JPRS 69561

8 August 1977

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY
BIOMEDICAL SCIENCES

No. 6

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 69561	2.	3. Recipient's Accession No.
4. Title and Subtitle TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY BIOMEDICAL SCIENCES No. 6			5. Report Date 8 August 1977 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address As above			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts

The report contains information on aerospace medicine, agrotechnology, bionics and bioacoustics, biochemistry, biophysics, environmental and ecological problems, food technology, microbiology, epidemiology and immunology, marine biology, military medicine, physiology, public health, toxicology, radiobiology, veterinary medicine, behavioral science, human engineering, psychology, psychiatry and related fields, and scientists and scientific organizations in biomedical fields.

17. Key Words and Document Analysis. 17a. Descriptors

USSR	Medicine
Aerospace Medicine	Microbiology
Agrotechnology	Physiology
Biology	Psychology/Psychiatry
Botany	Public Health
Epidemiology/Immunology	Radiobiology
Human Engineering	Toxicology
Marine Biology	Veterinary Medicine

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 2, 5E, 5J, 6, 8A

18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22151	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 71
	20. Security Class (This Page) UNCLASSIFIED	22. Price PCA04

JPRS 69561

8 August 1977

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY
BIOMEDICAL SCIENCES

No. 6

CONTENTS PAGE

CONTENTS (Continued) Page

AGROTECHNOLOGY

UDC 632.954:633.11

EFFECT OF HERBICIDES ON THE HARVEST AND TECHNOLOGICAL PROPERTIES OF WHEAT GRAIN

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian, No 4, 1977 pp 63-65

[Article by S. S. Sinitsyn, P. P. Ovchinnikov, and G. A. Dianov, Siberian Scientific Research Institute of Agriculture]

[Text] It is well known that the use of pesticides facilitates increased harvests of wheat (1-4). Yet, the effect of herbicides on technological properties of wheat grain has not been sufficiently studied, as a matter of fact in literature contradictory statements are reported. And so, on the basis of the studies in Kustanayskaya Oblast it has been established (5) that application of 2,4-D improves the quality of grain: in the Saratovskaya 29 brand of wheat the protein content increased by 1.7 percent and the gluten by 0.8-2.0 percent.

Experiments carried out under conditions of Northern Kazakhstan (6) in the Omskaya Oblast' (2) with the same brand of wheat showed that application of 2,4-D had no real effect on technological qualities of grain.

We studied the effect of herbicides on the quality of spring wheat of the Mil'turum 553 brand (1970-1972, "Omskoye" experimental-demonstration farm).

The years in which the experiments were carried out were good in respect to rainfall, but the springs were long and cold. During the vegetative period more precipitation occurred than on the average of a number of years: in 1970--67 mm more than the average, in 1971--53 and by 1972--9.6 mm more. Average air temperature in 1970 and 1972 was 1.1-1.4°C below the average of many years, and in 1971 it was on the level of average temperature. The soil of experimental sections--poorly leached out, average fertility, heavily argillaceous chernozem, the pH of salt extract--6.4, humus content according to Tyurin--8.43 percent total phosphorus content 1524-1280 mg/kg soil, free phosphorus (by the Chirikov method)--6.8 percent of total reserves, total nitrogen (by the Kieldall method)--0.239-0342 percent, and metabolic potassium 566-583 mg/kg of soil. As a rule the fields were contaminated by the weed bristly fox tail grass, amaranth, pigweed, buckwheat, hemp nettle and storkbill.

Herbicides were applied manually (water consumption--500 l per hectare). The sections measure 50 m^2, with a five-fold repetition. The weeds were measured by the weight-quantitative method of the Scientific Research Institute of Agriculture of South-east (1969).

Following herbicides were used: dosanex in doses of 4.5 and 6 kg per hectare (on the basis of the agent itself, bayyalan in doses of 3 and 4 kg per hectare (by the agent) as well as 2M-4KhP in dose of 1 kg per hectare and mixed with gezaran 25 at a dose of 1+0.2 kg of the active component per hectare.

With the use of dosanex, on the average of 3 years the weeds were diminished by 90-93 percent by their quantity and by 93-94 percent by weight. When the wheat was sprayed during the 2-3 leaves phase, dosanex was harmless towards the culture, but very toxic towards the annual grasses and dicotyledonous weeds. The grain yield in experiments with dosanex increased by 3.4-5.2 hundred weights per hectare in comparison to the nonweeded control (Table 1).

Table 1. Effect of herbicides on the harvest of spring wheat grain (hundred weight per hectare) Brand Mil'turum 553 (data of I.N. Kuzina, and G. A. Dianova.)

Experimental variable		1970	1971	1972	Average
Control		16.4	22.3	24.7	21.1
Dosanex, kg/hectare	4.5	19.3	26.1	28.2	24.5
	6	21.3	26.4	31.2	26.3
$NSR_{0.95}$ hundredweights/hectare		1.3	1.7	2.4	-
Control		19.0	17.3	21.5	19.3
Bayyalan, kg/hectare	3	19.3	20.1	24.7	21.3
	4	20.9	21.9	23.8	22.2
$NSR_{0.95}$ hundredweights/hectare		1.9	1.8	2.2	-
Control		-	20.4	23.5	22.1
2M-4KhP, 1 kg/hectare		-	20.3	23.5	21.9
2M-4KhP+gezaran 25, 1+0.2 kg/hectare		-	23.9	27.2	25.5
$NSR_{0.95}$ hundredweights/hectare		-	2.6	2.2	-

Bayyalan used at doses of 3 and 4 kg per hectare during the 1970 phase of tillering was less effective towards the weeds than dosanex: the quantity of weed was lowered by 72-75 percent, the mass by 88.3-88.7 percent.

The use of bayyalan in 1971 and 1972 during the phase of 2-3 leaves development of wheat was more effective against the weeds than its application during the phase of tillering: the yield of grain increased by 3-3.4 hundredweights per hectare in comparison to the control (cf. Table 1).

A mixture of 2M-4KhP (1 kg/hectare) with gezaran (0.2 kg/hectare) lowered the field weed content on the average of two years by 72.8 percent in respect to the quantity and 81.2 percent in respect to the mass; the grain yield increased by 3.4 hundred-weights per hectare. 2M-4KhP used at a dose of 1 kg/hectare did not affect the weeds (their mass dropped by 34.2 percent), and as a result of it the harvest was the same as that of the control.

Use of herbicides had a definite effect on technological properties of the wheat grain (Table 2). Dosanex used at a dose of 4.5 kg/hectare lowered somewhat the nature, glassiness and bread baking properties of the grain. Using a 6 kg/hectare dose resulted in an even worse situation, with the additive effect of lowered content of gluten in the grain.

In contrast to dosanex, bayyalan showed no undesirable effects on the quality of grain. The use of 2M-4KhP improved slightly the quality of grain in comparison to the control. Concurrent use of 2M-4KhP with gezaran 25 improved almost all indicators of the grain quality: of the 1000 grains, content of protein and gluten, quality of flour and bread baking properties.

Table 2. Technological Properties of Wheat Grain With Use of Herbicides

Experimental Variable	Mass of 1000 grains g	Nature g/l	Glassiness %	Protein Content %	Content of crude gluten %	Quality of gluten by the IDK unit
Average data for the 1970-1972						
Control	31.8	756	74	13.32	25.4	51
Dosanex 4.5 kg per hectare	32.4	747	67	12.88	25.2	53
Dosanex 6 kg per hectare	31.8	744	66	12.82	24.2	52
Average data for the 1970-1972						
Control	33.7	754	69	12.44	22.2	55
Bayyalan 3 kg per hectare	32.7	741	66	12.53	23.0	50
Bayyalan 4 kg per hectare	32.4	748	71	12.10	22.2	51
Average data for 1971-1972						
Control	33.6	-	64	11.90	20.1	58
2M-4KhP 1 kg per hectare	35.1	-	66	12.0	20.9	46
2M-4KhP+gezaran 1+0.2 kg/ha	35.4	-	67	12.48	23.8	46

Note: In 1972 quality of flour and gluten were not determined

Table 2 continued on following page

Alvegraph reading		Baking with sugar				
Flour Quality e.a.	p/l	Bread Volume ml	Inside appearance	Porosity	Shape of the bread	General quality of bread baking
118	1.34	416	3.6	3.6	0.36	3.3
120	2.46	397	3.4	3.4	0.35	3.1
113	2.08	382	3.3	3.3	0.35	3.0
116	2.10	414	3.5	3.6	0.35	3.2
116	2.18	413	3.4	3.5	0.36	3.3
112	1.78	417	3.5	3.5	0.34	3.2
76	3.34	442	3.4	3.4	0.35	3.3
108	2.07	475	3.5	3.7	0.40	3.6
142	2.02	476	3.4	3.7	0.39	3.6

Thus, dosanex at a dose of 4.5 kg/hectare and bayyalan in doses of 3 and 4 kg/hectare showed no real effect on technological properties of wheat grain. The herbicide 2M-4KhP, and even more so its mixture with gezaran 25 improved above properties.

BIBLIOGRAPHY

1. Krasheninnikov, N.N., Mal'tsev, V.F., The effect of fertilizers and herbicides on the harvest and quality of spring wheat grain "Khimiya v Sel'skom Khozyaystve: 1971, No 5, pp 36-39.

2. Milashchenko, N.Z., Ovchinnikov, P.P., and Larina, T.A., The effect of herbicides on the harvest and wheat grain quality. Nauchnyye Trudy Sibniiskhoza, V. 5., Omsk 1973 pp 85-88.

3. Zinchenko, V.A., and Tabolina, Yu. P., The effect of 2-year treatment with herbicides on the harvest and wheat grain quality Dokl. TSKhA, Vol. 208, 1975 pp 43-46.

4. Lysenko, A.K., The effect of herbicides on the weed content, harvest and quality of winter wheat "Khimiya v Sel'skom Khozyaystve" 1975, No 4, pp 44-49.

5. Kudasheva, L.A., Amine salt of 2,4-D shows a good effect "Zemledeliye" 1972, No 6, p 44.

6. Terekhova, M.A., Pantelimonova, A.I., The effect of 2,4-D on the technological properties of spring wheat grain. "Khimiya v Sel'skom Khozyaystve," 1972, No 11, pp 48-50.

7813
CSO: 1870

CLINICAL MEDICINE

UDC 618.39-021.6-058(470.331-25)

SOME SOCIOHYGIENIC ASPECTS OF CRIMINAL ABORTIONS AMONG WOMEN IN THE CITY OF KALININ

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 5, 1977 received 8 Dec 75 pp 19-22

/Article by V. L. Krasnenkov, Department of Social Hygiene and Organization of Public Health at the Kalinin Medical Institute/

/Text/ It is well known that induced abortion is the most widespread method of conscious birth control. At present a significant number of studies is devoted to the sociohygienic aspects of medical abortions (Ye. A. Sadvokasova; A. A. Verbenko et al.; V. K. Kuznetsov; O. Ye. Chernetskiy; D. Agadi et al.). However, very few studies of sociohygienic problems of criminal interruptions of pregnancies have been published and this problem is very urgent.

The number of criminal abortions recorded in the gynecological departments in the city of Kalinin in the last few years does not have a tendency toward reduction. Furthermore, these abortions very often end with complications. For example, whereas in 1971 a total of 2.5 percent of all the artificially interrupted pregnancies among women in the city of Kalinin ended with complications, after criminal abortions this indicator comprised 87.2 percent. Among the complications there were such serious ones as sepsis, anemia and metritis.

We studied criminal abortions among women in the city of Kalinin from a sociohygienic point of view. For this purpose we developed a special anonymous questionnaire which was filled out by women admitted with criminal abortions to hospitals in the city of Kalinin during 1971. Furthermore, the cards of the same women released from hospitals were used.

A total of 1,581 abortions begun outside a medical institution were recorded in the city of Kalinin in 1971 (13 percent of the total number of interrupted pregnancies), of which abortions with factually established criminal interruptions of pregnancies comprised 17 percent.

Only questionnaires with established criminal abortions were accepted for the study. When the collection of data was completed, 252 questionnaires filled out by women with criminal abortions proved to be suitable for processing, which comprised 93.7 percent of the total number of criminal abortions recorded in the city of Kalinin in a year.

The age composition of women based on the data of questionnaires and the cards of women released from hospitals is identical, which confirms the representativeness of the questionnaire data.

It is quite clear that it is impossible to establish the true frequency of criminal abortions, because a considerable number of them end comparatively safely for women and, naturally, such abortions are not recorded in gynecological departments. However, having data on the age composition of women who had criminal abortions and knowing the age composition of the female population in the city of Kalinin, it is possible to calculate the relative intensity of criminal abortions. This makes it possible to disclose the age groups of women where criminal abortions are most widespread. For comparison similar indicators were also calculated for women who had medical abortions.

Women 20 to 24 years of age resort to criminal interruptions of pregnancies more often. With an increase in age this indicator is reduced sharply. For example, in the next age group of women (25 to 29 years of age) criminal abortions are encountered 2.2 times less frequently than at the age of 20 to 24, which accounts for more than 43 percent of all the recorded criminal abortions.

Of all the women with criminal abortions in the city of Kalinin the proportion of unmarried women was 36.6 percent. Medical abortions among unmarried women did not exceed 11.3 percent.

A study of the dependence of criminal and medical abortions on the level of education showed that women with a higher level of education resort to artificial interruptions of pregnancies under nonhospital conditions relatively less frequently. The difference is statistically reliable.

It was disclosed that 25.5 percent of all the women with criminal abortions interrupted their first pregnancies. At the age of 15 to 19 women pregnant for the first time comprised 87.5 percent, at the age of 20 to 24, 38.6 percent, and at the age of 25 to 29, 20.0 percent. At the same time, the proportion of women pregnant for the first time among those who had medical abortions was 12.5 percent. Among women with criminal abortions 31.2 percent protected themselves against pregnancies, whereas the proportion of such women who had medical abortions was 56.8 percent.

Of definite interest is the distribution of women admitted with criminal abortions depending on the person who performed the abortion (an outside person or the woman herself). On the whole, for women of childbearing age (15

to 49) criminal abortions performed with the help of another person comprised 25.5 percent, and by the women themselves, 74.5 percent. The same ratios for 20- to 24-year old women comprised 43.2 and 56.8 percent respectively.

The comparatively big proportion of women using the services of an outside person to interrupt their pregnancies is noteworthy. Among young women (15 to 24 years of age) the proportion of such cases is much higher than for older ages. This once again confirms the need to carry out effective sanitary and educational work on problems of protection against pregnancy, especially among young people.

Of the women admitted to gynecological departments in connection with criminal abortions, those on whom a medical institution refused to perform abortions because of their advanced stage comprised 26.5 percent. The largest proportion of such cases is noted at the age of 15 to 19 (50 percent), is much lower among 20- to 24-year old women (29.5 percent) and is reduced to 14.3 percent among 40- to 44-year old women. Such a situation is quite explicable. At a young age there is a large proportion of unmarried women and women pregnant for the first time. Undoubtedly, these factors affected the desire of women to hide their pregnancies as long as possible. Furthermore, most of these women were not aware of the critical periods of pregnancy during which interruption is still possible.

In the study of criminal abortions from a sociohygienic point of view detection of their causes was of special interest. At the same time, we were more interested in the question as to why a woman did not want to have children at a given stage, not why she interrupted her pregnancy outside a medical institution. Work aimed at eliminating some causes of abortions should lead to a reduced frequency of a criminal interruption of pregnancy. Data on a previously conducted investigation of the causes of medical abortions among women in the city of Kalinin are presented for comparison /see following page/.

As can be seen from the table, the lack of a husband is the first cause of criminal abortions (27.3 percent); among women who had medical abortions this cause was indicated only in 4.3 percent of the cases.

"Lack of desire to have more children" and "shortage of living space" hold second place among the causes of criminal abortions.

All the other causes can be united into the third group.

It is necessary to note that with the exception of the first cause (lack of a husband) the proportion of all the other causes of criminal abortions is very close to the proportion of the causes of medical abortions.

Causes of Criminal and Medical Abortions According to the Data of Survey by Questionnaire of Women in the City of Kalinin (in Percent of the Total)

Cause of Abortion	Abortions	
	Criminal	Medical
Lack of desire to have more children	21.2±2.6	33.4±0.9
Shortage of living space	20.2±2.5	20.2±0.6
There is no one to leave the child home with and it is impossible to place him in a children's institution	6.1±1.5	6.0±0.5
Family trouble in connection with the husband's drunkenness	8.1±1.7	7.0±0.5
Husband and wife studying	7.1±1.6	8.5±0.6
Small family income	1.0±0.6	4.6±0.4
Sickness of the wife herself or the husband	3.0±1.1	5.8±0.5
Lack of a husband	27.3±2.8	4.3±0.4
Other causes	6.1±1.5	10.2±0.6
Total	100.0	100.0

Conclusions

1. The frequency of criminal abortions depends on the woman's age. Their greatest intensity is noted at the age of 20 to 24 and then it declines sharply.

2. The significant proportion of women of young age who underwent criminal abortions with the help of another person, as well as the large proportion of young women on whom a medical institution refused to perform abortions because of the advanced stage of their pregnancies, points out the need to intensify sanitary and educational work on problems of sex education among young people.

11,439
CSO: 1870

CLINICAL MEDICINE

SURVEY

UDC: 615.849.19.03(047)

USE OF LASERS IN MEDICINE

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY in Russian No 3, 1977 pp 78-82

[Article by I. N. Danilova and T. M. Kamenetskaya (Moscow), submitted 3 Jun 76]

[Text] One of the achievements of the 20th century is development of optical quantum generators, or lasers, which are sources of radiation of light with monochromatic (presence of only one wavelength in the spectrum) and coherent (with all electromagnetic waves in phase) properties. All this makes it possible, if necessary, to generate an extremely high concentration (density) of luminous energy over an area ranging from a few millimeters to a few microns in size, reaching rather high temperatures.

In recent years, various types of lasers have been developed for research and practical use in engineering, as well as experimental and clinical medicine.

Soviet scientists have made a large contribution to the development of lasers, particularly A. P. Prokhorov and N. G. Basov, who were recipients of the Lenin Prize in 1959 and the Nobel Prize in 1964.

Optical generators are divided into units with pulsed (ruby and neodymium) and continuous, constant (gas) action, according to nature of monochromatic coherent radiation.

The intensity of laser radiation is determined from the density of energy flux (joules per sq cm) or density of power flux (watts per sq cm).

The power of radiation, mainly of solid (ruby, neodymium) generators or generators filled with carbon dioxide, ranges from tens to hundreds of joules, so that in recent times increasing significance is being attributed to the time characteristics of radiation: duration of the pulse which, under specific modes of laser operation, is of the order of 10^{-11} s. The radiation from low-power lasers, including those made of helium and neon, ranges from a few to dozens of milliwatts.

The mechanism of action of laser radiation depends on many factors: type of laser, physicochemical and biological properties of tissues and organs (heat capacity, heat transfer, optical properties) and photochemical processes. The degree of tissular pigmentation and vascularization is of substantial significance. For example, after exposure of black mice to ruby laser radiation, their pelage is discolored (Goldman). Changes in erythrocytes are more marked than leukocytes, due to greater absorption of radiation energy by hemoglobin. The changes in different tissues and organs depend on wavelength and intensity of monochromatic coherent radiation.

In the case of high-power generators, both the high temperature of the laser beam itself and tissue heating as a result of absorption of radiation have a significant effect. In this case, changes develop in tissues on the order of varying degrees of thermal burns. Thus, radiation of ruby and neodymium lasers in the infrared region induces formation of a blister on the skin and inflammatory reaction in surrounding tissue (G. G. Shamayeva et al.; V. P. Yatsenko); it diminishes enzymatic activity of the skin (R. S. Babayants and A. P. Rakcheyev; Low et al.). In addition to the thermal factor, mechanical effects on tissues as a result of appearance of a "shock wave," which induces an "explosive effect" are significant; as a result, tissues crack or flatten out. One cannot rule out the possibility of effects on cells and tissues of endotoxins formed as a result of cellular necrosis under the influence of the laser beam.

High-energy laser radiation has primarily a destructive effect on tissues. Even brief exposure of rabbit bone to radiation from a continuous action generator filled with carbon dioxide at 8 to 10 W for 2-3 s elicits destruction of the bone with subsequent formation of a cone-shaped defect and involvement of marrow. A process of the cortical osteomyelitis type develops in bone (E. S. Mirzoyev; Fayn and Kleyn).

Exposure of the animal cranium to a focused beam of significant energy (100 J) elicits fracture and protrusion of the brain through the suture lines, instantaneous respiratory and cardiac arrest. Post mortems reveal coagulation, necrosis, effusion of blood and edema at the exposed site (Fayn and Kleyn). Degranulation of cytoplasm and mast cells develops in the skin of mice under the influence of neodymium lasers (N. V. Tsyganova). After exposing animals to ruby laser beams in an intensive mode, dystrophic changes appear in the myocardium, liver and kidneys (A. T. Raynov et al.). Exposure of the skin of the mouse belly to ruby lasers (30-50 J) induces lesions to the liver and intestine, and when the dosage is increased (300-500 J) there may be effusions in the peritoneal cavity, changes in the kidneys, spleen, pancreas and spinal cord (Fayn and Kleyn; A. A. Vishnevskiy et al., 1971a, c; L. A. Arakelyan; Arichi).

Hemolysis with release of hemoglobin are observed under the direct influence of radiation from a ruby laser (focused and unfocused beams). According to spectrophotometric data, reduced hemoglobin is subject to the most marked changes, but without changes in cyanmethemoglobin and oxyhemoglobin.

No doubt, radiation from low-power generators is of great interest to physiotherapists. Unlike high-power lasers that have a destructive effect on tissue, helium and neon lasers have a stimulating effect, according to some data. Thus, exposure of animals to helium and neon lasers of low energy (energy density of 1 mW/cm^2) at a wavelength of 632.8 nm stimulated repair and transplantation regeneration of skin, increasing its biosynthetic activity (D. L. Korytnyy; V. I. Dyuba). This was associated with appearance of isolated perivascular, lymphohistiocytic infiltrates in the skin, with an admixture of plasma cells, foci of proliferation of fibroblasts and, occasionally, stimulation of RNA in the cell cytoplasm (I. Ya. Shakhtmeyster et al., 1974; A. S. Chechulin et al., 1972, 1973; A. P. Rakcheyev).

Certain changes are observed in blood under the influence of low-energy lasers. With exposure of animals to helium-neon laser, there were phasic changes in formed elements of blood. While the erythrocyte, leukocyte, lymphocyte and thrombocyte content decreases after the first few exposures, the eosinophil and monocyte levels rise. With further exposures, only the lymphocyte level drops, without change in amount of other formed elements of blood (A. I. Semenov and V. A. Syngayevskaya; A. S. Chechulin et al., 1972; A. P. Rakcheyev). As a result of irradiation, there is a change in volume and resistance of erythrocytes.

The dosage is significant, even with reference to the same helium-neon laser. Thus, the amount of young forms of reticulocytes increases with larger doses and decreases with smaller ones (V. M. Inyushin). Single brief exposure to helium-neon laser increases the levels of basophil and polychromic erythroblasts (by a mean of 5-10%); repeated, multiple exposure increases myelocyte content, mainly referable to eosinophils, as well as amitotic activity of medullary cells, in addition to the increase in amount of young erythroblasts. (Ye. P. Smirnova).

There are indications of marked changes in the blood-clotting system under the influence of low-power lasers. There is increased production of thromboplastin and thrombin, faster clot formation and shorter retraction time (A. S. Chechulin et al., 1972).

There are contradictory data concerning changes in protein composition of blood. Some authors (I. Ya. Shakhtmeyster et al., 1973) observed some decrease under the influence of low-power lasers, while others (A. P. Rakcheyev) observed an increase in total protein referable to albumins.

Low-power laser radiation stimulates regenerative processes in the mucosa (D. L. Korytnyy; Sh. N. Askarov), bone and nerve tissues. For example, in bone tissue, there is prevalence of proliferative processes referable to the endosteum and periosteum (N. V. Gorpinko; A. F. Pavlova; B. Z. Shuyskaya), and there is faster callus formation (P. P. Chekurov).

Experiments on rats showed that helium-neon laser radiation stimulates regeneration of the neurotomized sciatic nerve and has a beneficial effect on processes of restoration of excitability (A. R. Rakhishev and V. P. Tsoy).

The first reports on the clinical use of lasers pertain to treatment of detached retina and malignant tumors of the eye. The laser beam, so to speak, welds the detached retina to the underlying choroid (S. P. Berezina; K. N. Pataraya et al.; M. B. Chutko; K. V. Trutneva et al.). In eye surgery, this beam is used without anesthesia, and healing is faster than with other methods of treatment. In ophthalmology, lasers are used not only for therapeutic, but for diagnostic purposes, for example for the detection of glaucoma.

It has been proposed that a focused laser beam, with high radiation power, the so-called laser knife or light scalpel, be used in oncology (L. S. Terent'yeva; I. G. Lagunova et al., 1971; R. Ye. Kavetskiy et al.; I. V. Kudryavtsev et al.; N. F. Gamaleya; B. M. Khromov, 1974, 1975; B. M. Khromov et al.; I. L. Lazarev). The fact that tissue is removed from a very specific site, surrounding tissues are not injured and hemorrhage is minimal is the advantage of the "laser knife" over other methods (B. V. Ognev et al.; V. I. Remizov), and the danger of infection is lower by virtue of the bactericidal effect of radiation; there is less chance of hematogenic metastases of tumor cells. Laser beams are used in cardiac surgery to correct congenital valvular stenosis of the pulmonary artery (A. D. Arapov et al.).

It should be mentioned that, with development of laser techniques, there is increasingly distinct manifestation not only of advantages, but of disadvantages of the "laser scalpel." Thus, wounds heal more slowly after the use of lasers than after an ordinary incision. Furthermore, there are still no methods of preventing thermocoagulation necrosis (Goldman). Thus far, the use of lasers in urology has not yielded beneficial results.

High-power generators are not suitable for restoration of impaired functions of the organism. For this purpose, low-energy lasers have begun to be used. Depending on the nature and distinctions of the disease, therapeutic methods involving different localization of the target site have been used (focus of lesion, corresponding reflexogenic zones, so-called acupuncture points). The duration of the treatment ranged from 20-30 s to 30 min, with 10-15 to 30 treatments per course. When necessary, the course was repeated at various intervals.

Laser radiation has been used in dermatology, in the presence of ulcers of various etiology, to stimulate regenerative processes (R. S. Babayants and A. P. Rakcheyev; R. S. Babayants et al.; A. P. Rakcheyev); it has been used in stomatology to speed up healing of the buccal mucosa in the presence of acute and chronic, recurrent aphthous stomatitis (D. L. Korytnyy). Lasers have been used in neurological practice on 60 children with cerebral paralysis, by means of direct exposure of the involved extremities, corresponding segments of the spinal cord and acupuncture points. After repeated courses of 25 daily treatments, improvement was observed in 50% of the cases (V. M. Inyushin et al.). Some good results were also obtained in the treatment of eight children with syringomyelia (T. M. Shakirova and Z. V. Burnasheva). Beneficial results were observed in children with marked encephalopathy from treatment delivered to acupuncture points and reflexogenic

regions (L. P. Strigina, 1971). An analgesic effect was obtained in the treatment of radiculitis based on dystrophic lesions to the spine, by treating reflexogenic regions and corresponding regions of the spine (L. Ya. Mazo). Helium-neon laser radiation has been used on patients with neuritis of the facial nerve (B. Z. Shuyskaya), myelitis and the spinal form of multiple sclerosis. The response to treatment of 49 patients with the diencephalic syndrome was related to the form of illness. In this instance, treatment was directed to the collar region (G. Ya. Chatskiy et al.).

In some cases, arterial pressure dropped after the first treatments among the 118 patients with essential hypertension given this therapy (U. V. Utemuratova and L. S. Sokolova). Reflexogenic regions and acupuncture points were treated in women with gynecological pathology (inflammatory processes, impairment of ovarian and menstrual function), after which ovarian and menstrual function reverted to normal and the inflammatory process diminished (Ya. Ye. Bykhovskiy et al.).

An improvement was noted in 43.3% of the 30 patients with rheumatoid arthritis, after 25-30 treatments to the involved joints: appearance of a tendency toward slower erythrocyte sedimentation rate, decreased leukocytosis and total protein of blood serum, referable to α_2- and γ-globulin fractions (Z. I. Odinets). Treatment was directed to the reflexogenic zones and regions of involved joints in cases of rheumatoid arthritis, periarthritis of the shoulder and scapula, epicondylitis and bursitis; the course of therapy was repeated when necessary (A. M. Antonov and B. M. Khromov).

Helium-neon laser radiation was used in the treatment of 28 patients with bronchial asthma; their condition improved somewhat after 10-20 daily treatments (40-50 s each). Spirographic data were indicative of improved external respiration due to increased vital capacity, inspiratory reserve and decrease to normal of minute volume of the lungs (N. N. Voronina and V. M. Inyushin). In some patients, there were changes in oxyhemographic indices (T. K. Yermukhambetov and N. N. Kugin). In 28 cases, protein and lipid content of blood serum did not change (L. V. Sayenko); however, there was a tendency toward hypocoagulation, according to the results of testing the blood coagulating and anticoagulating system (Z. R. Bekturganova).

Caution is required when working with laser beams. The eyes are the most sensitive to laser radiation, and its effect depends on the intensity of radiation and wavelength (V. V. Shikhodorov et al.). Shorter wave radiation, in the ultraviolet region, is absorbed primarily by the cornea; the infrared region is absorbed by the lens and retina, and the visible region, by melanin, blood and blood vessels. Focusing of laser radiation leads to intensification of the eye's reaction. With the same energy level, only focused radiation causes formation of cataract (P. I. Saprykin; S. P. Berezina; V. V. Shikhodorov et al.).

Functional changes in the visual analyzer and electric status of the retina develop when working with high-power lasers. Histologically, there is destruction of pigment epithelial cells, with dystrophic changes around this region, which are particularly extensive in the region of the rods and cones (L. P. Laricheva and A. F. Migacheva)

Reflected radiation, both mirror and direct, is also dangerous to sight (V. G. Artamonova; A. B. Butman et al.).

In conclusion, it must be stated that some of the data obtained under experimental and clinical conditions are indicative of some beneficial effect from monochromatic coherent radiation; however, most of the data, particularly clinical ones, are based on a small number of cases and for this reason are inconclusive; furthermore, they have not been confirmed by the results of objective investigation. For the time being, we have no comparative data on the effects of lasers and other physical factors.

The use of low-power lasers as physiotherapeutic agents is still exploratory in nature, and this is attributable to the lack of adequate information about the mechanism of action of monochromatic coherent radiation on the organism. For this reason, extensive use of lasers with the above power will become feasible in therapeutic [medical] institutions only after clearcut indications and contraindications are worked out.

BIBLIOGRAPHY

1. Antonov, A. M., and Khromov, B. M. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike" [Use of Lasers in Modern Engineering], Leningrad, 1975, p 117.

2. Arakelyan, L. A. in "Problemy diagnostiki i lecheniya khirurgicheskikh zabolevaniy" [Problems of Diagnostics and Treatment of Surgical Pathology], Leningrad, 1975, p 6.

3. Arapov, A. D.; Vishnevskiy, A. A. (Jr); Abdullayev, F. Z.; et al. EKSPER. KHIR. [Experimental Surgery], No 4, 1974, p 10.

4. Askarova, Sh. N. "Reaction of Lingual Tissues to Helium-Neon Laser Beams Under Normal Conditions and in the Presence of Burn Trauma," author abstract of candidatorial dissertation, Alma-Ata, 1974.

5. Babayants, R. S., and Rakcheyev, A. P. in "Aktual'nyye voprosy dermatovenerologii" [Pressing Problems of Dermatovenereology], Moscow, 1971, p 7.

6. Babayants, R. S.; Rakcheyev, A. P.; Konstantinov, A. V.; et al. VESTN. DERMATOL. [Vestnik of Dermatology], No 4, 1974, p 7.

7. Berezina, S. P. "Biological Effects of High-Power Laser Radiation on Tissular Elements of the Eye (an Experimental Study)," author abstract of candidatorial dissertation, Moscow, 1973.

8. Butman, A. B.; Gudakovskiy, Yu. P.; Kovach, R. I.; et al. VOYEN.-MED. ZH. [Military Medical Journal], No 3, 1975, p 53.

9. Bykhovskiy, Ya. Ye.; Dreyzen, Yu. V.; Moshcheyeva, A. N.; et al. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine" [Use of Lasers in Modern Engineering and Medicine], Leningrad, Part 2-3, 1971, p 107.

10. Vishnevskiy, A. A. (Jr); Troitskiy, R. A.; Musonabiyev, D. S.; et al. Ibid, p 87.

11. Vishnevskiy, A. A. (Jr); Troitskiy, R. A.; Rozenfel'd, E. B.; et al. Ibid, p 83.

12. Gamaleya, N. F. "Experimental and Clinical Use of Lasers," Moscow, 1972.

13. Gorpinko, N. V. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike," Leningrad, 1975, p 116.

14. Dyuba, V. M. "Skin Reaction to Laser Radiation (an Experimental Study)," author abstract of candidatorial dissertation, Khar'kov, 1975.

15. Inyushin, V. M.; Inyushina, T. F.; Mazo, L. Ya.; et al. ZDRAVOOKHR. KAZAKHSTANA [Kazakhstan Public Health], No 7, 1967, p 33.

16. Kavetskiy, R. Ye.; Kudryavtsev, I. V.; Gamaleya, N. F.; et al. in "Ispol'zovaniye opticheskikh kvantovykh generatorov" [Use of Lasers], Leningrad, Part 2-3, 1971, p 99.

17. Korytnyy, D. L. Ibid, p 105.

18. Kudryavtsev, I. V.; Kavetskiy, R. Ye.; Baratov, Kh. A.; et al. Ibid, p 96.

19. Lagunova, I. G., et al. Ibid, p 88.

20. Lagunova, I. G.; Likhovetskaya, L. L.; Vishnevskiy (Jr); et al. Ibid, p 102.

21. Lazarev, I. R. "Use of Lasers in the Treatment of Skin Tumors," author abstract of doctoral dissertation, Kiev, 1973.

22. Laricheva, L. P., and Migacheva, A. F. in "Biologicheskaya i Meditsinskaya Elektronika" [Biological and Medical Electronics], Sverdlovsk, Part 3, 1972, p 113.

23. Mazo, L. Ya. in "Materialy mezhrespublikanskoy konferentsii kurortologov Kazakhstana i respublik Sredney Azii" [Proceedings of Interrepublic Conference of Balneologists of Kazakhstan and Central Asian Republics], Alma-Ata, 1970, p 39.

24. Mirzoyev, E. S. "Morphological Changes in Bone Tissue Under the Influence of Laser Beams (Experimental Study)," author abstract of candidatorial dissertation, Leningrad, 1972.

25. Ognev, B. V.; Vishnevskiy, A. A. (Jr); Troitskiy, R. A.; et al. in "Biologicheskaya i meditsinskaya elektronika," Sverdlovsk, Part 3, 1972, p 118.

26. Odinets, Z. I. "Trudy Kirgizskogo nauchno-issled. in-ta kurortologii i fizioterapii" [Works of the Kirgiz Scientific Research Institute of Balneology and Physiotherapy], Vyp 9, 1972, p 101.

27. Pavlova, L. F. in "Ispol'zovaniye opticheskikh generatorov v sovremennoy tekhnike," Leningrad, 1975, p 115.

28. Pataraya, K. N.; Goguadze, I. I.; and Kalandadze, N. I. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 78.

29. Raynov, A. T.; Popova, N.; and Andreyeva, T. KURORTOL. I FIZIOTER. [Balneology and Physiotherapy] (Sofia), Vol 13, 1976, p 45.

30. Rakcheyev, A. P. "Use of Laser Radiation in Dermatological Practice," author abstract of candidatorial dissertation, Moscow, 1973.

31. Rakhishev, A. R., and Tsoy, V. P. in "Obshchiye zakonomernosti morfogeneza i regeneratsii" [General Patterns of Morphogenesis and Regeneration], Alma-Ata, 1972, p 83.

32. Remizov, V. I. in "Problemy diagnostiki i lecheniya khirurgicheskikh zabolevaniy," Leningrad, 1975, p 37.

33. Saprykin, P. I. "Investigation of Applications and Determination of Optimum Parameters of Laser Intervention on the Anterior and Posterior Segments of the Eye (Experimental and Clinical Studies)," author abstract of doctoral dissertation, Moscow, 1974.

34. Semenov, A. N., and Syngayevskaya, V. A. in "Biologicheskoye deystviye lazerov (dozimetriya, primeneniye v meditsine i zashchita (Tezisy dokladov respublikanskogo simpoziuma)" [Biological Effects of Lasers (Dosimetry, Use in Medicine and Protection)(Summaries of Papers Delivered at a Republic Symposium)], Kiev, 1969, p 59.

35. Smirnova, Ye. P. in "O biologicheskom deystvii monokhromaticheskogo krasnogo sveta" [On the Biological Effects of Monochromatic Red Light], Alma-Ata, 1967, p 76.

36. Strigina, L. P. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 107.

37. Terent'yeva, L. S. Ibid, p 104.

38. Trutneva, K. V.; Avetisov, E. S.; Urmakher, L. S.; et al. in "Biologicheskaya i meditsinskaya elektronika (Materialy 4-y Vsesoyuznoy konferentsii)" [Biological and Medical Electronics (Proceedings of 4th All-Union Conference)], Sverdlovsk, Part 3, 1972, p 124.

39. Utemuratova, U. B., and Sokolova, A. S. in "Materialy 2-y Mezhrespublikanskoy konferentsii kurortologov Kazakhstana i respublik Sredney Azii," Alma-Ata, 1970, p 35.

40. Fayn, S., and Kleyn, E. "Biological Effects of Laser Radiation," Moscow, 1968.

41. Khromov, B. M. KLIN. MED. [Clinical Medicine], No 11, 1974, p 9.

42. Idem, in "Izpol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike," Leningrad, 1975, p 105.

43. Khromov, B. M.; Frygin, N. V.; Mel'nikov, A. P.; et al. "Nauchnyye trudy Leningradskogo in-ta usovershenstvovaniya vrachey" [Scientific Works of Leningrad Institute for Advanced Training of Physicians], Vyp 97, 1971, p 45.

44. Tsyganova, N. V. BYULL. EKSPER. BIOL. [Bulletin of Experimental Biology], No 12, 1973, p 29.

45. Chatskiy, G. Ya.; Utemuratova, U. B.; and Prikhodchenko, N. G. "Trudy Kirgizskogo nauchno-issled. in-ta kurortologii i fizioterapii," Vol 9, 1972, p 79.

46. Chekurov, P. P. in "Ispol'zovaniya opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 81.

47. Chechulin, A. S.; Yakunin, G. A.; Shakhtmeyster, I. Ya.; et al. in "Biologicheskaya i meditsinskaya elektronika," Sverdlovsk, Part 3, 1972, p 125.

48. Chechulin, A. S.; Shakhtmeyster, I. Ya.; Val'tseva, I. A.; et al. in "Modelirovaniye, metody izucheniya i eksperimental'naya terapiya patologicheskikh protsessov" [Modeling, Investigative Methods and Experimental Therapy of Pathological Processes], Moscow, 1973, p 205.

49. Chechulin, A. S.; Yakunin, G. A.; Shakhtmeyster, I. Ya.; et al. Ibid, p 207.

50. Chutko, M. B. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 102.

51. Shakirova, T. M., and Burnasheva, Z. V. in "Svet geliy-neonovykh lazerov v biologii i meditsine" [Helium-Neon Laser Beams in Biology and Medicine], Alma-Ata, 1970, p 33.

52. Shamayeva, G. G.; Chekhlov, V. I.; and Likhovetskaya, L. D. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 90.

53. Shakhtmeyster, I. Ya.; Chechulin, A. S.; Shekhter, A. B.; et al. in "Modelirovaniye, metody izucheniya i eksperimental'naya terapii patologicheskikh protsessov," Moscow, 1973, p 207.

54. Shakhtmeyster, I. Ya.; Val'tseva, I. A.; Shekhter, A. B.; et al. VESTN. DERMATOL. [Vestnik of Dermatology], No 12, 1974, p 7.

55. Shikhodyrov, V. V.; Tolstikova, Ye. V.; and Klimov, A. D. in "Biologicheskaya i meditsinskaya elektronika (Materialy 4-y Vsesoyuznoy konferentsii)," Sverdlovsk, Part 3, 1972, p 133.

56. Shuyskaya, B. Z. "Changes in Surviving Bone Tissue Preserved in an Organ Under the Effect of Lasers (Morphological, Biochemical and Biophysical Investigation)," author abstract of candidatorial dissertation, Alma-Ata, 1975.

57. Yatsenko, V. P. in "Ispol'zovaniye opticheskikh kvantovykh generatorov v sovremennoy tekhnike i meditsine," Leningrad, Part 2-3, 1971, p 70.

58. Arichi, S. J. JAP. BALNEOL. CLIM. ASS., Vol 36, 1972, p 7.

59. Loar, J., et al. AM. J. PATH., Vol 47, 1965, p 643.

60. Goldman, L. OPT. LASER TECHN., Vol 7, 1975, p 87.

61. Goldman, L., and Rockwell, R. J. "Lasers in Medicine," New York, 1971.

10,657
CSO: 1870

ENGINEERING PSYCHOLOGY

COSMONAUTS ASSIST SPACECRAFT DESIGNERS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, 1977 pp 34-35

[Article by Engr-Lt Col V. Simayev, Cand Tech Sci: "Designer Seeks Advice From Cosmonauts"]

> [Text] Officers S. Barsukov and K. Bondarev have requested information on the way cosmonauts participate in creation of spacecraft and orbiting stations.

With their flight aboard a spacecraft or an orbiting station, cosmonauts complete the labor of large collectives of people who create the space rocket equipment and support its launching and flight. At this time they play the role of test pilots, studying various problems associated with designing the equipment and perfecting and improving it. Cosmonauts have never flown without such testing as part of the mission.

Moreover, cosmonauts enjoy a large share of the credit for solving these problems while still on Earth, when the spacecraft or station is still in the planning and design stage. Their assistance to designers is becoming more and more tangible from flight to flight. After being in space, they assess many things in a new way. Things which had not attracted special attention before a flight become important and significant in their eyes.

For the most part, all cosmonauts are pilots and qualified engineers; thus it would seem that they of all people should be able to manage all of the fine points of adapting the spacecraft and the equipment to man. However, flight aboard a spacecraft differs significantly from flight aboard an airplane from many points of view. The problem lies not only with the duration of the flight, the artificial atmosphere, and confined space. Cosmonauts could cope with all of this, were it not for the constant effect of weightlessness. Weightlessness is the decisive factor of flight. Its effect is multifaceted, and it has not been fully researched as yet. Weightlessness significantly influences the state of the individual and his performance of operator functions and others. That which can be done relatively easily and simply on the ground or aboard an airplane requires additional effort and time in space. This is why the designers of space apparatus, systems, machine units, and instruments need qualified assistance from people who had been in space.

While cosmonauts had initially spent their time basically making themselves at home in the working places of the craft, adapting themselves to the layout and equipment of the working places, and memorizing where things were, now they play an active role: In all stages of a craft's creation they provide expert assessments on components which are associated to one extent or another with their activity as operators and testers and with life aboard the craft.

Even before, designers always tried to satisfy the desires of cosmonauts. We are all aware of proposals made by G. Titov, P. Belyayev, and A. Leonov to improve certain units in the Vostok and Voskhod spacecraft.

K. Feoktistov, who had accumulated a great deal of design experience by the time of flight tests of the first multiple-place Voskhod spacecraft, took part in these thorough tests. This permitted him to acquire extremely valuable scientific-technical information. It was highly needed at that time so that a spacecraft of a new type could be designed. Later, K. Feoktistov participated in all stages of development of the Soyuz spacecraft; working together with other designers, he embodied in this craft all of the better things learned during creation of the Voskhod and tested in flight. The layout of personal compartments and working places was especially successful in the new craft. Together with other positive concepts, these advances are continually praised by cosmonauts.

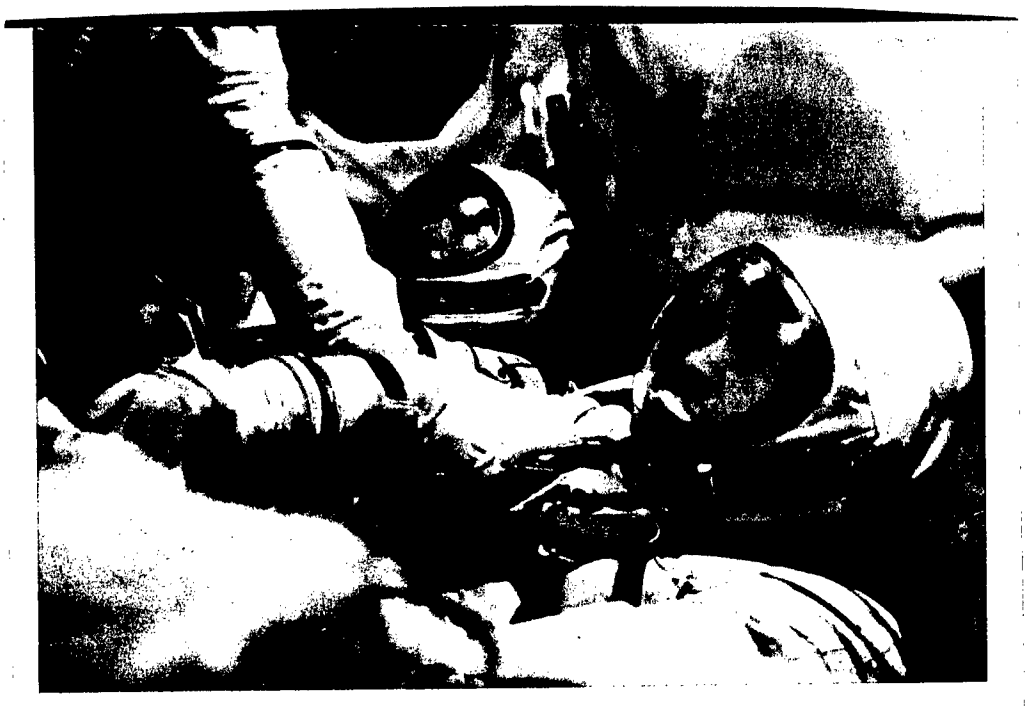
While in former times such business-like mutually enriching contact between cosmonauts and designers was an exception, today it is the rule.

After a flight, designers now expect cosmonauts to assess the personal compartments of spacecraft, the working places, and their equipment from the standpoint of engineering psychology. They listen with interest to the opinions of people who had been space pertaining to the convenience of viewing and using equipment at the working place when the cosmonaut is in a fixed position. They determine whether or not access to the equipment for maintenance and repair and the routes for movement of crewmembers and cargo are satisfactory. The cosmonauts assess the effectiveness of the tools and equipment with which they are secured at their working places. All of their remarks are carefully studied and, when even the slightest possibility affords itself, the ideas are incorporated into the design.

Thus, as an example, acquainting themselves with a mock-up of the Salyut-3 station, P. Popovich and Yu. Artyukhin turned the attention of the designers to the fact that some of the instruments on the control consoles were located without accounting for the frequency with which they are used in flight. Additional research and tests were conducted with the crew participating. The validity of the remarks made by these cosmonauts was confirmed. The instruments were rearranged on the consoles and the shortcoming was corrected.

Cosmonauts usually begin assessing the convenience of operator activity aboard a future spacecraft or orbiting station by revealing the extent to which the proposed layout of the craft and the characteristics of its onboard equipment correspond to the capabilities of the crew. Doing so, they make use of outline drawings, layout drawings, and mock-ups. During the planning stage, together with the designers they analyze the variants of the distribution of responsibilities among crewmembers, they examine the principles behind the structure of working places, and they specify the industrial design, color, and lighting concepts pertaining to the living compartments of the spacecraft.

Optimum location of the crew, equipment, and control and display resources within working zones is achieved through unit analysis. This method is based on the principle "Man and apparatus working together." The essence of the method lies in graphical representation of all visual-motor associations between the cosmonaut and the equipment on outline drawings of the working zones, and in subsequent analysis of both the work load in the zones and their overlap. Use of this method permitted P. Popovich and Yu. Artyukhin to detect the inconsistency between the locations of some instruments on the control console and the frequency with which crewmembers use them in flight (see photograph).



There are usually several working places in an orbiting station. For example there were five of them in Salyut-4 and four in Salyut-5. When equipping these places, it is very important to determine the working

posture of the operator and to establish whether or not he can conveniently use and service the onboard systems and move about.

This is done by relying on the method of so-called "cardboard dummies." A flat hinged model of the human body, all elements of which are manufactured in accordance with anthropometric tables and the scale of the outline layout drawing to be assessed, is superimposed over orthogonal projections of the working space. Optimum location of the cosmonaut in the station's working space relative to the equipment and the monitoring and control resources is achieved by moving the model in space and varying the orientation and position of its elements.

After the cosmonauts make their proposals during preparation of the plans, the proposals undergo stage-by-stage testing. The proposals are elaborated upon as development proceeds and as a transition is made from computations and graphical materials to mock-ups, laboratory test stands, and experimental models.

After a life-size static mock-up of the spacecraft is created, the cosmonauts make a final check and elaborate upon the layout of working places, the locations of display and warning system elements and manual controls, the position of crewmembers behind control consoles, and the conditions of vital activities.

Cosmonauts wear pressure suits while placing the craft into orbit and returning to Earth. This is mandatorily accounted for when selecting the best variants of working place organization and the locations of instruments and controls aboard the Soyuz transport craft. The pressure suit restricts mobility of the cosmonaut's hand, owing to which his working space and the zones of accessibility and view decrease when he is secured to his chair. For this reason cosmonauts invariably participate in such work.

Experience has shown that errors and outlays of effort and assets to make modifications can be avoided by including cosmonauts in the work of developing manned craft from the very beginning--that is, in the planning stage.

Special attention is devoted in assessing the algorithms followed by cosmonauts during their work in flight to the time required to complete various operations, to the probable errors, and to the nature of work and the load of each crewmember. Real and permissible activity norms are set.

During this stage of development the cosmonauts have the possibility for checking access to onboard system units and their reparability. They are in a position to perform all of the basic operations of controls and of searching for and correcting malfunctions, and to determine the order of actions in emergency situations.

Having clarified the opinions of the cosmonauts, the designers and specialists make their conclusions on the correspondence of the flow of information transmitted to displays to the capacity of the crew, and on the convenience of operating the onboard systems and the craft as a whole. Only after this do they begin creating an experimental model of the manned spacecraft and work up the operational and onboard documents.

Next the cosmonauts participate in electric independent and integrated trials of the spacecraft conducted at a monitoring and testing station, where the most favorable possibilities are afforded for assessing, from the standpoint of engineering psychology, the entire complex of issues having a bearing on the equipment in the craft's personal compartments and working places. This can be explained by the fact that completely assembled, functioning onboard systems are subjected to tests for the first time at this point, moreover in compartments laid out as they would be in the real craft. In contrast to previous stages, joint, concurrent work of several onboard systems can be checked at this time. And, what is especially important, in most cases the working conditions of onboard systems are consistent in most cases with the working conditions they will experience in a real space flight. Owing to this the cosmonauts can not only assess the effectiveness of all units in the "man-machine" system but also determine the possibility the crewmembers have for completing various functions fully.

Participation of B. Volynov and V. Zholobov in ground tests of the onboard systems of the Salyut-5 orbiting station made it possible to take fuller account of the effect of space flight factors upon the work of cosmonauts in all modes of control, monitoring, operations, technical maintenance, and so on. Working jointly with V. Zudov and V. Rozhdestvenskiy, they elaborated upon the resources used to secure cosmonauts in their working places, determined the routes cosmonauts would take as they move about the craft, and mapped out the convenient ways to approach additional equipment installed aboard the station.

Of course, the merits or shortcomings of particular design concepts reveal themselves most fully in real flight. But active participation by cosmonauts in the planning, development, and ground testing of manned spacecraft provides them with much useful information, as a result of which it becomes much easier for them to monitor the work of systems and equipment, determine the specific features of their work, and assess their effectiveness and reliability in flight.

Close communication between cosmonauts on one hand and designers and specialists on the other enriches their knowledge of the space rocket technology, develops their technical outlook, and encourages confidence in completion of flying assignments. By their advice and recommendations, cosmonauts help the developers to improve the operational and technical characteristics of the craft and to justify improvements on the onboard systems and the tactical-technical requirements on future spacecraft.

11004
CSO: 1870

ENVIRONMENTAL AND ECOLOGICAL PROBLEMS

AUTOMATION OF NATURAL AND SEWAGE WATER PURIFICATION PROCESSES

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 5, 1977 pp inside front cover, 2-4

[Article by D. N. Smirnov, doctor of engineering sciences, All-Union Scientific Research Institute of Water Supply, Sewer Systems, Hydraulic Engineering Structures, and Engineering Hydrogeology [VNII Vodgeo]: "So that the Water Will Be Tastier--The Situation and Long-Range Outlook for Development of Means of Automation for Purification of Natural and Sewage Water"]

[Excerpt] Moscow. At the Vostochnaya Water Supply Station construction and start-up and adjustment work has been completed for a water ozonization station. The mightiest in the Soviet Union, it processes an entire river of drinking water--1.2 million cubic meters daily.

The water has been rendered harmless by chlorine. Ozone has a number of advantages over it. Ozone is considerably more rapid in removing microbes, is from 15-30 quicker in providing water and destroys all odors and aftertastes. River water after ozonization reminds one of spring water.

The device used in treatment is completely automated. It has special regulators to sustain an optimal ozonization system. A central control point monitors all technilogical processes.

The development of automation in the field of water supply and sewage systems to a great degree has been furthered by the great amount of attention presently devoted to environmental protection problems and, in particular, to the purity of water sources and underground water.

Automation of water supply systems and water purification is divided into two characteristic types: automation of electric drives (pumps, gate valves and shut-offs, scrubbers, agitators and other mechanisms) and automation of engineering processes connected with the purification with natural and sewage water and with their conditioning.

Electric drives are finding wide application in all branches of the national economy. Therefore, their improvement and automation (control, regulation

and protection) are being brought about independently of use in water supply systems and water purification although each of them has its own specifics. We will point out only that at present there are all necessary means for regulating the rotation frequency of electric engines and consequently, regulation of the rate of operating mechanisms. For induction engines with phase-wound rotors it is possible to use an induction valve stage [AVK], for short-circuited engines having average or low power--electric current frequency converters. These and others are manufactured based on modern semiconductor elements. Inductor slip couplings are successfully being used for average power engines. All the above means are produced by industrial methods. They allow for economically regulating the output and pressure of pumps working in water pipeline networks that input water from water sources with a strong degree of water fluctuation, and pumps pumping sewage water from reception tanks with uneven flow. The wide use of means of regulation of electric drives of pumps will allow for savings in electricity used up in the pumping and distribution of water.

The regulated electric drive is also finding application in ventilating cooling towers, metering pumps, paddle stirrers that mix chemical solutions, mechanized aerators during biological purification of sewage water, and in a number of other instances.

Achieving automation for the processes of purifying natural and especially sewage water is quite complicated because here it is necessary to deal with specific processes having no direct analogies with either chemical technology nor with industrial biotechnology. These processes are characterized by the strongly pronounced instability of basic parameters, especially by the concentration of contaminants, by the wide range of contaminating substances and chemical reagents used. Besides, automation of these processes is complicated by the peculiarity of construction of engineering structures and devices in which water purification is carried out, and by other conditions.

The basic difficulty in the realization of automation of water purification processes consists of the lack of primary data units for measuring the amount of one or another substance, especially when it is necessary to measure their concentrations at the level of maximum permissible concentrations [PDK].

"The Rules on the Protection of Surface Water from Contamination by Sewage Water" specify 420 substances for which PDK standards have been set; of these 148 according to sanitary and toxicological indicators. At the same time there are not more than a dozen instruments suitable for instrument control over the various substances under industrial conditions. The creation of every new instrument for continuous measurement of this or that parameter up to this point is a great achievement in the technology of water purification and specialized instrument building. The number of such instruments is growing every year and the opportunities for automation are expanding.

An entire complex of new instruments has been developed and a number of earlier developed instruments has been modernized during the Ninth Five-Year

Plan. Of this number we shall make note, first and foremost, of the second generation of instruments for continuous measurement of concentrations of soluble oxygen: laboratory model AKVA-L and the production model AKVA-S. The basis of these devices is the polarographic method of measurement using a monitoring unit with solid metallic electrodes shielded by a polymer film pervious for oxygen. These instruments will be put on the market under experimental production by the experimental design office for automation [OKBA] until they are industrially adopted by the enterprises of the USSR Ministry of Instrument Making Automation Equipment and Control Systems [Minpribor].

Potentiometric signalling instruments for given concentrations of cyanide (the STs-1M instrument) and for the presence of hexavalent chrome (the SKh-1m) have been modernized. These instruments are equipped with a gold laminated indicator electrode that is more versatile in regards to various contaminants. In addition, attached to the device for cyanide is a membrane electrode that discriminated with regards to ions of cyanogen. With comparatively small concentrations of cyanide (up to 60-70 milligrams per liter) the STs-1M instrument provides not only a signalling but a measuring capability. An inexpensive indicator electrode has been found for highly concentrated cyanide, and soluble gold and ion-discriminative membranes.

Immersible pickup units of the specified instruments are equipped with a device for mechanical purification deposits and film-forming substances from the surface of electrodes. This makes it possible to use them in heavily contaminated liquids.

It is worth noting that recently ionometry by the potentiometric method has begun to occupy a greater place in the technological control of water purification processes and in the determination of water quality in bodies of water. This is attested to by the special meeting of water management specialists devoted to this problem which took place in Warsaw in 1974 according to a plan of the member nations of the Council for Mutual Economic Aid [CEMA].

In the processes of fluorination and defluorination of drinking water an electrode for fluorides has begun to be used. During the purification of sewage water from nitrogen compounds an electrode for nitrates is used. There are ion-discriminative electrodes for chlorides, calcium, magnesium, potassium, copper, the SO_3 ion, NH_3, and a number of other ions.

F-202 flow photometers for determining the concentration of active sludge according to its optical density, and optico-electrical continuous measurement of concentration devices M-101 for suspended substances of the flow and submersible type, were developed and manufactured during the Ninth Five-Year Plan. The SU-42 and the multiple-point variant SU-101, devices that are photoelectric signal indicators for a given level of residue and sludge in sedimentation tanks were industrially adopted. They allow for automated maintenance of the sludge regime in these structures.

For the first time our country developed the U-101 instrument for determining the overall amount of organic substances in sewage water according to organic carbon. The first models of semiautomatic instruments for determination of the chemical demand in oxygen (KhPK-meters) were created. They are special purpose titrating apparatuses performing the bichromatic method for detecting KhPK eith a potentiometric determination of the point of equivalence. Experimental models of automated respirometers have been developed to detect the oxygen demand in the time and speed of its demand during oxidation of sewage water by active sludge. Development has begun on devices to detect floating, emulsified and dissolved oil in water, and devices to detect phenols and several other substances.

This incomplete list indicates the great work done in the Ninth Five-Year Plan by our instrument builders and engineering organizations. No less an amount of work in this field has been noted during the 10th Five-Year Plan. Work will be completed on a large complex of instruments and apparatuses intended for evaluating water contamination of organic origin. There are two variants of the semiautomatic KhPK-meters (one of them will have potentiometric determination of the moment of reaction completion, the other--calorimetric), and an industrial model of a respirometer. This will be a block-type instrument. Every fermenter of the instrument will represent an independent light device adapted for handling operations. The customer can, if he wishes, obtain the number of fermenters he needs.

During the 10th Five-Year Plan a complex of instruments to detect oil and oil products will be completed; an analyzer of the ammeter type for free chlorine will be updated and produced alongside the polarographic device KOKh-1; a range of potentiometric type instruments will be expanded; the quality of a whole number of ion-discriminative electrodes and electronic converters has been improved. Evidently, the potentiometric method for measuring the amount of dissolved oxygen in water with the help of a thallium electrode will be widely put into practice. New instruments for measuring the amount of suspended substances in the range of 5-200 milligrams per liter will be produced since the list of such sludge meters now being manufactured is quite narrow; the means to measure the expenditure of water, sludge and residues have been improved. There are proposals to create supersonic instruments for measuring the density of sludge and residues.

A whole series of instrument control means over the qualitative and quantitative parameters of water undergoing purification processes in engineering facilities conforms to the means of control used by the hydrometeorological service and by organizations of the Ministry of Water Management. This circumstance helps to more quickly resolve difficult problems for special instrument building, including those of financing and organization.

The instruments indicated, together with a traditional apparatus (ph-meters, conductometers, flow meters for water and reagents, level and pressure gauges and others), allow for solving many problems through automated regulation of purification of natural and sewage water and through control systems

over water supply and drainage. Besides, in order to achieve this aim, there is wide use of the means of automation having an overall industrial purpose: a relay and switching apparatus, pneumatic and electronic control devices, and elements from automated industrial systems.

The use of all these means, despite the fact that there are not many instruments to detect the various substances, provides the opportunity for reliably conducting purification up to the PDK level of a number of substances or for providing for fulfillment of the engineering requirements made for water in circulating and repeater water supply systems.

To a great degree automation requires chemical (reagent) and electrochemical purification methods. The attention of specialists was devoted to these first of all. At present chemical purification control processes are successfully being automated based on the reactions in the neutralization of acids and alkalis, the settling of metals, and reduction-oxidation reactions.

As an example we cite our country's wide application of sewage water reagent purification automated systems in the electrolytic metallurgical industry. These systems are built based on the aforementioned potentiometric instruments for cyanide, chromate and pH. Similar systems are finding application in the purification of sewage water in a number of chemical industries (nitron, nitrogenous fertilizers, etc.) and at ore concentration plants. Well-developed is the automation of neutralization of sewage water derived during metal etching (at metallurgical and metal goods plants), at viscose fiber plants, etc. These systems are built based on industrial pH-meters, conductometers and other instruments designed to measure concentrations of cationites of metals.

A whole series of physico-chemical purification methods has been automated: coagulation, electrochemical oxidation and deoxidation, all typed of flotation (pneumatic, chemical, electrical), and electroflotation coagulation. Automation of ion exchange processes is being improved. It has become apparent that control over the breakthrough through a filter of free ions according to a measurement of the electrical conductance of water is insufficient.

The biological purification of sewage water is being automated. A device for continuous measurement of dissolved oxygen, concentration of active sludge, and for estimating the organic content of biochemical oxygen demand [BPK] and chemical oxygen demand [KhPK] is providing great opportunities to solve these tasks.

New highly productive purification methods, for example, with the application of technical oxygen, are generally impossible without a specific minimal amount of automation. In the not too far distant future an automated system will be developed for control over biological processes according to their fundamental parameter: the content of organic substances and the activity of fermentative reactions.

During the 10th Five-Year Plan the automation of all processes for the purification of natural and sewage water will be improved. Special attention will be given to the development of the means for technological control and management of water quality in sewageless water supply systems of the industrial enterprises.

8504
CSO: 1870

MICROBIOLOGY

UDC 576.8:001.8(477)

VIROLOGY RESEARCH AT UKRAINE INSTITUTES SURVEYED

Kiev VRACHEBNOYE DELO in Russian No 5, 1977 pp 1-5

[Article by A.F. Frolov, Kiev Scientific Research Institute of Infectious Diseases of the Ukrainian SSR Ministry of Health: "Basic Results and Prospects of Development of Scientific Research in the Field of Virology in the Ukraine"]

[Text] The 25th CPSU Congress determined as among the priority tasks of medical science the problem of virology and viral infections, and among these particularly influenza and viral hepatitis. Its urgency is conditioned by the significance of the indicated infections for the health of the population and the economy of the state. It is enough to say that the proportion of the rate of illness just with respiratory viral infections, to which influenza is related in particular, comprises, according to data of the World Health Organization (WHO), 60-70 percent in the general structure of man's morbidity.

During the elapsed 5-year period virologists in cooperation with clinical physicians, epidemiologists, immunologists and representatives of other sciences have studied more deeply the ideas about the pathogenesis of viral infections, they have improved the methods of their diagnosis, prevention and treatment. An essential contribution to this was made by scientific collectives and public health workers in the Ukrainian SSR.

Extensive and universal introduction of anti-measles vaccination has led to reducing measles morbidity in the Ukraine.

Distinguished in the west of the Ukrainian SSR were limits of noso-ranges of arboviral infections. Associates of the L'vov Scientific Research Institute of Epidemiology and Microbiology (LNIIEM) isolated an arbovirus new for the Soviet Union from the Ukuniem group, utilized for producing diagnostic preparations.

Ascertained were the basic regularities of formation of natural foci of ornithosis in the Ukraine, and also of the circulation of highly pathogenic strains of rabies virus among inhabitants of the animal world (KNIIEMP [Kiev Scientific Research Institute of Epidemiology, Microbiology and Parasitology -- ?], ONIIVE [expansion unknown]).

A study has been made of the epidemiological and clinical-laboratory significance of an Australian antigen for viral hepatitis, and a test has been developed for differential diagnosis of viral and infectious hepatitis (KNIIEMP, KNIIIB [Kiev Scientific Research Institute of Infectious Diseases]). The factors in lowering the level of mass immunity to poliomyelitis were determined, and introduced on this basis were proposals about changing the instructions for application of live poliomyelitis vaccine (KhNIIMVS imeni I.I. Mechnikov [expansion unknown]).

In the Odessa IVE [expansion unknown] imeni I.I. Mechnikov obtained by the method of the immuno-press were highly immunogenous strains of the influenza virus, promising for production of prophylactic preparations. As a result of many years of research, colleagues of this same institute established the role of the nuclease in immunity during influenza and other acute respiratory illnesses. The significance of nonspecific factors in development of non-susceptibility toward these diseases was shown by works of virologists of the Donetsk Medical Institute.

In the Ninth Five-Year Plan much attention was given to a study of the pathogenesis and clinical picture of infectious diseases caused by viral-microbe associations. Essential changes were revealed in the microbe landscape of the respiratory tract during influenza infection, and also revealed was the ability of Streptococcus and Staphylococcus to adsorb the virus of influenza. The diagnosis of mixed viral-bacterial infections was improved, and methods for increasing the effectiveness of their treatment were worked out. A cycle of work was done to study the influence of the influenza virus on the central nervous system. Incorporated in the practice of public health were methods of treatment of major, complicated and uncomplicated forms of influenza (KNIIIB, Kiev Medical Institute, LNIIEM, ONIIVE [expansion unknown]).

Summarized were the results of many years of study of the ability of influenza viruses to induce and stimulate processes of experimental carcinogenesis, and to have a mutagenic effect on the chromosome apparatus of cells and the human fetus (KNIIEMP, KNIIIB, KNIIPAG [expansion unknown]), and work was conducted for a study of the action of radiation of non-heat intensity on the adenovirus (KhNIIMVS).

One of the essential tasks of modern virology is to raise the proportion of fundamental research directed at solution of concrete practical problems not only in the remote future, but also in the near future. This is conditioned first of all by the specifics of the interaction of the virus

and the infected system, being realized on the genetic and molecular levels which, undoubtedly, has an effect on the peculiarities of the epidemiology, diagnosis, pathogenesis, clinical picture and treatment of viral infections.

The fundamental developments should be the basis of further studies of the character of the epidemic process of modern influence, hepatitus and certain other infections of a viral nature, and of a deeper study of the ecology of the causative agents, of the regularities of their circulation not only during flareups and epidemics, but also especially in the period between epidemics. Over a number of years virologists of the Ukraine, particularly colleagues of the KNIIEMP, have obtained definite data about the circulation of certain viruses of man in the populations of animals and birds surrounding him. The importance of these works is unquestionable, although much in the chain of man -- external environment (animals, birds, insects, plants) -- man remains unexplained and is in need of further investigation. Can the viruses of animals and birds, particularly the influenza virus, be the cause of flareups and epidemics among man, and are their hosts a natural reservoir of the causative agent in the period between epidemics? We do not have any clear answer to this question, although animals and birds, undoubtedly, are the source of viruses that are close with respect to a number of properties to the viruses of man and are capable of participating in genetic recombinations leading to the appearance of new strains, which possess high virulence and a significant epidemic potential.

The problem of the ecology of viruses is not limited to studies just of influenza. Recently data have been obtained about the isolation from animals of other of man's viruses (para-influenza type 3, coronaviruses and others) and about the fundamental possibility of infection of the latter with oncogenic viruses, particularly leucosis of birds and mammals.

The importance of research on ecology is determined also by the fact that along with a large number of live, killed, attenuated and other types of anti-virus vaccines, receiving broad practical application are the so-called biological insecticides -- viruses used for combatting agricultural pests, and the consequences of this for man need to be studied in depth.

The necessity of controlling flareups and epidemics of viral infections demands the development of scientifically-based forecasts of their appearance and regularities of development. However the urgency of this task still does not correspond to the intensity of its study. Whereas the rates of development of a started influenza epidemic can be calculated, determination of the time of its appearance and especially the type of causative agent remains the priority task of virology, epidemiology and allied sciences.

The urbanization of society, the limited reserves of water resources even now are forcing economically developed countries to use for agricultural needs, and sometimes even for supplying the population, waters which do not

correspond according to their indicators to the accepted norms, especially with respect to the content of viruses in them. This leads to where in the United States alone during a 5-year period 130 flareups occurred connected with viruses carried by drinking water, and covering about 50,000 people. It is clear that the studies on sanitary virology in the Ukraine cannot be limited just to the work in this field by the Kiev Scientific Research Institute of General and Communal Hygiene and that they require the enlistment of new scientific collectives.

Up to the present time the etiology of viral infections, particularly of the respiratory group, in the majority of laboratories of the republic is determined by mercury reactions, which require considerable time for determination of the nature of the disease. Even immunofluorescent methods can far from always insure early and highly-specific, especially in the period between epidemics, diagnosis of diseases of a viral nature. This determines the necessity of further work on questions of express and retrospective diagnosis of viral infections, based on the utilization of results of molecular-biological study of the interaction of the causative agents, the cells and the systems of the organism.

Remaining exceptionally urgent is the problem of effective etiotropic and pathogenetic therapy of diseases of a viral nature, particularly of infections of the respiratory group and hepatitis, during which one of the basic tasks is preventing the crossing of their acute forms into lingering forms, chronic and complicated forms. According to the data of the KNIIIB, over 25 percent of influenza pneumonias take on a lingering course. If you consider the total number of those contracting influenza, and out of these from 6-8 percent of the cases are complicated by pneumonia, then the medical and national economic significance of this problem really stands out. No less complicated is the question of preventing the development of lingering and chronic forms of viral hepatitis, the number of which fluctuates from 5 to 10 percent, and the outcome of cirrhosis comprises from 1 to 2 percent.

Implementation of rational therapy of patients is organically linked with in-depth study of the features of pathogenesis of viral infections, uniting a complex of problems -- from general virological problems (features of reproduction of the causative agent in the cells of different organs and tissues and the course of the infectious process connected with this) to immuno- and cytogenetic problems, assuming examination of the action of viruses on the hereditary apparatus of different cells of the patient, the consequences of which at the present time it is still difficult to predict with all completeness, and also the study of the genetic mechanisms of the resistance of the organism to viral diseases.

In considering the clinical and pathogenic apsects of infections of a viral nature, we should take into account that viruses are only a part, although a very active one, of the biosphere and their action on man, as a rule, is combined with factors of animate (bacteria, mycoplasma) and inanimate (chemical and physical) nature. Here there can occur a unique accumulation

of the action of viruses and chemical compounds, which in addition to intensifying the effect from the action of a microdose of the latter is capable of changing the course of the viral infection, particularly influenza. Under the conditions of an intensively developing chemical industry, of an increased content of chemical compounds in the environment, including those possessing carcinogenic properties, the study of the combined action of viruses and the indicated factors cannot remain outside the vield of vision of virologists, infectionists and hygienists.

One of the characteristic features of virology and the clinical picture of viral infections at the present time is their increasingly more distinctly appearing connection with those clinical disciplines, the object of study of which it would seem is not connected with infectious pathology.

It follows to point out first of all infectious diseases of the nervous system, particularly chronic and slow running diseases, such as lateral amiotrophic sclerosis, leucoencephalitis, Parkinson's disease, meningitis, Kuru disease, Creutzfeldt-Jakob disease and certain others, in the onset of which a part can be played by viruses of the cortex, parotitis, type 2 herpes simplex virus, adenoviruses, particularly type 32 and so on. The very fact of detection of viruses in such an immunologically privileged system as the nervous system, and their connection with definite clinical syndromes has advanced the necessity of study of these phenomena, in the onset and development of which, as it seems to us, an essential part may be played by the mutability of the viruses, their defective forms, immune and auto-immune processes in the organism, and genetic factors.

Extended observations made by virologists and clinical physicians make it possible to come to the conclusion that, at least, half of the cases of non-bacterial myocarditis and one-third of the pericarditis cases are etiologically connected with Coxsackie B viral infection. It has been established that in a number of cases the cause of injury to the walls of the blood vessels, particularly the aorta, can be viral infections (herpetic or cortical).

Established under clinical and experimental conditions has been the affection of the insulin-secreting islets of Langerhans of the pancreas and the development of diabetes during an infection caused by agents from the groups of picornaviruses, reoviruses, herpes and certain others. Being connected with viral infection of late are the appearance of geronto-psychiatric syndromes, intensive development of processes of aging, as a result of the suppression by persisting viruses of certain functions of the genome of the cells of the organism. These data require in-depth study by virologists and representatives of other disciplines.

The discovery of new data on the ability of viruses to affect practically all organs and systems of the organism, to cause mass or individual, but serious cases of diseases, advances with especial acuteness the problem of specific treatment and prevention of viral infections. The close

connection between reproduction of the virus and the metabolism of the cell, and the expressed interdependence of the activity of their genetic systems advance as one of the necessary conditions of progress in this field the in-depth study of molecular-biological and molecular-genetic regularities of these processes. It follows to consider as promising the intensification of studies in the field of the search for the agents acting on enzymes of synthesis of the nucleic acids of viruses (RNA- and DNA-polymerases), thymidine nucleotides, neuraminidases and other components of virions. Discovery of the RNA-dependent DNA-polymerase has outlined the prospects of obtaining inhibitors of the replication of oncornaviruses, to which are related, in particular, viruses of the leucoses group.

Of significant interest is the study of the antiviral action of atypical nucleosides, playing the role of antimetabolites and destroying the processes of reproduction of viruses. Lying at the basis of this is their ability actively to take part in newly synthesized virus-specific nucleic acids. Certain of the atypical nucleosides have been tested with encouraging results for treatment of encephalites, and affections of the eyes and skin of a herpetic nature.

It is expedient to intensify the research for a further study of the therapeutic and prophylactic action of interferon. Of exceptional significance in this problem is the search for highly-active and low-toxic inductors of interferonogenesis, and also the study of the mechanism of their action on cells of the host and reproduction of the virus.

The serious attention of the republic's researchers should be drawn by the production of new highly-immunogenic strains of viruses, particularly influenza, capable of serving as the basis for creation of effective preventive preparations.

In evaluating the potentials and tendencies of development of virology in the Ukraine, it is possible to say with confidence that the decisions of the 25th CPSU Congress for development of research in this field will be fulfilled.

10908
CSO: 1870

UDC 615.225.1

NEW PHARMACEUTICALS

Moscow FARMATSIYA in Russian No 3, 1977 pp 88-89

[Excerpt] PHETANOL, 1 (methyl-oxyphenyl)-2-(ethylamino)-ethanolo-hydrochloride: a white or off-white crystalline powder, freely soluble in aqueous or alcohol media. Produced as 5 mg yellow-coated tablets and 1% sterile aqueous solution.

This solution belongs to the group of sympathomimethetic amines with structure and function being close to Mesatone. Phetanol elicits contraction of peripheral vessels and raises arterial pressure. When compared to adrenalin and noradrenalin, Phetanol produces a less marked, but more prolonged effect (internal: 2-5 hours, parenteral: 1-3 hours). In comparison with Mesatone, the effect is longer lasting. Phetanol is prescribed for raising arterial pressure in cases of acute and chronic hypotonia, during operative and post-operative shock-collapse, collapse during myocardial infarction, hypotonia connected with non-infectious diseases, neurocirculatory and autonomic vascular dystonia with low arterial pressure.

In moderate hypotonia, Phetanol is prescribed in 5 mg tablet form 2-3 times per day. For marked hypotonia, rapid effect is by intramuscular injection of 1 ml of a 1% solution. In acute loss of arterial pressure (shock, collapse), Phetanol is administered intravenously -- 1 ml of a 1% solution. Injections are repeated at 2 hour intervals. When necessary, Phetanol can be introduced intravenously (60-80 drops/min.) in isotonic NaCl or 5% glucose solution: 1 ml of 1% Phetanol/100 ml saline or glucose solution; total introduction to 300 ml. Young children's dosage: 1.25-2.5 mg, older children's dosage: 2.5-5 mg; 2-3 times per day.

Contraindications: Hypertension and conditions involving elevated arterial pressure, advanced cardiac or pulmonary sclerosis and thyrotoxicosis.

Side effects: nausea, vomiting, vertigo, temporary chills. In these cases, reduction or withdrawal is recommended.

[Procedures for qualitative and quantitative assessment are included in the original text.] Tablets must conform to State Pharmaceutical Industry code (GFKh) page 654. Suggestions for storage: tightly capped amber vials and ampules in subdued light. Shelf life: 2 years.

CSO: 1870

PSYCHOPHYSIOLOGY

PSYCHOPHYSIOLOGICAL INDICATORS TAKEN INTO ACCOUNT IN FLIGHT TRAINING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, 1977 pp 14-15

[Article by N. Rudnyy, major-general of the medical service, doctor of medical sciences, professor, and V. Bodrov, colonel of the medical service, doctor of medical sciences: "Taking into Account Psychophysiological Indicators"]

[Text] As technical aviation equipment develops, there are ever greater requirements on the vocational training of fliers and the methods of training them. It also becomes more important to take into account the phychophysiological qualities of the person controlling complicated aviation equipment. Knowledge of the physical and psychological capabilities of the aviator and regard for his individual peculiarities and also psychophysiological laws of aviation activity play an important role in vocational improvement.

The role of training mock-ups in solving problems of flight training is obvious at the present time. Suffice it to recall that the cost of 1 hour of training in a mock-up is 3-15 times less than in the air. Moreover, mock-ups make it possible to teach actions in special flight circumstances more extensively and -- the main thing -- more safely. True, one still encounters cases where individual fliers underestimate the significance of training in mock-ups. Things like this are explained either by the lack of a personal example, or the fact that the leader does not have the proper control over flight personnel or that this important kind of flight training is poorly organized.

It is known that the effectiveness of training in mock-ups depends on their quality and on the methods of using them. In the complex of methodological problems, the most serious is the problem of means of methods of evaluating the readiness of the flier or trainee in training.

At the present time the evaluation of the readiness of the trainee is done by the instructor with respect to indicators of the instrument simulators and entries regarding the route and trajectory of the flight. He also writes up the evaluation. The shortcomings of this method are that when one and the same student is examined by various instructors, in 30 percent of the

cases there are differences in the ratings of 1-2 points. This is a result of the different levels of flight and methodological training of the instructors, their subjective approach to evaluation and also certain moral and social factors.

An evaluation of the level of training of a flier only in terms of external results of his activity, that is, in terms of parameters that reflect the quality of control, is inadequate and, moreover, is not always reliable. Frequently good quality is achieved through extreme exertion of effort, work at the limit of one's individual psychophysiological capabilities and it does not show stable skills. In these cases, the occupational reliability of the flier is low and any complication of his activity during flight will lead to a sharp decline in his effectiveness or to bad mistakes.

In order to judge objectively the flier's assimilation of the program of training in a mock-up and also to predict the effectiveness of his actions in an actual flight, it is necessary to use not only indicators of the quality of control, which the instructor evaluates, but also data from the registration of the condition of a number of psychophysiological functions determined by a physician in the training process which, taken together, makes it possible to determine the level of nervous-psychic tension that was reached when the flier achieved one degree of quality or another in fulfilling the assignment.

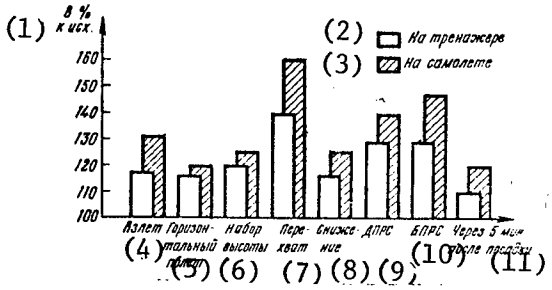
The results of this registration for the fliers and trainees during the training period in mock-ups, the pulse and respiration rates, the reserves of attention and other indicators show that their dynamics under these conditions are close to those observed in actual flight. For example, Figure 1 shows a comparative description of the change in the pulse rate of a flier when performing one and the same element of flight in an aircraft and in a mock-up. Despite the differences in the absolute amounts, the pattern of change in this indicator in both cases remains the same which, incidentally, also shows a certain adequacy of conditions of activity in a mock-up and in an actual flight.

Indicators of psychophysiological functions of the flier in a mock-up show, first of all, the degree of informational, energy and psychological loading when performing a certain assignment, that is, they reflect the totality of a specific exercise as well as individual elements of it. Additionally, these indicators reflect the dynamics of establishing and adjusting skills, the degree of their formation and functional reliability. In the process of training, as a skill is acquired or a flying quality is improved, there is a reduction in the intensiveness of psychophysiological reactions and an increase in the reserves of attention to a level that corresponds to the complexity of the assignment that is being performed. It is typical that the stabilization of psychophysiological indicators happens somewhat later than that of the indicators of the quality of control.

Analysis of the dynamics of the indicators of the quality of control and psychophysiological functions during training on a mock-up makes it possible to single out four stages in the training process. The first reflects the

process of clarification of the assignment and ways of carrying it out. It is usually accompanied by strong functional reactions and a certain improvement in the quality of piloting up to the moment of completion of the exercise. The second is the stage of active formation of the skill and is characterized by a significant improvement in the quality of control and a reduction in nervous-psychic tension. The third is the stage of reinforcement of the skill and stabilization of the indicators of the quality of control and psychophysiological functions. It is a stage of stable and reliable work. And, finally, the fourth stage can appear when the process of working on any specific exercise is extremely prolonged and the student loses interest and becomes indifferent to the training. Here, in addition to a reduction in nervous-psychic tension, there is an increase in the number of mistakes in control. It should be noted that the dynamics of the indicators that are typical of the fourth stage can also be observed in the initial stages of training which, in turn, indicates that the flier does not have a positive attitude toward the training or a desire to perform the exercise well.

Figure 1. Pulse Rates of Fliers in an Aircraft and a Mock-Up



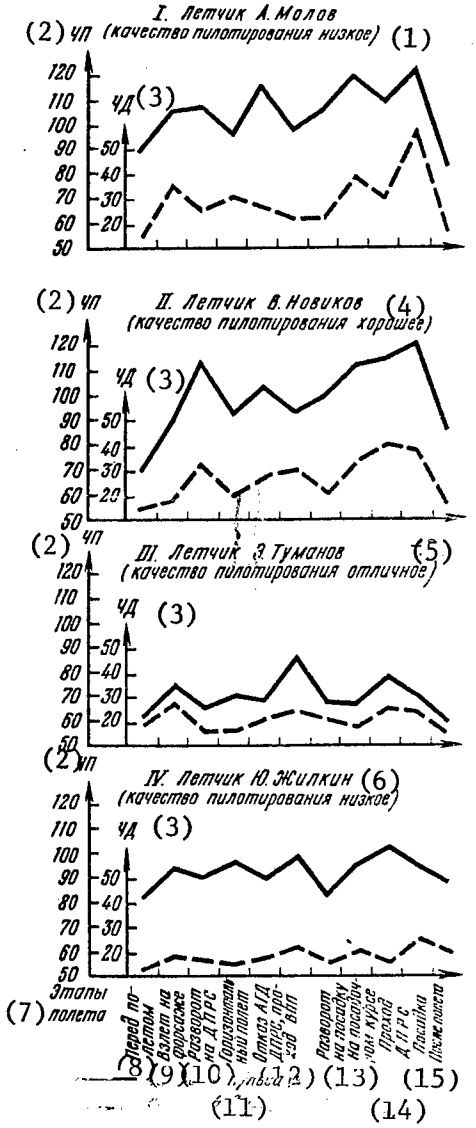
Key:

1. Percentage of initial
2. In mock-up
3. In aircraft
4. Takeoff
5. Horizontal flight
6. Climb
7. Interception
8. Descent
9. Long-range homing radio station
10. Close-in homing radio station
11. 5 minutes after landing

In order to evaluate the degree of nervous-psychic tension and the level of training of the fliers, it is necessary to determine the most informative indicators and the norm of psychophysiological reaction for each exercise as well as the flight element and the type of training. A list of these indicators and reference norms of reaction for the main elements of flight on

a KTS-4 mock-up have been developed in special investigations. They are presented in the table.

Figure 2. Dynamics of Psychophysiological Indicators and Quality of Performance of Exercises by Various Fliers



———— Pulse rate, 8 min.
---------- Respiration rate, 6 min.

Key:

1. I Flier A. Molov (piloting quality poor)
2. Pulse rate
3. Respiration rate
4. II Flier V. Novikov (piloting quality good)
5. III Flier Z. Tumanov (piloting quality excellent)
6. IV Flier Yu. Zhilkin (piloting quality poor)

[Key continued on following page]

7. Stages of flight
8. Before flight
9. Afterburner takeoff
10. Turn to long-range homing radio station
11. Horizontal flight
12. Failure of azimuth gyro sensor of long-range homing radio station, passing through runway
13. Turn to land on landing strip
14. Passing long-range homing radio station
15. Landing after flight

The most informative indicators are: the pulse and respiration rates, the volume of pulmonary ventilation, the pressure on the control column, the reserves of attention and the electromyogram of the arm muscles. But under combat conditions these readings can be limited to a registration of the indicators of the pulse and respiration rates and reserves of attention.

It is a more difficult problem to provide all mock-ups with equipment for registering these indicators. At the present time oscillographs of the K-12 type can be used for these purposes and also the Fiziolog-3 instrument which is available in aviation medical laboratories.

Let us give as an example the results of the utilization of psychophysiological indicators for evaluating the level of training of fliers during the period when they are performing a control exercise on a mock-up. Here it is interesting to compare the evaluation of the quality of piloting with the dynamics of psychophysiological reactions. The combination of the dynamics of psychophysiological indicators and the quality of the performance of the exercise that were obtained are presented in the form of four variants (Figure 2).

Variant 1: According to the conclusion of the instructor, the quality of piloting of the flier A. Molov is poor. The level of his psychophysiological reactions is high in all flight elements which shows his poor preparation for performing the exercise. It is recommended that he repeat the exercise.

Variant 2: The quality of the performance of this assignment by the flier V. Novikov is good. But during turns and direct landing, increased nervous-psychic tension is observed, which shows that these elements of flight are difficult for him and that in subsequent training sessions it will be necessary to devote special attention to this.

Variant 3: For the flier E. Tumanov the quality of the performance of the flight assignment is excellent and the level of psychophysiological indicators is within normal limits. The flier is well prepared for this exercise.

Variant 4: According to the conclusion of the instructor, the quality of performance of the flight assignment by the flier Yu. Zhilkin is poor, but his level of functional reactions is within normal limits. This combination is possible only when there is a lack of interest in the assignment or a lack of responsibility for performing it well. In this case one should find the reason for this attitude toward training.

I should like once again to draw attention to the fact that the pulse and respiration rates of all fliers clearly reflect the complexity of the elements of flight that are being performed.

Table. Normatives of Psychophysiological Indicators of Fliers During Training on a KTS-4 Mock-Up

Показатели в % (2)	(1) Этапы полета								
	Фон (3)	Взлет (4)	Набор высоты (5)	Горизонт. полет (6)	Перехват цели (7)	Разворот (8)	Снижение (9)	Посадка (10) / Выход на (11) ДПРС (12)	БПРС (13)
Частота пульса (14)	100	115	112	110	130	115	109	124	130
Объем легочной вентиляции (15)	100	140	120	125	145	125	120	150	150
Частота дыхания (16)	100	150	145	140	155	145	140	150	155
Зажим ручки (17)	—	130	110	100	250	110	110	200	250
Резервы внимания (18)	100	30	65	70	31	66	75	51	26
ЭМГ (19)	—	170	150	100	235	155	140	246	

Key:

1. Stages of flight
2. Indicators in percentages
3. Background
4. Takeoff
5. Climb
6. Horizontal flight
7. Interception of target
8. Turn
9. Descent
10. Landing
11. Approach to
12. Long-range homing radio station
13. Close-in homing radio station
14. Pulse rate
15. Volume of pulmonary ventilation
16. Respiration rate
17. Pressure of grip
18. Reserves of attention
19. Electromyogram

In order to increase the effectiveness of the preparation of fliers in training, it is necessary to take psychophysiological indicators into account and also to continue scientific searches for reserves for objectively evaluating the level of preparedness. It seems to us that it is most promising to create in training a unified system of objective registration, processing and analysis of indicators of the quality of the activity and the condition of

psychophysiological functions and also an objectivization of the evaluations of the instructor. For this, one can recommend a formula for calculating the indicators of the integral error in piloting (IOP) which pursues the goal of assisting the instructor in evaluating the quality of performance of the exercise in a differentiated way:

$$IOP = \frac{\sum_{1}^{n}(\Delta M_i + 3\delta_i)K_i + \sum_{j}^{m}\Delta X_j K_j}{n+m},$$

Where ΔM_1 -- average error in maintaining each parameter of the flight routine (altitude, speed, bank angle, and so forth);

δ_1 -- root-mean-square deviation;

ΔX_j -- error in maintaining given parameters at control points (for example, when passing long-range and close-in homing radio stations);

$K_i; K_j$ -- weight coefficients for each of the control parameters of the flight obtained from the normatives of the program;

n -- number of given parameters of the flight routine;

m -- number of given values of parameters at control points (long-range and close-in homing radio stations).

But I should like to say that an objective system of evaluating and controlling the preparedness of a flier or trainee on a mock-up in no case fully replaces the instructor. It can only expand his capabilities and increase the reliability of his conclusions. Quantitative descriptions of the activity of a flier on a mock-up makes it possible for the instructor or commander to evaluate more objectively the strong and weak points in the vocational training of the fliers, to take into account their individual peculiarities and to avoid a certain amount of subjectivity when a conclusion is made regarding the level of their preparedness. On the other hand, the introduction of a system of objective registration of the quality of the activity and the functional condition of the flier increases the responsibility of each of them for effective performance of training on a mock-up.

11772
CSO: 1870/711

MANUAL ON CLINICAL PATHOPSYCHOLOGY REVIEWED

Kiev VRACHEBNOYE DELO in Russian No 5, 1977 p 156

[Review by Doctor of Medical Sciences G.L. Voronkov, Kiev, of the book "Klinicheskaya Patopsikhologiya" (Clinical Pathopsychology) by V.M. Bleykher, Meditsina, Uzbek SSR, Tashkent, 1976, 325 pages]

[Text] Medical psychology, just as psychotherapy, is entering more widely into the daily practice of physicians, not just of psychoneurologists. At the same time it follows to note the shortage of literature on medical psychology, especially on pathopsychology. The publication of V.M. Bleykher's manual on clinical pathopsychology therefore should be considered very timely.

General problems of pathopsychology are discussed in the first section of the book. Discussed here is the place of pathopsychology in the complex of disciplines forming at the junction of medicine and psychology -- medical psychology, clinical psychology, neuropsychology, pathopsychology. These questions are controversial and it seems to us that the author's point of view relative to the interrelations between pathopsychology and medical psychology, and also the definition developed by him of the concept of pathopsychology, given previously by the leading Soviet pathopsychologists B.V. Zeygarnik and S.Ya. Rubinshteyn, are completely convincing and valid. Appearing original are the author's data on the interrelations arising in the process of an experiment between the patient and the investigator, and also about the role of pathopsychological investigation in the conduct of psychotherapy.

Presented laconically but completely enough in the next six sections are the methods of clinical pathopsychology: for studying the memory, attention and sensomotor reactions, the level and course of thought processes, speech, praxis, optical gnosia, and so on. Deserving of especial attention is the presentation of methods directed at investigation of personality and intellect. The author gives a quite complete and critical discription of the psychometric and (jointly with L.F. Burlachuk) projective tests that are most well-known and widespread in foreign psychology. Here the author does not approach alternatively the controversial question

of the possibility of their application in Soviet pathopsychology. Showing their weak points, he at the same time finds what is rational in the application of these experimental methods.

The following sections are devoted to a description of the features of mental activity detected with the help of a pathopsychological experiment in the case of such illnesses as schizophrenia, oligophrenia, epilepsy, brain atherosclerosis, senile feeble-mindedness, and Alzheimer's disease. Summarized in the monograph are the data of many years of research by the author and his colleagues. It should be noted that the author, being not only an experimental pathopsychologist, but also a clinical psychiatrist, has contributed much that is new to these sections.

The last section of the book is devoted to pathopsychological investigations in the case of some somatic illnesses. The author has outlined the prospects of application of pathopsychology in somatic clinical treatment, and he demonstrated its role in achievement of an integral understanding of the personality of the patient, in illuminating the so-called "internal picture" of the disease. The author cites an an example the results of investigations making it possible to describe the features of the personality during ulcers as premorbid, contributing to the illness, just as being the result of the illness and requiring appropriately directed treatment.

The Meditsina publishing house has issued a book that is useful for a broad circle of medical workers and psychologists working in public health institutions. It is necessary to note in addition the good polygraphic design of the monograph being reviewed. It can be recommended as an auxiliary textbook for students studying medical psychology and psychiatry.

10908
CSO: 1870

UDC 614.2:616-006(477)

IMPROVED ONCOLOGICAL SERVICE IN UKRAINIAN SSR URGED

Kiev KLINICHESKAYA KHIRURGIYA in Russian No 5, 1977 pp 69-72

/Article by Prof I. P. Dedkov and A. Ye. Prisyazhnyuk, senior scientific worker, Kiev Scientific Research Roentgeno-Radiological and Oncological Institute: "Ways of Improving Oncological Service to the Population of the Ukrainian SSR"/

/Text/ During the Ninth Five-Year Plan the specialized oncological service of the Ukrainian SSR made definite advances in the fight against cancer. Its material base was strengthened considerably. In the republic there are 46 oncological dispensaries and 636 dispensary departments and offices. In 1975 the total number of oncological beds was 10,310. The average capacity of an oblast oncological dispensary has reached 229 beds and in three oblast oncological dispensaries--Khar'kovskaya, Zaporozhskaya and Voroshilovgradskaya--there are more than 300 beds in each dispensary. The provision of oncological institutions with the equipment necessary for conducting diagnostic examinations and for rendering medical aid at an advanced level is being improved. In oncological dispensaries radiological departments and radioisotopic laboratories have been established, gamma-therapeutic installations operate and endoscopic apparatus with fiber optics are being acquired.

Further narrow specialization of oncological service is noted. For example, in 27 oblast oncological dispensaries in 1975 there were 1,855 general oncosurgical beds and 1,160 gynecological beds and 6 thoracic departments (160 beds), 8 oncourological departments (345 beds), 12 chemotherapeutic departments (469 beds) and 2 otolaryngological departments (70 beds) were established. The provision of the Ukrainian SSR with oncological beds was 1.7 per 10,000 of the population and together with radiological beds, 2.1. A total of 942 oncologists worked in the republic in 1975, which was 0.19 per 10,000 of the population. The highest and first skill categories were awarded to almost one-half (40.2 percent) of the oncologists. In 1975 a total of 8,667 physicians in the general medical network improved their knowledge of oncology in seminars.

Large population groups are systematically examined for the purpose of early detection of cancer and precancerous states. This makes it possible to detect up to 18.1 percent of the persons afflicted with malignant tumors and to treat them promptly. The use of objective methods of examination, in particular fluorographic, cytological and endoscopic, plays an important role in early tumor diagnosis.

Whereas in 1971 a total of 1975 cases of lung cancer, that is, 16.7 percent of all the cases, were detected during preventive fluorographic examinations of the republic's population, in 1975, a total of 31.6 percent, and the absolute number of diagnosed cases of cancer of this localization was 4,561.

In a number of oblasts (L'vovskaya, Nikolayevskaya, Rovenskaya, Ivano-Frankovskaya, Chernovitskaya, Zakarpatskaya and Chernigovskaya) the method of cytological examination of the discharge of the cervix of the uterus and the cervical canal is widely introduced into the practice of public health. In four oblasts--L'vovskaya, Nikolayevskaya, Chernovitskaya and Rovenskaya--in 1975 a total of 1,284,506 women were examined, cervical cancer was detected in 507 (0.04 percent of all those examined) and suspected in 1,278 (0.1 percent) and atypical cells were found in 7,380 (0.6 percent of all those examined). Of 507 patients 137 had cancer in situ and 148 had first-stage cancer.

In the Ukrainian SSR in last year of the Ninth Five-Year Plan 104,500 patients with malignant tumors diagnosed for the first time in their life were recorded, which was 213.5 per 100,000 of the republic's population--217.1 among the urban population and 208.2 among the rural population. Therefore, the morbidity index in rural areas is only 4.3 percent lower than in urban areas, whereas 5 years ago, that is, at the end of the last five-year plan, this difference was equal to 14.5 percent. The figures cited indicate an improvement in patient registration and, at the same time, an increase in the number of oncological diseases. In 1975 malignant lip, stomach and cervical tumors were more often recorded among the rural population, as compared with the urban population, and malignant esophagus, rectum, larynx, lung, mammary gland and skin tumors, among the urban population.

An analysis of the age and sex morbidity indices and standardized indices (eliminating the effect of changes in the age and sex composition of the republic's population) calculated on their basis in 1970-1975 makes it possible to judge the dynamics of morbidity among the Ukrainian population during those years. It indicates that morbidity among men continues to increase both in ordinary and in standardized indices, and among women, declines slightly. A distinct increase in lung, rectum, mammary gland and blood forming organ tumor morbidity and, at the same time, a decrease in ordinary and standardized indices of cervical cancer morbidity have been noted.

In approximate and standardized indices morbidity among the male population is higher than among the female population. This gap increases gradually with age and is especially pronounced in the oldest age groups. Malignant

lip, oral cavity, esophagus, stomach, lung and blood forming organ tumors are found more often among men, and mammary gland and sex organ tumors, among women.

The structure of morbidity among men and women differs considerably.

In the rate of affection and in the structure of morbidity among the male population in the last 2 years lung tumors have held first place (50.3 per 100,000 men, or 22.8 percent in the structure), stomach cancer, second (45.7, or 20.7 percent), skin cancer, third (25.2, or 11.4 percent), blood forming organ and lymphatic tissue tumors, fourth (12.9, or 5.9 percent) and lip cancer, fifth (12.7, or 5.7 percent).

In the rate of affection and in the structure of morbidity among women skin cancer holds first place (30.8 per 100,000 of the female population, or 14.8 percent in the structure), stomach cancer, second (30.1, or 14.5 percent), mammary gland cancer, third (27.2, or 13.1 percent), cervical cancer, fourth (25.4, or 12.2 percent) and lung cancer, fifth (12.4, or 5.9 percent).

In individual oblasts in the Ukrainian SSR tumor morbidity indices fluctuate sharply. The maximal index (in Kirovogradskaya Oblast, 261.8 per 100,000 inhabitants) exceeds the minimal index (in Zakarpatskaya Oblast, 154.8 per 100,000 of the population) almost 1.7 times.

Malignant tumor morbidity sharply increases with age, especially among the male population. If the morbidity index at the age of 30 and under is taken as a unit, at the age of 70 and over it will be 179 times higher among men and 71 times, among women. At the age of 40 and under the indices of morbidity among women are higher than among men, because mammary gland and sex organ tumors are often found among women of relatively young age groups. Beginning with the age of 50 morbidity among men becomes higher and the difference in indices increases more and more.

In 1975 the proportion of advanced forms of cancer among new patients was 23.2 percent and that of cancer of internal organs, even higher: stomach cancer, 41.5 percent, lung cancer, 33 percent and cancer of the esophagus, 29.5 percent. There were also quite many advanced forms of cancer among visual tumors.

A certain increase in the proportion of advanced forms of cancer as compared with previous years has been noted. This is due to increased attention to the registration of oncological patients in the republic and to greater demands on the determination of a clinical group. As a result, in the last few years an impression has been created that the number of patients with the fourth clinical group of tumors has increased among new patients. This phenomenon is due to the fact that, according to the statute put into effect in the last few years, individuals whose clinical group was corrected after an exploratory operation or a more careful examination began to be included among patients with the fourth clinical group, whereas previously it had been determined according to the data of initial diagnostic registration (without corrections).

The significant proportion of patients suffering from third- and fourth-stage cancer admitted to oncological hospitals is noteworthy. They comprised almost one-half of the hospitalized patients and in some tumor localizations this index was even higher--in cancer of the large intestine, 71 percent, in cancer of the rectum, 72 percent, in cancer of the esophagus and lungs, 76 percent and in stomach cancer, 82 percent.

Among those admitted with visual or easily visible forms of cancer the percent of the patients hospitalized with early stages of the disease was also low. In oral cavity and throat cancer first stage was determined in 31.4 percent of the patients, in cancer of the rectum, in 3.3 percent, in cancer of the larynx, in 5.8 percent, in mammary gland cancer, 11.1 percent and in cervical cancer, in 17 percent.

An analysis of the data on the use of various methods of treating patients with malignant tumors indicates an increase in the proportion of individuals whose special treatment was terminated at the end of the year under review. In the last year of the Ninth Five-Year Plan they comprised about 70 percent of all the patients subjected to special treatment. The indices of application of basic methods of treatment remained stable during the five-year plan. Surgery alone was performed on about 20 percent of the patients, radiation therapy alone was given to 31-33 percent, combined surgical and radiation treatment, to about 15 percent, chemotherapy, to about 20 percent and complex treatment, to 13 percent.

The data on the possibility of using the surgical method as one of the methods of radical treatment, which makes it possible to hope for a permanent cure of the patient, are significant.

In connection with the significant proportion of widespread forms of malignant tumors the percent of the patients on whom surgical treatment was attempted is negligible. For example, in cancer of the esophagus surgical activity in oncological hospitals was equal to 13 percent. In stomach cancer only about one-half (42.5 percent) of the patients are subjected to surgery, in cancer of the rectum, 41 percent, in cancer of the large intestine, 63 percent, in cancer of the larynx, 23 percent and in lung cancer, 6 percent.

Among all the patients with malignant tumors operated on in oncological hospitals radical intervention was performed on 68 percent; in stomach cancer, only on one-half of those operated, in cancer of the esophagus, on 51 percent, in cancer of the larynx and lungs, on 57 percent, in cancer of the large intestine, on 58 percent and in cancer of the rectum, on 60 percent.

The data on the volume of surgical intervention and post-operative lethality are important.

A total of 1,746 radical operations connected with stomach cancer were performed in the republic's oncological hospitals; postoperative lethality--9.8 percent. The proportion of gastrectomies and subtotal resections was 63.6 percent of all the radical stomach operations (15.3 percent of gastrectomies and 48.3 percent of subtotal resections).

In cancer of the large intestine postoperative lethality was 16 percent, in cancer of the rectum, 12.4 percent, in lung cancer, 18.5 percent and in radical mastectomies, 0.62 percent.

A major part of the operations connected with cancer are performed in the institutions of the general medical network (33 percent of the interventions connected with malignant tumors). Surgical interventions connected with cancer of the larynx (73 percent), cancer of the esophagus (68 percent), lung cancer (66 percent), stomach cancer (46 percent), cancer of the rectum (38 percent) and cervical cancer (37 percent) comprised a large proportion in the general medical network.

To evaluate the quality of diagnosis and treatment of oncological diseases, the proportion of the patients who successfully underwent radical treatment is used as a guideline. An analysis of this index in the forms of tumors in which a radical operation is the basic therapeutic method and makes it possible to hope for a permanent recovery of the patient indicates that the proportion of those who underwent radical surgery among the people that fell ill in 1975 still remains low. In cancer of the esophagus this index was only 8 percent, in lung cancer, 5.3 percent, in stomach cancer, 19.3 percent and in cancer of the rectum, 34.9 percent.

Definite advances in the diagnosis of tumors and in the treatment and prophylactic medical examination of oncological patients are indicated by the steady increase in the groups of patients in this field. A total of 524,280 patients and individuals who have had malignant tumors were registered in oncological institutions in 1975, or 1,116.6 per 100,000 residents. Whereas during the five-year plan malignant tumor morbidity increased by 16 percent, the number of groups of patients, by 24 percent (among the rural population, by 30 percent and among the urban population, by 22 percent).

In some oblasts the morbidity index also varies quite significantly: the maximal (in Kirovogradskaya Oblast, 1,499.9) exceeds the minimal (in Zakarpatskaya Oblast, 756.6) almost twice.

The life span of oncological patients can be judged from the following data. Among the individuals registered in oncological institutions at the end of 1975 a total of 223,000, or 51.1 percent, lived 5 years and longer and 119,500, or 27.4 percent, 10 years and longer.

Although the number of persons who died of malignant tumors increases annually, the rates of increase in mortality are much slower than those of morbidity. Whereas during the five-year plan the morbidity index rose by 16 percent, the mortality index, by 11 percent. Patients with tumors of the digestive organs comprised about one-half of those that died of malignant tumors (42 percent) and patients with tumors of the respiratory organs, 20 percent. All the other cancer localizations accounted for 37 percent of the death cases.

The highest indices of mortality from malignant tumors, as well as the highest morbidity indices, are noted in the republic's southern and south-eastern oblasts, and the lowest, in northern and north-western.

The population's mortality from malignant tumors reveals a distinct tendency toward stabilization. In approximate indices it increases slightly more intensively than in standardized indices. However, this depends only on the changes in the population's age and sex composition, because standardized mortality indices have increased negligibly in the last few years. However, rise in the indices of mortality from tumors of the trachea, bronchi, lungs (9 percent), rectum (among men, 40.5 percent; among women, 30.3 percent) and mammary gland (18.6 percent among women) continues. A decline in mortality from cancer of the esophagus (among men, 5.8 percent; among women, 10.6 percent), stomach cancer (3.5 and 10.4 percent respectively) and cervical cancer (1.7 percent) has been noted.

Thus, the established system in the fight against cancer has made it possible to make definite advances in the prevention, diagnosis and treatment of tumors.

At the same time, a number of shortcomings in rendering specialized oncological service to the population of the Ukrainian SSR have been noted.

In some of the republic's oblasts the population's provision with specialized oncological beds is below the standard. In a number of oncological dispensaries, including oblast dispensaries, physicians cannot render specialized assistance at an advanced level owing to the poor material base.

A total of 32.7 percent of the republic's oncologists are not certified.

Owing to the inadequate material base of oncological service only 57 percent of the patients with malignant tumors diagnosed for the first time are hospitalized in oncological dispensaries.

In prophylactic screening objective methods of examination are not used quite widely. The inefficient technical provision of preventive medical institutions with modern endoscopic and roentgenological equipment, lack of cytological laboratories, frequently slackened attention on the part of some directors of preventive medical institutions to problems of oncology and insufficient oncological competence and alertness of physicians of the general medical network are still noted. All this is reflected in the diagnosis of tumors, especially of visceral localizations.

To improve the system of the fight against cancer, the tasks of further developing specialized oncological service through the construction of large oncological dispensaries for 450 beds with radiological departments and pensions and through the reconstruction and expansion of existing dispensaries as a result of the construction of new buildings should be considered most urgent.

In the structure of an oncological institution in accordance with its bed resources provision should be made for an organization of narrowly specialized departments (children's oncology, head and neck tumors, oncourology, thoracic, proctological, soft tissue and bone tumors, chemotherapeutic and so forth) entrusted with interoblast functions.

It is necessary to provide oncological institutions with modern diagnostic and medical apparatus, equipment and instruments, paying special attention to an expansion of the network of city and interrayon cytological laboratories and radioisotopic and endoscopic diagnostic laboratories in all oblast oncological dispensaries. Oncological dispensaries should be supplied with endoscopic instruments with fiber optics and roentgenodiagnostic and roentgenotherapeutic apparatus of remote gamma-therapy.

Improving the skills of physicians in oncology in oncological institutions and of physicians in the general medical network by training them in specialization and advanced training courses, short-term courses, seminars and work places in scientific research institutes is an important task. The problem of training nurses for specialized departments, laboratories and offices of oncological institutions is urgent.

It is necessary to introduce the position of oncologist into the staffs of all central rayon hospitals.

The efforts of the preventive medical institutions of the general medical network should be directed toward improving the organization and quality of the prophylactic screenings and examinations of the population through the use of modern objective diagnostic methods. Serious attention should be given to improving fluorographic and cytological services, which should be maximally enlisted in the detection of oncopathology.

Directors of oncological institutions should give thought to how to use hidden reserves to improve hospital service. This involves an efficient use of oncological hospitals--improvement in the intensity and quality of treatment, shortening the average time of a patient's stay in bed, hospitalization of specialized patients, expansion of the volume and quality of diagnosis and dispensary observation of oncological patients.

It is necessary to improve the system of anticancer propaganda among the population in accordance with the latest achievements of oncological science.

11,439
CSO: 1870

PUBLIC HEALTH

UDC 575.591

STUDY OF APPROACHES TO ORGANIZATION OF GENETIC MONITORING IN ARMENIA. I. ANALYSIS OF THE DISTRIBUTION OF CONGENITAL DEFECTS AND PERINATAL MORTALITY ACCORDING TO DATA FROM ARCHIVAL MATERIAL

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian No 4, 1977 pp 89-93

[Article by E.S. Yeolyan]

[Text] In order to establish the initial data and methodological approaches for genetic monitoring, the archival material of the republic's maternity homes was analyzed in the Armenian SSR in 1966-1975. Taken into consideration in this case were the characteristics with a high degree of genetic conditionality.

The problem of the consequences of environmental pollution by various factors, especially various chemicals, is being discussed by many specialists. In this case attention is primarily directed to the possible genetic consequences, based on the experimental data of the mutagenic nature of a number of chemical compounds [1, 2]. With a view to preventing chemical mutagenic agents from entering man's environment, various methods of testing them have been proposed [3]. At the same time, many authors acknowledge that this means of revealing mutagenic agents is not the decisive one in controlling them, since the methods of testing thus far proposed are limited to experimental biological models and subsequent extrapolation.

Because of this, several approaches have been suggested for making direct studies of the human population, making it possible to control the change in intensity of the mutational process in time [2, 4]. Suggested as the criteria for evaluating the intensity of the mutational process are the estimate of certain demographic indices (frequency of spontaneous abortions, mortinatality, congenital defects of development, mortality in early childhood, general morbidity and the epidemiology of malignant diseases), the study of the frequency with which chromosomal diseases arise, hereditary diseases with clear phenotypal manifestations, etc. The methodological uses of these criteria are now being widely studied.

The purpose of this analysis was to study, on the basis of archival material from maternity homes and the data from special questionnaires, the epidemiology of congenital defects in development, perinatal mortality and other demographic indicators in Armenia, as one of the components of national monitoring. This work gives an analysis of the data of the archival material from maternity homes in Armenia during the period from 1966-1975.

Materials and methodology. The basis of the analysis of the archival material was a collection of data from the outcome of births during the period from 1966-1975 from maternity homes in Yerevan and regions of Armenia. Taken into consideration were the mortinatality, congenital defects in development (VPR) and neonatal death, in the origin of which the mutational component played a substantial role [5].

Because of the fact that the diagnosis of congenital defects in development is in many ways determined by the degree of skill of the physicians and is more fully revealed in the course of the first year of the child's life in a special division, only gross and (or) multiple defects in development are estimated in this work [6]. This group of defects is usually fully and unequivocally revealed immediately after the birth of the child or in the first days of its life.

For the maternity homes in Yerevan, all types of congenital defects were taken into consideration that were diagnosed in the delivery unit, as well as by pediatricians in the children's divisions of the maternity homes. The analysis was made in consideration of the fact that in these maternity homes the level of skill of the physicians is high, and identical criteria are used in recording the VPR.

The data collected on perinatal mortality and congenital defects in development were analyzed by years, and the characteristics of their fluctuations by different geographical regions were also analyzed.

Results and discussion. A total of 519,481 case histories of the development of the newborn were analyzed, and their general characteristics are shown in Table 1. It can be seen from the data of the table that the mortinatality in these years on the average was 12.141 per 1000 births; premature births--48.23/1000; the birth of children with congenital defects in development--6.98/1000 of those born alive; newborn mortality rate--6.91/1000 of those born alive.

Table 2 shows the results of an analysis of the frequency of gross and multiple defects in development, diagnosed among the children born alive. A comparison of these data by different years revealed an increased frequency of congenital defects in development in 1969 and 1974. On the average, the indicator of the frequency was 6.98 per 1000 live births. The data obtained by us proved to be similar to that in the work of Chebotarev and coauthors [6], who used an analogous method of subdividing VPR and estimating them.

Table 1. General Characteristics of the Newborn According to Data From Archival Material of Maternity Homes in the Armenian SSR From 1966-1975.

(1) Годы	(2) Всего новорожденных	(3) Всего живорожденных	(4) Всего мертворожденных		(7) Всего недоношенных		(10) Рождение детей с грубыми и (или) множественными врожденными пороками развития		(13) Неонатальная смертность	
			(5) число	(6) на 1000 рождений	(8) число	(9) на 1000 рождений	(11) число	(12) на 1000 живорождений	(14) число	(15) на 1000 живорождений
1966	49897	49318	579	11,60	2181	44,22	257	5,21	253	5,13
1967	47033	46483	550	11,69	2240	48,19	266	5,72	280	6,02
1968	48611	47981	630	12,96	2183	45,50	260	5,42	319	6,65
1969	48935	48269	666	13,61	2264	46,90	554	11,48	319	6,61
1970	46913	46321	592	12,62	2461	53,13	342	7,38	376	8,12
1971	52638	52034	604	11,47	2508	48,20	296	5,69	370	7,11
1972	54661	53966	695	12,71	2670	49,48	314	5,82	450	8,34
1973	55005	54305	700	12,71	2512	46,26	333	6,13	379	6,98
1974	56039	55261	778	13,88	2713	49,09	500	9,05	362	6,55
1975	59749	59093	656	10,98	3016	51,04	464	7,85	440	7,45
(16) Всего	519481	513031	6450	12,41	24748	48,23	3596	6,98	3548	6,91

Key:

1. Years
2. Total newborn
3. Total born living
4. Total stillborn
5. Number
6. Per 1000 births
7. Total premature
8. Number
9. Per 1000 births
10. Birth of children with gross and (or) multiple congenital defects in development
11. Number
12. Per 1000 born living
13. Newborn mortality rate
14. Number
15. Per 1000 born living
16. Total

Table 2. Frequency of Gross and (or) Multiple Congenital Defects in Development Among Total Number of Children Born Alive

(1) Годы	(2) Всего живорожденных	(3) Врожденные пороки развития	
		(4) число	(5) на 1000 живорожденных
1966	49318	257	5,21
1967	46483	266	5,72
1968	47981	260	5,42
1969	48269	554	11,48
1970	46321	342	7,38
1971	52034	296	5,69
1972	53966	314	5,82
1973	54305	333	6,13
1974	55261	500	9,05
1975	59093	464	7,85
(6) Всего	513031	3586	6,98

Key:

1. Years
2. Total born living
3. Congenital defects in development
4. Number
5. Per 1000 born alive
6. Total

The average index of gross and (or) multiple defects in development for six economic regions during the period from 1966 to 1975 proved to be as follows: for the Northeastern region of Armenia , 24,978 case histories of births were analyzed and the VPR frequency was 2.1 per 1000 live births; for the Sevanskiy Basin, 44,482 birth case histories were analyzed, and the VPR frequency was 3.1/1000; for the Shirakskiy region--67,453 birth case histories, and the VPR frequency was 5.2/1000; for the Zangezurskiy region --38,962 birth case histories, with the VPR frequency 3.8/1000; for the Lori-Pambakskiy region--52,676 birth case histories, with the VPR frequency 4.7/1000; for the Central region (including Yerevan), 290,315 birth case histories were analyzed, and the VPR frequency was 9.3/1000. As can be seen, the index of VPR frequency varies within a broad range from 2.1 (Northeastern region) to 9.3 per 1000 live births (Central region), and R 0.001. The reasons for these fluctuations are still difficult to explain. On the one hand, they may stem from the fact that the sampling material was not identical in the quantitative respect. For example, for the Northeastern region, about 25,000 records of birth case histories were analyzed, while for the Central region there were about 300,000. Nor is the fact ruled out that in different maternity homes in different regions, differing criteria were adopted in recording the VPR. In the third place, A broad network of specialized departments may bring about a greater admittance of women giving birth from other regions with some pregnancy pathology in the maternity homes of the Central region, particularly in

Yerevan. Other causes may also be admitted, the ascertaining of which would make it possible to evaluate the characteristics of the geographical fluctuations in the frequency of congenital defects in development.

Table 3. Frequency of Congenital Defects in Development and Perinatal Mortality for Maternity Homes in Yerevan from 1971-1975.

(1) Роддом	(2) Всего рождений	(3) Всего живорожденных	(4) Врожденные пороки развития		(7) Мертворожденные		(10) Неонатальная смертность	
			(5) число	(6) на 1000 рождений	(8) число	(9) на 1000 рождений	(11) число	(12) на 1000 живорожд.
(13) НИИ акушерства и гинекологии	10600	10391	232	21,88	209	19,71	188	18,09
Роддом 1	15034	14800	234	15,56	234	15,56	171	11,55
Роддом 2	15905	15641	266	16,72	264	16,59	302	19,30
(14) Роддом 3	14357	14152	187	13,02	205	14,27	208	14,69
Роддом 5	11436	11321	79	6,90	115	10,05	100	8,83
(15) Родильное отделение VIII больницы	14299	14154	158	11,04	145	10,14	130	9,18
(16) Родильное отделение „Малатия"	7360	7310	43	5,84	50	6,79	48	6,56
(17) Всего	88991	87779	1199	13,47	1222	13,73	1147	13,06

Key:

1. Maternity home
2. Total births
3. Total born alive
4. Congenital defects in development
5. Number
6. Per 1000 births
7. Stillborn
8. Number
9. Per 1000 births
10. Newborn mortality
11. Number
12. Per 1000 live births
13. Scientific Research Institutes of Obstetrics and Gynecology
14. Maternity home 1, 2, 3, 5
15. Maternity Division of Hospital No 8
16. Maternity Division, Malatiya
17. Total

With respect to individual maternity homes in Yerevan, data were collected from 1971-1975 (Table 3). As was mentioned above, both gross and multiple defects in development (defects of group A) and some of the defects of group B [6] were taken into consideration. The average frequency of VPR was 13.47 per 1000 born alive. This index is almost half that of the data

of Chebotarev and coauthors [6]. At the same time, the data that we obtained coincides with the data of other authors that determined the VPR frequency with respect to the data of the primary recording at maternity homes [7].

Table 4. Frequency of Perinatal Mortality

(1) Годы	(2) Всего рождений	(3) Период смерти			Общая перинатальная смертность (7)	
		антенатальный (4)	интранатальный (5)	неонатальный (6)	(8) всего	на 1000 (9) рождений
1966	49897	346	233	253	832	16,67
1967	47033	317	233	280	830	17,64
1968	48611	244	386	319	949	19,52
1969	48935	342	324	319	985	20,12
1970	46913	331	261	376	968	20,63
1971	52638	332	272	370	974	18,50
1972	54661	338	357	450	1145	20,94
1973	55005	353	347	379	1079	19,61
1974	56039	397	381	362	1140	20,34
1975	59749	330	326	440	1096	18,34
(10) Всего	519481	3330	3120	3548	9998	19,24

Key:

1. Years
2. Total births
3. Death period
4. Antenatal
5. Intranatal
6. Neonatal
7. Total perinatal mortality
8. Total
9. Per 1000 births
10. Total

Perinatal mortality is a collective concept, and includes cases of the death of the fetus before and during delivery (antenatal and intranatal death) and the death of the newborn during the first seven days of life (neonatal death). These data are given in Table 4, from which it can be seen that there are no substantial fluctuations for different regions and different maternity homes in the years under consideration.

As is known, the relative proportion of mutational components among cases of congenital defects in development and perinatal morbidity is high. For example, the frequency of just the chromosomal abnormalities among newborn infants with gross and multiple VPR is 13.6 percent [6, 8], and among perinatal infant deaths--over 6 percent [9, 11]. The frequency of chromosomal anomalies is several times higher among the cases of perinatal mortality with VPR. In consideration of this fact (namely, the relative proportion of mutational components is higher among the cases of VPR when combined with other pathology), we determined the VPR frequency among the

cases of perinatal mortality (Table 5). The over-all index of VPR frequency among perinatal deaths of children for the maternity homes of Yerevan was 11.08 percent (among the stillborn--8.95, and among the newborn dead--13.34 percent).

Table 5. Frequency of Congenital Defects in Development Among Cases of Perinatal Mortality

(1) Годы	(2) Мертворождение			(6) Неонатально умершие			Перинатальная смертность (8)		
	(3) Всего	(4) мертворожденные с ВПР (5) число	%	(3) Всего	(7) неонатально умершие с ВПР (5) число	%	(3) Всего	(9) количество случаев с ВПР (5) число	%
1971	221	19	8,59	249	26	10,44	470	45	9,57
1972	248	20	8,06	265	50	18,86	513	70	13,64
1973	269	29	10,78	212	24	11,32	481	53	11,01
1974	230	17	7,39	184	30	16,30	414	47	11,35
1975	260	25	9,61	244	24	9,83	504	49	9,72
(10) Всего	1228	110	8,95	1154	154	13,34	2382	264	11,08

Key:

1. Years
2. Stillborn
3. Total
4. Stillborn with VPR
5. Number
6. Newborn dead
7. Newborn dead with VPR
8. Perinatal mortality
9. Number of cases with VPR
10. Total

Therefore, the analysis of our material on congenital defects in development and perinatal mortality in the Armenian SSR in 1966-1975 revealed a considerable increase in VPR during the last few years, especially in the Central region. The average VPR index for the republic coincides with the average data from the USSR.

BIBLIOGRAPHY

1. Zhurkov, V.S. "Sbor. Genetika cheloveka" [Human Genetics Collection], Moscow, No 2, 1975, pp 116-161.

2. Kuleshov, N.P., and Zhurkov, V.S. "1st All-Union Conference on Medical Genetics, Devoted to Modern Problems of Human Genetics and Hereditary Diseases," Moscow, 1975, pp 67-70.

3. Bochkov, N.P.; Shram, R.Ya.; Kuleshov, N.P.; and Zhurkov, V.S. GENETIKA, Vol 11, No 10, 1975, pp 156-169.

4. Neel, J. MUTATION RESEARCH, No 25, 1974, p 319.

5. Batikyan, G.G., and Arutyunyan, R.M. BIOLOGICHESKIY ZHURNAL ARMENII, No 2, 1976, p 29.

6. Chebotarev, A.N.; Bochkov, N.P.; and Kirichenko, O.P. GENETIKA, Vol 9, No 2, 1973, pp 146-150.

7. Kennedy, W.P. "Birth Defects," original article series, 3, 2, 1967, pp 1-18.

8. Bochkov, N.P.; Kuleshov, N.P.; Chebotarev, A.N.; Alekhin, V.I.; and Midian, S.A. HUMANGENETIK, No 22, 1974, p 139.

9. Kuleshov, N.P. HUMANGENETIK, Vol 31, No 1, 1976, pp 151-160.

10. Machin, G.A., and Crolla, J.A. HUMANGENETIK, Vol 23, No 2, 1974, pp 183-196.

11. Sutherland, G.S.; Bauld, R; and Bain, A.D. LANCET., 1974, p 752.

12151
CSO: 1870

PROTECTING HEALTH OF FEMALE WORKER

Moscow IZVESTIYA in Russian 24 May 77 p 5

[Interview by correspondent S. Tutorskaya with Professor Z. Volkova, director of Laboratory of Women's Work Hygiene at Institute of Labor Hygiene and Occupational Diseases AMS USSR and L. Bobrova, head of Laboratory of Industrial Hygiene and Ergonomics of All-Union Scientific-Research Institute of Labor Safety of AUCCTU]

[Text] The Laboratory of Women's Labor Hygiene, created on the initiative of the State Committee for Science and Technology of the USSR Council of Ministers, has now been in operation for three years at the Institute of Labor Hygiene and Occupational Diseases AMS USSR. This is a head scientific subdivision, where conditions of women's labor are studied and sound optimum work regimes are worked out for different production operations. Our correspondent S. Tutorskaya met with the director of the laboratory Professor Z. Volkova and head of the Laboratory of Industrial Hygiene and Ergonomics of the All-Union Scientific-Research Institute of Labor Safety of the AUCCTU L. Bobrova and asked them to answer some questions.

[Question] Zarya Aleksandrovna, one sometimes hears the assertions that a woman has more endurance than a man and that--according to statistics--she lives longer than he. Therefore, is there any sense in creating special conditions for her at work?

Z. VOLKOVA These diverging statements denote a wrong explanation of the facts. Yes, a woman lives on the average longer than a man. But if we put to one side such "risk factors" curtailing man's life as everyday and street traumatism (from early childhood age), alcohol, nicotine, the difference would boil down to only two years. Not everybody is aware that at many industrial facilities women, under absolutely identical conditions with men,

have a much higher morbidity because of the influence of harmful factors. Their susceptibility to certain physical and chemical influences is higher than man's. Illnesses in women in many cases have an effect on their child-bearing capacity and on the health of the offspring. And today, when the rapid scientific-technical revolution has encompassed all spheres of life, we must provide a maximum protection to women from unfavorable influences and lighten their work.

We well know that not a single bourgeois democratic legislation did half as much for women as the Soviet power in the first days of its existence. As the first in history, the Soviet state assumed the care of woman-the mother--materially, medical and socially.

The special features of woman, the possible unfavorable effects on her of work overloads and harmful factors of the environment were taken into consideration even in the first legislative acts of our state. In 1932, the People's Commissariat of labor put out a "List of Especially Heavy Work and Trades Forbidden to Women"; at the same time, limits of physical loads for working women were established through legislation. I might point out that certain developed capitalist countries still do not have such a special legislation.

I also want to bring to mind the fact there exist in our country rules for the organization of manufacturing processes and hygienic requirements for industrial equipment. Sanitary norms used in the design of industrial enterprises strictly regulate the composition and temperature of the air in production establishments. Such unique requirements applied on the scale of an entire state are not to be found in a single capitalist country.

Since the adoption of the basic determinations for women's labor safety, our country has become a modern industrial power. And the old verity that woman is not man's equal in the biological and psychological sense should again be recalled and new conclusions made from it under perfectly new conditions. It is fitting in this connection to remember the words of Vladimir Il'ich Lenin that equality of men and women should not be understood as their leveling "...in productive labor, amount of labor, its duration under conditions of labor..."

Nature has created woman not just externally different from man. As a rule, the size of her heart is smaller, her respiratory organs are not as powerful, and her muscles have a different structure. The female organism is simply incapable of "male" energy expenditures. The physical strength of the average woman is about 70 percent of the physical strength of the average man. Woman has a special hormonal status, determining her general condition in relation to the phase of the physiological cycle. Finally, she carries large additional loads connected with pregnancy, labor, breastfeeding. And not only physical, but moral ones as well.

[Question] Lyudmila Petrovna, my next question is for you. Your laboratory, as we know, investigates conditions of best interaction within the "man--machine" system. How does your activity take into account the special features of a woman discussed by Professor Volkova?

L. BOBROVA Our laboratory works out sanitary rules and norms, GOST's, which after promulgation become obligatory for industry.

There are now many instances where, let us say, a machine tool is produced without consideration of who will be working with it--a man or a woman. Sometimes it is difficult for a female worker to reach a handle, turn a leve or work a pedal. These defects in design could be eliminated if at the very beginning of the creation of a machine an ergonomist is present--a specialist equipped with knowledge on a rational arrangement of a work place.

It is perfectly intolerable to forget in making a machine for a woman that it is harmful for her to be obliged to remain long in an uncomfortable pose, to work in a half-bent position, to hold a heavy tool in the hands for a long time. In this connection, it is helpful to cite the example of the Volga Motor-Vehicle Plant and the Kama complex of plants for the production of large-load vehicles. A very high level of mechanization of auxiliary operations exists there in most of the shops. Women are not obliged to hold heavy tools--they are light and also suspended. At these plants much in the organization of labor was taken into account in the planning stage. The medical and sanitary unit performs a good job at the Volga Motor-Vehicle Plant. The physicians together with the administration are constantly improving the arrangement of work places and keep track of observance of labor hygiene. This, naturally, has a favorable effect on labor productivity and on woman's moods.

We ergonomists have more to complain in regard to the designers of agricultural equipment. It is particularly important to reduce to a minimum vibration, which has an adverse effect on the health of workers. In particular, it is most harmful to women. Thought should be given to reducing the dust and gas contact the cabs of tractor drivers. Designers should see to it that the control levers of the machine are located more conveniently and require less physical effort to operate.

Experience shows that in the great majority of production facilities where it is permitted to hire female labor conditions could be improved significantly through the joint efforts of specialists and the administration. At some enterprises in Kazan' and Ivanovo, hygienists noted that women spent almost the entire workday on their feet and proposed a working regime of "sitting--standing." On the recommendations of scientists, stools, chairs and racks for parts were fabricated that were convenient and adjusted for height.

At the Ivanovo Institute of Labor Safety, new shift schedules were worked out in which female textile workers work much less frequently during the night shift. And there are many such examples. Our task is to generalize this experience and to propose it for general adoption.

Z. VOLKOVA Some time back when maximum permissible concentrations were being determined for certain harmful substances, insufficient attention was paid to their particular influence on the female organism. Now this oversight is being eliminated. In many sectors of industry, substances especially harmful to women, such as benzene, dichlorethane, chloroprene latexes and others, have been eliminated from technology. Many maximum permissible concentrations of harmful substances are being revised and reduced. Naturally, the technology of a number of production operations had to be changed accordingly. In the evaluation of possible influences of harmful factors on the health of offspring, we are working in close cooperation with scientists of the Moscow Oblast Scientific-Research Institute of Obstetrics and Gynecology and the Sverdlovsk Institute for the Protection of Mother and Child.

We have expanded considerably a list of jobs in which the use of female labor is forbidden. We think that this new list will soon acquire force. All of us know how much consideration is being given in our country to woman as the mother. To provide fuller implementation for this concern, our laboratory is completing a more precise rendering of recommendations on job placement of pregnant women. According to Soviet labor legislation, a woman is transferred to lighter work from the moment of establishing her pregnancy. But what kind of work in each specialty can be considered light? Scientists are working on physiologically based labor norms for future mothers. Under the conditions of rapid reequipment, chemicalization of production, this constitutes a large field of endeavor. Incidentally, scientists have developed new norms for the carrying of loads by women.

Inasmuch as it is not always possible to implement recommendations connected to changes in technology and design of machinery, we are attaching great importance to general health providing measures for women. For various vocations, complexes of gymnastics, and where necessary--special nutrition, are being developed. Special drinks saturating the organism with oxygen are very helpful. Not the least important role is being played by well selected in terms of size and taste sewn special work clothing and shoes with a broad toe, a small stable heel, convenient goggles protecting the eyes, respirators. It is also important how the lunch break is spent, whether rooms used for rest are convenient and whether locker rooms and showers are in order.

Woman has a very important social role as a moral and home support for the family and as the educator of new generations. We need initiative, a scientifically based approach and a burning desire to make the labor of woman healthy and joyful.

7697
CSO: 1870

END