs obtained from natural materials; 46% of the toxic substance abusers use medicines, while 54% use household chemicals. Adult females in both groups prefer to use medicinal drugs (57% of the drug abusers, and 88% of the toxic substance abusers).

Nineteen percent of the drug abusers and 7% of the toxic substance abusers have been brought to court for criminal activity. It should be kept in mind that, under certain circumstances, practically any activity involving drugs may be considered a violation of the law, while the problem of toxic substance abuse lies outside existing laws.

Eleven percent of the drug abusers and 18% of the toxic substance abusers had been in remission 12 months or more. This possibly indicates that the former are more resistant to therapy.

Of special interest are data obtained from comparing groups of urban and rural dwellers. There were no substantial age or educational differences between the two groups. Among the urban group, 53% use medicinal

drugs and nonnarcotic preparations (59% of the males, 76% of the females, and 25% of the minors), while among the rural group the figure is 31% (28% of the males, 57% of the females and none of the minors). Drugs from natural materials are used by 18% of the urban group (23% of the males, 22% of the females and none of the minors); in the rural group, the figure is 48% (57% of the males, 43% of the females and none of the minors). An even more substantial difference was revealed in comparing the urban groups of drug users, 66% of whom consume medicinal drugs (68% of the males, 58% of the females and 100% of the minors), and the rural groups, in which only 26% use such drugs (26% of the males, 33% of the females and none of the minors). Obviously, this difference is due to degree of accessibility of various drugs.

Conclusions

1. It is doubtful that the morbidity figures for drug and toxic substance abusers in Belorussia are a function of curtailed sales of alcoholic beverages.
2. The fact that a considerable proportion of the drug and toxic substance users consume narcotic and nonnarcotic medicines indicates the ineffectiveness of measures implemented by health care organizations and institutions to prevent the illegal circulation of drugs and the dispersing of medications without a doctor's prescription from drug stores and treatment-and-prevention institutions.
3. Groups of drug and toxic substance users have definite age and educational differences. Since they live in both urban and rural areas, it is necessary to conduct further research to work out more specific preventive measures.

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Medicine Shortage in RSFSR Nonchernozem Zone

907C0112A Moscow IZVESTIYA in Russian
22 Oct 89 p 3

[Article by V. Kurasov: "Is the Medicine Problem Curable?"]

[Text] It was not so long ago that when we frequently spoke about the need to manage our affairs reasonably and economically, we inevitably added something like "in spite of the abundance of our wealth." Today we prefer to remain modestly silent about wealth inasmuch as it turns out that no matter what area of life or what industrial sector you might select there is nothing in particular to brag about. We ostensibly increased our industrial capacity, renovated our old plants, and purchased manufacturing processes and entire plants with hard currency, but in return, alas, the yield has been miserly...

How many billions of rubles have been drawn out for various decrees about the development of the Nonchernozem region?! Where is that money now? My recollection about the Nonchernozem is not just incidental. It was a topic of discussion at a session to which these remarks were related. There was an examination of a local problem about serious shortages of medicinals for the population of the Nonchernozem zone of the RSFSR. The session participants were handed information which was the result of joint inspections undertaken by the deputies and people's control.

Although I am taking the risk of exhausting readers with voluminous citations and figures taken from the information report, I shall do so anyway. In the first place, this document will hardly be published, and in the second place, each line in the report deals with our health, or to be more precise, our ills. And so:

"The RSFSR Ministry of Health, and primarily the Main Pharmacy Administration (Chief Yu. A. Valfish) has failed to fulfill the demands set forth by the decrees of the CPSU Central Committee and government dealing with an acceleration of the socioeconomic development of the Nonchernozem zone, and has not implemented the required supply of medicinals. The rate of growth in the resources allotted for these purposes lags behind the rate for the republic. Moreover, over the last three years the rate decreased from 11.5% to 4.1%."

"...the Ministry's permanent commission for planning and predicting supply needs is taking a formalistic attitude to the matter at hand and the rational distribution and utilization of medicinal agents (the chairman is First Deputy Minister V. G. Panov). Whereas there is an average shortage of 450 drug items as a whole, there was a shortage of 657 items in the RSFSR and 730 items in the inspected rayons of the Nonchernozem zone."

Comrades Panov and Valfish were at the session and spoke from the rostrum. Their addresses abounded with the following types of statements: "We did not set up or assert proper controls, and some employees lost their sense of responsibility..."

A more specific statement was made by USSR First Deputy Minister of Health I. N. Denisov. But he, too, although attempting to defend his officials, depicted a rather gloomy picture about the current state of our medical and pharmaceutical industry. He wondered how anything could be provided if there were no supplies to provide. Once again, he reminded us of our poverty. Then the people's deputies and members of the People's Control Committee quite reasonably asked: "In that case why are we so wasteful?"

The information report states: "A selective check of 1,100 prescriptions for medicines in extremely short supply showed that 25% of the drugs were prescribed without justification and over 17% were written for fictitious persons. Many drugs are simply stolen. Over a

three year period the losses from shortages, thefts, and spoilage as a whole increased in the republic from 3.5 to 4.9 million rubles."

Representatives of the Ministry of Health could find no arguments against the affirmation of deputy V. I. Semukhi that the lack of an established information service and the poor quality of work on the rational distribution of medicinals constitute the main reason for the shortage of a number of preparations in one region, while the same preparations are plentiful in another region.

The correctness of that view was supported by specific examples presented by deputy N. I. Karpenko, who went on an inspection tour to Bryansk Oblast, and by deputy A. I. Kondratev who visited Chuvashiya. In the first instance, people were often found to be waiting a year or more for needed medicines. Over the last three years, these people spent more than one and one-half million rubles on necessary drugs purchased from neighbors or more remote sources. In the Chuvash ASSR (as, incidentally, in many other places), pharmacies are covering their financial shortcomings by violating the government's decree on the free provision of medicines for children under three years of age and by allowing those drugs to be sold at full cost.

USSR People's Control member and fitter of the Rubin Moscow production association N. N. Glebova visited a number of the capital city's pharmacies and hospitals and was convinced that the medicine availability situation here is no better and that there are no fewer violations. The same problems persist: only one-seventh of the warehouse and storage space needs for medicines in Moscow have been met...

An enormous amount of work was undertaken in the course of the preparations made by the people's deputies and people's controllers for hearings on this problem. They examined 14,000 medical documents in six oblasts and three autonomous republics and in almost 400 pharmacies and hospitals.

Chairman of the USSR Supreme Soviet Committee on Public Health Care Yu. I. Borodin said that "we believe that we have given a 'first reading' to this problem. Perhaps we should not adopt a decree right now. The decree draft, as was demonstrated by the discussion, needs considerable additional work.

Chairman of the USSR People's Control Committee G. V. Kolbin, having noted the effectiveness of the work undertaken by the committee headed by him in concert with the permanent parliamentary bodies of our country, introduced a resolution to inform the Presidium of the USSR Supreme Soviet on the progress being made on the examination of this problem at the session and to request that the Supreme Soviet order the USSR Council of Ministers Bureau for Social Development to prepare specific measures for the resolution of the "medicine

problem" by the beginning of the third session and that a report on that progress should be made to deputies at that session.

"As regards to punishments," said G. V. Kolbin, "I can assure you that the guilty persons shall not escape with impunity. But I firmly believe that our main task is not to apprehend and punish, but rather to identify the causes of the problems that are costing us so much today. In that sense, I don't mean money, but the health of our people."

The resolutions of the co-chairmen were adopted.

Alopecia at Ukrainian Military Base Linked to Pollution

*907C0173A Moscow KRASNAYA ZVEZDA in Russian
3 Dec 89 First Edition p 4*

[Article by Major V. Novikov, Kiev Military District: "Chernovtsy Syndrome? Alarm About an Unknown Disease at the Air Force Garrison"]

[Text] Let us turn to the recent past. Hundreds of people began to gather at the Officers' Club of the garrison early on a Saturday morning. Many officers, warrant officers, and Soviet Army civilian employees had come with their children or with their entire families. They were rushing to a rather unusual meeting which was being held with the permission of the garrison commander.

The meeting was opened by Major A. Tayenchuk, chairman of the initiating group, city council deputy, and Guards political worker:

"There are limits to one's patience, comrades. An unknown disease is affecting our children, but neither the medical institutions nor the city authorities are taking any measures at all. We have decided to collect signatures for a petition to be addressed to the republic authorities...."

And here is the problem. Some time ago the families of pilots started to notice that their children were complaining more and more of weakness and malaise. Even adults were experiencing increasing fatigue. And then something incredible happened: Some children began to lose their hair, just as had recently happened in the city of Chernovtsy. In the face of this calamity, people began to analyze what was happening and started to look for the causes of this illness. It certainly wasn't hard to figure out. On three sides of the air base are plants that had been moved to the outskirts of the rayon center. Here there is also a casting and metalworking plant, as well as a construction machinery plant and two highway asphalt plants. There is even a tobacco factory. But everyone is convinced that the root of the problem is at the plastics plant.

When I arrived at the garrison and dropped into the office of Guards Major Tayenchuk, I immediately asked him to close the window. It was impossible to breathe that "air."

"That's how we live," Tayenchuk said as he smiled bitterly. "And just read the answers we are getting to our complaints..."

"Gorispolkom chairman N. Mamay responded in September that we should check the toxicity of our airplane fuel, because, he said, all our problems are caused by its combustion. So that's it, just blame it on someone else. Look, nothing of this sort has been observed at other air bases, and there are not that many flights from this base. But people are choking from the 'air' every day."

That is why military personnel and their families came out to the "ecology" meeting.

Passions boiled at the meeting. A total of 1,524 persons signed a petition appealing for immediate help for the town's residents.

An expert commission headed by Deputy Chief Physician of the Republic Health-Epidemiological Service of the UkSSR Ministry of Health Ya. Derevyanko documented and confirmed that the maximum allowable concentrations of atmospheric phenol and formaldehyde exceeded the norm by 3.5-fold in some places. Over a nine-month period in 1989, a total of 29 cases of alopecia (loss of hair) were recorded in the rayon center. Fourteen cases were children, and fifteen were adults. The commission's depressing conclusions were that "alopecia cases were widely spread throughout the entire city."

So what can be done about it? Alas, the residents of the military garrison and the rayon center don't know yet. And their main problem is not the Chernovtsy syndrome itself, but the syndrome of sluggishness and unpreparedness of officials to take action in such situations.

"Perhaps we should now hold a meeting on the Kreshchatik, maybe then our plight will be understood," people are saying with bitter resolve.

From the editors In order to get an explanation, our correspondent went to the medical service for long-range aircraft which has jurisdiction over this garrison. The military medical personnel confirmed that the ecological situation here is in fact adverse. The plastics plant that is releasing phenol and formaldehyde resins into the air is just 100 meters from the residential area of the military settlement. In the meantime, the health-protection zone of the plant is supposed to be no less than 500 meters. And although the commission referred to in the article believes that the alopecia cases in the children and adults are not related to the effects of toxic substances, that is no cause for complacency. According to information given to us at the medical service, the board of the UkSSR Ministry of Health adopted a decision at a meeting held November 15 to take measures to halt the operation of the shop producing the resins and phenol plastics at the plastics plant by January 1, 1991.

But the people do not want to wait that long, and cannot wait that long. Their thoughts today are of a possible

ecological catastrophe, unknown diseases, and the inaction of many officials. And they have quite reasonable questions: Who is going to finally resolve this burning problem which has spawned so many different false rumors, and when? The editors address these questions personally to the UkSSR minister of health, the UkSSR minister of the chemical industry, the chief sanitation physician and head of the Sanitation-Epidemiological Organization [SEO] of the Kiev Military District. We propose to publish their responses in our newspaper.

Chazov Interviewed on Health Issues

907C0174 Moscow PRAVDA in Russian 20 Nov 89
Second Edition p 3

[Interview with USSR Minister of Health Ye. Chazov by L. Pyatiletova, under the rubric "PRAVDA Mail—Let's Read It Together": "To the Minister for a Prescription"; first paragraph is source introduction]

[Text] *USSR Minister of Health Ye. Chazov appears quite often in the press and on television. The lively debates that unfolded during his confirmation at the first session of the USSR Supreme Soviet are still fresh in our memory. It would seem that everything has been said. Nevertheless, the letters in the mail to our column are mostly addressed to him.*

[Correspondent] Yevgeniy Ivanovich, the condition of our health care sector and the reasons for it are well known. Today, however, it is not enough for PRAVDA readers to know the diagnosis of the protracted disease. They want to hear exactly when recovery will come. Is the minister confident of the prescription for treatment?

[Chazov] At this very moment, the foundation is laid for big changes that will occur not today or perhaps not tomorrow, but will begin to be felt as early as 1991-1992. Society's attitude toward health care has begun to change. There is the realization that it should no longer be kept on a diet of leftovers from "someone else's" table, but should be given as much as possible. This year our budget is 24.8 billion rubles, 26.6 billion are planned for next year, and 35 billion for 1991. Is that a lot, or a little? For the kind of work that's being done by S. Fedorov's clinic, those are crumbs! But the allocations we are receiving are almost twice those we had in 1986.

Perestroika has been under way in the sector for only two years. I start my count from the moment the "Basic Guidelines for the Development of Soviet Health Care for the Period Up to the Year 2000" were adopted by the CPSU Central Committee and the USSR Council of Ministers. The new principles of planning, financing, and management set down in them have prepared the ground for new approaches to human health. Take the outpatient-polyclinic component, which is our weakest sector. People have gotten used to seeing the district physician in the role of a dispatcher: he sends his patients to this specialist or to that specialist... But who is responsible for the patient's state of health? No one is.

A family physician is another matter. Therefore, we have started training general practitioners.

Or take diagnostic centers. Two years ago we did not even have such a concept. But today there are 26 of them: in Moscow, Leningrad, Donetsk, Tula, Vladimir, Gorkiy, and Novosibirsk... In another year there will be 35, and by 1995 there will be 150. They have modern equipment. Every center costs \$3.5 million. That, you'll agree, is a totally different level of primary care!

[Correspondent] I understand your pride, but just as one swallow does not make the spring, neither do individual innovations represent a turnaround in medicine...

[Chazov] I connect the turnaround with the new economic mechanism—it will be in operation in the sector as of 1 January. The right to dispose of the budget and the opportunity to replenish it will be fully transferred to the republic's hands. Furthermore, many people probably remember that at the congress of physicians I came out with the idea of establishing a system of state sick-pay offices. Since then I have become convinced that the matter is worth fighting for till the end, and I wrote this to Deputy Chairman of the USSR Council of Ministers L. Abalkin six months ago. I am tired of hearing from foreign delegations: Your system is good in everything except one thing—the individual has no interest in his health. Don't we ourselves realize that in our country now it is often more profitable to be sick than to work?

But think of this: every person will have an insurance policy. On average, about 74 rubles per individual will come from the budget—that's the first contribution to you. The enterprise where you work will make the second one. How much? A simple, but vitally important, example is the mortality among mothers. Our country has the highest rate—four times higher than, for example, the FRG. Can it be otherwise when almost 200,000 women work at jobs that require heavy physical labor, when 3.8 million work on night shifts, and 3.4 million work in conditions that don't meet the labor protection standards and regulations? And until the enterprise has to pay the full amount out of its own pocket for the consequences of this uncivilized state, it won't be thinking of making any radical changes!

The local soviet will also pay a certain sum into your account, and some of it will come from charitable funds... Let's say you're 18 years old, and young people rarely get sick. The money, however, is coming in every year, and it is building up. But you land in the hospital, maybe? You spend some of what has built up. Then the balance is transferred to the pension fund. Just think how you can manage your own health.

[Correspondent] The prospects look tempting. But let's get down to the sinful ground our readers walk on. As A. Novinkov reports, in the village of Aptakovo, in Ulyanovsk Oblast, almost one-half of the inhabitants, like himself, are veterans. But in that entire area, there is not one paramedic-obstetrics center, and not even a nurse.

In the city of Istra, which is very near the capital, there is an affiliate of a rayon hospital. Its wards are cold and dirty, but it doesn't seem to bother anybody except the patients. The population of the village of Magazinka in Crimean Oblast has its sad tale. The rayon health department has decided—probably, in pursuit of fashion—to reoutfit the local district hospital into a gerontological unit. Inhabitants of 12 villages are going from office to office, saying: Don't do this, what will happen to us? They're even ready to help to brace up the hospital with their personal savings. Nobody is listening to them...

[Chazov] You are talking about prospects as if they were something mythical, a notion that I categorically disagree with. Let's look at the figures. The average lifespan in the USSR in 1984 was 67.7 years, but in 1988 it was 69.5. Yes, it is shorter than in the United States, France, or Japan, but two whole years have been won back! That represents about 100,000 lives saved annually! And there's a continuing decline in child mortality and in temporary disability among workers!...

Now about the letters. The Basic Guidelines plan the construction of 14,000 paramedic-obstetrics centers. In order to draw attention to them—otherwise Gosagroprom has to build with its own money—I traveled almost all over the country and spoke wherever I was, whether it was at meetings of the party and economic aktiv or at sessions of supreme soviets of republics. In Vitebsk Oblast, local party bodies stirred up all kolkhozes and sovkhozes, and with their participation these problems have already been eliminated. However, in the Nonchernozem zone, the situation for now is the worst of all, and that includes Ulyanovsk Oblast. I discussed this at the March Plenum of the CPSU Central Committee, and all the necessary decisions by party and Soviet organs are in place. But does the Union minister really need to go to every oblast, take somebody by the hand, and make him build paramedic-obstetrics centers?

[Correspondent] Of course, not. But what should be instead?

[Chazov] What I said: local independence and responsibility. Without them, it'll be impossible to raise the material-technical base, which must be literally rebuilt in the next three years. According to the data of the State Committee for Statistics, the buildings of one out of 11 hospitals and one out of 12 polyclinics are unsafe and are to be demolished. We are now building more than ever. However, about 200 million rubles earmarked for construction have yet to be appropriated!

Of course, to simply put a place in order, it's not at all necessary to wait for new mansions—I'm talking about Istra. That is fully within the powers of the Moscow Oblast Health Department. I will also state unequivocally with regard to the district hospital that without the inhabitants' consent, no one has the right to make the decision to close it or turn it into something else.

[Correspondent] It would be good to have that on paper!

[Chazov] There's no need to invent anything. There are the Fundamentals of Health Care Legislation of the USSR and Union Republics. They state clearly that health care is to be managed by local soviets. If deputies think that people need a district hospital more than a gerontological unit, any of our departments must comply.

[Correspondent] People have to reckon with financial difficulties. But they don't want to then have to write them off for nothing but rudeness, indifference, and incompetence from the medical profession, the consequences of which are irreparable mistakes, emotional traumas, and even the death of patients.

[Chazov] Do you know what I fear most of all? Suppose we rebuild everything, buy the best equipment, and the physician remains the same—stamped with the seal of indifference and even heartlessness. I was brought up in a physician's family, and I cannot help but compare: physicians of the old school had a totally different morality. Why has corrosion occurred? That's a long story. Think about how we used to grind out physicians—600,000 in 20 years, exactly as many as during the previous 45-50 years. Now we see that some higher educational institutions simply have to be closed, because they turn out "semifinished products," and immediately we encounter the opposition of local organs. I would very much like to make medical collectives our allies. What is the situation now? I am a good physician, but next to me sits another—he does nothing, yet I don't care. From now on we will give the collective a wage fund and a "fork": decide on your own who is worth what.

[Correspondent] The powerful have power! For example, the wife of a local manager works as a physician. Isn't it clear where the "fork" will tend to go?

[Chazov] The certification commission, which includes representatives of technical supervisory services and public organizations, may choose to not confirm the rate set by the chief physician. How principled the representatives of the collective are in these organizations depends on the collective itself.

However, with respect to incompetence and negligence... Many times I have raised the issue of taking away the certification of physicians on whose conscience are the people they didn't save. Jurists object. However, with the certification we have, nevertheless, declared about 10 percent of the physicians only conditionally suitable, and that represents almost 80,000 people. All of them are forbidden to do independent work with patients until they are retrained.

Moreover, a supreme certification commission under the direction of USSR Academy of Medical Sciences Academician Komarov has now been established. It can withhold a physician's right to work in a specialized medical field for three years. The basis for such a judgment is not necessarily the death of a patient—it could even be just the worsening of his condition.

[Correspondent] Can the letter to PRAVDA by the Chulin family from Salavat in the Bashkir ASSR, which is convinced that its daughter died through the fault of physicians, be submitted to this commission for investigation?

[Chazov] Yes, we will report the results.

[Correspondent] You mentioned wages. Unfortunately, in themselves they are still not a guarantee of high-quality medical services. Cooperatives are a convincing example of this. They have inflated the prices of their services to an absurd level, but, alas, they have no obligations to patients. Readers point out that at one time Comrade Chazov supported only health-promoting cooperatives and came out against treatment cooperatives. Meanwhile, not many of the latter cooperatives have been established. Perhaps the minister's position has changed?

[Chazov] No. Medical cooperatives are supposed to supplement the existing network of polyclinics, not replace them or be set up at state polyclinics. The USSR Council of Ministers reached such a conclusion when it adopted on 24 October a decision to, first, strictly control their activity and stop the inflation of prices; and, second, to establish favored treatment for the development of state cost-accounting medical institutions.

[Correspondent] Moscow residents V. Ivanov and D. Radutskiy share that point of view. However, they cite a fact of life that directly contradicts that: a homeopathic hospital whose construction cost the state 4 million rubles was transferred from the cost-accounting network to a cooperative.

[Chazov] In accordance with a decision of the executive committee of the Moscow City Soviet, the cost-accounting status was returned to the homeopathic hospital. In order that similar cases not be repeated, managers of state medical institutions are now banned from joining cooperatives.

[Correspondent] I think departmental medical-sanitary units were also established for the purpose of expanding the medical network and for people's convenience. But as a result, in some places affiliation with them has become an obstacle to treatment near one's home, in a territorial polyclinic. L. Komarova was denied treatment by the Moscow Polyclinic No. 60 according to her place of residence, and when her disease became aggravated, she had to use three forms of transportation to get to the medical-sanitary unit. For the husband of Ye. Churkina from Sukhinichi in Kaluga Oblast, a similar case ended in tragedy. In both cases, the refusals were justified by the existing order of the USSR minister of health.

[Chazov] The latter of those cases is nothing but a crime. Emergency assistance must be given by any medical institution, regardless of its affiliation. The physician who refused it should be tried.

[Correspondent] Sometimes it is impossible to get a response from the court. Perhaps professional courts of honor should be introduced?

[Chazov] The commission under Komarov's leadership is a unique court of honor itself. We also support the establishment of such courts in localities. However, there have, in fact, been disagreements between departmental and territorial polyclinics. They were financed from the same budget, and it turned out that two physicians were seeing the same patient, while another patient could not get even to one physician. The Supreme Soviet adopted a decision to the effect that departments would maintain medical-sanitary units at their expense. The citizen has the choice as to where he wants to be treated—according to his place of work, or according to his place of residence.

[Correspondent] You say, a choice. But can he go abroad for treatment?

[Chazov] We have agreements with a number of countries on the exchange of patients, but we send a pitiful number of patients to them. It has to do with currency—as a rule, ministries assume the payment. Foreigners are also eager to come to us for treatment, in particular, to the Moscow Cardiological Center, which, along with the American center near Washington, is considered the most advanced in the world. A. Livshits's Spinal Center and S. Fedorov's and G. Ilizarov's clinics are "competitive" on the world market. If there is a proper base, we will also be able to fight for preeminence in other areas. But I understand that the question of foreign countries didn't come out of the good life. We are ready to provide consultation with Moscow's best specialists to the person who needs help.

[Correspondent] Good, but people will not travel to Moscow for pills and there are very many letters about the lack of drugs. Recently, PRAVDA discussed in detail the meeting of the Politburo of the CPSU Central Committee, which was devoted especially to this matter. What can you add to this?

[Chazov] By the new year, we will provide cardiological, anti-tuberculosis, oncological, and diabetic drugs to all those who need them.

I hope that things will not get to the point of needing coupons for contraceptives, as it is written here. Hormonal and intrauterine contraceptives have been bought and produced according to the need. A total of 450 million contraceptive devices will be on sale this year, and two imported lines for their production of a capacity of 1 billion units will be put into operation next year.

[Correspondent] Yevgeniy Ivanovich, PRAVDA readers are puzzled about your silence in connection with A. Kashpirovskiy's television shows. The physician's supporters ask why he does not have students, followers and, finally, a clinic. However, his opponents look at it this way: the Ministry of Health is silent. That means, it's playing into his hands. He doesn't need currency, he

doesn't have to work with physicians—let people be treated at the television screen, he says...

[Chazov] I met Anatoliy Mikhaylovich. He is a phenomenon and that's why, as he himself thinks, he cannot have students. We have proposed the establishment of one or two laboratories for the study of his experience, but so far he has not given his consent. Are his appearances of any benefit? I believe that they are of benefit to people, who have undergone psychological and emotional stress that caused a diseased state. But I don't believe that it is possible to cure cancer in such a way. All this notwithstanding, Kashpirovskiy is a physician and a psychotherapist, and he is very careful in his appearances.

[Correspondent] Working correspondent L. Vasilenko from Mariupol in Donetsk Oblast writes the following to us: "I would like to know precisely when the needs of stomatologists will be met fully and what is being planned to get this key sector of medicine out of its extremely neglected state?"

[Chazov] Instead of an answer I will give you this small box as a gift. This is the first sample of a dental-filling kit for use by stomatologists and produced by a joint Soviet-American venture. It has just gone into production in Kharkov, and polyclinics have already received the first 1,000 sets off the assembly line. Whereas previously a filling lasted a maximum of six months, a filling made from these materials is guaranteed to last a minimum of three years.

[Correspondent] Thank you very much. I think that physicians and inhabitants of the settlement of Sinda in Nanayskiy Rayon, Khabarovsk Kray, where I am about to go, will be very pleased with your gift. But in the Far East—and all over the country, for that matter—there are many more people who need such materials. When will they get these remarkable kits?

[Chazov] During the first half of the new year. But you have not asked me another question.

[Correspondent] Which one?

[Chazov] Concerning group narrow-mindedness. For example, in Leningrad the situation with the oncological service is very bad. We began to build a hospital in Pesochnoye. The people made a fuss and began demonstrations demanding a halt to construction. But are any of those demonstrators immune to cancer?

Or you could ask how many types of medical equipment labor collectives refused to make for us. The collectives—not the managers! About 300 types. Only one-half of the orders for scalpels have been accommodated! There is no bleaching powder for the disinfection of hospitals, but the Ministry of the Chemical Industry says, "We are closing production of it!"

So, what then do I hope for? What should all of us hope for? For society's recovery in the literal and figurative sense.

Editorial note: Letters from the following people were used in this interview: A. Novikov (village of Aptakovo in Ulyanovsk Oblast); N. Ponomarev (city of Istra in Moscow Oblast); N. Chernenko (village of Magazinka in Crimean Oblast); A. Larionov (city of Sverdlovsk); the Chulin family (city of Salavat, Bashkir ASSR); V. Ivanov, D. Radutskiy, L. Komarova, and Kh. Abramov (city of Moscow); Ye. Churkina (city of Sukhinichi in Kaluga Oblast); L. Vasilenko (city of Mariupol in Donetsk Oblast); Ye. Shishkina (city of Leningrad); M. Dolgov (city of Mogilev); Ye. Yeletska (city of Odessa); V. Tonchiyev (city of Smirnov in North Kazakhstan Oblast); D. Tsedrik and S. Gomelskiy (city of Kherson); A. Sleptsova (city of Voronezh), and other readers.

Hospital, Polyclinic Construction Figures

907C0177 Moscow STROITELNAYA GAZETA
in Russian 15 Nov 89 p 1

[Article with commentary by L. Domaruk, chief of the Main Administration of Capital Construction and Procurement, under the rubric "Social Sphere: Health Care Facilities": "A Building for the Patient and the Physician"; first two paragraphs are STROITELNAYA GAZETA introduction]

[Excerpts] Medicine takes care of us, even the healthiest ones, throughout our lives. However, it does not take care of us in the best way. And much of the problem stems from the acute shortage of modern medical institutions of all types—ranging from medical schools to rural hospitals, from maternity homes to research centers.

For expressly this reason, there has been a considerable increase in budgetary appropriations for the development of the material-technical base of health care. At the present time, our medicine receives 21 billion rubles of state capital investments per year. However, how are they being used? How is construction of health care facilities proceeding? This is the subject of the selected articles. [passage omitted]

Report for First Three Quarters of 1989

Hospitals built (in thousands of beds)

| | Annual target | On line | Percent fulfillment |
|---------------------------------|---------------|---------|---------------------|
| RSFSR | 27.94 | 7.39 | 26 |
| Moscow gorispolkom ¹ | 1.76 | — | — |
| Moscow oblispolkom ² | 0.39 | 0.02 | 6 |
| Leningrad gorispolkom | 0.12 | — | — |
| Ukraine | 6.39 | 1.94 | 30 |
| Belorussia | 1.16 | 0.38 | 33 |
| Uzbekistan | 5.2 | 2.03 | 39 |
| Kazakhstan | 1.99 | 1.17 | 59 |
| Georgia | 0.91 | 0.11 | 12 |
| Azerbaijan | 1.33 | 0.16 | 12 |

| | | | |
|--|-------|-------|----|
| Lithuania | 0.57 | 0.12 | 21 |
| Moldavia | 2.12 | 0.1 | 5 |
| Latvia | 0.34 | — | — |
| Kirghizia | 0.49 | 0.4 | 82 |
| Tajikistan | 0.69 | 0.31 | 45 |
| Armenia | 0.84 | 0.28 | 33 |
| Turkmenia | 0.94 | 0.4 | 43 |
| Estonia | 0.35 | — | — |
| Totals | | | |
| Union republics | 51.25 | 14.79 | 29 |
| Customer services of ministries and agencies | 21.75 | 6.41 | 29 |
| Nationwide | 73 | 21.2 | 29 |

Polyclinics built (in thousands of visits per shift)

| | Annual target | On line | Percent fulfillment |
|--|---------------|---------|---------------------|
| RSFSR | 69.67 | 19.68 | 28 |
| Moscow gorispolkom | 13.16 | 3.42 | 26 |
| Moscow oblispolkom | 1.01 | 0.53 | 52 |
| Leningrad gorispolkom | 4.35 | 0.53 | 3 |
| Ukraine | 13.85 | 5.86 | 42 |
| Belorussia | 9.21 | 4.71 | 51 |
| Uzbekistan | 9.97 | 5.08 | 51 |
| Kazakhstan | 5.42 | 2.44 | 45 |
| Georgia | 2.4 | 0.95 | 39 |
| Azerbaijan | 3.1 | 0.75 | 24 |
| Lithuania | 1.65 | 0.6 | 36 |
| Moldavia | 4.82 | 2.66 | 55 |
| Latvia | 0.37 | 0.25 | 68 |
| Kirghizia | 2.2 | 0.76 | 35 |
| Tajikistan | 2.75 | 1.74 | 63 |
| Armenia | 1.6 | 0.73 | 46 |
| Turkmenia | 0.87 | 0.61 | 70 |
| Estonia | 2.14 | 0.44 | 20 |
| Totals | | | |
| Union republics | 130.02 | 47.24 | 36 |
| Customer services of ministries and agencies | 53.73 | 13.26 | 25 |
| Nationwide | 183.75 | 60.5 | 33 |

Footnotes:

1—city soviet executive committee; 2—oblast soviet executive committee

Nationwide, 53% of the annual plan for state capital investments for construction of health care projects was realized, the figures being 51% for RSFSR, 44% for Leningrad, 45% for Georgia, 34% for Armenia and 33% for Moscow Oblast.

Comments of L. Domaruk, Chief of the Main Administration for Capital Investments and Procurement:

This year we are completing the certification of medical institutions nationwide; the process was begun about a year and a half ago (results have already been reported for six republics). It will enable us finally to gain a complete idea of the devastation, if one can so describe it, of the present material-technical base of our medicine. In order to preclude distorted and embellished information, we are performing the certification down to what is called the primary level: special cards are being filled out by local administrators of health care institutions, rather than by oblast or city controllers. We also enlisted regional institutes, which not only analyze the results, but also perform a preliminary check of their reliability.

What do the initial results tell us? About a third of our treatment facilities are housed in makeshift buildings, often with no hot water or central sewage system, and four percent do not even have electricity. There are virtually no properly equipped pharmaceutical warehouses in our country. Hospitals and polyclinics are overfilled and cannot cope with the flow of patients.

And so, because of all this, during the 13th Five-Year Plan, state capital investments for us are planned to increase to a level that is slightly more than three times that of the 12th Five-Year Plan, to 25.4 billion rubles. In order to accomplish this difficult task, it will be necessary to start an enormous number of projects as early as in 1990: as a rule, builders require more than a year to produce our facilities. We went to the government and the USSR Gosplan with a request for the allocation next year of an additional 630 million rubles for these purposes (chiefly for starting construction of maternity and pediatric facilities, of which there is the most acute shortage). We were even supported by the USSR Supreme Soviet's commission for health care. However, for the time being, the planning agencies have promised us no more than 140 million, and consequently we are planning in advance for the failure of the next five-year target.

The argument of the USSR Gosplan is that we are not even utilizing what we have. That is reasonable, and the results of the first three quarters of this year seem to illustrate that rather graphically. Even the RSFSR, which has the most decrepit material base for medicine, is scuttling the plans. And there are so many problems in Armenia and central Asian republics! For this reason, I consider it imperative to formulate the problem as follows: so long as the contractors involved in our construction projects are subordinated solely to the ministries of Union republics, it is virtually impossible for us to influence their performance. There are a lot of holes all over the place, and, of course, they get to fixing ours just about last.

We need to have specialized contracting organizations that are capable, incidentally, not only of doing contract work, but also of building specific hospitals, pharmacies

and maternity homes—that would also enhance the competence of specialists working here. For Moscow and the vicinity, by the way, we have already established our own trust, Soyuzzdavstroyremont, which does 12 million rubles worth of work annually. Moscow also has the Mosstroy-17 trust, which is concerned chiefly with health care projects, even though it is subordinated to the Mosstroy Committee. This practice should be expanded. Furthermore, the technical base of such contractors should be reinforced.

New approaches to construction of medical institutions also require higher qualifications in the people involved in it—after all, now a hospital bed, for example, costs not 17,000 rubles, as it did before, but 34,000, and 40% of these funds must be used for equipment. However, in the structure prevailing at the present time, we are multiplying drawn-out construction projects as we did before, we are ruining plans, and we are delivering poor facilities.

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Use of an Automated Screening System to Reveal Pulmonological Patients

907C0193A Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 6, Jun 89 pp 35-36

[Article by A. V. Nikitin, A. M. Studenko, N. V. Shepilov, B. M. Pereverzev, N. V. Grabovskaya and Ye. F. Yevstratova, Department of Propaedeutics of Internal Diseases (director—Doctor of Medical Sciences A. V. Nikitin) of the Voronezh Medical Institute imeni N. N. Burdenko, and the Voronezh Oblast Medical Information and Computer Center for Health Control and Disease Prevention]

[Text] A program for providing universal clinical treatment and examination to the population—the most effective method of implementing the preventive direction of our public health—is soon to be introduced. There can be no doubt that this objective may be reached only with the use of modern computer technology making it possible to establish large diagnostic centers with a high throughput. Such centers can easily be programmed to examine different groups of patients, and particularly to reveal chronic illnesses of respiratory organs. Examination of pulmonological patients is all the more urgent because thus far, fluorography has been practically the sole method of actively revealing them. It is commonly known that the possibilities of fluorography are limited, and that it can reveal only pulmonary pathology that is already distinctly evident.

A flexible technological automated screening system (GITASS), operating at the Oblast Medical Information and Computer Center for Health Control and Disease Prevention under the Voronezh Oblast Public Health Department, was used to examine 1,549 persons with the goal of early detection of pulmonary disease. Because of programming and technical difficulties and the large

volume of work required, the system was developed in stages. A working model was developed in the first stage (1982-1985). The main objective of this stage was to create the necessary foundation for further efforts to develop organizational, medical, mathematical, technical and program support to the GITASS, and to debug and test it out. The quality of medical examination using the working model was insured by participation of the developing physicians in the examination, together with middle-grade medical personnel. An experimental clinical test showed that the model was able to work well.

A GITASS ready for duplication was created in the second stage. This system was now able to carry out the full volume of medical examinations of different population groups on the basis of programs approved by directive documents: The most commonly employed instrumental and laboratory forms of analysis were automated, and the system was coordinated with the automated clinical treatment and examination control system.

The third stage of development, which is proceeding today, entails purposefully selecting and optimizing the volume of analyses and signs recorded, and substantiating the examination methods employed and the recommendations arrived at by the system.

The GITASS includes the following subsystems: "Registration," "Medical History," "Anthropometric Measurements and Instrumental Analyses," "Laboratory," "Functional Diagnosis," "Objective Data Collection." The "Registration" subsystem is used to collect personal information, determine the volume of analyses required and organize information on prior illnesses and on work, social and personal conditions. "Medical History" interviews the patient in interactive mode, asking 53 questions and providing 187 possible answers. The "Anthropometric Measurements and Instrumental Analyses" subsystem consists of medical instruments connected to a computer and operating automatically. "Laboratory" carries out biochemical and clinical analyses of blood and urine semiautomatically. "Functional Diagnosis" is equipped with apparatus for taking and automatically interpreting EKGs using an Elektronika-60 computer. The "Collection of Objective Data" subsystem collects information on the basis of specially formatted cards developed with regard for utilizing the capabilities of middle-grade medical personnel.

The entire analysis complex is carried out by one physician and 11 nurses. The system uses Soviet quantity-produced computers and medical equipment primarily. Medical instruments are connected to the computer by way of a unified printed board developed specially for this system. The positive qualities of the GITASS were revealed in the course of its operation: high throughput (up to 10,000 persons per year), fast examination (not more than 1 hour), acquisition of a large volume of

information, and the possibility for automatically adjusting the diagnosis in connection with change in analysis volume.

In order to determine the possibilities of the GITASS system for revealing pulmonological patients, 1,549 patients visiting a polyclinic were examined. A control group of 60 subjects participated at the beginning of the study in order to confirm the correctness of the diagnosis made by the automated system. The dispensary medical examination cards of these control subjects, which additionally provided spirometric data, the results of a doctor's examination, and coded fluorographic and EKG data of the subjects, were analyzed simultaneously. Comparison of the diagnostic conclusions of the GITASS with diagnoses by physicians revealed 100 percent agreement in relation to classes of disease. The accuracy of diagnosis within the class of infectious-inflammatory pulmonary diseases was 93 percent for chronic bronchitis, 80 percent for bronchial asthma and 50 percent for acute pneumonia. This research showed that the GITASS is capable of 100 percent agreement in diagnosis in relation to disease classes; within the class of bronchopulmonary diseases, the diagnosis of chronic bronchitis is sufficiently reliable, while the programs for diagnosing acute pneumonia and bronchial asthma require further improvement by the introduction of additional differential diagnostic tests.

As far as the frequency of detection of infectious-inflammatory pulmonary diseases in the examined subjects is concerned, it was revealed to be as follows: Affliction of the bronchopulmonary system with dominance of bronchitis symptoms was revealed in 18.3 percent, affliction of the bronchopulmonary system with dominance of pneumonia symptoms was revealed in 8.6 percent, and affliction of the bronchopulmonary system with dominance of bronchial asthma symptoms was revealed in 1.1 percent. Thus the signs of chronic affliction of the bronchopulmonary system were revealed in 28 percent of patients coming to the polyclinic.

Chronic bronchitis patients were the largest group. The small number of bronchial asthma patients revealed can possibly be explained by the fact that automatic screening diagnosis of this disease requires further detailed study of the symptoms and an analysis using a system of additional functional parameters.

The research demonstrated the effectiveness of using the GITASS for early detection of persons suffering chronic bronchopulmonary diseases. The system makes it possible to establish the group of patients requiringto dispensary registration, and to subject these groups to prompt preventive and therapeutic measures making it possible to reduce temporary incapacitation.

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Insurance-Based Health Care Advocated

907C0316 Moscow PRAVDA in Russian 4 Jan 90
Second Edition p 3

[Article by Professor Yu. Belenkov, deputy chairman of the USSR Supreme Soviet Committee for Protection of Public Health, under the rubric "Tribune for People's Deputies": "Money for Medicine"; first paragraph is source introduction]

[Text] Not only has criticizing our public health become fashionable, but it seems that it has also become a positive thing to do. In terms of the level of criticism it receives, the medical profession medicine is probably second only to trade workers and our builders. I think that we need to seriously analyze the causes that have brought medicine close to collapse and determine the ways out of the crisis.

What are the principal negative trends? First of all, there is the left-over principle of financing. When expressed in terms of gross national product, our country spends less on health care than not only developed capitalist countries, but also most socialist countries.

Next there is a gap between the creation of centralized consumption funds and the quality of medical care rendered in the republic, the region and the enterprise. This has led to a virtually total lack of economic interest in the improvement and preservation of health both on the part of the individual citizen and on the part of the enterprise in which he works. We have gone from free medicine—or more accurately, medicine "of no value"—to health "of no value" for the toilers.

The particular way in which the budget has been drafted over the course of many years has stimulated growth of gross indicators (the number of doctors, the number of beds and so on), but not of the quality of health care. This, in combination with the absence of a relationship between taxes and the provision itself of medical care, leads to a large number of unjustified referrals to treatment institutions. The rigid budgetary system of financing also limits the use of expensive medicinal preparations and diagnostic equipment, because that is possible only by cutting other expenses.

The absence of an economic interest has led to a decline in the average level of training of medical personnel and the social prestige of the profession and, thus, to a decline in the level of medical care. That is, to a shortage of highly skilled workers and a general surplus of doctors.

Finally, this has led to the appearance of a shadow economy in medicine.

What, then, is the way out of this situation?

The simplest way out is this: Let's increase financing of public health. This is necessary in principle. However, as research by specialists shows, capitalist countries that have a state-backed health care system—there are four in

all (England, Denmark, Ireland and Italy)—spend considerably more than the USSR on health care, but still have many problems similar to ours.

Thus, we need to change the very principles underlying the organization and financing of medical care. Although the state structures in developed countries vary widely, those countries generally possess a similar health care system—insurance-based health care.

What is insurance-based health care? It is a state system of socialized health care financed by three sources—targeted contributions by enterprises (business owners), targeted contributions by the workers themselves (generally in the form of an imposed tax), and monies coming from the state both from the budget and from various centralized funds, including charitable funds. This system of medical care embraces all blue and white collar workers and their families. It is also used by retired persons, students and small businessmen. As a rule, a large part of the expenses are covered by social funds and the state budget—from 70 to 90 percent. The rest are covered by funds of business owners (8-20 percent) and by the workers themselves (5-10 percent). As a rule, retired persons, students and persons with low incomes are excused from making these contributions.

Insurance covers payment of the expenses associated with treatment, including surgery, hospital examinations and visits, and outpatient examination and treatment. The overwhelming share of the expenses of drugs, eyeglasses and prosthetics, patient transport expenses and the cost of sanatorium treatment are also paid for. The insurance company resolves all financial matters between the patient and the medical institution. There may be only a few insurance companies in the whole country, as in Japan, or several thousand, as in the FRG. In the overwhelming majority of the countries, they are state institutions, but they may also be joint stock companies or privately held companies, as in the USA, for example. It should be noted, however, that even private insurance companies in the United States belong to their own association, which regulates the general principles of their activities rather rigidly.

What are the advantages of insurance-based medicine?

First of all, let me repeat once again that this is a state system. The share financed by the budget is provided by the same consumption funds, and they are under the direct control of the state. The sector is managed by the government. The centralized financing makes it possible to provide social guarantees of health care to the entire population.

One important feature of insurance-based health care is a reasonable combination of state and local financing—that is, centralized and decentralized financing. The decentralized part of the financing makes it possible to locally solve problems concerned with preferential development of a given field of medicine, depending on local conditions, and to provide a greater or lesser degree of social uniformity in the level of the health care provided.

Insurance-based health care also makes each individual personally interested in maintaining his health. First of all, the size of insurance policy premiums depends on state of health and on the presence of risk factors such as excessive weight, smoking, or frequent use of alcohol. These things are revealed by physical examinations and, when necessary, by another, unbiased party. Every insurance company has contracts with clinics for these purposes. On the other hand, good health means not only a lower insurance premium, but also certain insurance benefits—pension supplements, for example.

Finally, insurance-based health care provides a possibility for making the wages of medical workers and the income of the treatment institution directly dependent on the quality of treatment and diagnostic care rendered.

It would be wrong not to say something about a number of problems always encountered in countries developing insurance-based health care. First of all, they spend more on medicine than countries with health care financed by the state budget alone. The increase ranges from 5-6 percent to 7-9 percent of the gross national product. Moreover, observers note a tendency toward artificial inflation of prices for new examination methods, toward prescription of analyses and procedures unneeded by the patient, toward a larger number of operations than necessary, and so on. These negative tendencies are monitored by the government, by insurance companies, and by public medical and nonmedical organizations.

And so, should we introduce insurance-based health care into our country? I think so. But we should not forget that this will not be an easy path. First of all, we need to realistically understand that we will not be able to set it up tomorrow by simply issuing an order. We need fundamental changes in tax policy and in the principles for setting up the budget and public consumption funds both centrally and regionally. That is, the transition to insurance-based health care must be a component of general economic reform, and it must be based on the principles of republic-level cost accounting and local self-management.

The principles for it must also be laid out in the new Law on State Enterprises. With that, I do not exclude the possibility of not only a phased transition, but also of differences in the schedule of transition in various regions. For example, I was able to acquaint myself with what, in my opinion, are interesting proposals from the Latvian Physicians' Society on restructuring health care within the framework of republic-level cost accounting. Insurance-based health care is viewed as the basis of these proposals.

I think that the RSFSR can also shift to the new conditions of organizing medical care on a region-by-region basis, as each becomes ready. In general, though, this process should proceed from two angles. On one hand, at the state, republic and regional levels with preparation of the appropriate laws and with reorganization of tax and investment policy. On the other hand,

at the level of health care institutions and of the sector as a whole. An important step here is the introduction of a rate of payment schedule for treatment—that is, calculations of how the actual costs of treatment, various forms of surgery, and various examinations. That would make it possible to determine treatment costs and, based on that, to draw up a budget for treatment institutions and wage scales for physicians and medical personnel. The Mikrokhirurgiya Glaza Interbranch Scientific and Technical Complex, the Institute of Cardiovascular Surgery imeni A. N. Vakulev, the All-Union Scientific Center for Surgery and a number of other institutions are already operating in this way.

It is already possible for contracts to be drawn up between enterprises and treatment institutions for the provision of treatment and preventive care, with monies allocated from social development funds or enterprise profits on the basis of standardized treatment costs. The next step could be to make deductions from the profits of enterprises into a regional budget for health care needs. Moreover, these deductions could differ according to the presence of harmful working conditions, the ecological cleanliness of the workplace, and other conditions.

In the future, republic, rayon and city health care funds could be supported by various sources of monetary income.

The reorganization of the health care system must be based on the actual conditions evolving in our country. This is why we also need to think about ways of insuring not only staff members of state enterprises, but also people such as staff members of cooperatives, lessees, self-employed persons, and joint venture personnel. It is here, in the new economic conditions of the activities of treatment institutions, that the solution to the problem of medical cooperatives probably lies—not a prohibitive solution, but one based on economic advisability.

And finally, the main component of insurance-based health care is insurance offices or companies. We will need to determine how and where they are to be created—within the framework of the state insurance system, independently, or within the USSR Ministry of Health and republic ministries—or we need to seek other organizational forms. In any case, we need to discuss not a fragmentary system of medical insurance, but an integral system.

Child Mortality Statistics

907C0319B Moscow *RABOCHAYA TRIBUNA* in
Russian 31 Jan 90 p 2

[Article by Candidate of Economic Sciences A. Levin, under the rubric "Social Arithmetic": "Danger in the Cradle"; first paragraph is source introduction]

[Text] **Our country occupies one of the last places among the world's developed countries in child mortality. Twenty-third, to be exact. And although this indicator has decreased somewhat in our country in recent years, almost**

one out of every 40 children born each year does not live to see the end of the year. In other words, nearly 25 out of every 1,000 children that are born die in the first year of life. This is approximately 2.5-fold higher than in the USA, twofold higher than in Cuba, fourfold higher than in Sweden and fivefold higher than in Japan.

Child mortality varies considerably over the country's territory. It is highest in the Turkmen SSR, where 53 out of every 1,000 infants die in the first year of their life; in Tajikistan the number is 49, and in Uzbekistan it is 43. And the lowest numbers are in the Baltic republics, in Belorussia and in the Ukraine (11 in Latvia, 12 in Lithuania, 13 in Estonia and Belorussia and 14 in the Ukraine). In 1988, in the Russian Federation, 19 out of every 1,000 children born died in the first year of their life.

But even these generally rather high indicators of child mortality in our country are clearly understated. How can that happen? In order to make the real situation seem better, personnel of maternity hospitals often label the death of a born child as a miscarriage. There is also evidence that parents do not record the deaths of infants with civil registry offices.

These facts were revealed by inspections carried out by state statistical organs. According to their information, the failure to account for child mortality was as high as 86 percent in certain regions of the Central Asian republics, 60 percent in the Transcaucasian republics and Moldavia, 50 percent in the RSFSR and 19 percent in the Ukrainian SSR. As a result, actual child mortality in rural areas of the Central Asian republics and in the Kazakh and Azerbaijan SSR is 1.5-2 times higher than shown by the figures on recorded cases.

What do our young children die of? Among all medical causes, respiratory diseases are in first place: Almost a third of all children who die in the first year of their life die from that. Child mortality resulting from this cause is especially high in the Central Asian republics, where according to data of the USSR Goskomstat [State Committee for Statistics] it is 22 times higher than in the Baltic republics.

Among other causes of child mortality, the most widespread are infectious and parasitic diseases and digestive tract diseases. Once again, the Central Asian region retains the unfortunate first place. According to data of the USSR Goskomstat, out of the total number of children that died in 1988 due to acute intestinal infections, 80 percent died in the Central Asian republics and in Kazakhstan: Mortality resulting from this cause increases by a factor of 10-20 there in the summer months.

But it would probably be wrong to explain the high child mortality in our country solely by medical causes. All of this is a derivative of profound social misfortune and, above all, of the living and working conditions of women. For example, 71-87 percent of the women in oil extracting, gas, chemical and petrochemical, and oil

refining industry and in ferrous and nonferrous metallurgy and the construction materials industry do heavy and harmful work. And this of course cannot help but affect the health of the workers themselves and their progeny. According to data of the USSR Goskomstat, 12 percent of women in childbirth had anemia, while in the Central Asian republics and in Kazakhstan and Moldavia this indicator was even higher—from 17 to 30 percent.

The low level of medical services to pregnant women, a considerable percentage of whom lack regular medical supervision, also contributes to the causes of high child mortality. In 1988, some 17,000 pregnant women never visited a physician or gynecologist once; moreover, more than half of these women live in the Central Asian republics.

Many maternity hospitals are in an extremely dilapidated state. A selective survey conducted with the participation of the USSR Goskomstat showed that out of 500 surveyed maternity hospital buildings, over a third require constant repairs, more than a fourth need major repairs, 11 percent of the maternity hospitals need serious rebuilding, while 6 percent need to be torn down. Elementary conveniences are lacking in many childbirth institutions: Twenty percent of the maternity hospitals do not have baths or showers, 10 percent lack hot water, 4 percent lack central heating, 3 percent lack a sewage system, and 2 percent lack plumbing. Hence the unsanitary conditions and the spread of sepsis, the incidence of which is growing catastrophically: According to data of the USSR Goskomstat, in 1988 sepsis was found in 7,000 women in the postpartum period, which is 40 percent more than in 1987.

At the same time the plans for opening maternity hospitals funded by state capital investments are chronically failing: They were only 73 percent completed in 1988.

The high child mortality indicators are also associated with ecological problems.

There is one other cause of high child mortality: The poor material status of large families. It was established that in large families, the fourth, fifth and subsequent children die much more frequently than do the first and second children in ordinary families. According to data of the USSR Goskomstat, 21 out of every thousand first-born, 23 out of every thousand second-born and 43 out of every thousand fourth and subsequent children die in their first year of life. And this is directly associated with unfavorable living conditions in large families.

So, what must be done to rectify the situation? The answer I think is obvious: raise the level of maternity services in our country, build more maternity hospitals, create favorable working conditions for women, improve the ecological situation, and expand production of food products for children and upgrade their quality. And of course, improve material assistance to mothers of large families.

New Healthcare Structure Proposed

904D0041A Moscow TRUD in Russian 11 Jan 90 p 4

[Article by M. Krylov, Candidate in Technical Sciences: "A Proposal: More Profitable to Provide Better Medical Care"]

[Text] Our medicine is preparing to shift to economic management methods. The system of funding health care based on the number of residents in the district has been selected. If an oblast, for instance, has 1 million residents, then, given annual budgetary allocations of, say, R45 per person, it gets a total of R45 million from the budget. The funds will be spent on treatment and disease prevention, with the remainder given to doctors to spend independently, on salaries, building repairs, equipment, housing construction, etc.

But should experimentations in this area be considered finished? We do not think so. A discussion has begun in earnest on shifting to so-called insurance medicine, which in many forms is widely practiced in the West. From this point of view, this model of reorganizing and shifting medical care in the country to economic accountability may be useful.

On the one hand, I will speak as a patient, or a consumer, and, on the other, as a man of science, one who is used to analyzing facts and phenomena. Why are we unhappy with our medical care?

It is basically funded by the state budget and because of this is termed "free." But, as the proverb goes, there is no free lunch. The budget is funded mainly by levies on business activity of enterprises, which under economic accountability come directly from workers' pockets.

Moreover, this "for-pay" system is not managed well: accountability breaks down since funds disbursed by the treasury belong to no one. Fixed salaries of medics do not depend on results of their labor and provide no guarantee to the patient that he will get quality care. As to paid medical care, it is simply highway robbery since workers, having paid for medical care from their pockets, are now forced to pay once again to the self-financed clinic, the cooperative or the private practitioner, which violates the principle of social justice.

What is it that I propose? The money allocated to medical care should be given back to enterprises based on approximately R90 per employee annually. (This number is derived by dividing the proposed health care budget of R25 billion by the total population figure.) The money will comprise the fund for treating all members of the collective, but every person will have the exclusive right to make use of his share. As a rule, employees will not get this money in cash but will be able to transfer it through the bookkeeping department to the medical institution of their choice, where they will get treatment when they need it. Doctors will be paid only for days when the employee is healthy and reports to work or is on vacation, with payments suspended automatically whenever he is unable to work. In special cases, such as

during business trips, treatment funds could be paid to employees in cash and receipts for treatment honored at the payroll department, with the funds drawn from the annual medical allowance.

Funds to treat retirees will be transferred to social security offices and those to treat children to public education entities. Retirees will decide themselves how to use their share, while parents will make this choice for children below a certain age.

The clinic will issue its patient a standard book of coupons which will be submitted to the bookkeeping department of the enterprise, the sovkhoz or the kolkhoz, to the social security office, to the public education department, etc., for regular transfers of money to the clinic's account. Or else, patients could pay cash for treatment: they will pay the cashier at the clinic and the coupon book will be stamped accordingly. Other ways are possible as well, but the essence remains unchanged: all medical facilities will be self-financed and the patient will have the right to choose which one he wants to use.

Large labor collectives could establish their own medical facilities and maintain them at their expense, without however constraining their employees who should still have the right to be treated wherever they wish. The right to guaranteed medical care should entail freedom of choice, too.

Outpatient clinics and hospitals must be reorganized. There is no need to divide their functions. Any medical facility should provide all forms of treatment as well as the necessary specialization or universalization. This will be better for the patients and for the doctors. Naturally, once medical institutions become fully self-financed and self-managed, their labor collectives will decide all work-related issues themselves. Initially, medical institutions should get their facilities and equipment free.

Once clinics become independent, there will be no need for intermediary management structures and rayon, city and oblast health care departments will be abolished. The union and republic health care ministries will change their functions, too. They will continue to exercise control over treatment methods, professional qualification requirements and training and retraining of medical personnel, as well as assess, approve or reject new drugs and treatment methodologies and finance promising scientific research and academic science.

What are the advantages of the proposed model? The population will get a raise in their budgets and everyone will know how much his treatment costs. This will be a disciplining factor encouraging people to stay healthy. To promote the healthy way of life, clinics may reward non-smoking, non-drinking, athletic citizens who never fall ill by refunding them a portion of their money at year end. Also, citizens, cooperatives and all other organizations may transfer to their clinic's account other funds,

including money earmarked for special purposes such as for disposable hypodermic needles, thus protecting themselves from infection.

The number of employees at the clinics will fall, salaries will go up and the quality of care will rise: they will get as much as they earn and will treat people well, so as to keep patients from returning for additional treatment: poor treatment will not be profitable while good treatment will be. Referrals for a second opinion, to finish up treatment elsewhere or, for difficult patients, to see specialists will not be profitable since all those unprofessional activities will be paid for out of the clinic's own pocket.

Of course, the Ministry of Health Care will need a reserve fund to treat the chronically ill, for epidemics, natural disasters, etc.

Clearly, alongside the proposed model a small municipal health care network should also be retained, as well as ambulance services and a group of luminaries treating for cash. But I am convinced that a majority of citizens will prefer the health care model I have outlined here.

Chernobyl Workers Protest Health Care

904F0089A Moscow TRUD in Russian 13 Feb 90 p 2

[Article by A. Dzhapakov, TRUD correspondent, Sverdlovsk: "Payment for Courage: What Forced the Chernobyl Heroes to Take Extreme Measures?"]

[Text] At Hospital No 21 in Sverdlovsk eight heroes from yesterday—participants in liquidating the consequences of the accident at the Chernobyl AES (or as they are now called even in official documents "liquidators")—announced that they were going on a hunger strike. These people, overstrained and weakened by illness, decided upon this last, desperate step in order to at least attract society's attention to their misfortune.

In eager rivalry they told me that this strike was not about the deadly danger of their work on the roof of the second block and at other heavily damaged sections, but about how they, who had lost their health, were separated from their families, were treated unkindly at work and how their requests and concerns were disregarded.

Between stays in the hospital one of them lives in a bathhouse because there is no longer any room for him at home, where he left his family. V. Novichkov, a worker at a worsted textile kombinat, has been in the hospital for eight months. During this time nobody from the enterprise, not even the trade union committee, visited him.

Why do I insist on calling them heroes? Here is the opinion of P. Ramzayev, director of the Institute for Radiation Medicine, RSFSR Ministry of Health, and an expert at the World Health Organization:

"One has to have great courage in order to work in the zones where these people were. Their advancement into

the area was fraught with deadly risk. They all knew that. They all experienced serious psychological problems that could not but leave traces. The most frightening thing of all is that radiation is an invisible death. It requires much more courage than to face a danger that one can see."

Everywhere the Chernobyl veterans encounter the attitude: "What are they complaining about? They went there for the easy money, benefits and awards—now they are paying for it!" But it was not that way at all.

They did not go on their own. These eight, like many others, were called to an ordinary military reserve muster. Without asking for their agreement, they were sent to Chernobyl. This fact shows heartlessness at the state level. Even in war, authorities ask for volunteers for the most dangerous missions. So they did not go for the benefits... At the accident site they were promised big rewards. There was talk about large bonuses; they were even given papers showing this. Not a one with whom I talked obtained anything. After returning home they appealed to various authorities for benefits, but they only shrugged their shoulders...

And now they are paying for the negligence of those who caused the accident. For the complete disregard others showed for their legal right to refuse to go to that zone of death.

The "liquidators" are paying the debts of others. And at what a price! At Chernobyl each of them received a 25-roentgen dosage. This is a small amount, not enough to cause any special illness. Some of these young men felt bad right after returning home, while for others it took a year or two. They began to get severe headaches; the muscles in their arms and legs grew weak and sudden fainting became more frequent. At Sverdlovsk they were sent to Hospital No 21, where they now spend more time than at home. They are discharged, but in a month or so are back again in the ward—they are sick to death of its grimy walls.

L. Kokhno, the deputy chief doctor and the chief hematologist in the city, thinks: "The entire clinical picture points to radiation sickness. But we cannot state that officially. The diagnosis, written in their papers, is a low dosage."

In accordance with USSR Minzdrav Order No 731, the right to make an official conclusion about the linkage of their sickness to their work at the accident belongs only to a specially created expert council in Kiev. It is the only one in the country. It is almost impossible to go there; one has to be summoned. L. Khokhno has repeatedly sent requests to Kiev; most of the time they are unanswered.

The "liquidators" themselves travelled from the Urals to Moscow. Only one of them, V. Zavarzin, was able, after great labors, to have his "dosage changed." However, this did not alter his unfortunate situation.

The official dosage is a stumbling block not only for obtaining benefits. A low dosage means that the illness is not linked to radiation and must be treated as an ordinary illness.

"I cannot treat them," says L. Kokhno, "nobody can, except specialists at the Main Third Administration at Minzdrav."

The Third Administration is a special zone for our health care. There everything is secret, including the methods for treating the consequences of radiation. One can only think that there are sick people who are suffering, there are doctors who can treat them, there are medicines and, probably, some achievements in this area of medicine. But people continue to suffer under the press of an incomprehensible, unfathomable secret.

This situation cannot be called anything but outrageous.

The "liquidators" themselves explained about how the dosage was determined at Chernobyl. There was no serious monitoring; some dosages were determined by eye. There were sections in which one could be for only a few minutes or even seconds. Nobody seriously kept track of this. If you lingered there, then it was estimated that you were there only the allowed time and that you received only the authorized dosage. Even the "liquidators" did not pay any attention to the figures being entered in their papers. It was new to them. At that time who among them could think that these little numbers, entered by an indifferent hand, would have such an effect upon their later fate?

A small dosage means that one is classified as disabled only on general grounds. A disabled person 30 to 40 years old is paid a 70- to 120-ruble pension. Medicines alone cost more than that! Work? Find work for a welder, driver or lathe operator where they will not strain themselves, periodically faint and spend months in a hospital. A pension equal to average earnings at one's previous job will be paid only to somebody whose illness is linked to cleaning up after the accident. To make this "linkage" one needs a high dosage in one's papers.

The benefits are in this vicious circle, a wheel grinding out their fate. However, nobody can see them, for they too are secret.

I saw a list of benefits for an individual with radiation sickness. It had a "Secret" stamp on it. Secret benefits—this is incomprehensible! Who is the government decree for and where are these benefits enumerated? For the workers of special units, the first departments, who, having signed for these documents, will not show them to anybody? To no one—not even to the patients, their trade unions or workers at institutions and organizations who are to pay these benefits.

There is much in these papers—about apartments without waiting, telephones, sanatoria-health spa treatment, etc. The patients really need all this. Think about the one who is living in a bath, think about the frequent need to call for first aid.

"People who worked at Chernobyl during 1986-1987 received considerable, poorly monitored, radiation," says G. Zubovskiy, chief radiologist for RSFSR Minzdrav and

deputy director of the ministry's Institute for Roentgenology and Medical Radiology. "They can have a wide range of illnesses, but most often these are linked to radiation exposure. They need medical monitoring, examinations. They need to frequently leave their jobs, where, of course, this is not welcomed. They should stay in a hospital for at least five months and not less than four months at a time each year. They need better nutrition, sanatorium-health spa treatment and many other things."

G. Zubovskiy came to Sverdlovsk to show the hunger strikers a package of such benefits worked out at Minzdrav. They were not very convinced. This package still had to make its way through the government.

Later they agreed to end their hunger strike, after A. Leonov, deputy chairman of the Sverdlovsk Oblispolkom, firmly promised to meet all their demands. Also, he promised that there would be an oblispolkom decree granting benefits to those suffering from radiation sickness. This would be similar to benefits for other types of illnesses, but would be linked to work at Chernobyl. Perhaps the government will finally pay attention to the misfortunes of those who were at Chernobyl?

According to rough data, there are about 3,200 "liquidators" in Sverdlovsk Oblast alone. There are probably hundreds of thousands in the far corners of our vast motherland. They need rehabilitation centers and, of course, specialists. If there are not enough, then it will simply be necessary to reveal the secrets of the Third Administration and to teach methods of treating the consequences of radiation to ordinary, "non-secret" doctors.

G. Zubovskiy thinks: "Neither we nor specialists in the Third Administration, can determine the actual extent of exposure. Without this it is impossible to give these patients skilled care. In order to learn the actual dosage we need materials concerning work at the accident. These documents are stored at the Ministry of Defense and the Ministry of Atomic Power. The Ministry of Health has repeatedly gone to these ministries with requests to give these materials to doctors. Every time they have been refused. The only thing we have achieved is the military commissariat's authorization to obtain such data. But after we had flown back to Sverdlovsk, there was nothing at the oblast military commissariat. And why is there a military commissariat here? It is nothing but extra red tape. **Doctors need materials; without them we cannot really help the patients.**"

For so many years we have been proud of the rights of Soviet citizens embodied in our constitution. How many of them have been refused to yesterday's heroes of Chernobyl? They have also been deprived of unwritten rights. They are unwritten because they are natural for any society. These are the rights to the state's recognition and thanks to citizens who have risked their lives carrying out its orders and the right to a good attitude of others to

people whose suffering is not their own fault. Even those whose misfortunes are their own fault have a right to compassion...

Here is another frightening fact: three of the "liquidators" in Sverdlovsk have killed themselves.

Institute for Juvenile Oncology Created

907c0062C Moscow *SOVETSKAYA ROSSIYA* in *Russian* 29 Aug 89 2nd Edition pp 4

[Interview of Professor L. Durnov, director of the Children's Oncology Clinic at the USSR Academy of Medical Sciences's All-Union Science Center for Oncology: "The Best Medicine is Optimism: Institute for Juvenile Oncology Created"]

[Abstract] Recent developments in Soviet oncological care have witnessed the establishment of the Scientific Research Institute of Juvenile Oncology at the All-Union Scientific Center for Oncology. The institute was created in an attempt to rectify the neglect that this area of pediatrics has suffered in comparison with the advanced countries, with support coming from the Children's Fund imeni Lenin. As explained by L. Durnov, head of the children's clinic at the All-Union Center, the institute will establish and coordinate a network of oncologic services for children across the USSR, as well as serve as a leading training center for pediatric oncologists. Every attempt will be made to alter the prevalent attitude that childhood cancer is a terminal disease and to follow the American model where hope, a positive outlook, and emotional support in conjunction with the latest in medical technology are combined in a holistic approach to this special aspect of pediatric practice.

UDC 578.833.21:578.427].08

Isolation of Viruses of Antigen Complexes of California Encephalitis and Bunyamvera (Bunyaviridae, Bunyavirus) From Mosquitoes in Northeastern Asian Continent

907C0130d Moscow *VOPROSY VIRUSOLOGII* in *Russian* Vol 34 No 3, May-Jun 89 (manuscript received 5 Feb 88) pp 333-338

[Article by S. D. Lvov, V. L. Gromashevskiy, Yu. V. Voropanov, V. P. Andreyev, T. M. Skvortsova, Ye. I. Usacheva, G. A. Dmitriyev, O. V. Voltsit, A. A. Shilov, A. M. Butenko, A. A. Kuznetsov, N. G. Kondrashina, T. N. Morozova, Ye. A. Gushchina, Ye. A. Bystrova, S. M. Klimenko, N. N. Shchipanopv, V. B. Grigoryev, A. D. Avershin and G. V. Bogoyavlenskiy, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences; Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental data are reported on isolation of bunya viruses from mosquitoes collected in July-August of 1986 in tundra, forest-tundra and northern taiga regions of Kamchatka Oblast and the Chukotsk Autonomous Okrug of the Magadan Oblast. The collection points were within an area extending from 53°N lat to 69°N lat and from 156°E long to 177°E long. In viral studies carried out on 2-day-old mice, seven strains of the California encephalitis complex (Tahyna-like [Tyaginya] strains) were isolated, as were four of the Bunyamvera complex (Batai-like strains); both complexes were found in all geographical areas involved. Virus-neutralizing antibodies were identified in serum specimens of reindeer and among humans inhabiting these territories. No antibodies to the Uukuniemi virus were found. These data resembled the results of analogous studies on the North American continent. It was shown that mosquito-borne viruses of the California encephalitis antigen complex are circulating in the northeast of the Asian continent (as they have been shown to be in northern Europe and North America). Figures 2; references 15: 3 Russian, 12 Western.

Mutations May Not Be Chernobyl-Related

907C0318B Moscow PRAVDA in Russian 12 Dec 89
Second Edition p 6

[Interview with Professor Tamara Ivanovna Buzhiyevskaya, doctor of medical sciences and head of the department of medical genetics at the Kiev Institute of Postgraduate Medicine, by PRAVDA correspondent M. Odinets: "Concerning Eight Legs..."; first paragraph is source introduction]

[Text] A photograph of a foal with eight legs was circulated during one of the recent meetings of the USSR Supreme Soviet as evidence of abnormalities resulting from the accident at the Chernobyl Nuclear Power Plant. We asked Prof T. Buzhiyevskaya, doctor of medical sciences and head of the medical genetics department of the Kiev Institute of Postgraduate Medicine, to comment on such a photograph.

[Buzhiyevskaya] The fact that such an animal was born makes it necessary to seek the causes of the phenomenon. Congenital developmental defects are not all that rare among the progeny of animals and man. They have been known since ancient times, and they have often been portrayed in works of art. Recall Saint Sixtus in Raphael's "Sistine Madonna." He had six fingers on his right hand.

A congenital developmental defect may be the consequence of harmful environmental factors acting directly on the developing fetus during pregnancy. Such factors are radiation, chemicals and viruses.

[Odinets] Is it true that chemicals are more highly mutagenic than is radiation?

[Buzhiyevskaya] Yes, of course. However, the mutagenic action of radionuclides is still poorly studied. We need to know the frequency of appearance of abnormalities—that is, the relative figures, and not the absolute figures that journalists and politicians are now using. To say, for example, that seven or a hundred piglets on a farm were born with one eye and to photograph foals with abnormal limbs are very emotional things to do, and they make an impression, but they do not prove anything. After all, we don't know things like, The defects occurred among how many animals born? How had things been before then? What are things like in other regions? That is, we know nothing of the changes that have occurred over time, and there's no monitoring in terms of space. Until statistical treatment is carried out and the population is sampled adequately, nothing can be asserted.

We need to take into account hereditary pathology. We need computers, we must create a data bank, and unless additional funds are forthcoming, no one is going to involve himself in gathering these data and working them up. The country does not possess a register of hereditary diseases, and the frequency of this pathology is unknown. We know that the frequency of congenital defects worldwide averages 2-3 percent of all births. But what is the percentage in different regions of our country? A few isolated papers have been written, but these data are just beginning to be published this year.

[Odinets] A great deal of work has recently been going on in the Ukraine to create a network providing medical genetic services to the public.

[Buzhiyevskaya] Yes, an order of the UkSSR Ministry of Health published last year divided the Ukraine into eight regions, and in each of which an interblast medical genetics center was created. Much attention is being devoted to providing these centers with personnel, equipment and reagents.

[Odinets] People are worried about how the doses they received will affect their progeny.

[Buzhiyevskaya] I can say in this regard that the genetic effects of the Chernobyl accident would hardly show up in individuals in the first generation. They would be more likely to show up in the third or fourth generation. But our conscience would not allow us to wait tranquilly for 75-100 years. Sound genetic observations of agricultural animals that would make it possible to obtain these data (for different generations) rather quickly. We can find answers concerning the danger of the genetic consequences of the Chernobyl accident even faster by conducting experiments on laboratory animals. Such experiments are already being carried out in parallel with genetic monitoring of newborn infants. This research is financed by the UkSSR Academy of Sciences within the framework of the scientific-technical program "Ecology of the Impact Zone of the Chernobyl Nuclear Power Plant." There are also plans for studying earlier effects of radiation on human health.

Scientific research and the neutralization of the consequences of the Chernobyl accident would be more effective if everyone did what they were supposed to do: if the scientists learned the truth and publicized it, if the doctors treated people, and if the politicians made the decisions. As long as politicians demand that scientists implement practical measures to neutralize the consequences of the accident, and that physicians implement measures to calm the people and to fight "radiophobia," the effort will move forward very slowly, and many mistakes will be made.

UDC 612.014:616.588.6

Study of Effect of Allogenic Tumors Extracts on Development, in Calves, of Experimental Infection by Bovine Leukemia Virus

907C0099 Kiev *EKSPERIMENTALNAYA ONKOLOGII* in Russian Vol 11 No 3, May-Jun 89 pp 26-28

[Article by R. A. Kukayn, L. I. Nagayeva, S. V. Chapenko, T. N. Ilyinskiy, L. A. Vitolin and A. K. Auzinya: "Study of Effect of Alogenic Tumors Extracts on Development, in Calves, of Experimental Infection by Bovine Leukemia Virus"]

[Abstract] Immunization of calves with allogenic tumors extract made it possible to study the possibility of

protection from experimental infection by cattle leukemia virus. Brown Latvian calves (8) (8-10 months of age) from a herd susceptible to leukemia kept on an isolated farm of the scientific-experimental farm "Sigulda" underwent immunization by extracts of tumors of the lymph node and abomasum of 3 cows with leukemia, by the Opita and Olson method. Immunization did not induce elaboration of antibodies to antigens of the virus nor affect the course of spontaneous virus infection. Infection of immunized animals by lymphocytes of blood of leukemic cows produced development of infection in 100 percent of the cases. The data indicated that successful protection of the cattle from cattle leukemia virus is impossible without induction of antiviral antibodies and therefore immunization of the animals with aviral extracts is inadvisable. References 15: 8 Russian; 7 Western.

UDC 578.828.6.04:615.275].085

**Effects of Immunomodulators on HIV-1
Production In Vitro**

18400573C Moscow VOPROSY VIRUSOLOGII in
*Russian Vol 34 No 2, Mar-Apr 89 (manuscript received
10 Jan 88) pp 171-174*

[Article by S. L. Nesterchuk and I. F. Barinskiy, Institute
of Virology imeni D. I. Ivanovskiy, USSR Academy of
Medical Sciences, Moscow]

[Abstract] An analysis was conducted on the effects of
selective immunostimulants and immunosuppressors on
HIV-1 production in H9 cells. The H9 cells grown in
RPMI-1640 medium with 10-15% bovine embryonic
serum. The resultant data demonstrated that the immu-
nostimulants leikadin (USSR) and thymosin in concen-
trations of, respectively, 5 and 10 µg/ml enhanced HIV-1
replications by ca. 40%. The immunosuppressants corti-
sone and dexasone, on the other hand, suppressed HIV-1
replication in H9 cells: after 7 days of cultivation the
percentage of control HIV-1+ cells was 29.0%, vs. 5.5%
with the immunosuppressants. Furthermore, these agent
did not affect expression of the HIV-1 specific CD4

cellular receptor on the H9 cells. The fact that immuno-
stimulants have been shown to enhance HIV-1 replica-
tion suggests that induction of transcription transacti-
vator may be involved in the mechanisms of action.
Figures 1; tables 1; references 18: 2 Russian, 16 Western.

UDC 573.826.6:578.224].08

**Biosynthesis of Encapsulated Protein of Acquired
Immunodeficiency Syndrome (HIV) Virus With
Remote Hydrophobic Region in E. coli Cells**

907C0204B Moscow MOLEKULYARNAYA
GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA
in Russian No 6, Jun 89 pp 16-20

[Article by A. I. Starov, P. M. Rubtsov, Yu. A. Birkin et
al.; Institute of Applied Molecular Biology, USSR Min-
istry of Health, Institute of Molecular Biology, USSR
Academy of Sciences, Moscow]

[Abstract] The study involved construction of an env
gene fragment of HIV virus and a study of expression of
the env gene fragment obtained under control of a
"powerful" lac-promoter. Deletion of the hydrophobic
region from the env gene greatly increased biosynthesis
of antigen-specific proteins in E. coli. The low level of
protein-antigen synthesis under control of the "power-
ful" lac-promoter was tentatively associated with the
presence of a toxic peptide sequence in the synthesized
protein. Figures 3; references 14: 3 Russian; 11 Western.

International Conference on Laser Therapy Held in Tashkent

907C0176 *Moscow POISK in Russian No 30, 23-29*
Nov 89 p 6

[Interview with Vitaliy Konov, doctor of physical-mathematical sciences and head of the Department of Light-Induced Surface Phenomena of the USSR Academy of Sciences Institute of General Physics, by Lada Lyashenko, under the rubric "Details for POISK": "The Healing Beam"; first paragraph is source introduction]

[Text] An international conference on aspects of the use of lasers in medicine was held in Tashkent. Vitaliy Konov, doctor of physical-mathematical sciences and head of the Department for Light-Induced Surface Phenomena at the Institute of General Physics of the USSR Academy of Sciences, discusses its results.

[Konov] This was the first conference, which with good reason can be called a unifying one. Whereas previously physicists made up only 5 percent and medical men, 95 percent of the participants in such meetings, now their number was approximately the same.

In all, more than 500 scientists gathered at the conference. Seventy participants came from abroad especially for the meeting. Many Western firms brought ultra-modern units. Soviet lasers were also shown. Our erbium laser, which has undergone tests in FRG clinics and received the most complimentary comments, attracted particular attention on the part of specialists. That unit was considered one of the best.

[Correspondent] Vitaliy Ivanovich, scientists all over the world are now working with a new generation of lasers. In what way do they differ from the older generation?

[Konov] There are two fundamentally different types of lasers—continuous and pulsed. Until recently, continuous lasers, for the most part, have been used in medical practice, that is, lasers that act on an ailing organ during the entire therapeutic procedure, with a constant intensity. They had a number of shortcomings: they produced a large area of damage, and they had various side effects. Increasingly, pulsed lasers are being used, with optical fibers that "deliver" small amounts of radiation to the ailing organ. And if previously physicians used, primarily, laser treatment, now they are using the beam to perform the most complicated surgeries. They use lasers to "weld" vessels and to remove damaged tissue, tumors, and stones in kidneys and biliary tracts.

A unique nonsurgical technique for treating atherosclerosis—angioplasty—was developed recently: a laser destroys thrombi that are obstructing vessels. Twenty such patients underwent this treatment successfully at the Vishnevskiy Institute.

Ideal laser keratotomy—vision correction—was performed at the Mikrokhirurgiya glaza [Eye Microsurgery] Interbranch Scientific-Technical Complex for the first

time in the world. A surgeon uses a laser beam to produce perfect vision in highly myopic or hyperopic individuals.

[Correspondent] Vitaliy Ivanovich, you are talking about our major clinics, which are quite difficult to get into? What is the situation with modern laser units in ordinary city or rayon hospitals?

[Konov] We will not, of course, be able to provide such units for each and every hospital in the next few years. There are several reasons for this. The main one lies in the fact that our industry does not keep pace with scientific developments. At best, we'll have small-lot production of laser units. In the West, firms that produce such units are shouldering the entire chain of production—from design to industrial manufacture.

For us at the moment, working up joint ventures with Western firms represents the only possibility of our setting up series production of medical lasers. Let us hope that one such venture will appear in the very near future.

We must see to it that the laser ceases to be a source of wonder to our surgeons, even if they work in a small rayon hospital.

UDC 615.849.19.03:617-089:061.3(100)"1988"

International Symposium on Lasers in Surgery and Medicine

907c0108B *Minsk ZDRAVOOKHRANENIYE*
BELORUSSII in Russian No 7, Jul 89 pp 69-71

[Article by S. I. Leonovich, docent, and Yu. M. Gain, candidate of medical science, Minsk]

[Abstract] An international symposium on lasers in surgery and medicine was held in Samarkand October 18-20, 1988. It was attended by some 560 participants, including 57 delegates from abroad. The meeting concentrated on laser physics, interaction with biological tissues, laser applications in general and abdominal surgery, urology, gynecology, otorhinolaryngology, and ophthalmology. Special sessions dealt with photodynamic therapy in oncology, intravascular blood irradiation, and the expanding use of low-intensity soft lasers. Finally, administrative and economic aspects of the medical use of lasers were also given due consideration. Evaluation of this modality in the USSR has shown that there are 21 specialized centers dealing with laser applications in medicine and that lasers are in regular use at 527 medical facilities, encompassing 323 cities. It has been estimated that the use of lasers results in a cost reduction amounting to several billion rubles over conventional technologies in the USSR alone. In Belorussia, medical laser technology is largely undergoing development at the Institute of Physics, Belorussian SSR Academy of Sciences, and is currently being applied at 20 medical establishments in such cities as Minsk, Gomel, Brest, Grodno, and Vitebsk.

Exhibit of Western Medical Devices in Moscow

907C0171B Moscow *MEDITSINSKAYA GAZETA*
in Russian 8 Sep 89 p 3

[Article by *MEDITSINSKAYA GAZETA* correspondent Yu. Bliyev, under the rubric "Exhibitions": "Packaging is an Important Matter"; first paragraph is source introduction]

[Text] An international exhibit "Upakovka-89" [Packaging-89] is under way in the pavilions of Moscow's Sokolniki park. At first glance the thematic material of the exhibit would seem to be quite remote from medicine and public health. Reliable, clean packaging is necessary for today's sanitation and hygiene requirements. However, the exhibit does have booths that have a very direct connection to medicine.

The West German firm Hilovi has exhibited an automatic device for cleaning and disinfecting laboratory utensils. It can be operated with control based on 16 computer programs. An assembly for washing, sterilizing, filling containers, labeling, and packaging drugs was of considerable interest to representatives of the pharmaceutical industry. Hilovi equipment has performed exceptionally well at enterprises and hospitals in Moscow, Leningrad, Kiev, and Minsk. Trade with Soviet partners has come to one and one-half million marks.

Machinery from the Transkojekt firm of the FRG produces precision parts for the medical sector. The machinery is of high quality, is accurate, and ensures a high degree of purity. Casting, labeling, assembly, and packaging are all done in clean rooms. This company is known in 25 countries of the world as a producer of disposable syringes. Soviet medical personnel are also familiar with this equipment—syringe production has been started on it in Tyumen. The next cooperative program between Transprojekt and the USSR calls for the building of such plants in three more cities of our country—Vormsa, Yeltsa, and Izyum. Of no less importance is the fact that our West German partners have undertaken to train our specialists at their own enterprises, where dozens of our engineers and technical personnel are undergoing training. The company has persistently striven to expand and intensify its contacts with our country and is prepared to consider any form of cooperation.

Pipenbrok is another firm that is well known in clinics and hospitals of many countries of the world. Our specialists are also familiar with its equipment for state-of-the-art purification and hygiene applications at medical institutions. The company offers unlimited services for the cleaning of hospital premises. Incidentally, the Pipenbrok company is now negotiating for the creation of a joint Soviet-West German venture. But this is just one aspect of the company's activities. At its current exhibit, the firm has displays of packaging machines for various products and articles, including medical items. Such machines include those that apportion pharmaceuticals and shrink-wrap small packets of tablets and capsules. Also displayed there are precision scales for weighing the apportioned products. The scales are automated and preclude contact with human hands.

The Finnish Feksima firm that is well known in our country also has an impressive display at the exhibit. Among the various medical items shown that attracted the attention of visitors were hygienic packaging films and other materials. The company also is exhibiting systems for storing infusion solutions.

The display of another Finnish company, Vipak, is almost completely related to medicine. Of interest here are materials for packaging sterilized instruments. Such instruments can be stored in an absolutely pure state for several years in a special packaging film. This kind of technology is indispensable to the creation of centralized services for the sterilization of medical instruments at major hospitals. First-class raw materials are used as the starting materials, and good results are obtained by the special design of the packaging itself, which withstands various stages of handling, including filling and sterilization.

The well-known West German firm Bosch has a display of packaging machines and equipment for the pharmaceutical industry. This high-precision, automated machinery satisfies the most rigid requirements of pharmacy. The Bosch firm is a multifaceted, reliable partner of drug manufacturers throughout the world. Attracting considerable attention are the automated washing machines that are designed for practically all existing types of glass packaging. Also of interest is the rapid sterilization technology which is simple and reliable. The equipment manufactured by the Bosch firm is distinguished by its efficient performance and economy.