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## AEROSPACE MEDICINE

### FLIGHT INTO THE STRATOSPHERE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 83 pp 38-39

[Article\* by N. Rudnyy, Lt Gen Med Serv, doctor of medical sciences, professor: "Flight Into the Stratosphere" from section on "Psychology of Flying Work--Scientific Recommendations for Training Practice"]

[Text] Lieutenant-Colonel V. Solov'yev was scheduled for a difficult high-altitude flight on that work shift. There was not very much time left before taking off into the sky. The aviation specialists were almost done with preflight servicing of the bomber. They were concentrated on the final checks of complicated program and automatic devices. The pilot's calm and imperturbability seemed somewhat strange during their intense work. But it only appeared so. He attentively watched the work of the engineering and technical personnel. The officer was also thinking about the forthcoming mission, imagining it in all of its details, from take-off to landing; he analyzed mentally the different difficult situations that could be encountered in flight.

Only those who knew the pilot well realized how tense his thoughts were in these crucial minutes, saw through his calm exterior that he was self-composed and concentrated to the utmost. While inspecting the winged vehicle, its high-altitude equipment and testing equipment, Solov'yev proceeded very precisely, accurately, his motions were conservative and calculated. One sensed that the pilot had confidence in himself and the equipment, that he was psychologically prepared for unforeseen complications in the situation.

And the situation seemed to have the intent of testing this preparedness of the aviator. At one of the most crucial stages of the flight, the vehicle was shaken and extraneous sounds invaded into the noise of the operating engine. The ship's commander needed precious seconds to ascertain from the instruments how the power plant was operating and then make a decision. The pilot continued with his assignment. He honorably resolved the critical situation, demonstrating to his subordinates an example of courage and self-command.

During similar high-altitude flights, every airborne fighter encounters the unexpected and experiences difficulties. And this is not surprising: while

Continuation. Article begins in No 3.

psychological loads grow when inspecting and operating cabin equipment; the memory and thinking are burdened to the utmost when analysis is made of the numerous data received in the aircraft.

However, there are also difficulties of a different nature. At high altitudes, in a rarefied air environment, it is substantially more difficult to pilot an aircraft and unique reactions appear in the body. During a stratospheric flight, the pilot strives not only to fend off aircraft disturbances, but to anticipate them, and this is not so easy to do. The inevitable change in work results in an increased number of movements and requires expansion of range of attention. It is only with refinement of skill that these movements acquire stability, the aviator develops stable skills, his own professional "handwriting."

Commanders of advance units [chasti] and subunits [podrazdeleniya], when analyzing high-altitude flights and pilot actions, strive to make fuller use of recommendations of military pedagogics and psychology. Profound knowledge of the psychological distinctions of their subordinates helps superior officers in making the correct determination of causes of errors and developing the means of preventing them. This is also very important for pilots who have been away from flying for long periods of time for some reason or other.

Until recently, it was believed that only long intervals between flights, from 30 to 45 days, have an adverse influence on a pilot's professional skills. But the most recent studies have shown that this is not so. An interval of even 15-20 days, and sometimes less, have the same adverse effect on stability of flying skills. Thus, when wearing special high-altitude gear, which hampers movement to some extent, even after a 2-week hiatus, the pilot could make a mistake in performing an assignment in the stratosphere.

As we know, the air environment often puts crew members to rigorous tests. While flying speed does not affect the human body, its psychological effect is quite perceptible. Excitement builds up in an aviator, which is related to so-called "ecstasy of speed." As a rule, the sensation of acceleration affects the pilot's mind proportionately to the magnitude of accelerations. He experiences heaviness and fatigue. His thinking may slow down for a time and his vision could become poorer.

The increase in amount of information transmitted to an aircraft is an important factor that affects pilot performance during a high-speed, high-altitude flight. Moreover, he has to assess and process the received information within a limited time. It has been determined, for example, that the pilot performs 6-8 times more diverse operations per hour when flying at supersonic speed at high altitudes than at infrasonic speeds. Obviously, commanders who are preparing subordinates for stratospheric flights must take this into consideration and construct the learning process more purposefully.

During a stratospheric flight at high speed, a zone is created before the aircraft, within which the crew is usually unable to detect a newly appearing object, since they do not have time to actuate their perception system. The higher the speed, the larger and longer such a zone is. Not infrequently, this is when pilots make mistakes, for example, there is delayed elimination

of banking. It is very important for them to bear these circumstances in mind and to be inwardly prepared to prevent oversights in their actions. As a rule, training at the proper time helps avoid problems.

The distinction of piloting an aircraft at the acceleration and "ceiling" stages is not so much referable to muscular and motor exertions of the pilot, expenditure of physical energy, as the ability to solve problems in an optimum fashion in a concrete complicated situation, to make prompt use of their psychological capacities. This can be illustrated by the following example. As we know, introduction of automation in control systems of aircraft and their equipment has made substantial differences in flight work and alleviated it appreciably. At the same time, it has been found that the more of man's functions taken over by automation, the more complicated the pilot's actions if automatic equipment suddenly fails. Here too, the pilot's intelligence and his psychological preparedness to withstand difficulties advance to the fore.

I recall how the exercises proceeded in the simulator class with pilots in the squadron commanded by Lt Col A. Volkov. The squadron commander and flight leaders presented unexpected inputs against a complicated tactical background, which simulated malfunction of sighting and flying-navigation equipment. They attentively watched how the subordinates redistributed their attention in this extreme situation, used back-up equipment, assessed the situation and made decisions at different stages of interception. The class leaders gradually increased the speed of exercise with due consideration of the flying skills of the fighter pilots, their emotional state and psychological readiness for action in a difficult situation. The exercise was repeated for those who could not perform within the prescribed time. It was found that such training was quite effective.

I have also had occasion to hear the following opinion: since it is necessary to solve various problems aboard a modern aircraft within strictly limited time, oversights are inevitable. On the basis of many years of experience, it can be stated that this view is wrong. Experience in combat training shows that the main cause of mistakes in flight is inadequate pilot training, rather than shortage of time to perform some operation or other with cabin equipment. As a rule, someone who works much to improve himself, honed his skills until they are automatic and acts rapidly in the air does not make mistakes, even in a rapidly developing situation. Conversely, someone who is not sufficiently trained makes mistakes, not only when time is short, but when there is a surplus. This means that, in order to perform with confidence, flight personnel must have good professional training and, of course, firm psychological conditioning, which helps retain composure, control and discretion in an extreme situation.

In this regard, we believe that the experience of air combats during the Great Patriotic War and the retraining of flight personnel for jet aircraft in the postwar years could be of great assistance to commanders. In both instances, the emotional factor, related to either a dangerously altered situation or novelty of equipment, or instrument flights beyond visibility of the natural horizon, was the chief distinction that determined aviator performance. There is much of value there, that is instructive, helps improve psychological conditioning of fighter pilots, refine their skills in a simulated flight.

It should be noted that the pattern of a flight is acquiring increasing significance to assure the safety of flight work. This method helps avoid numerous problems in piloting an aircraft in the clouds, using both the main and back-up instruments, as well as in eliminating excessive stress in spatial orientation. Pilots who do not have a deep and serious enough approach to simulating their actions are not infrequently faced with failures. When flying blind, they are subject to increased stress. There have been instances when pilots with heightened sensitivity of the vestibular system developed spatial illusions. It is imperative to explain to flight personnel how to control these phenomena, teach them to correctly switch attention to piloting and navigation instruments, particularly when there is a heavy burden on attention.

It was noted that psychological stress unconsciously causes the pilot to become distracted from instruments to search for external landmarks. This often happens when descending to the bottom edge of the cloud cover after a high-altitude flight. And, being distracted from the instruments, the pilot could create an emergency situation. For this reason, experienced methodologists develop, on the ground, a model of the flight in trainees; they are concerned about psychological readiness for action in weather minimum, they teach them to distribute attention to both instruments and the exterior, by means of electronic equipment.

Vagueness of the horizon, diminished accommodation (capacity of vision to adjust to distinct vision of objects at different distances) and a number of other factors complicate high-altitude flights appreciably. Moreover, the pilot constantly monitors the increased outlay of fuel when the aircraft power plant is operating in a reheat rating, exhaust fume temperature, etc. These and other circumstances require that attention be paid to psychological training of flight crews. Knowledge of the main laws of psychological science helps eliminate mental stress during flights.

(To be continued).

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## DIAGNOSIS FROM VOICE SIGNALS

Moscow GUDOK in Russian 10 Mar 83 p 4

[Article by N. Patrikeyev: "How Do You Feel?"]

[Text] I dialed the telephone number of Boris Ivanovich and deliberately asked in a "sick" voice:

"May I please speak with Trifilov."

"This is Trifilov."

"Hello, Boris Ivanovich. You recognized me?"

"Of course. Aren't you feeling well? Forgive me, but this is a professional matter. Before teaching a machine to identify human emotions, we analyzed for a long time tens of sound tracks [phonograms] with the voices of the most diverse "operators": pilots, air traffic controllers, cosmonauts. We even involved professional actors in our work, asking them to act out a dialogue between a pilot and controller in the case of arbitrary failure of two engines. All this was recorded on tape, compared to pulse rate and the cardiogram. Now, back to you."

... Prior to every trip, the locomotive engineer undergoes medical certification.

What if the trip lasts many hours? What if causes of excessive excitement or inhibition appeared after the physical? After all, one cannot wrap the engineer in a web of wires from numerous sensors. It turns out that there is a rather reliable means of monitoring a man's state involving no contact--from his voice. And, while even someone close to you must hear at least a few phrases to realize that you are not feeling well, the machine makes this diagnosis from a single word in which there are at least two vowel sounds. From such a simple word, for example, as "heaven."

Scientists of the Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, the Aviation Medicine Branch of the State Scientific Research Institute of Civil Aviation and Leningrad Institute of Electric Engineering participated in developing the "equipment for isolating voice signal parameters" (SVPRS) system.

B. Trifilov, candidate of medical sciences, head of the Aviation Medicine Branch of the State Scientific Research Institute of Civil Aviation tells us:

"It has been long known that the fundamental [basic] tone of human speech, which equals about 250-300 Hz, changes drastically under stress, tension or excitement. There is also change in length of pauses. Friends have no difficulty in determining one another's condition from the voice. Instruments work much more precisely--the automatic recorder of sonic pressure provides a graphic tracing of your voice. The complicated SVPRS machine consists of a tape recorder, frequency analyzer, micro-computer and other instruments for analysis of a verbal signal and its input in a computer."

"This work was started as far back as 1975, and we now have a working mockup, which enables us to monitor remotely the emotions of an operator. This unbiased machine can record all changes in the voice. Imagine the following dialogue...."

"Two, Two, I am One. How do you feel? Over."

"One, this is Two. I feel OK."--"Two, turn the controls over to the back-up immediately... you are tired."

"I repeat: I feel well...."

"Two, obey the command!"

The rudder is handed over to the copilot. After a brief rest, the commander will be able to control the machine again. Even now, it is true that on the basis of several other studies at the Aviation Medicine Branch of the State Scientific Research Institute of Civil Aviation, major airport traffic controllers are scheduled for a 20-min break after each 1.5-2 h of work.

This what A. Onufrash, head of the Psychophysiology Department, had to say:

"At the present time this appears fantastic, but we believe that it will happen. There will be an enormous control tower controlling the most responsible or longest flights on the domestic and international Aeroflot lines. There, the voice records ["identification cards"] of all commanders of aircraft are gathered. Communication with the aircraft is turned on, there is a brief dialogue including some test words and the controller decides whether the pilot should continue with the flight or needs some rest."

"You mentioned the term, "voice record." What is that?"

"It is a sample of a given pilot's normal speech. It is individual, like a fingerprint. Without it, there could be rather approximate voice identification. A new stage of our work is to teach a machine to identify the voice parameters of fatigue. The first task was to determine the level of emotional tension."

We asked M. Frolov, candidate of engineering sciences, head of the Laboratory of Applied Physiology at the Institute of Higher Nervous Activity and

Neurophysiology, USSR Academy of Sciences, to tell us what scientists have accomplished to solve this problem and what are the prospects:

"Just one example. We examined the level of emotional tension in parachutists at all stages prior to jumping by means of contact sensors, backing up their records with a record of the voice signal. We succeeded in identifying emotions in different subjects. Of course, the signal is different in each individual. Our task is to learn to inform the operator of the required emotional charge for each type of work. We are also working on forecasting states and work capacity, since long-term mental tension leads to fatigue. The prospects? Work on all types of transportation. To teach digital computers to work without programmers, logarithm computers or punchcards, being governed only by the operator's voice. In the not too distant future, robots that obey the voice will become our helpers."

10,657  
CSO: 1840/511

INDIVIDUAL AND COMBINED EFFECTS OF HIGH INTENSITY ELECTRIC FIELDS AND  
NITROSODIMETHYLUREA ON THE BIOLOGICAL AND AGRICULTURAL PROPERTIES OF COTTON

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR. SERIYA BIOLOGICHESKIKH  
NAUK in Azerbaijani No 1, Jan-Feb 82 pp 45-49

NASIBOV, N. N,

[Abstract] Investigations were conducted on the individual and combined effects of high intensity electric fields and nitrosodimethylurea treatment of cotton seeds on the biological and agricultural characteristics of cotton. Studies with cotton varieties S-4727 and 2833 demonstrated that electric fields alone exerted a stimulating effect, while the urea derivative altered certain biological and commercial characteristics of the plants. Combined treatment had, among other consequences, the effects of accelerating maturation, increasing the harvest yield, and elongating the cotton fibers.

References 12 (Russian).

[359-12172]

UDC 581.132.1+577.3

INFORMATIONAL ROLE OF BIOELECTRIC POTENTIALS IN PLANTS

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA BIOLOGICHESKIKH NAUK in Russian No 1, Jan-Feb 82 pp 110-116

ALIYEV, D. A. and ADYGEZALOV, V. F., Scientific Center for Biological Research, Azerbaijan SSR Academy of Sciences

[Abstract] A review of the current state of knowledge on the functional role of action potentials in plants is provided. Consideration is given to the innate bioelectrical phenomena of plants, as well as that induced as a result of the application of various external physical and chemical stimuli under natural and experimental conditions. The role of certain electrical events in the stimulation of plant respiration and photosynthesis have been well documented, and the suggestion has been made that action potentials in plants serve to transfer information from one region to another or from one organ to another. Considerable further work remains to be done to provide definitive information on the role of action potentials in the possible coordination of physiological processes in various parts of a plant. References 40: 27 Russian, 13 Western.  
[359-12172]

UDC 576.851.252,097,29

SOME PHYSICO-CHEMICAL, STRUCTURAL AND FUNCTIONAL PROPERTIES OF STAPHYLOCOCCAL ENTEROTOXINS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 12, Dec 80 (manuscript received 28 Dec 79) pp 9-17

FLUYER, F. S., Institute of Epidemiology and Microbiology imeni Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A summary of title data in the literature and of experimental data is presented in five sections: the physico-chemical properties of

staphylococcal enterotoxins, the structure of staphylococcal enterotoxins and the role of active groupings in biological activity, the mechanism of action of staphylococcal enterotoxins, immunology of enterotoxins and methods of identifying enterotoxins. The author characterizes staphylococcal enterotoxins as polypeptides with a molecular mass of 26,000--34,000 daltons with certain differences between types in terms of molecular structure, antigenic properties and biological activity in spite of the generality of their physico-chemical properties, chemical nature and nature of biological action. Methods of radioimmune assay and reverse passive hemagglutination are reported to be the most sensitive methods of identifying enterotoxins while double diffusion on gel is the simplest method. References 48: 3 Russian, 45 Western.  
[395-2791]

UDC 576.851.252.097,22:07

NON-UNIFORMITY OF THE AGGLUTINABILITY AND SENSITIVITY TO ANTIBIOTICS OF POPULATIONS OF STAPHYLOCOCCUS AUREUS, ISOLATED FROM TONSILLAR LACUNAE OF ANGINA AND CHRONIC TONSILLITIS PATIENTS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 2, Feb 81 (manuscript received 1 Apr 80) pp 41-45

LEBEDEV, K. A., SHIBANOVA, Ye. M., RUMANTSEVA, M. G., TURCHINOVA, G. D.  
and DOLGIKH, Ye. I., Moscow Scientific Research Institute of the Ear,  
Nose and Throat, RSFSR Ministry of Health

[Abstract] A study of the clonal structure of Staphylococcus aureus populations, isolated from the tonsillar lacunae of 15 angina patients and 10 persons with chronic tonsillitis, in reference to their agglutinability by the patient's blood serum and their sensitivity to antibiotics (levomycetin, tetracyclin, streptomycin, erythromycin, penicillin, chlorotetracycline, monomycin) showed great non-uniformity in sensitivity to these antibiotics and in the agglutination level by the patients' sera. Only clones from 3 of the 25 patients were identical in resistance to the antibiotics; in two of these, staphylococci were identical in sensitivity to all of the antibiotics used; in the third, they were sensitive to streptomycin, erythromycin and monomycin and resistant to other antibiotics. Some patients with low level of antibodies revealed clones which were resistant to the antibiotics but which were effective against some staphylococcus populations; these were called antibiotic immunoresistant clones. It was assumed that these clones of microbes are a potential source for development of an antibiotic-resistant population in the organism during antibiotic therapy. References 7:  
6 Russian, 1 Western.  
[394-2791]

UDC 616.12-073.97:519.24

STATISTICAL SYNTHESIS OF ALGORITHM FOR AUTOMATIC PROCESSING OF CARDIO-SIGNALS

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 5, Sep-Oct 82  
(manuscript received 12 May 81) pp 25-29

PIVOVAROV, Yu. L.

[Abstract] Since one aspect of medicobiological information consists of cardiosignals that require proper analysis, the author developed a mathematical synthesis of algorithmic and heuristic evaluation of the probability that given signals indicate specific medical conditions. The algorithm seeks to compare standard test values. The resulting algorithm could be simplified with only an insignificant loss of effectiveness by using modular operations instead of squaring functions. The algorithm includes scaling of recorded cardiosignals, standardization, phase referencing and comparison for determining similarities to standardized models. Figures 3; references 3 (Russian). [12131-393]

UDC 596:578.088.78

ANALYSIS OF SPECTRAL CHARACTERISTICS OF PINNIPED ACOUSTIC SIGNALS

Kiev VESTNIK ZOOLOGII in Russian No 2, Mar-Apr 82  
(manuscript received 17 Jul 81) pp 63-67

SVIZHENKO, V. A., Institute of Zoology imeni I. I. Shmal'gauzen, UkSSR Academy of Sciences

[Abstract] Sound signals of pinnipeds have not been adequately studied. Individual sounds vary in a wide range; the animals cough, burp, whistle, etc. A two-stage study was performed: first under natural conditions, then in a laboratory set-up. Spectral characteristics are reported of sound signals of representative pinniped species: *Phoca vitulina* L., *Eumetopias jubatus* S., *Erignatus barbatus* E. and *Odobenus rosmarus* L. The widest range was noted among the walruses: 0.08-5 kGh. The sound spectra of the

seals were in the 0,08-3 kGh range. They were easily differentiated from the sound spectra of real seals. In general, it appeared rather easy to classify the animal signals at the family level, and rather difficult at the species level. Figures 3; references 6: 4 Russian, 2 Western.  
[356-7813]

MULTIPLICATION OF DNA FRAGMENT IN OLEANDOMYCIN-PRODUCING STREPTOMYCES ANTIBIOTICUS

Moscow ANTIBIOTIKI in Russian Vol 28, No 3, Mar 83  
(manuscript received 6 Sep 82) pp 163-167

ORLOVA, V. A. and DANILENKO, V. N., All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms, Moscow

[Abstract] Investigations were conducted on the status of an extrachromosomal 21.3 Md DNA (eSA1) fragment in oleandomycin-producing *Streptomyces antibioticus* 326, and in strain 1607 derived from 326 for high oleandomycin production. Electrophoretic and electron microscopic analyses of DNA fragment obtained after restrictase treatment showed that 326 contains only one eSA1 copy integrated into the chromosome at sites located in PstI-C and BamHI-B fragments. In 1607 eSA1 accounted for 30% of the total cellular DNA and was calculated to be represented by more than 150 copies in the 1607 chromosome and, perhaps, one extrachromosomal copy. Tentative conclusions are that the multiple copies of eSA1 present on the 1607 chromosome in a tandem fashion are responsible for the high oleandomycin production. This contention is supported by the lack of success at isolation of eSA1 from 1607 variants producing low levels of oleandomycin. Figures 3; references 8; 2 Russian, 6 Western.  
[362-12172]

EFFECTS OF STORAGE CONDITIONS ON VIABILITY AND GRISEIN PRODUCTION BY STREPTOMYCES GRISEUS

Moscow ANTIBIOTIKI in Russian Vol 28, No 3, Mar 83  
(manuscript received 24 Sep 82) pp 171-177

TRENINA, G. A., LAVROVA, L. N., YUSTRATOVA, L. S. and KUKLIN, V. V., All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms, Moscow

[Abstract] Investigations were undertaken to determine the optimum storage conditions for *Streptomyces griseus* S-248 (Central Museum for Industrial

Microorganisms collection), an active producer of grisein which finds use as a feed additive. Evaluation of viability, colony morphology, and grisein synthesis demonstrated that optimum retention of antibiotic synthesis was exhibited by cultures stored on medium G-1, containing  $KNO_3$  as the sole nitrogen source, with periodic replating or storage under mineral oil at either 5 or 20°C. Alternatively, high viability and productivity were also shown by specimens lyophilized on bovine serum albumin with 5% sucrose for a period of 1.5 to 2 years. A sharp drop in grisein synthesis was seen in cultures lyophilized for 3.5 years. However, lyophilization could also be used for the selection of clones exceeding the original level of grisein synthesis. Colonies of active grisein producers were characteristically gray to dark-gray with an aerial mycelium. Figures 1; references 8: 5 Russian, 3 Western.  
[362-12172]

UDC 615.339:578.245/.07

INFLUENCE OF PRETREATMENT (PRIMING) WITH HOMOLOGOUS INTERFERON ON PRODUCTION OF IMMUNE HUMAN INTERFERON

Moscow ANTIBIOTIKI in Russian Vol 28, No 3, Mar 83  
(manuscript received 30 Sep 82) pp 214-218

ASPETOV, R. D., NOVOKHATSKIY, A. S., NOSKOVA, V. P., YEZEPCHUK, Yu. V. and SHURATOV, I. Kh., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences; Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow; Kazakh Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases, Ministry of Health Kazakh SSR, Alma-Ata

[Abstract] Roller tube cultures of human peripheral blood leukocytes and splenocytes were pretreated with the incubation medium of mitogen-stimulated human lymphocytic cells. The incubation medium contained various lymphokines including human interferon (10-1280 units/ml). Following a two hour priming period with the lymphokine preparation the cells were incubated for 72 h at 37°C after stimulation with staphylococcal enterotoxin A, phytohemagglutinin, or pokeweed mitogen. The effect of priming was to increase interferon production at least four-fold, with a concomitant increase in DNA synthesis. Furthermore, lymphokine pretreatment favored increased binding of radiolabeled enterotoxin to splenocytes, a phenomenon which may underlie the increased production of interferon by cells pretreated with various lymphokines. Figures 1; references 16: 4 Russian, 12 Western.  
[362-12172]

ENVIRONMENT

UDC 613.644+613.646]-07:[612.45+612.89

EFFECT OF COMBINED NOISE, VIBRATION AND HIGH TEMPERATURES ON STATE OF SYMPATHETIC-ADRENAL SYSTEM OF SAILORS

Moscow GIGIYENA TRUDA I PROFESSIONAL'YE ZABOLEVANIYA in Russian No 9, Sep 82 (manuscript received 31 Mar 82) pp 44-46

BOL'SHAKOVA, T. D., Moscow, VOYTENKO, A. M., NEYZHMAKOVA, N. A. and SHAFRAN, L. M., Odessa, Branch, Institute of Water Transport Hygiene, USSR Ministry of Health

[Abstract] The authors studied the title phenomena as they affected 25 engine-room sailors and 10 deck-crew members, by analyzing their urine, collected during watch periods and rest periods, for content of free catecholamines--adrenaline, noradrenaline, dopamines, sulfo-O-esters of the catecholamines--and the end products of free catecholamine metabolism. No (viz., vanillin-mandelic acid and homovanillic acids) statistically-significant differences were noted between the two groups for catecholamine excretions, but the engine crew showed lower levels of free and bound dopamines, bound noradrenaline and total adrenaline. They had higher noradrenaline synthesis activity and higher synthesis activity of dopamines. The mediator link showed greater activation, accompanied by increased relative biosynthesis activity and a corresponding reduction in noradrenaline metabolism, accompanied by reduced dopamine-link activity. The results were used to support a proposed new 12-hour work shift alternating with 24 hours of shore rest for port crews. References 12 (Russian), [383-12131]

ANALYSIS OF MAMMALS' INFECTIONS AND THEIR EPIZOOTOLOGIC MEANING IN FOCI OF PLAGUE IN THE ARAL SEA REGION

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol 61, No 5, May 83  
(manuscript received 15 May 81) pp 755-763

BURDELOV, L. A., KOSHENOV, U. A., ZHUBANAZAROV, I. Zh., RUDENCHIK, N. F., NURMAGANBETOV, A., PSHENISNOVA, N. A. and IKMATOV, A., Central Asian Scientific Research Anti-Plague Institute (Alma-Ata); Aral Sea Plague Control Station, (Aral'sk)

[Abstract] To determine the involvement of various mammals in epizootology of plague, results of bacteriologic and serologic studies performed at the Aral Sea Plague Control Station during the past 30 years was analyzed. Over 1.5 million mammals, representing 40 different species, have been examined bacteriologically. Plague infection was diagnosed in 3400 animals representing 17 species. Serologic tests were performed on about 400,000 animals, of which 15,000 had survived plague. Overall, 25 species were implicated in the epizootic process. By far the predominant plague inducers were isolated from sandworts, among which 96% exhibited antibody titer. This pattern was representative of the animal capture for the testing and represented various regions of the Aral Sea territory. A hypothesis was proposed according to which the epizootic process is initially inactivated by a high number of acutely sick animals, which only later appear as the principal carrier. The secondary carriers appear to have an independent input into the natural formation of the plague foci. References 22: 21 Russian, 1 Western.  
[352-7813]

## FOOD TECHNOLOGY

### UNDERWATER FARMS IN THE WHITE SEA

Moscow PRAVDA in Russian 4 Apr 83 p 7

[Article by V. Gerasimov, PRAVDA correspondent, Leningrad: "Underwater Farms in the White Sea--Search to Benefit Us"]

[Text] Floats made of polyethylene pipes and boards have grown into the ice in picturesque Chupinskaya Bay. Rarely, people reach them on snow mobiles. They make ice holes, collect water samples, and sometimes take the gear [tackle] attached at the bottom. Soon the ice will melt under the northern sun and the dams will again start rocking in the swells. Then people will take boats to go there.

Autumn came and went four times before Eduard Kulakovskiy, candidate of biological sciences, picked a 3-m segment of net from the water after stepping one more time on the float. He lifted it with difficulty, the fabric was invisible because of the dense accumulation of large mussels on it. The mollusks were suspended on the simple tackle forming a 60-kg live chain. And in all, there were as many such wreaths per float as pieces of netting submerged--110.

E. Kulakovskiy, head of the mariculture department, and B. Kunin, senior laboratory technician--both specialists from the Zoological Institute of the USSR Academy of Sciences, are presently summarizing the results of their experiments. The results are such that the method of growing mollusks on artificial substrates, which was proposed by the staff of the station, could be literally introduced on an industrial scale at the present time.

Mankind has been using the gifts of the sea since time immemorial. Fish and sea animals, crustaceans, comestible mollusks and diverse algae, which constitute the assortment of ocean products that are used by man, are abundant. And, although the biological resources of the world oceans are tremendous, this does not mean that they are inexhaustible. In other words, the future of mariculture lies in purposeful cultivation of some inhabitants of the deep or other on underwater farms organized by man.

In many countries, mainly those adjacent to warm waters, mussels in particular have been raised for a long time on artificial substrates. Posts are hammered

into the bottom, on which larvae settle, ropes and nets are dropped into the water and they gradually become overgrown with mussels. They develop rapidly in warm water. They can be harvested already in 1 year.

What then is the novelty of the proposals of researchers at the Zoological Institute, since there is already rich and comprehensive worldwide knowhow? Would it not be better to make use of it, for example, in the Black Sea? After all, there is already an experimental mussel farm there, about which PRAVDA reported last year.

E. Kulakovskiy states: "The Black Sea has its own problems--storms and heavy surf destroy the devices invented by man. The conditions for setting up underwater farms are more favorable in the White Sea or, as it is called by biologists, the Sea of Mollusks, which is virtually on the northern boundary of the habitat of mussels. The coast is etched with fjords. There are many small areas of water protected from the wind. In the summertime, there is enough feed for mussels and their larvae in the top water layer."

The White Sea has yet another distinctive feature. Mollusks have one merciless enemy, the starfish. It literally depletes colonies of mollusks, including mussel farms in certain warm seas. One cannot imagine the ruses and expenses that must be used to get rid of these gluttons! Divers place special covers on the chains of growing mollusks. The substrate is hoisted in the air by floating cranes.... This does not have to be done in the rocks of the White Sea.

There is a 2-m layer of fresh water that stays for several days during the spring thaw of snow and ice in the small inlets, where the staff of the biological station recommend that the collector-floats be placed just above the salt water. If sections of floats are lifted at this time into fresh water for a few hours, a defense reflex is triggered in the mollusks. They shut tight the valves of their shell and, as they say, thrive on such a change. While the starfish, which are so to speak "scalded," drop to the bottom. This is the simple solution of one of the most difficult problems to mussel farming in the White Sea.

"Observations and experiments have revealed, of course, that there are also problems in raising mollusks in this region," commented A. Golikov, doctor of biological sciences, who heads the laboratory of marine research at the institute. "Mussels grow only in the summer, and for this reason they gain weight more slowly here, in the north, than in warm seas. It takes 4 years for them to reach a marketable size. Evidently, it is the duration of the developmental cycle that is the psychological barrier, which must be overcome by practical workers in order to undertake the necessary and profitable matter of organizing mussel farms."

The workers at the "Sevryba" Association have provided a good example: they intend to help develop semi-industrial farms over an area of several hectares, as much as they can. Together with the institute, this association has already produced the first batch of smoked mussels in oil in cans. Those who have been fortunate enough to taste them are unanimous in praising this delicacy.

Research is proceeding at its own pace at the Black Sea station. The specialists have guaranteed that one can produce 300 tons of mussels (including shells) or 30 tons of net meat per hectare of sea, regardless of weather conditions. This will happen in 4 years. For feed purposes, for example, for fur-bearing animals, as mineralized supplement to fowl feed, one does not have to wait this long: an underwater farm can produce 30 tons in 1 year, 100 tons in 2 years and 200 tons of mollusks in 3 years. And, let us repeat, this can be done without the least expenditure on feed, with minimal labor. Everything is useful: mussel flesh, shell valves and liquid.

Questions of a practical nature arose in conversations with the institute staff, as we learned about the results of research: Where should the products of, let us say, a large underwater farm, be processed? Is it expedient to build specialized enterprises if work there will be seasonal, since the "harvest" is gathered in the fall at the White Sea station?

"Of course," comments O. Skarlato, corresponding member of the USSR Academy of Sciences, director of the institute, "it will be necessary to expand the capabilities of existing processing enterprises or build new ones, preferably closer to the farming regions. If, for some reason, this would be impossible, it is no problem either. Mussels, unlike fresh fish, can be well-preserved for 3-4 days without water or refrigeration, they do not lose their qualities during transportation. They can be transported right on the substrate, in chains. Incidentally, the mussels raised at the White Sea station are not contaminated with soil particles or parasites. The catch does not have to be submitted to special cleaning before processing for food purposes, as is usually done. It is not hard to change seasonal harvesting: there are no rules against harvesting the mollusks any time of the year."

Practical implementation of their recommendations should logically be the outcome of their research. The "Sevryba" Association has undertaken this. An agreement has just been made between it and the Zoological Institute to organize, already this year, the first industrial underwater farm 1 hectare in area. It is planned to develop one more hectare of water in the future. And so it will be, year after year, in order to "close" the full 4-year cycle of raising mussels under the conditions prevailing in the White Sea, and then one can move on to introduction of mariculture technology over larger areas.

10,657

CSO: 1840/418

## MEAT INDUSTRY TARGETS FOR 1983

Moscow MYASNAYA INDUSTRIYA SSSR in Russian No 2, Feb 83 pp 1-3

### EDITORIAL

[Abstract] Improvements in meat production are reviewed for 1982, in comparison to 1981. Among some of the highlights were: a more complete utilization of all meat and meat byproducts for production of foods, improvements in equipment and opening of new plants. Some of the shortcomings concerned individual republics which lagged behind others in fulfillment of contractual agreements, in utilization of byproducts for non-nutritive purposes, production of suboptimal meat products, etc. Great plans are laid out for 1983 to improve the well-being of the entire population. Meat industry should do everything possible to satisfy the needs of consumers. The projections for 1983 anticipated a 5-8% growth in meat production without an expansion of the labor force. This was considered to be only the minimal goal. Each industry, including the meat producers, have untapped reserves which must be mobilized to gain new production levels: higher efficiency in utilization of raw material, decreased production losses, processing of blood for nutritive products, utilization of bones and other meat byproducts to the highest degree, wider use of refrigeration to avoid meat spoilage, opening and improving of meat production plants and expansion of the purchasing and delivery of meat to these plants--all should help in increasing the national productivity.

[350-7813]

UDC 637.11.15:658.012.02

## ALL EFFORTS TOWARDS FULFILLMENT OF FOOD PROGRAM

Moscow MYASNAYA INDUSTRIYA SSSR in Russian No 2, Feb 83 pp 5-6

BROKS, O. Ya., Latvian SSR Ministry of Meat and Milk Industry

[Abstract] Review of the advances in meat reprocessing in Latvian SSR is reviewed including reports on attempts to fulfill the goals projected by the May 82 Plenum of CC CPSU. There are 13 meat plants in Latvia and two

more plants are to be opened in the near future. The delivery of cattle to these plants has been improved to minimize losses in transport. Obviously, the main condition for the fulfillment of the goals rests with the individual supplier farms and their fulfillment of their respective norms. New technique has been developed for skinning pigs, to save most of the fat; refrigeration of beef was stressed as a means of avoiding unnecessary losses due to spoilage. Total utilization of meat was strongly advocated: meat byproducts, blood and even bones can be used for various nutritional products. To increase labor productivity, team work, team specialization and competition have been introduced along with various meetings, seminars, courses and political education leading to voluntary decision of many teams to improve their productivity and to challenge others,

[350-7813]

UDC [658.012,2:637.5].003.13

#### COMPARISON OF NNP WITH PRODUCTION EFFICIENCY INDEX SYSTEM

Moscow MYASNAYA INDUSTRIYA SSSR in Russian No 2, Feb 83 pp 9-12

SITNIKOV, M. M., Sverdloysk Meat Production Association

[Abstract] To evaluate economic effectiveness of meat industry productivity, several indices may be used: labor productivity, cost efficiency and other more specific characteristics. A new index was introduced recently at the Sverdloysk meat production association--the so called Normative Net Productivity (NNP)--in the planning and evaluation of productivity. [The description given for NNP is not clear.] In some areas indeed productivity did improve with application of this index. A wide ranging analysis of various specialty jobs in meat processing was performed using NNP and more traditional methods of productivity evaluation. Overall, it was concluded that on a gross scale this was a good index to evaluate effectiveness of productivity. However, in detail jobs of various sub-productions such as sausages, processing of meat byproducts, work with feathers, this index was not very practical because many of these activities appeared to have been cost ineffective due to reasons beyond their control. In other words, the NNP should be refined for these subspecialty jobs to better reflect their characteristics and relationship to the whole.

[350-7813]

NEW DEVELOPMENTS IN PRODUCTION OF CANNED MEATS FOR BABIES

Moscow MYASNAYA INDUSTRIYA SSSR in Russian No 2, Feb 83 pp 17-19

USTINOVA, A. V., candidate of technical sciences, PAVLOVA, N. L., candidate of agricultural sciences, ORESHKIN, Ye. F., candidate of technical sciences, All Union Scientific Research Institute of Meat Industry, TURJANSKIY, V. A. and VLEZ'KO, A. A., Tikhoretsk Meat Combine

[Abstract] The leader among canned meat producers in the USSR was the Orshansk meat plant which in 1980 routinely produced seven types of baby food meat products. In 1982 a new plant was opened in Tikhoretsk with automation of many technical procedures. Three types of baby food meats are produced: homogenized meat for 6-7 months babies, pureed meat for the 7-9 month old consumers and ground products for 9-18 months toddlers. The plant is capable of processing 17.5 tons of final product per shift. The step by step procedure is described for preparation of canned ham. Addition of this new plant will facilitate planned production of meats for the little ones.

[350-7813]

PREVENTING VITAMIN DEFICIENCIES IN THE SPRING

Moscow ZDOROV'YE in Russian, No 3, Mar 83 p 27

YAPPO, T., candidate of medical sciences

[Abstract] The author emphasizes means of preventing vitamin C deficiency since vitamins of other groups are adequately supplied in food eaten in all seasons. Salted whole cabbage and sauerkraut are recommended as excellent sources of vitamin C and methods for keeping it are described. Methods for cooking potatoes and soups so as to preserve their vitamin C content are discussed. Reheating of vegetables is not advised. Fresh greens are a good source of vitamin C and may be grown indoors.

[499-2791]

DETERMINATION OF COMPARATIVE ACTIVITY OF THREE MAIN PROMOTERS OF  
BACTERIOPHAGE  $\phi$ X174 WITH EXPRESSION OF tet AND gal-OPERONS OF E. COLI  
IN VIVO

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 10, Oct 82  
(manuscript received 21 Apr 82; after revision, 26 May 82) pp 1365-1374

FEDCHENKO, V. I., DOLGANOV, G. M., AKOP'YANTS, N. S., CHESTUKHIN, A. V.  
and SHEMYAKIN, M. F., Institute of Bioorganic Chemistry  
imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Practically all information on regulation of the transcription of  $\phi$ X174 has been obtained in vitro, since its study in vivo by traditional methods is difficult for a number of reasons. In the present article, the authors attempt to evaluate the relative activity of the three main promoters of the phage (A, B and D) in vivo based on the expression of tet- and gal-operons in E. coli cells carrying the properly constructed plasmids. All the promoters were inserted in place of the natural promoters and their effectiveness compared based on stability of the transformed E. coli cells to tetracycline. All of the primary promoters are active in the expression of both tet- and gal-operons in vivo. The D promoter is most active of all, its effectiveness being maximal in both test systems studied. The activity of this promoter is significantly greater than the activity of natural promoters of inactive tet- and gal-operons or the frequently used promoter lacUV5. It is significantly greater than the activity of the strong G2 promoter of the phage fd in the gal-operon and many times more in the tet-operon. The D promoter should therefore be widely used in genetic engineering, particularly for expression of artificial genes in microbiological production of peptide-protein substances, Figures 3; references 34: 5 Russian, 29 Western.  
[361-6508]

PROTOPLAST FUSION AS A METHOD FOR CONSTRUCTING HYBRID BACTERIAL STRAINS

Moscow GENETIKA in Russian Vol 18, No 12, Dec 82  
(manuscript received 12 Jul 82) pp 1927-1937

FOMICHEV, Yu. K., MAKSIMOVA, N. P. and ZHELDAKOVA, R. A., Belorussian State University imeni V. I. Lenin, Minsk; Minsk Reference Point, All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms

[Abstract] A brief review is provided of the use of the protoplast fusion for the creation of novel bacterial hybrids and as a method for facilitating plasmid transfer. Research along these lines has been greatly stimulated by the use of polyethylene glycol to induce fusion, and, to date, such studies have encompassed 21 genera, including *Bacillus*, *Brevibacterium*, *Corynebacterium*, *Streptococcus*, *Staphylococcus*, *Streptomyces*, *Escherichia*, *Providencia*, and *Pseudomonas*. In many cases the formation of recombinants has been improved by parallel UV irradiation. Recombination, however, is a rare event and usually haploid parental forms dissociate. Successful interspecies hybrids have been obtained with *Streptomyces fradiae* and *S. bikiniensis*, and intergeneric hybrids have resulted from fusion of *Brevibacterium flavum* and *Corynebacterium glutamicum* protoplasts.

References 61: 10 Russian, 51 Western.

[358-12172]

EXPERIMENTAL TICK-BORNE RICKETTSIOSIS IN MYOMORPHOUS RODENTS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 13 Apr 82) pp 46-49

LEBEDEVA, N. N. and VORONTSOVA, T. A., Institute of Epidemiology and  
Microbiology imeni N. F. Gamaleya, Moscow

[Abstract] In order to study duration and level of infection, as well as formation and maintenance of complement-fixation antibodies, in rodent tick-borne rickettsiosis, 30 common voles, 32 meadow mice and 16 great gerbils were infected with *Rickettsia sibirica*. Titration in white mice demonstrated that the doses used were  $10^4$  times the  $ID_{50}$  in white mice for the voles and meadow mice, and  $10^2$  for the gerbils. While the voles had no symptoms, they exhibited rickettsiemia for six days after infection, as well as organisms in nipple smears on days four and five. Complement fixing antibody appeared from day 23 to day 90. Meadow mice were also symptom-free and only one animal showed a blood titer, which was only observed on days two and three. Complement fixing antibodies were found in meadow mice from day 3 to day 90. In gerbils, no clinical manifestations were seen, with rickettsiemia on days one through five. The blood titer was one and a half times higher than in the voles, though the infecting dose was 100 times less. Complement fixing antibodies appeared from day 11 to day 90. The data indicate that the test animals are not very susceptible to *R. sibirica*, with gerbils the most sensitive. Figures 1; references 4 (Russian).

[711-12126]

## METHOD FOR SHORT-TERM PROGNOSIS OF SONNE DYSENTERY ANNUAL MORBIDITY RATE

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 28 Jun 82) pp 53-56

VLASOV, V. I., ZAMOTIN, B. A. and BURYKH, V. M., Ryazan Medical Institute imeni I. P. Pavlov

[Abstract] A method for short-term prediction of Sonne dysentery morbidity levels and seasonal increases was developed and tested, based on the observation that the average monthly air temperature for June and July, as well as the number of days with temperature greater than 25°, have the greatest effect on morbidity and seasonal variation. Paired correlation coefficients for air temperature, number of hot days and morbidity were calculated using data for the preceding eight to ten years and combined to form an aggregate correlation coefficient. The prediction equation is linear in both variables, with coefficients determined from the paired correlation coefficients, arithmetic means of the three parameters and root-mean-square deviations. Prognosis error is calculated from morbidity root-mean-square deviation and the aggregate correlation coefficient. For three-year-olds in the central European section of the Russian Soviet Federated Socialist Republic predicted morbidity per 100,000 equals 31.7 times mean air temperature in June and July plus 45.3 times the number of days in June and July with temperature greater than 25°, plus 991.5. The results are particularly suitable for comparative purposes. The method was found to adequately describe the multi-year dynamics of Sonne dysentery in retrospect and to give accurate predictions for all population groups. Preliminary predictions are based on weather forecasts and final predictions on actual data. References 6 (Russian). [711-12126]

UDC 616.36-002.15-022:578-891]-036.2(470.313)

## ASPECTS OF VIRAL HEPATITIS EPIDEMIOLOGY IN RYAZAN OBLAST'

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 2 Jul 82) pp 56-59

ZHDANOV, G. P., KONOPLEVA, T. K., DAVYDOVA, S. N., NIKULIN, V. A., ANTONOV, V. I., YEGEREV, V. M., ROSSIKHIN, N. F. and SHUVALOV, V. V., Medical Institute imeni I. P. Pavlov, Oblast' Sanitary Epidemiological Station, Ryazan

[Abstract] The public health records of the Ryazan oblast' over the last 30 years were studied to determine the epidemiological dynamics of viral hepatitis A in the area. Four cyclic increases in viral hepatitis morbidity were found from 1958 to 1980, with four to six years between cycles. While in 1954-1958 children, aged 11-14, were only 9.0% of cases, in 1974-1978 they

were 25.8%, due to decreases in collective immunity resulting from immunoprophylactic measures. Fluctuations in morbidity levels from 1966 to 1980 were much greater in children than in adults. This has been particularly true for older schoolchildren in recent times. Children contacted viral hepatitis 3,4 to 6,5 times more frequently than adults. Half of all cases occur from September to December. Seasonal variations were much more intense in school children than in adults. While in recent years the number of hepatitis A cases in Ryazan has decreased, due to immunoprophylactic measures covering 50% of all children, this level of coverage can not fundamentally change the epidemiological process. The characteristics of the 530 outbreaks of hepatitis A noted in the last 23 years suggest air-borne transmission. Figures 2; references 5 (Russian).

[711-12126]

UDC 616.98:578.832,1]-085,281-036.8

ORGANIZING AND EVALUATING EFFECTIVENESS OF EMERGENCY PROPHYLAXIS AND EARLY TREATMENT OF INFLUENZA WITH REMANTADINE IN SEVERODVINSK

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 21 Jul 82) pp 60-63

GAGARINOVA, V. M., SHADRIN, A. S., KUBAR', O. I., KUSTIKOVA, Yu. G.,  
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[Abstract] In order to evaluate the usefulness of Remantadine in emergency influenza treatment and prophylactic dosing of unvaccinated individuals, the 1979 and 1980 epidemics of influenza A in Severodvinsk, a city of population 200,000 were studied. In addition, adult family members in contact with patients were given Remantadine, one 0,05 g tablet daily, for five days and the effectiveness of this measure was evaluated in 1979-1981. Planned emergency prophylaxis was found to decrease morbidity among workers and medical personnel by a factor of 1.7 to 1.8 in 1979 and 1980. Treatment of family members decreased cases from 7-15 per 100 to 1-1,6 in 1979 and 1980. However, in 1981 during the influenza B epidemic the decrease was only from 67,1 to 36,5 cases per 100. Remantadine does not decrease influenza B virus reproduction in animals but does not decrease viral toxicosis. The data indicate that Remantadine is an effective component of influenza A prophylaxis, particularly in individuals for whom vaccination is contraindicated and for high-risk groups. Therapeutic use of Remantadine also decreased symptom duration and frequency of complications, particularly if used early in the course of the infection. References 12 (Russian).

[711-12126]

USE OF TOXIN-TISSUE RECEPTOR REACTION FOR DETECTING TOXIC SUBSTANCES  
PRODUCED BY CAUSATIVE AGENTS OF ACUTE INTESTINAL DISEASES

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 15 Jul 82) pp 63-65

BUNIN, K. V., YEFREMENKO, V. I., DOLMATOVA, L. A., CHERCHENKO, I. I.,  
NECHAYEVA, I. P., PARFENOVA, N. N. and NARBUTOVICH, N. I., Volgograd  
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imeni I. M. Sechenov

[Abstract] A new method for detecting enterotoxins via passive hemagglutination with erythrocytic ganglioside diagnostic reagents was developed for *Vibrio cholerae*. The usefulness of this method for detecting enterotoxins produced by other agents causing acute intestinal diseases was evaluated using a diagnostic reagent made from formalinized erythrocytes and commercial gangliosides. Filtered culture media, obtained both from strains isolated from patients with acute intestinal diseases and from museum strains, were tested for passive hemagglutination and with biological methods using skin tests, isolated rabbit intestine and suckling rabbits. All enteropathogenic intestinal bacilli gave positive results in all tests. In *S. newport*, *S. virchow* and *S. london* strong correlation between results of hemagglutination and skin tests was seen. No *Shigella* or *Staphylococcus* gave hemagglutination, though one *Shigella* strain was positive in the rabbit intestine tests and all *Staphylococci* disturbed skin permeability. For museum strains *V. cholerae* were positive in all tests, while *S. typhi*, *S. sonnei*, *S. aureus*, nonagglutinating *Vibria* and *S. paratyphi B* gave only negative results. Enterotoxin loss may be due to frequent reculturing. The data indicate that passive hemagglutination with erythrocytic gangliosides is useful for the detection of *V. cholerae*, *Salmonella* and *S. coli* enterotoxins.

References 10: 6 Russian, 4 Western.

[711-12126]

MECHANISM OF VIRUS-INDUCED IMMUNOPATHOLOGY, COMMUNICATION I.  
REACTIVITY OF IMMUNOCOMPETENT CELLS IN ACUTE EXPERIMENTAL HERPES INFECTION

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 6 Jul 82) pp 65-68

SHAVROVA, Ye. N., SHARKO, R. M. and KHLIUSTOV, S. V., Belorussian  
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[Abstract] The immune reactivity of various mice lymphocyte subpopulations, thymocytes and splenocytes, in acute herpetic encephalitis was studied.

Blast transformation induced by Herpes simplex virus (HSV) or phytohemagglutinin was compared for infected and intact mice. Acute HSV encephalitis resulted in decreased blast transformation in response to both mutagens, indicating specific immunodepression and general immunosuppression. In the splenocytes, but not in the thymocytes, of uninfected animals, HSV stimulated blast transformation. The data indicate that herpetic infections inhibit the activity of the T-subpopulation of spleen lymphocytes. The degree of specific immunosuppression was greater in the thymus than in the spleen. This fact and the blast transformation stimulation seen in the spleen may be due to differing ratios of T- and B-lymphocytes in the two organs or to cooperation of various subpopulations. The ability of HSV to induce immunodepression may explain its long-term persistence in the body and prevalence of bacterial complicating infections. Immunostimulators may provide useful therapy, References 12: 5 Russian, 7 Western.  
[711-12126]

UDC 616.98:578.835.15]-087.47-036.8

#### DYNAMIC CHARACTERISTICS OF COLLECTIVE IMMUNITY TO POLIOVIRUS AND QUALITY OF VACCINATIONS AGAINST POLIOMYELITIS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 7 May 82) pp 75-78

VLASOVA, L. V., VASERIN, Yu. I., STEPANOVA, G. P., ZAKIROVA, S. F.  
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Viral Infections

[Abstract] In order to evaluate the state of collective immunity to poliomyelitis among the children of Sverdlovsk, virus neutralizing antibodies were determined in 653 1-3 year old visitors to children's clinics from 1976 to 1981. The percent of individuals with antibodies to type I and II virus increased substantially from 1976 to 1979, due to the introduction of the more effective liquid vaccine. The proportion of subjects with antibodies to type III increased less, from 55% to 65%, as compared to changes of 67% to 89% for type I and 55% to 98% to type II. The mean geometric titer among immune individuals did not change significantly during the period studied. The greatest changes in rate of immunity were seen in children aged 1 to 2. Seronegative individuals decreased from 40% in 1976 to 6.4% in 1978 and 8.8% in 1980. Errors in immunization procedure, particularly incomplete series of vaccinations, incorrect intervals between vaccinations, interfering immunizations and administration despite contraindications were found to decrease the percent of subjects with antibodies but not the titer in seropositives. The data demonstrate the increased effectiveness of liquid vaccine as compared to sugar-coated live dry vaccine and the need to control vaccination procedure quality. Figures 1; references 11 (Russian).  
[711-12126]

EVALUATION OF TOXIC ACTION OF PROPHYLACTIC AND THERAPEUTIC PREPARATIONS ON CELL CULTURES. COMMUNICATION III. DETECTING TOXIC PROPERTIES IN MEDICAL BIOLOGICAL PREPARATIONS FROM DEGREE OF CELL DAMAGE IN CONTINUOUS CELL LINE L132

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 17 Jun 82) pp 87-92

KRAVCHENKO, A. T., DZAGUROV, S. G. and CHERVONSKAYA, G. P., State Scientific Research Institute for the Standardization and Control of Medical Biological Preparations imeni L. A. Tarasevich, USSR Ministry of Health, Moscow

[Abstract] Cytotoxicity in cell culture, as determined after staining with trypan blue, was measured for 16 types of vaccines, sera and allergens. High cytotoxicity, similar to that previously observed for DPT vaccine with thimerosal, was seen in Fermi type antirabies vaccine, in which the virus is inactivated with phenol. High titers in DPT vaccine were previously demonstrated to correlate with intense local reactions in pediatric patients. Moderate cytotoxicity was found in UV inactivated antirabies vaccine; cytotoxicity was absent in cultured rabies vaccine. Preparations containing thimerosal as a preservative demonstrated a substantially higher cytotoxicity titer than those without it. Low cytotoxicity was seen in purified influenza vaccine, immunoglobulin without thimerosal and bacterial allergens. The cell culture passage method give an accurate and rapid indication of bacterial contamination, as well as cytotoxicity. The results confirm that thimerosal is not a suitable preservative for parenteral pharmaceutical preparations. Cell culture passage methods can be effectively used in pharmaceutical quality control. References 27; 13 Russian, 14 Western.  
[711-12126]

UDC 579.843.95:[579.222:547.455]

CARBOHYDRATE FERMENTATION BY CAUSATIVE AGENT OF TULAREMIA

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 28 Nov 81) pp 95-96

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[Abstract] In order to determine carbohydrate fermentation in the causative agents of tularemia, a simple bacteriological method using a protein-poor liquid medium is employed. A change in the color of the phenol red indicator included in the medium indicates a strain positive for oxidation of the carbohydrate under test. In a comparison of the new method

to the Downs method as modified by Yemel'yanov and Kunits, 82 Holarctic strains, 63 Central Asia strains and the Nonarctic Schu strain were tested with 11 saccharides. The new method indicated that all strains ferment glucose and mannose, while Central Asiatic strains also break down galactose. The modified Downs method did not indicate glucose and mannose fermentation for Central Asiatic strains and gave later fermentation for the other strains. No oxidation of lactose, saccharose, arabinose, rhamnose, xylose, melobiose, sorbose, and raffinose was observed in either test. The new method permits detection of carbohydrate fermentation on the second to third day, while the modified Downs test required 5-6 days and is less sensitive.  
[711-12126]

UDC 616.41-091-02:579.841,93]-092.9

#### SENSITIVITY SPECTRUM OF VARIOUS TISSUE ORGAN CULTURES TO BRUCELLA

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 83 (manuscript received 11 May 82) pp 100-101

GRUSHINA, T. A., SOKOLOVA, N. N., REMENTSOVA, M. M., IRZHANOV, S. D.  
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Microbiology and Infectious Diseases, Kazakh SSR Ministry of Health,  
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[Abstract] Morphological changes and multiplication dynamics were studied in organ cultures of guinea pig brain, trachea, lung, spleen, liver, kidney, intestine, uterus and Fallopian tubes infected with *Brucella melitensis* 16M. While control spleen cultures had 15-20% surviving cells after 9-10 days, infected cultures exhibited complete cell death before days 4-5. A dose of 500,000 microbes caused culture death in 2-3 days; doses of 25 and 50 million microbial cells killed the cultures in one day. *Brucella* multiplied in spleen, liver, Fallopian tubes, uterus, trachea and kidney cultures but not in lung, intestine and brain. Pathogen multiplication was maximal on days 2-4. Maximum colony-forming unit titers ranged from  $2 \times 10^3$  to  $10^8$ . Multiplication ceased on day 4-8, depending on the tissue. Phagocytic activity of the cells was low, as indicated by direct Coons staining. Liver, kidney, uterus and Fallopian tube organ cultures are recommended for studying mutability and pathogen accumulation in *Brucella* isolated from patients.  
[711-12126]

CLINICAL-IMMUNOLOGICAL CHARACTERISTICS OF VIRAL HEPATITIS IN COMBINATION WITH SHINGLES

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, May 83 (manuscript received 5 May 82) pp 102-103

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[Abstract] Clinical, biochemical and immunological shifts were studied in patients with viral hepatitis complicated by Herpes zoster shingles. Eleven patients with hepatitis and shingles were compared to fifteen with uncomplicated hepatitis of equivalent severity and to twenty normal individuals. Herpes zoster appeared in the second to third week of the hepatitis, accompanied by pain, fever, intoxication, increased jaundice and bilirubinemia. Leucocyte blast transformation was elevated in reaction to hepatic antigen and depressed in reaction to phytohemagglutinin. Leucocyte migration was retarded. Levels of rosette-forming cells were increased. Phagocytic activity was depressed in all patients with hepatitis, with those complicated by shingles having lower complement activity. The data indicate that complicating Herpes zoster leads to a more serious clinical picture in hepatitis with depression of nonspecific protective mechanisms and prolonged convalescence. [711-12126]

UDC 591.67(574-2)

INFECTIOUSNESS OF HUMAN PATHOGENIC MICROORGANISMS IN SMALL ALMA-ATA MAMMALS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 5 May 82) pp 103-104

STEPANOV, V. M., ARKHANGEL'SKAYA, N. P., BEZRUKOVA, L. S., KUDINOVA, T. P., BURDELOV, A. S., BURDELOV, L. A., DEMIDENKO, Z. S. and STOGOV, V. I.,  
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[Abstract] Small wild mammals, trapped in Alma-Ata in 1979 and 1980, were studied for the presence of plague, pseudotuberculosis, intestinal yersinosis, salmonellosis, brucellosis, pasteurellosis, listeriosis, erysipelas, tularemia and anthrax. Intestinal yersinosis was the most widespread. It was found at almost every site of animal trapping, in 9% of all subjects. Salmonella typhimurium was seen in 2.4% and S. enteritidis in 1.3%. Pseudotuberculosis was much more frequent in areas of high human population density. The rate of infection was 2.1% in domestic animals and 7.5% in field animals. Coinfections with two pathogens were found in five cases. No pathogens were detected in three grey hamsters, one small shrew, two gray shrikes and one flying mouse tested. The data represent the first study of the rate of infection with human pathogens in Kazakh small mammals. [711-12126]

METHOD FOR DETERMINING TWEENASE ACTIVITY IN FRANCISELLA TULARENSIS AND FRANCISELLA NOVICIDA

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 83 (manuscript received 2 Jun 82) pp 104-105

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[Abstract] The conventional method for determining Tween esterase activity was modified for Francisella species using the principle of double radial diffusion in agar and the limited solubility of the aliphatic acid products in water. Esterase activity was indicated by the appearance of a whitish, turbid zone in the agar between the wells for enzyme and substrate. Using this method, activity versus Tweens 20, 60 and 80 was found in individual *F. novicida* strains and the 503, 1298, 232, 236, Miura, 543, 122. 55, Schu, E-261 and Cole strains of *F. tularensis*. By incubating post-electrophoresis polyacrylamide gel portions in alpha-naphthylacetate esterase before the double diffusion experiments it was demonstrated that the two esterases, for Tween and alpha-naphthylacetate, are very similar or identical in strains 236, 1298, Cole and 543, as well as in *F. novicida*. The data indicate that these isoenzymes require further study before they can be classified.  
[711-12126]

LASER EFFECTS

UDC 613.647:621.375.826]-07:616.831-073.97

USE OF ELECTROENCEPHALOGRAPHY TO ESTIMATE THE INFLUENCE OF LASER IRRADIATION ON THE HUMAN BODY

Moscow GIGIYENA I SANITARIYA in Russian No 5, 1980  
(manuscript received 21 Mar 1979)

[Article by Candidates of Medical Sciences V. P. Zotkina, A. A. Komarova and T. F. Markova, Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman]

[Text] We studied the electrical activity of the brain in a group of workers operating optical lasers (OL) at industrial enterprises. There were constant levels of diffuse laser irradiation at their work sites.

A total of 28 people were examined (10 men and 18 women) of 20 to 40 years of age and having a history of 2.5 to 8 years of work with lasers. Of them, 11 people operated the Korund serial pulsed laser neodymium glass apparatus (1.06  $\mu$  wavelength, 0.7-1.8 J pulse energy, 1-5 msec pulse duration) and the UPR CO<sub>2</sub> apparatus (10.6  $\mu$  wavelength, 0.82 J energy, 35-100 Hz pulse repetition frequency).

In evaluating the sanitary-hygienic labor conditions of the workers that we investigated (Yu. P. Pal'tsev et al.) it was established that the intensity of diffuse laser irradiation at the work sites is  $3 \cdot 10^{-5}$  to  $3.4 \cdot 10^{-7}$  J/cm<sup>2</sup> during operation of the Korund apparatus,  $4 \cdot 10^{-8}$  to  $4.3 \cdot 10^{-6}$  J/cm<sup>2</sup> on the SU-1 and  $1.8 \cdot 10^{-4}$  J/cm<sup>2</sup> on the UPR apparatus. The OL's gave bright bursts of light from the flare and excitation lamp, the number of which reached 230-250 thousand per shift, especially during operation of the Korund apparatus. A considerable straining of the workers' vision also resulted from an unsatisfactory ratio of levels of local and general illumination (local comprised 0.2-3.4% of the general instead of 10% according to the standard). The levels of stable noise at the work sites usually did not exceed the maximum permissible, while the sharp noise accompanying each pulse generation in the form of a bang or clap could exceed the maximum permissible by 2-6 dBA at frequencies of 4-8 kHz. The quantity of condensation aerosols from worked materials, ozone, nitric oxide and nitrogen peroxide forming in the air of the work sites did not, as a rule, exceed the maximum permissible concentrations.

Upon medical examination of the workers of the given group it was learned that most of them noticed an impairment of well-being specifically during the period of work with OL's. Most characteristic were complaints of a peculiar fatigue by the end of the shift, accompanied by sluggishness, apathy, a depressed mood and an increased irritability. They were frequently disturbed by pains and unpleasant sensations in the eyeballs, a feeling of eye fatigue and heaviness in the eyelids. Seventeen of the 28 examined had symptoms contained in the symptom complex of an asthenic and asthenovegetative syndrome and, also, in the syndrome of vegetative-vascular dysfunction.

Electroencephalograms (EEG's) were recorded on an eight-channel electroencephalograph of East German manufacture with biopotential recording from symmetrical points of the frontal, parietal, temporal and occipital regions of the brain by a mono- and bipolar method. In addition to the spontaneous EEG, the change in the EEG was recorded under the influence of functional tests: rhythmic photostimulation with a flash frequency of from 5 to 24 per second and a three-minute hyperventilation.

Electroencephalograms were taken from people under identical procedural conditions in the control groups, comprising 17 institute associates having no contact with unfavorable productional factors and in whose anamnesis no cerebral traumas or organic diseases of the nervous system were noted.

The character of the EEG was evaluated visually taking into account the frequency and amplitude parameters, the presence of a dominant rhythm, pathological activity, interhemispherical asymmetry, the zonal distribution of waves, the degree of their expression and so on.

Comparison of the results of the electroencephalographic investigations of people in the main and control groups showed that shifts in the condition of brain bioelectrical activity of a primarily functional character and indicating definite disturbances in the activity of both the cortical and to a lesser extent the deep structures of the brain were noted in 76% of the OL workers and in 31% of the people in the control group.

The most indicative was a decline in the amplitude level of  $\alpha$ -activity and the  $\alpha$ -index. The average amplitudes of the  $\alpha$ -waves in OL workers comprised  $40.6 \pm 3.4 \mu\text{V}$  against  $55.3 \pm 4.3 \mu\text{V}$  in the control ( $P < 0.05$ ). At the same time the  $\alpha$ -rhythm amplitude was reduced in 43% of the subjects, while no low-voltage EEG's were obtained in the control. In workers operating OL's, the  $\alpha$ -index in 21% of the cases was low; no reduction of  $\alpha$ -activity in people in the main group by presence of a moderate polyrhythmia and polymorphism of the waves, their insufficient modulation with respect to spindles and by blurring of the differences in the zonal distribution.

The  $\beta$ -rhythm in OL workers was distinguished by a frequency greater than that in the control and by a tendency towards large amplitude. Thus,  $\beta$ -activity with an oscillation frequency of more than 30 per second was not encountered at all in the control, while it was observed on 28% of the curves in people of the main group. The average amplitude of  $\beta$ -activity in people in the main group comprised  $15.6 \pm 1.3 \mu\text{V}$  against  $12.1 \pm 0.9 \mu\text{V}$  in the

control ( $P < 0.05$ ). Sharp waves of moderate voltage were recorded somewhat more frequently on the EEG's of workers than in the control. An irregular slow activity of the  $\beta$ -spectrum with an amplitude of no more than  $30 \mu\text{V}$ , recorded in the anterior segments of the brain, was encountered no more often in OL workers than in the control.

Pathological activity on the EEG's of people in the main group was represented in the form of bilaterally symmetrical high-voltage discharges of  $\theta$ -waves or low-frequency  $\beta$ -waves, localized more frequently in the anterior brain segments; sometimes the discharges were of a generalized character. No such discharges were observed in people in the control group. It should also be noted that anomalous activity was revealed primarily upon the use of the functional tests.

In evaluating the response to rhythmic light in OL workers, there was noted a narrowing of the frequency limits of light-flash repetition in 76% of the cases (against 31% in the control) and their displacement in the direction of low frequencies. Furthermore, isolated instances were noted with a generalized and distorted character of repetition and, also, non-responsiveness, which was not observed in the control. The response to three-minute hyperventilation in 64% of the subjects did not differ from that in the control. In 21% of the cases hyperventilation brought out or intensified background pathological shifts in electrical activity.

Comparison of the frequency of both types of brain electrical activity found in the subjects of both groups showed that curves of a normal type predominated in 94% of the cases in the control, while a hypersynchronized type was found in 6%. At the same time, during OL operation, the normal type of curves was encountered in only 39% of the cases. The curves were of a desynchronized character in 11% of the subjects, of a hypersynchronized in 4% and tracings with a disorganized rhythm were noted in 4%; there were "flat" curves in 14% of the cases and pathological EEG's in 28%.

Thus, the data of the electroencephalographic investigation of workers subjected to prolonged exposure to diffuse laser irradiation of low intensity indicate that the majority of the workers have diffuse changes in brain electrical activity (in the form of a reduction of the  $\alpha$ -rhythm and a decline in the amplitude level, a blurring of regional differences, arrhythmia, etc.). The functional tests revealed in a large percentage of cases a decline in the responsiveness and lability of the cortical neurons (sometimes to complete aresponsiveness). Local signs were noted in eight subjects indicating a change in the functional state of the mesodiencephalic and stem structures of the brain.

Comparison of the changes in brain electrical activity in OL workers under industrial-production conditions, with earlier-described shifts on the EEG's of workers in a scientific research institute (T. F. Markova), demonstrated the unidirectional character of the deviations but their differing degree of expression; local changes in the form of bilaterally-synchronized bursts of pathological activity, i.e., more profound disruptions in electrical activity,

were found comparatively more frequently in industrial workers. It is important to note that we found shifts on EEG's both in people with the presence of clinically-detected functional disorders in nervous- and cardiovascular-system activity and in virtually healthy workers, which imparts particular value to the electroencephalic investigations, making it possible with the help of this method to find people with an early, preclinical stage in need of dynamic physician observation and prophylactic treatment. At the same time our investigations do not allow all shifts in bioelectrical activity found to be attributed solely to the action of diffuse laser irradiation, since the people we examined were, in addition to laser radiation, exposed to a complex of unfavorable productional factors, including light bursts and high-frequency pulsed noise. Refinement of the etiologic role of laser irradiation in the deviations found requires further study.

### CONCLUSIONS

1. Disturbances in brain bioelectrical activity may be one of the earliest responses of the body of OL workers to prolonged exposure to low-intensity diffuse laser irradiation.
2. The character of the EEG's in OL workers indicates the prevalence, during the initial stages, of diffuse changes in brain electrical activity, as well as disturbances in cortical neurodynamics in the direction of a decline in cortical responsiveness. Signs of a dysfunction of the deep structures of the brain were noted in the more pronounced cases.
3. The method of electroencephalography, making it possible to detect the early preclinical signs of the influence of laser irradiation on the body of OL workers, should be widely employed for the clinical examination of appropriate worker contingents in the interests of a timely selection of persons liable to dynamic observation and prophylactic treatment.

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CSO: 8144/1148

GLANDULAR SYSTEM OF THE VESICULAR FIELD OF THE FRONTAL AIR SAC OF THE CACHALOT

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 29, No 2, Mar-Apr 83 (manuscript received 29 Dec 81) pp 232-236

[Article by V. A. Kozak, Institute of Physiology imeni A. A. Bogomolets, Kiev]

[Text] There are published descriptions of the vesicular elements of the frontal air sac of the cachalot [1, 2-5, 8, 9, 10].

Norris and Garvey [9] give some histological data on the structure of vesicles, describe vesicular elements taken for study from two embryos and one adult cachalot and reveal collagenic fibers in the walls of the vesicles.

Earlier [2, 3, 5], we calculated the average number of vesicular elements in cachalots, explained the peculiarities of their histological structure and conducted electronic microscopic studies.

Structural peculiarities of vesicular elements were studied with the use of radiopaque compounds with subsequent roentgenography in various projections. A biochemical analysis of the vesicular cavity was done.

Study Method

Small fragments of the vesicular field with unopened vesicles were placed in a neutral 10% formalin solution. In some instances, for a better fixation, a fixing solution was introduced with a syringe into the vesicular cavity or the vesicular cavity was cut open widely and a piece of gauze was placed in it to prevent the adhesion of the inner walls.

After standard processing and coating with paraffin, the pieces were cut in serial sections. In some instances, such as pieces of the vesicular field of embryos, serial sections were obtained on a freezing microtome (staining -- hematoxylin-eosin, Van Gieson's). For studying nervous elements, sections obtained on a freezing microtome (60-70  $\mu$ m) were stained [6].

Results of Studies

The obtained results of studies are shown with the use of preparation given in Figures 1-3. Islands of glandular tissue can be seen in the connective macrofibrillar mass of the stroma, as well as excretory canals, ducts of various

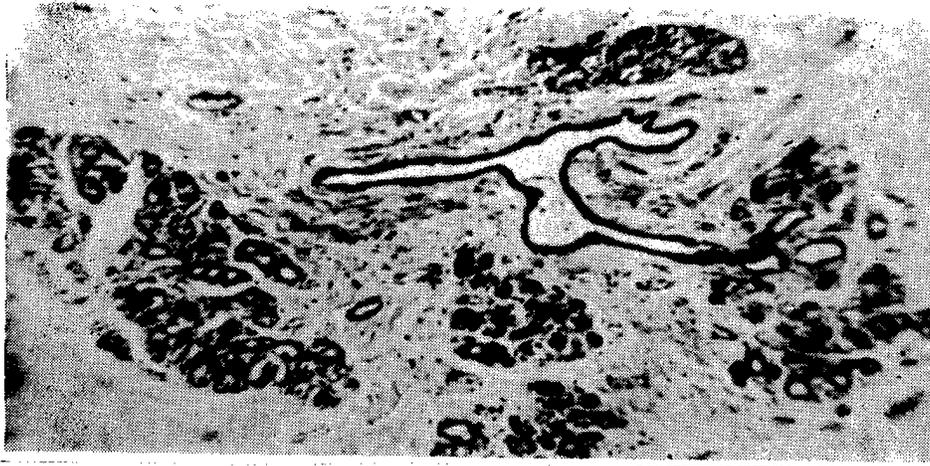


Figure 1. Part of the gland represented by several lobules. Three interlobar ducts joined into a common excretory duct cut diametrically are clearly visible. Each lobule consists of separate alveoli. Eosin-hematoxylin, 10 x 7.



Figure 2. Separate gland lobule. Alveolar structure is well represented. A duct joining with other interlobar ducts extends from the lobule. Hematoxylin-eosin, 20 x 10.

calibers (Figures 1, 2). Glandular epithelium united into an alveolar structure and individual acini are well visible. Small lobules are united into larger structures. The glands have a well developed system of excretory ducts. Each alveolar structure has its own duct which is joined with ducts coming from adjacent lobules. Finally, the ducts are joined into a large canal, a common excretory duct lined with single-layered epithelium. The duct approaches the vesicle and enters its cavity. The mouth of the common excretory duct (Figure 3) has elements which give reason to believe that there is a valve at the entrance of the duct to the cavity of the vesicle. It is possible that this formation ensures unidirectional movement of the gland's secretion into the cavity of the vesicle and excludes the reverse movement of the fluid. The secretory cells lie in one layer on the basal membrane. Their nuclei are large, clearly outlined with a well visible nucleolus. A large number of inclusions can be clearly seen when greatly magnified. The total size of the gland measured in the sections reaches more than 4 mm. The diameter of the common excretory duct reaches 100-200  $\mu\text{m}$ . The basic dimensions of the alveoli are 40-60, cell size 15-18, the nuclei 5-6  $\mu\text{m}$ .

With respect to their structure, these glands can be placed into the class of complex exocrine alveolar glands with a clearly marked lobous structure, with branching end sections and, evidently, merocrine type of secretion.

According to the study of the corrosion preparations prepared after filling the cavity of the vesicle under pressure with latex, there were loosely filled formations of the gland body between the vesicles connected with the cast of the cavity of the vesicle with thin threads of the common excretory duct (Figure 4).

Biochemical studies of the contents of the vesicle, i.e., secretion of the gland, taken for study 3-4 hours after the animal was killed indicated that the fluid from the vesicles has a water base which is slightly opalescent and tastes saltish (no toxic irritative properties of the fluid were confirmed); its density is  $1.0 \pm 0.0004$ , pH 6.5-6.7. When specimens of the fluid were examined under a microscope, sometimes it was possible to see individual exfoliated cells of the epithelium lining the inner cavity. The content of sodium, potassium and calcium approximately corresponds to the amounts of these ingredients in the blood serum: sodium --  $336 \pm 42$ , potassium --  $25.2 \pm 4.9$ , calcium -- 2 mg%. Protein concentration in the secretion -- 50-60 mg%, molecular weight determined by the electrophoretic mobility in the system with sodium dodecylsulfate -- 40,000-60,000, which corresponds to albumins and prealbumins.

The opalescence of the fluid was removed when it was mixed with fat solvents, acetone or ether, which were used in the ratio of 1 : 5 in order not to cause denaturation of the protein. Clearing was observed in the water phase of the solution. On the basis of these observations, it is possible to assume that the protein component is bound with the lipid fraction and is a lipoprotein complex.

No analogs of the glands described by us have, evidently, been found in the animal world, in any case among mammals. Only salivary glands probably have a similar function. We have an impression that the number of glands is considerably smaller than that of the vesicular elements, whose average number in the animal was  $2730 \pm 708$ . We had an opportunity to observe a case when one gland was with two vesicular elements.

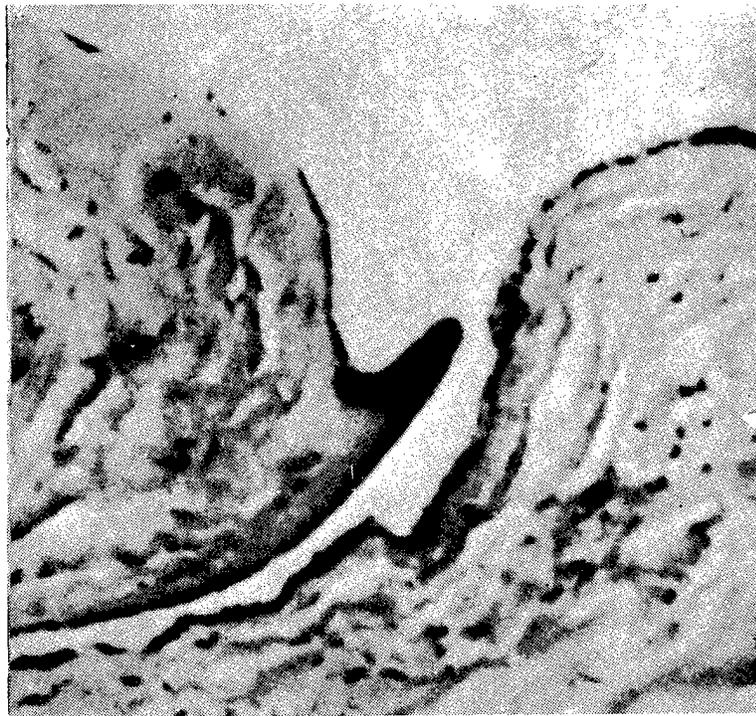


Figure 3. Mouth of the common excretory duct. At the inlet of the duct to the cavity of the vesicle: protrusion, and corresponding depression on the other side. It is possible that these are valve structures. Hematoxylin-eosin, 20 X 15.

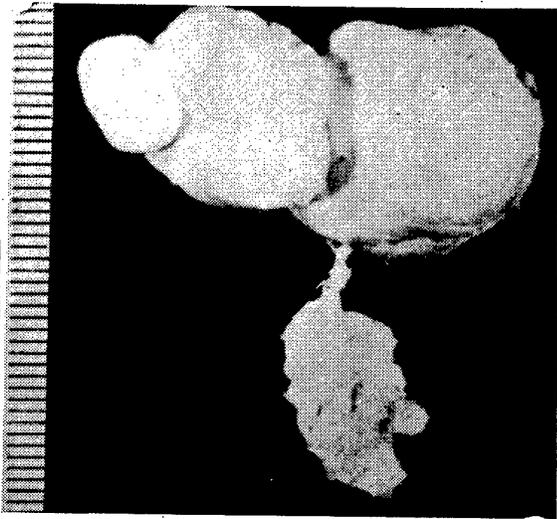


Figure 4. Corrosion preparation of the gland and the vesicle after covering with latex. The gland comes directly to the vesicle. On the left, a common excretory duct in the form of a thin thread approaches the vesicle. Divisions in mm.

The physiological significance of these glands consists, evidently, in filling the cavity of vesicular elements with liquid secretion and maintaining a definite pressure in it. It is necessary to note that the pressure in the vesicular element cavity is quite substantial:  $24.0 \pm 6$  mm Hg (3280 Pa). The vesicle wall consists of several layers and most of it consists of almost unstretchable collagenous fibers arranged along several axes similarly to the cornea of the eye [5]. This indicates the necessity of maintaining the degree of stretching of the wall in the process of the fulfillment of the function and, accordingly, maintaining a definite pressure in the cavity.

We suggested a hypothesis [2, 3] about the videoacoustic system of the cachalot which ensures the process of seeing encountered objects under the conditions of total darkness at great depths where cachalots catch squids. In this case, the carrier of energy providing the necessary information is the energy of the acoustic field, since the electromagnetic type of energy, such as light energy, does not penetrate at great depths and cannot give the necessary information on the presence of food at those distances and depths where the animal has to find it. It is interesting to note that in the process of evolution the eyes of the cachalot spread farther apart, making room for the acoustic complex which took upon itself the function of vision. The eyes of the cachalot have a number of signs of regression [1] and, moreover, they see separately on each side, excluding vision in the front part of the head [7].

The vesicular elements in the system described above are, evidently, a complex of biological hydrophones. In this connection, it is necessary to maintain a definite pressure in the vesicles and, accordingly, tension of the wall, which can be ensured by the glandular system. The elimination of the fluid from the vesicle is, probably, accomplished by its absorption by the walls of the vesicle which has a considerably branching venous network.

On the basis of the conducted studies, we described the heretofore unknown glands of the cachalot which, in their structure, belong to complex exocrine alveolar glands with branching end sections and, evidently, the merocrine type of secretion. These glands excrete their secretion through excretory ducts into the cavity of vesicular elements of the back wall of the frontal air sac of the cachalot. We consider it possible to call them vesicular glands of the cachalot (Glandulae vesiculares Physeter Catodon).

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10,233

CSO: 1840/482

INTERVIEW WITH DOLPHIN EXPERT, AVENIR GRIGOR'YEVICH TOMILIN

Moscow MOSKOVSKAYA PRAVDA in Russian 4 Mar 83 p 3

[Article by O. Glukhova, "Dolphins Are Swimming Toward People"]

[Text] In the last few years, there is probably no animal species that has drawn as much attention as dolphins. Dolphins, porpoises or small whales--it does not matter how one calls these marine mammals--have become the subject of discussion in books, journals, newspaper articles; they have become the stars of movies and television programs.

In the 1950's, there were several dozen oceanariums in the world, "dolphin circuses," where the spectators were entertained by dolphins who performed complicated circus acts with unusual ease and unconcealed pleasure. Their fame as having supernatural capacities began to grow at the speed of lightning. It was realized that the dolphin brain is inferior only to the human brain in all of its parameters. It was even believed that dolphins would be the first to enter into verbal contact with visitors from other planets, that they supposedly knew their language, "linkos" (space linguistics). The "dolphin boom" started. Incredible discoveries and sensations were expected of it. But the boom passed and was followed by ordinary, serious scientific work. Researchers involved in different fields, from zoologists and physiologists to engineers and linguists, started to really pay attention to dolphins, to their remarkable adaptation to life in the marine environment.

We met with one of these researchers, a well-known specialist in research on marine mammals, Professor A. G. Tomilin, doctor of biological sciences. In 50 years he has written 265 scientific works, 15 books, including Academy publications. Many of them have gained broad response in worldwide science; they have been translated into English, French, German and Czech. He developed an original course on "Biology of Marine Mammals."

We talked with Avenir Grigor'yevich in his office. On a table there are books about dolphins and unique artifacts of marine expeditions.

The first question was obvious:

[Question] What has caused the interest in dolphins, which has become a profession, a vital matter?

[Answer] I wish to begin at the beginning. In the course of evolution, cetaceans changed from living on the ground to the water, which is an exceptionally dangerous environment). They had to retain the properties of using air to breathe, being warm-blooded (water conducts heat 27 times more intensively than air) and viviparous. And they succeeded in so doing. For this reason, people started investigating these unique animals, to obtain from them some living models, some principles of construction to be used in science and technology. And the more comprehensively they were studied, the more interesting phenomena were discovered, which were extremely important to the national economy.

I have been involved with these animals since 1932. I started with the white whale, which is distributed in northern seas, then switched to large whales. I participated in expeditions and studied blue whales on a whaler. But, I became the most interested in small animals, dolphins, three species of which inhabit our country in the Black Sea. One of them, the bottlenosed dolphin, is of special interest. All of the problems that are related for us to dolphins can be well traced in it.

These animals are among the swiftest inhabitants of the hydrosphere, and they are swifter than the fish on which they feed. On the average, dolphins develop speeds of up to 40 km per hour. Professor Gray, the well-known specialist in biomechanics, has estimated that, with the enormous resistance that water has to a moving physical body, the dolphin must have at least 7, if not 10 times stronger muscles to develop such a speed. In the course of evolution, the powerful tail of cetaceans became their main propellant. Expressly the tail provides for the animals' high speed.

[Question] It is probably not by chance that dolphins are called the "sensation of the century." For they can, for example, with suction blinders on their eyes find a pea in a large tank.... How do they do this?

[Answer] In the course of their life in water, dolphins developed a very unique system of orientation, echolocation. Cetaceans have the capacity of producing high-frequency sounds. These sounds are projected forward at a high speed (5 times greater than in air), encounter resistance of the water and are reflected. Reflected sounds are picked up by an incredibly sensitive organ of hearing. The emitting system that sends signals and the receiving system constitute the echolocating apparatus. In essence, this means that this means of orientation in water can be used with high precision for all vital occasions. It became the prime factor in the highly developed brain of dolphins (up to 30 billion neurons, which is twice as many as in man).

At the present time, echolocating equipment is used in the sea that probes the bottom, examines the hydrosphere, etc. But the dolphin's echolocation system is so refined and compact that there is not a single piece of equipment in existence that can compare to it. For this reason, the echolocation problem constitutes a large section of hydrobionics.

[Question] Is there a connection between this problem and the known instances when entire herds of dolphins or whales have been beached?

[Answer] To some extent, yes. Even before the war, I had found that whales had two surfacing reflexes. Any cetacean that rises from the water performs a respiratory act. If, for example, a sperm whale has become disabled in water it is in danger of asphyxia. Its "comrades" must help it survive. The animals start to push the sperm whale to the surface. There is thus a sort of artificial respiration. When a cetacean is in a disastrous situation it sends disaster signals. The signal is picked up by its "kin" and having heard the call for help they drop absolutely everything, considering nothing, and rush to the animal in trouble and start to push him out of the water. Let us assume that the animal became stranded [in shallow water]. It is in danger of asphyxiation. It emits an alarm signal according to behavior encoded in the course of evolution. Other animals rush to it and become stranded themselves, then they also start to emit alarm signals. As a result of a chain reaction, all of the herd is stranded.

[Question] At the present time, much is being said and written about the possibility of collaboration between man and dolphins. What is your opinion on this score?

[Answer] I am convinced that comprehensive use should be made of dolphins. They could become man's friend in the water, like dogs have become on land. The dolphin is the most important helper in developing the shelf of the world oceans. When equipped with sensors, it is capable of delivering the most valuable information by executing the commands that will be given to it by man. This is quite realistic and feasible. One of the promising directions is to use dolphins in the fishing industry. It would be difficult to find a better herder of fish and explorer of shoals.

As I parted with Avenir Grigor'yevich, I glanced at a blue dolphin pup, a glass model that "participated" in our conversation. It continued to smile mysteriously.

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## REPORT ON INFORMATION REGARDING DOLPHINS

Moscow MOSCOW NEWS in English No 11, 1983

[Text] Millions of years passed before dolphins, formerly land mammals, managed to adapt themselves to the water and became the rightful masters of the world ocean. The adaptational mechanisms which they developed allowed them to live a life which was unthinkable for their land-faring relatives. Dolphin characteristics have long since been attracting scientists the world over.

### Unriddling the High-Velocity Puzzle

Dolphins can reach a velocity of as high as 40 kilometres per hour, and this in water, which is 800 times denser than air. How do they manage it? Soviet researchers Avenir Tomilin, Serafim Pershin, and Anatoly Sokolov have discovered the mechanism that changes the elasticity of the dolphin's tail according to the swimming needs. The discovery went quite far in explaining the high-velocity problem but has not solved it completely.

Many years of profound research have led to another discovery made by Vladimir Sokolov, Avenir Tomilin, Viktor Babenko, Leonid Kozlov, Serafim Pershin, and Oleg Chernyshov, registered in the USSR in November 1982.

When Academician Sokolov examined the skin of dolphins as a young scientist in the 1950s, he found its structure differing considerably from that of the other mammals. Its upper layer revealed not far from the surface crest-shaped formations, richly supplied with blood capillaries and nerve endings. They were named dermal nipples. The researchers proved that the nipples play a decisive role in bringing down the hydrodynamic resistance of the swimming dolphins. As soon as a whirl starts forming someplace on the surface of the body the skin elasticity and its other mechanical properties are changed in that area. This results in damping the whirl before it is hardly formed. The swift reaction is explained by the exclusive versatility of the dolphin's blood supply system, a fact established by Professor Tomilin as far back as the 1940s. An impressive sight can be watched by seamen in the south seas when there is no wind at night and the water is saturated with small

luminescing organisms. A swiftly swimming dolphin leaves a narrow fiery strip behind him. The animal actually progresses in the water without causing any whirls in the current flowing over him. That was how Soviet scientists unriddled the enigma of dolphins' high velocity. Engineers now try to apply the operational principles of the wonderful skin to create artificial coverings for high-velocity vessels.

#### Why the Big Brain for the Dolphin?

An animal's developmental level is often linked to the mass of their brain. The brain mass for a large lion or bear averages 0.3 kg, for a gorilla, 0.5 kg, while it is 1.7 kg for a dolphin (the human brain weights 1.5 kg). If we also take into consideration the fact that the dolphin's brain pattern of gyri and grooves is more intricate than the human one, it becomes clear why some researchers in the 1960s put forward the idea of these animals' capability to think abstractly. There were even attempts at making contacts with them through a special language. Although the research has not yet proved anything, it has excited interest in the dolphin brain. According to the latest concepts, the huge mass of its brain is linked to the unusually complex adaptational mechanisms, primarily their radar capability. A dolphin unmistakably recognizes an object by emitting ultrasonic pulses and receiving the reflected echo.

While thus probing into the processes which take place in the animals' brain, the researchers became interested in the problem of sleep.

It was clear that dolphin's sleep should somewhat differ from the sleep of other mammals because it has to inhale air every several minutes. Various suggestions were made: dolphins do not sleep or else sleep in fits, awakening for air inhalation. Both versions sounded improbable. Test data was required.

#### Sleeping Half-Headedly

"If a dolphin is quietly swimming it's impossible to judge from its appearance if its asleep or not," says Alexander Supin, head of the sensor systems laboratory at the Institute of Evolutional Morphology and Animal Ecology. "This can be established by the type of brain biocurrents recorded on an electroencephalogram. When the dolphin is awake, it produces zigzag curves of a small amplitude and high frequency. A sleeping dolphin gives a reverse picture."

The brain biocurrents registration procedure which is so simple with land animals has become very difficult with dolphins, requiring years of intensive work of biologists, physiologists, radio engineers and physicists. The anatomy of the dolphin's brain and skull did not allow conventional methods of electrode implantation. Besides, dolphins do not take anesthesia easily. It became necessary to develop painless methods of operation during which the

tested animals would not feel any irritation from the tiny electrodes implanted into them. Otherwise, the whole idea of studying the sleep process would be impossible. Such methods were found and the animals took the operations quite quietly, though they would go on for several hours. After the electrodes were implanted, they swam in the pool quite normally. A jacket that was put on them amplified their brain biocurrents and transmitted them to the shore. The first results of the test were obtained by Lev Mukhametov and Alexander Supin ten years ago. The phenomenon which they found did not fit into the conventional sleep mechanism patterns for animals or for humans, when both hemispheres fall asleep and awake simultaneously. With dolphins, one hemisphere alternately sleeps while the other one stays awake. Thanks to this mode of brain operation, the dolphin doesn't risk getting drowned. This discovery, registered in the USSR in November 1982, allows us not only to understand the sleeping mechanism deeper, but is of great practical significance, too. Using the dolphin brain model for testing new sleeping drugs will allow us to obtain a much more complete picture of their effect upon the brain.

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CSO: 1852/10

MEDICINE

UDC 616-001.4+616-00.1-022(049.3)

REVIEW OF BOOK 'WOUNDS AND WOUND INFECTION'

Leningrad VESTNIK KHIRURG IMENI I. I. GREKOV in Russian No 12, Dec 82  
(manuscript received 16 Nov 81) pp 107-110

ANANASENKO, B. G., professor and GRINEV, M. V., doctor of medical sciences,  
Leningrad

[Abstract] Major topics examined in the book edited by M. I. Kuzin and B. M. Kostyuchenok, published by "Meditsina" and discussed in more or less detail by the reviewers include: description of the morphology of healing of stitched purulent wounds; pathogenesis of the wound process from the viewpoint of traditional ideas; importance of quantitative bacteriological study of purulent wounds; first description in the Soviet literature of some problems of immunology of wound infection; emergency prevention of tetanus; some new approaches to the surgical treatment of purulent wounds; clinical aspects of the wound process; treatment of surgical sepsis; primary skin plastic surgery after purulent wound surgery; peculiarities of the course and treatment of traumatic wounds and gunshot wounds and principles of medical aid to nuclear explosion victims and to persons in evacuation stages of civil defense. Ideas concerning stitching of purulent wounds make up a recurrent theme throughout the book.  
[390-2791]

UDC 615.47.012.008.03

CERTAIN PROBLEMS OF STANDARDIZATION OF MEDICAL INSTRUMENT PRODUCTION

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 5, Sep-Oct 82  
(manuscript received 14 Dec 81) pp 38-42

IZMAYLOV, A. Kh., "Medinstrument" Scientific Production Association,  
Kazan

[Abstract] The 26th CPSU party congress stressed the need for standardization of parts, sub-assemblies and technological processes throughout Soviet

industry. The present article surveys efforts in the title branch of industry. The author sees major obstacles to be the lack of theoretical foundations for production in general and standardization in particular. Medical instruments by nature are of very specific design and consist of relatively unique parts that do not lend themselves to standardization. The application coefficient, used for the past 10 years to make quantitative evaluation of the level of standardization, actually fails to address functional matters and thus is not an efficient guideline. For more successful standardization, the industry must develop comprehensive theoretical and methodological bases and bring existing procedures up to date and current with functional approaches, rather than relying on the present oversimplified approach. References 9 (Russian).  
[393-12131]

UDC 615.916:546.18].015.4:616.155.3

#### FUNCTIONAL MORPHOLOGICAL FEATURES OF LEUCOCYTES IN CHRONIC PHOSPHORUS INTOXICATION PATIENTS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYE ZABOLEVANIYA in Russian No 9, Sep 82 (manuscript received 17 Mar 82) pp 46-49

BELOSKURSKAYA, G. I. and BALMAKHAYEVA, R. M., Institute of Regional Pathology, Alma-Ata

[Abstract] The authors studied quantitative and morphofunctional changes in leucocytes accompanying phosphorus intoxication in 110 patients with diagnosed and 38 persons with suspected involvement. Age ranged from 20-50 years, employment contact with yellow phosphorus from 4-10 years, and the known affected patients were divided into mild and moderate sub-groups. Measurements of general number of leucocytes, percent and absolute numbers of specific Le types, and nature and frequency of changes were analyzed. No average leucocyte count variations were recorded, but segmented neutrophils formed a higher percentage in all patients suffering or suspected of suffering phosphorus intoxication. Metabolic changes were noted in the patients with moderate degrees of intoxication, who also showed some increased destruction of leucocytes in peripheral areas and suppressed leucopoiesis. References 8 (Russian).  
[383-12131]

#### HYPERBARIC OXYGENATION IN COMBINED TREATMENT OF BURN PATIENTS

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 2, Mar-Apr 83 pp 50-51

ARALBAYEV, T. A., BAYZAKOV, U. B., MUN'KIN, L. M. and CHUKIN, R. N., Hospital Surgery Clinic No. 1, Division of Hyperbaric Oxygenation of the Republic Clinical Hospital

[Abstract] Hyperbaric oxygenation was performed as a part of combined treatment of 27 patients 10-56 years old. Both fresh burns and burns with

a 4-5 days delay were treated. In addition to treatment for shock, the patients were exposed to 5-12 sessions lasting from 60 to 80 minutes in hyperbaric chambers at 1.7-2.0 atm pressure of oxygen. No toxic side effects were noted. This treatment showed positive results: the scab could be removed at much earlier stages, permitting early autodermoplastic replacement.  
[355-7813]

## ANALYSIS OF POSSIBILITY OF RECOVERY OF AEROSOLIZED E. COLI CELLS WITH 30% RELATIVE HUMIDITY WITH USE OF SYSTEMS THAT REPAIR ULTRAVIOLET DAMAGE

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, Nov 80 (manuscript received 13 Feb 80) pp 71-75

[Article by A. G. Skavronskaya, V. F. Konyukhov, L. Ya. Likhoded and I. P. Pavlova, Institute of Epidemiology and Microbiology imeni Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Text] There are many diseases of man, animals and plants that spread when the pathogen is transmitted in aerosol form. But the processes that occur in aerosolized cells that are instrumental in preservation of the pathogen in air are not clear. The existence of contradictory hypotheses, which have not been confirmed by a sufficient number of experimental facts [8, 7], is indicative of the complexity of the problem. At the present time, most authors tend to believe that there are apparently two different mechanisms of destruction of bacteria that are in aerosol form. One of them is the toxic effect of oxygen, which is observed at low and medium relative humidity of 30-70% [5, 4, 10]. Another form of destruction, which includes dehydration and rehydration, is possible at both low and high relative humidity [8, 6]. However, Webb does not consider rehydration to be an important mechanism of destruction for aerosol forms [12]. He expounded the hypothesis that the repair systems that are involved in recovery from UV [ultraviolet] damage participate in repair of aerosol damage when relative humidity is average or high. Webb submitted several pieces of proof of this hypothesis. They include resistance of E. coli B/r to aerosolization and sensitivity to it of E. coli B<sub>S-1</sub>. Analogous findings were made in the case of exposure of these strains to UV radiation. It was demonstrated that there is increased degradation of DNA after aerosolization in radioresistant strain B/r and absence thereof in UV-sensitive strain B<sub>S-1</sub>, as well as diminished degradation of B/r when it is treated with proflavine, which blocks function of the dark repair system [13, 12]. All of the above effects were obtained at 50-70% relative humidity. Cox et al. [7], who worked with the same strains of E. coli group B, arrived at the conclusion that the Hcr, Exr phenotype with inherent radiosensitivity does not affect survival in aerosol form. Hence, the known mechanisms that repair radiation damage to DNA are not involved in repair of prelethal damage that occurs under aerosol stress. This conclusion is confirmed by the fact that dispersion of strains in nitrogen and air yields different survival rates. While there is some correlation to behavior of strains when cells are dispersed in air when exposed to UV, such a

correlation does not exist with dispersion in nitrogen. Moreover, the *E. coli* B/r strain obtained from Witkin was more resistant to aerosolization than the B/r obtained from Hill, although both strains are wild types with regard to capacity for repair [7]. The same authors reported the findings of their work to the Fourth International Congress of Aerobiology, which apparently enabled them to revise their initial conclusion. Their conclusion amounts to the fact that strains with a repair system are relatively resistant to aerosolization, unlike mutants that are incapable of recovery [8]. Such a discrepancy in opinions as to evaluation of the results is apparently indicative of both the methodological difficulty of experiments that were performed and multiple factor influence of aerosolization. All of the foregoing served as grounds for our study of the sensitivity of various repair mutants to aerosolization.

### Material and Methods

The bacterial strains used in our study are listed in Table 1. The strains were incubated at 37°C for 18 h, with constant light shaking, in beef-extract broth; they were centrifuged, eluted in distilled water and resuspended in 10 ml distilled water to a concentration of 1:10.

Table 1. Strains used in the study

STRAINS	UV GENOTYPE	GENOTYPE	SOURCE
<i>E. coli</i> K12 AB1157	WILD	thr, leu, pro, his, arg, lac, gal, ara, xyl, mtl, tsx	Howard-Flanders
<i>E. coli</i> K12 AB1899	lon	SAME	»
<i>E. coli</i> K12 AB1886	uvr A	» »	»
<i>E. coli</i> K12 AB2463	rec AB	» »	»
<i>E. coli</i> K12 AB2494	lex A	» »	»
<i>E. coli</i> B WP <sub>2</sub>	WILD	trp	Witkin
<i>E. coli</i> B <sub>S-1</sub>	uvr, exr, fill	»	Hill
<i>E. coli</i> B H/r 30R	WILD	arg	Bridges
<i>E. coli</i> B R-15	res I	»	»

In order to determine the initial concentration of *E. coli* cells in aerosol, we used *Bacillus subtilis niger* spores as a sol marker. A broth culture of *B. subtilis niger* was plated on Gladstone-Fildes agar, incubated for 5-6 days at 37°C until there was complete sporulation, which was monitored under a microscope. The spores were washed off in distilled water and heated at 60°C for 30 min. Their concentration was determined by plating on beef-extract agar (BEA).

We added to 1 ml bacterial suspension of *E. coli* 0.2 ml *B. subtilis niger* spores in a concentration of 1:10<sup>9</sup>. Viability of *E. coli* strains in air was determined by the method of May and Druett [12], by applying aerosol particles

containing live cells on fiberglass microfilaments. In this case, loss of viability was close to that occurring in real aerosol provided conditions surrounding the microfilaments and aerosol are the same. For this purpose, aerosol was generated from a mixture of *E. coli* and *B. subtilis* cultures in a specially designed device, and fiberglass spheres were placed in its stream. Then the fiberglass with cells fixed on it was placed in a Tobai climate chamber, where a specified ambient humidity and temperature level was maintained. After exposure for 15 min, the bacterial cells were eluted from the fiberglass in 0.85% NaCl solution and plated in dishes with BEA in the appropriate dilution. We counted *E. coli* and *B. subtilis* colonies 24 h later. The method of calculating *E. coli* survival rate is described in works by Marper and Morton [11], as well as Anderson [3].

## Results and Discussion

Table 2 lists the results of our study, and it shows that the triple mutant ( $B_{S-1}$ ) is characterized by about 10-fold increase in sensitivity to aerosolization, as compared to wild type strains. These data coincide entirely with those of other authors [8, 12].

Table 2.  
Survival of *E. coli* strains in aerosol with 30% relative humidity and 15-min exposure ( $M \pm m$ )

STRAIN	SURVIVAL RATE, %				MEAN
	EXPERIMENTAL SERIES				
	I	II	III	IV	
<i>E. coli</i> $B_{S-1}$	19	14	10	11	$13,5 \pm 3$
<i>E. coli</i> B	2	1,6	1	3	$1,8 \pm 0,6$

In the next experiments, we used a set of mutants deficient in various repair systems. In conducting these experiments, we wanted to find out, first of all, whether the demonstrated heightened sensitivity of the triple mutant could be attributed to a deficiency in its repair systems. We could obtain an answer to this question, since loss of the capacity to repair diverse damage is inherent in the mutants we used. For example, it is known that mutation in the *uvr* gene

leads to loss of the capacity to recognize and effect the first stage of repair of damage that distorts the secondary structure of DNA, such as local denatured segments [9]. Such damage is induced by UV radiation and a large group of chemical agents. Breaks of one of the DNA strands are another type of possible repair damage. Such damage occurs, for example, under the effect of penetrating radiation and monofunctional alkylating agents, and it occurs during the process of exposure repair of UV damage. Repair of single-stranded breaks occurs with the participation of the DNA enzyme, polymerase I, which is coded by the *pol(res)* gene. Mutations in this gene lead to loss of capacity to repair single-stranded breaks. It is known that damage that appears in DNA in the form of thymine dimers that are not removed before the start of replication is not necessarily the cause of cell death [10]. There is a mechanism that makes it possible to "survive" the presence in DNA of a certain number of unremoved pyrimidine dimers. In this case the *de novo* synthesized (daughter) DNA strand has gaps, repair of which occurs in the course of so-called postreplicative repair. The function of this system requires presence of high-quality products of the *res A* gene. A mutation in this gene deprives bacteria of the capacity for postreplicative repair. It is expressly because of the involvement of products of different genes in repair of various DNA damage that the sensitivity of the corresponding mutants to the same agent

may differ. An increase in sensitivity to an agent is inherent in mutants that are incapable of repairing damage caused by this agent. For example, uvr mutants, which are sensitive to UV light and bifunctional alkylating agents that distort the secondary structure of DNA, do not have heightened sensitivity to monofunctional alkylating agents and penetrating radiation. When the products of several of the analyzed genes are involved in repair of damage induced by the tested agent, mutant sensitivity to this agent also varies, and it is determined by the share of aberrations, possibility of expression of prelethal damage as lethal, and a number of other factors. Consequently, if aerosolization of bacteria leads to damage to their DNA, this should be manifested by heightened sensitivity to aerosolization of repair mutants. Table 3 shows that the sensitivity of various mutants to aerosolization increases in about the same way as that of wild type bacteria.

Table 3.

Survival of *E. coli* strains in aerosol with 30% relative humidity ( $M \pm m$ )

STRAIN	GENOTYPE	SURVIVAL %
<i>E. coli</i> K 12 AB1157	WILD	2,9±0,19
<i>E. coli</i> K 12 AB1886	uvr A6	0,2±0,05
<i>E. coli</i> AB 2AB2463	res A13	0,24±0,04
<i>E. coli</i> K 12 AB2494	lex A	0,25±0,04
<i>E. coli</i> K 12 AB1899	lon	0,023±0,05
<i>E. coli</i> B H/r 30R	WILD	8,5±1,6
<i>E. coli</i> BR-15	res 1	2,2±0,1

Table 4.

Survival of different strains in aerosol

SERIES OF EXPERIM.	SURVIVAL OF <i>E. COLI</i> STRAINS	
	<i>E. coli</i> B/r	<i>E. coli</i> K 12
I	19	2,6
II	11	3,5
III	14	3,3

As can be seen in Table 3, the uvrA mutant is more sensitive by a factor of 10 to aerosolization than the wild type strain, from which it was produced. An equally marked increase in sensitivity to aerosolization is observed with mutation in both recA and lex genes, which arise in the same original strain. In addition to mutants that are deficient in repair genes, the tested strains included a lon mutant of the same strain, with deficiency in cell division. As shown in Table 3, the increase in sensitivity of this mutant was just as marked as in the repair mutants. We used res1 mutant derived from another wild type strain as a DNA polymerase mutant. Presence of this mutation increased insignificantly bacterial sensitivity to aerosolization. As compared to wild type bacteria, the change in sensitivity of the res1 mutant was somewhat less marked than in other tested mutants (less than a factor of 10). Bacterial sensitivity to aerosolization increases to an equal extent in the presence of mutation in one of the tested repair genes and with simultaneous mutation in three genes (uvr, exr, fil--strain B<sub>S-1</sub>). The similar increase in sensitivity to aerosolization in mutants that cannot repair various types of damage warrants the belief that, under the tested conditions, the diminished viability of repair mutants is not related to their inability to repair DNA damage. The differences in sensitivity, which were demonstrated in the res1 mutant do not contradict this hypothesis. This mutant was not derived from the strain that produced the other tested mutants. Consequently, its uniqueness could be due to the distinctions of the original strain.

The lack of more marked sensitivity to aerosolization in any of the tested mutants warrants the assumption that the death of aerosolized cells is unrelated to DNA damage. At any rate, this does apply to DNA aberrations that distort its secondary structure, breaks in DNA strands and inhibition of DNA synthesis.

Our findings are indicative of equal (10-fold) increase in bacterial sensitivity to aerosolization when there are mutations in any of the tested repair genes, and they are interesting for two reasons. In the first place, they indicate that it is possible for bacterial sensitivity to aerosolization to change. For the time being, the nature of these changes is unknown. In the second place, our results suggest that mutations in different repair genes impair not only the capacity for repair of DNA damage in cells, but some mechanisms that are not directly related to repair but that influence bacterial resistance to aerosolization. In this respect, it is remarkable that dissimilar sensitivity to aerosolization is also inherent in different strains of *E. coli* bearing wild type genes. For example, Table 4 lists data characterizing survival of aerosolized *E. coli* B/r and K12. This table shows that strain K12 bacteria have a survival rate that is about one-third the rate for strain B/r. The same correlation is observed when K12 and B/r strains are exposed to UV light.

It is known that, in the process of DNA replication, membrane structures are apparently involved in repair [2]. There are also data indicative of impairment of membrane function and related impairment of heightened sensitivity of repair mutants [1]. The possibility of alteration of surface structures of aerosolized bacteria warrants the belief that the mechanism of their destruction is related to the function of cytoplasmic membranes.

#### Conclusions

1. Equally marked (10-fold) increase in bacterial sensitivity to aerosolization is observed with mutations in *uvrA*, *recA*, *lexA* and *lon* genes.
2. *E. coli* strains B/r and K12, which are wild types with regard to capacity for UV repair, differ in sensitivity to aerosolization.
3. The change in bacterial sensitivity to aerosolization related to mutations in repair genes is unrelated to loss of capacity to repair DNA damage.

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BASIC CONCLUSIONS OF THE ACTIVITY OF THE SCIENTIFIC COUNCIL ON VIROLOGY OF  
THE USSR ACADEMY OF MEDICAL SCIENCES IN THE 10TH FIVE-YEAR PLAN

Moscow VOPROSY VIRUSOLOGII in Russian No 1, Jan-Feb 83 pp 116-119

[Article by E. D. Akhyndova, Institute of Virology imeni D. I. Ivanoskiy,  
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[Text] The "Virology" Scientific Council of the USSR Academy of Medical Sciences (AMS USSR) joins eight national commissions on scientific problems: "General Virology", "Viral Hepatitis", "Arboviruses", "Cellular and other Viral Encephalitis", "Poliomyelitis and other Enteroviral Infections", "Influenza and Influenza-Like Disorders, Prevention and Treatment", "Measles and Parotitis" and "Pharmacology and the Prevention of Viral Infections". These eight bodies further and coordinate all scientific research activity in virology in the USSR.

In the period of which an account is given, research on the above-mentioned problems in virology was carried on in 110 institutions in all 15 republics.

During the period under review the CPSU 25th Congress represented a momentous occurrence in the life of the Soviet people. The Congress presented medical science with problems in the long-term resolution of important issues in biology and medicine, including the fight against viral diseases.

The achievements of Soviet public health are not only known but also honored throughout the world, to which Soviet virologists have contributed substantially.

In the last Five-Year Plan, a number of research projects have shed light on the molecular mechanisms of the evolution of viral influenza. Using a number of state-of-the-art methods (Oligonucleotide and oligopeptide analysis, monoclonal antibodies etc.), it has been possible to gain new insights about the pathways of antigen drift and to determine that new epidemic strains, even those belonging to one and the same subspecies, do not necessarily result from sequential mutational alterations, but rather may come about from rearrangement of genes within one and the same subspecies (AMS USSR Institute of Virology imeni D. I. Ivanovskiy).

Significant advances have been made in the study of the genome structure of the adenoviruses. Biologically active individual oncogenes of some tumorous human and animal adenoviruses have been identified. Another discovery has been the basically

new phenomenon that a covalent protein linked to DNA inhibits the transformational activity of adenoviral DNA, constituting an anti-integrational factor (AMS USSR Institute of Virology).

Significant progress has been achieved in the study of processing (post-translation modification) of viral proteins. These studies have been carried out in many laboratories around the world. Among the investigations completed in the USSR in this field in the last 5 years have been those on translation and post-translation modification of picornaviruses and flaviviruses carried out at the AMS USSR Institute of Poliomyelitis and Viral Encephalitis, and at Moscow State University (MSU) as well as those completed at the AMS USSR Institute of Virology on modification of virus-specific proteins of the influenza virus.

Certain processes in the persistence of the influenza virus have been investigated in cell cultures and in the animal organism. A series of studies has been devoted to explaining the structural and functional interactions in defective-interfering particles of the influenza virus. The role of defective particles in the composition and development of persistent influenza infection has been investigated in vitro (AMS USSR Institute for Epidemiology and Microbiology; AMS USSR Institute of Virology; USSR Ministry of Health: Institute of Influenza).

Studies on the reproductive mechanisms of viruses have been continued. Investigations of the early stages of the interaction between the influenza virus and the cell have been carried on in greater depth. We have been able to describe two types of receptor with which the virus interacts and two stages of the "stripping" of the virus (AMS USSR Institute of Virology imeni D. I. Ivanovskiy). There is a clear, logical connection between these investigations and the explanation of the mechanism of action of an antiviral agent, remantadine, on influenza. This agent acts upon the early stages of reproduction in the influenza virus, more precisely, it blocks the second stage of "stripping" of the influenza virus in the infected cell to prevent the interaction of the viral matrix (M) protein with the perinuclear membranes. As a result the viral ribonucleoprotein cannot be released from the M protein to initiate infection (AMS USSR Institute of Virology; AMS USSR Institute of Experimental Medicine, LaSSR Academy of Sciences: Institute for Microbiology; USSR Ministry of Health: Institute of Influenza).

There has been heavy emphasis on the dependence of influenza virus reproduction on the function of the cellular genome, in part manifested in sensitivity of influenza virus reproduction to actinomycin D (AMS USSR Institute of Virology). Concurrent hybridization, which inhibits consistent transcription of genes in the paramyxoviruses, has yielded interesting results (AMS USSR Institute of Virology). The first organism in which a genome fraction preventing "symmetric" transcription, i.e., transcription of both strands of DNA, was identified was the poxvirus.

Studies on the genetics of animal viruses have continued. Processes occurring in nature in recombination of different influenza viruses have been modelled under experimental conditions. A series of investigations on the genome structures of

optomyxoviruses has been carried out. Data obtained on the function of viral genes and proteins coded by them in reproduction of the influenza virus and manifestation of the virus' biological characteristics have been interesting. A collection comprising 69 mutants of poxviruses, which are characterized by a number of biological and biochemical parameters, has been compiled (USSR Ministry of Health; Institute of Viral Preparations).

The study of latent and chronic viral infections has been accorded great importance. As the most promising investigation of the past period, we must designate that of the mechanism of chronic integrating viral infections with the use of a number of virological and modern molecular-biological methods. This approach has made it possible to obtain new data on the existence of virus genomes integrated into the hereditary system of the host cell and to study the nature of diseases for which, earlier, viral etiology was only hypothesized (AMS USSR Institute of Virology imeni D.I. Ivanovskiy; USSR Ministry of Health; Institute of Viral Preparations).

Work of a practical nature occupies an important place in research activity.

There have been many more studies both on the obtaining of preparative quantities of purified interferon and on interferon inducers. At present interferon and inducers of interferon are regarded as the most promising means for large-scale protection against a great number of viral infections. Basically new and important data have been obtained in the study of new USSR-produced interferon inducers--the synthetic poly-G·poly-C complex and natural interferon inducers--replicative forms of the RNA bacteriophage. Their potential for clinical use has been demonstrated. A new USSR-produced interferon inducer--megacin--has been developed and is being introduced in clinical practice. This preparation is used for cutaneous forms of herpes (AMS USSR Institute of Virology). A new inhalant preparation of human leukocytaric interferon for the treatment of influenza and primary pneumonia has been developed. From leukocytes obtained from donor blood and that of corpses, high-quality interferon has been obtained (AMS USSR Institute of Epidemiology and Microbiology imeni N. F. Gamalei).

A method has been proposed for treating influenza by protease inhibitors. Studies of synthetic protease inhibitors, as used in medical practice, and phylogenous protease have shown that they completely block the distribution of the virus in the animal organism. The mechanism of proteolytic activation of virions by host proteases is inherent in all strains of the influenza virus (AMS USSR Institute of Virology).

A method has been worked out to identify mycoplasma in a cell culture using the antibiotic olivomycin, which has selective fluorescent properties (AMS USSR Institute of Virology).

A killed culture of herpetic polyvaccine, developed at the AMS USSR Institute of Virology, has been put into production at the Odessa Enterprise for Bacteriologicals of the USSR Ministry of Health.

Much attention has been devoted to acquiring new methods to facilitate progress-virological investigations. [sic]

In a field of great importance to public health, "viral hepatitis", highly sensitive methods have been worked out and perfected for indication of viral hepatitis A and corresponding antibodies for this virus, making it possible to identify the virus (or its antigens) in infected experimental systems and in materials from patients on preparations produced in the USSR. These include radioimmunological analysis in the hard phase (AMS USSR Institute of Virology), the immune electron microscopy and immunoenzyme analysis (AMS USSR Institute of Poliomyelitis; AMS USSR Institute of Virology).

Investigators have discovered a virus that corresponds in its morphological and biochemical characteristics to those of the virus known in worldwide practice to provoke hepatitis A (AMS USSR Institute of Virology; AMS USSR Institute of Poliomyelitis; La SSR Academy of Sciences Scientific Research Institute of Microbiology). These findings have been made in materials obtained from hepatitis A patients.

The possibility of cultivating (AMS USSR Institute of Poliomyelitis; AMS USSR Institute of Virology) and serially transmitting (AMS USSR Institute of Poliomyelitis) the hepatitis A virus in a series of cell lines of primate origin has been demonstrated. The possibility of reproducing the hepatitis B virus or its components in human tissue from the late embryonic stage and in transfected cell cultures has received further study, providing evidence that replication in the experimental systems of HB<sub>s</sub>-Ag or structures carrying its specificity to antigen exists (AMS USSR Institute of Virology).

For specific recognition of the hepatitis B virus, the following methods are now being used in the USSR to identify HB<sub>s</sub>-Ag, the primary marker of infection in the blood serum of hepatitis patients and in donor carriers of the virus: the immunoprecipitation reaction in gel, the counterimmunoelectrophoresis reaction and the reaction to reverse passive hemagglutination radioimmunological and immunoenzyme analysis.

To implement these methods, different ways of obtaining purified preparations of HB<sub>s</sub>-Ag and highly active immune serums have been developed (AMS USSR Institute of Epidemiology and Microbiology imeni N. F. Gamaleya; AMS USSR Institute of Virology; Gorkiy Scientific Research Institute of Epidemiology and Microbiology, RsFSR Ministry of Health; LaSSR Ministry of Health; Riga Medical Institute; USSR Ministry of Health; Central Scientific Research Institute of Hematology and Blood Transfusion; Uzbek Scientific Research Institute of Hematology and Blood Transfusion).

Two methods have been developed for preparing vaccine for the specific prevention of hepatitis B (AMS USSR Institute of Virology; USSR Ministry of Health; Central Scientific Research Institute of Hematology and Blood Transfusion; AMS USSR Institute of Epidemiology and Microbiology imeni N. F. Gamaleya). Investigators now have broader concepts of the conditions under which severe forms of hepatitis are formed and the mechanisms of development of severe viral hepatic encephalopathy. In particular the pathogenic role and prognostic significance of etiological agents, factors of cellular immunity of specific antibodies, the increase in penetrability of cell membranes, etc., have been classified.

Investigators have worked out a complex of clinical and epidemiological, laboratory and mathematical indicators for differential diagnosis of hepatitis A and B (AMS USSR Institute of Virology; USSR Ministry of Health: L'vov Medical Institute) and criteria for evaluating the severity of hepatitis B and prognostic signs of severe hepatic insufficiency (AMS USSR Institute of Virology; RSFSR Ministry of Health: Gor'kiy Medical Institute; RSFSR Ministry of Health: Moscow Medical Institute II; Kalinin Medical Institute, RSFSR Ministry of Health and RSFSR Ministry of Health: Leningrad Scientific-Research Institute of Children's Infections).

The development of effective methods for therapy in serious forms of hepatitis B remains as a more difficult task.

The most important among other Soviet virological investigations are the study of the structure, physicochemical properties and morphogenesis of many bunyaviruses, alphaviruses, and flaviviruses identified in USSR territory and the identification of serotypes of circulating arboviruses; new methods of identification have been developed. During the past Five-Year Plan, virological and ecological research uncovered the circulation in USSR territory of eight previously unknown arboviruses (AMS USSR Institute of Virology imeni D.I. Ivanovskiy).

Molecular-biological methods have been followed in the discovery of strain-specific differences in the Japanese encephalitis virus identified by the early form of a basic functional protein of the membrane, description of the structure of the Venezuelan encephalomyelitis viral genome, identification of fundamental principles of chronic experimental alphaviral and flaviviral infections and in obtaining data on integrative processes in persistence of some arboviruses in the mechanism of transovarial transmission of the Bkhaidzha arbovirus in ticks (AMS USSR Institute of Virology).

Among the new methods developed for laboratory diagnosis of arboviral infections are the radial hemolysis reaction in a semifluid medium, the indirect hemagglutination reaction and the immunoenzyme method (AMS USSR Institute of Virology).

Of the achievements of practical importance in the period under review we may mention the discovery of the great efficacy of a liquid form of poliomyelitis vaccine and its advantages over the "coated tablet" form (AMS USSR Institute of Poliomyelitis). We shall include the development of new types of concentrated and purified types of vaccine against Russian spring-summer encephalitis in the study of natural foci and the trials of new developmental acaricides for specific prophylaxis of infection in foci of Russian spring-summer encephalitis (AMS USSR Institute of Poliomyelitis).

We have been able to develop new preparations for the accelerated diagnosis of Russian spring-summer encephalitis, arenaviral infections and CGL and to facilitate their production (AMS USSR Institute of Poliomyelitis). Other research has included a program for differentiated prevention of influenza in various

population groups and completion of the epidemiological study of how a number of social and natural factors influence the epidemiological processes of influenza and ORI (USSR Ministry of Health: Institute of Influenza).

Recombinant vaccine strains of the influenza virus have been obtained and their use integrated into public health practice. Research on the development of principles for construction and genetic control of recombinant live influenza vaccine for immunization of children has particular importance (AMS USSR Institute of Experimental Medicine). Investigators have developed a new economical technology for preparing inactivated chromatographic vaccines according to a gel filtration-ultrafiltration-gel filtration sequence (RSFSR Ministry of Health: Leningrad Scientific Research Institute of Epidemiology and Microbiology). Sub-individual influenza vaccines have been obtained (AMS USSR Institute of Virology imeni D.I. Ivanovskiy; AMS USSR Institute of Poliomyelitis and Viral Encephalites). It may be said that here we have demonstrated with the aid of sensitive immunological methods that there are three qualitatively different antigen determinants in the composition of the hemagglutination virus of Type A influenza, isolated in the years 1968 to 1977 (AMS USSR Institute of Virology imeni D.I. Ivanovskiy).

There have been investigations geared at perfecting the production technology of measles vaccine and a new technology to document the production of live measles vaccine has been developed, as has an economical, more advantageous technique of preparing vaccine in large volumes (3-5 L) on roller assemblies. An erythrocyte diagnostic technique for measles has also been originated (USSR Ministry of Health: Institute of Viral Preparations). It is also of practical importance that a number of pharmaceuticals for treatment of viral diseases has been developed and remantadine adopted in practice for prevention and treatment of early stages of influenza A disorders. The clinical study of an anti-herpes drug has been concluded, the systematically acting bonaphton. The antiviral agent riodoxol has been introduced into practice.

These are the fundamental results of the activity of the "Virology" Scientific Council of the USSR Academy of Medical Sciences in the past Five-Year Plan: research in the discovery of the principles of viral morphogenesis and reproduction has been provided more stringent coordination; a number of epidemiological and ecological principles of their circulation in the territory of the USSR has been studied and therapeutic and prophylactic agents for the fight against viral diseases have been created.

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## COMPARATIVE STUDY OF BIOLOGICAL PROPERTIES OF PLASMID AND NATIVE HUMAN INTERFERON

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[Text] We know of three classes of human interferons: leukocytic ( $\alpha$ ), fibroblast ( $\beta$ ) and immune ( $\gamma$ ) [1]. Studies have been made of physicochemical antigen properties, as well as molecular structure, of these antiviral agents. All interferons demonstrate three types of functional activity: antiviral, anti-cellular and immunomodulating [2], which is why these agents are promising for treatment of viral infections, neoplastic diseases and to regulate the immune response in the presence of various immunodeficient conditions. However, heretofore interferon did not find wide practical application because of the limited possibility of producing it from scarce natural raw material--donor blood leukocytes and human diploid fibroblasts.

At the present time, this problem is being solved by methods of genetic engineering. Clones have been produced of recombinant bacteria that synthesize human  $\alpha$ -,  $\beta$ - and  $\gamma$ -interferons [3-5]. In our country, recombinant clones of bacteria that synthesize human  $\alpha$ -interferons,  $\alpha$ -F and  $\alpha$ -F/D (hybrid), were recently produced by addition to *E. coli* of interferon genes followed by direct expression of functionally active interferon protein [6, 7]. We submit here the results of a comparative study of biological properties of human plasmid ( $\alpha$ -F and  $\alpha$ -F/D) and native ( $\alpha$ ,  $\beta$  and  $\gamma$ ) interferons.

## Material and Methods

Cells: We used a culture of human embryo diploid fibroblasts (HEDF) on the level of the 10th-30th passage in Eagle's medium with 8% calf embryo serum. Monolayer cultures of chick embryo fibroblasts (CEF) were recovered after trypsin treatment of 10-11-day-old chick embryos. Transferable HeLa cell lines (cells from human cervical carcinoma), Vero (green marmoset kidney cells),

PEKC [pig embryo kidney cells), L<sub>929</sub> (mouse fibroblasts), MDCK (canine kidney cells), BHK-21 (Syrian [baby] hamster kidney cells) and K-562 (human myeloleukemia cells) were obtained from the collection of the Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences [8]. The culture of donor peripheral blood leukocytes in medium RPMI-1640 with 5% calf embryo serum was prepared using a method we have described previously [9].

**Viruses:** Vesicular stomatitis virus (VSV), encephalomyocarditis (EMC) of mice, Venezuela equine encephalomyelitis virus (VEE) and vaccinia were obtained from the stock of viral strains at the Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences.

Titration of interferon was performed by a micromethod on the basis of suppression of cytopathic action (CPA) of VSV and EMC virus in HEDF cells using the method we described elsewhere [10].

**Preparations:** Human plasmid  $\alpha$ -interferons,  $\alpha$ -F and  $\alpha$ -F/D, with specific activity of up to  $10^8$  units/mg protein were recovered in pure form from a lysate of recombinant bacterial clones of *E. coli*. Human leukocyte  $\alpha$ -interferon, with specific activity of  $10^6$  units/mg protein, was recovered from a culture of donor blood leukocytes after induction with Newcastle disease virus (NDV). Human  $\beta$ -interferon was obtained by superinduction with poly(I)·poly(C) in HEDF cultures. Human  $\gamma$ -interferon was obtained as a result of induction with staphylococcal enterotoxin A (SEA) in a culture of human splenocytes. The domestic reference preparation of human leukocytic  $\alpha$ -interferon R8 was used as a standard, as well as the G-023-902-507 human  $\beta$ -interferon standard from the U. S. National Institutes of Health. We used specific antiserum to human  $\alpha$ -interferon, which was prepared by immunization of sheep with a purified preparation of leukocytic  $\alpha$ -interferon, antiserum to human  $\beta$ -interferon obtained from the U. S. National Institutes of Health, as well as antiserum to human  $\gamma$ -interferon recovered by immunization of rabbits in divided doses with partially purified, concentrated  $\gamma$ -interferon.

## Results

**Antigenic properties of human plasmid and native interferons:** Serological analysis of interferons was made using specific antisera to human  $\alpha$ -,  $\beta$ - and  $\gamma$ -interferon using a method we described previously [8]. We added aliquots of working dilutions of plasmid  $\alpha$ -F and  $\alpha$ -F/D interferon, as well as native  $\alpha$ -,  $\beta$ - and  $\gamma$ -interferons, to dilutions of antisera. The mixtures were incubated at 37°C for 2 h, after which we determined antiviral activity of interferons in microcultures of HEDF. The results of these studies are listed in Table 1. They indicate that antiserum to human  $\alpha$ -interferon neutralized entirely the antiviral activity of plasmid and native  $\alpha$ -interferons, but did not affect the antiviral properties of antigenically different human  $\beta$ - and  $\gamma$ -interferon. At the same time, antisera to human  $\beta$ - and  $\gamma$ -interferons demonstrated great specificity for antigenic determinants of homologous interferons and did not suppress the protective properties of plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons, as well as native  $\alpha$ -interferon.

**Physicochemical properties of human plasmid and native interferon:** Samples of plasmid interferons  $\alpha$ -F and  $\alpha$ -F/D, as well as native  $\alpha$ - and  $\gamma$ -

Table 1.  
Neutralization of antiviral activity of native and plasmid human interferons by specific antisera

CONDITIONS	INTERFERON ACTIVITY, UNITS/ML				
	NATIVE		PLASMID		
	$\alpha$	$\beta$	$\gamma$	$\alpha$ -F	$\alpha$ -F/D
CONTROL	16	20	32	32	64
ANTI- $\alpha$ -INTERFERON SERUM	0	20	32	0	0
ANTI- $\beta$ -INTERFERON SERUM	16	0	32	32	64
ANTI- $\gamma$ -INTERFERON SERUM	16	20	0	32	64

Note: The initial interferon preparations were diluted to a working concentration.

Table 2.  
Stability of human plasmid and native interferons

CONDITIONS	INTERFERON ACTIVITY, U/ML			
	PLASMID		NATIVE	
	$\alpha$ -F	$\alpha$ -F/D	$\alpha$	$\gamma$
CONTROL	640	640	320	160
50°C, 30 MIN	640	640	320	20
100°C, 10 MIN	80	80	10	0
pH 2.0, 24 H	640	640	160	10
0.25% TRYPSIN, 2 H AT 37°C	0	0	0	0

Note: Initial interferons were diluted to indicated activity in medium with 0.5% lactalbumin hydrolysate and 50  $\mu$ g/ml gentamicin.

interferons, were treated at 4°C, pH 2.0 for 24 h, after which the medium pH raised to 7.0. Parallel specimens were heated at 56°C for 30 min and 100°C for 10 min. Other samples were treated with 0.25% trypsin at 37°C for 2 h, followed by suppression of enzyme activity by addition of an aliquot of serum. The results of analysis of these samples are listed in Table 2. As can be seen, plasmid interferons, as well as native  $\alpha$ -interferon, were equally stable at low medium pH and with heating. However, plasmid interferons are more resistant to 100°C heating than native  $\alpha$ -interferon. Trypsin inactivated both plasmid and native human interferons.

Stabilization of antiviral activity of human plasmid and native interferons with 0.01 M lanthanum chloride solution: We added lanthanum chloride in an end concentration of 0.01 M to samples of plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons, as well as native  $\alpha$ - and  $\gamma$ -interferons. Samples of interferon untreated with lanthanum chloride served as a control. The experimental and control specimens of interferon were incubated at 37°C for 4 days. Table 3 lists the results of assaying activity of interferon in samples collected immediately after addition of lanthanum chloride, as well as after incubation for 1, 2, 3 and 4 days at 37°C. As can be seen, addition of lanthanum chloride to both plasmid and native human interferon enhanced (doubled) and stabilized appreciably their antiviral activity when incubated at 37°C.

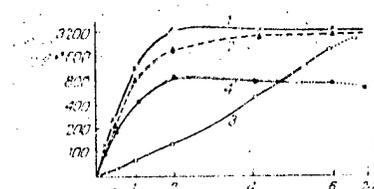
Kinetics of development of antiviral resistance in cells treated with human plasmid and native interferons: Microcultures of HEDF were treated with two-fold dilutions of plasmid and native interferons at 37°C for 15 and 30 min, 1, 2, 4, 6 and 24 h, after which we added a working dose of VSV. Further incubation was effected at 37°C for 20-24 h from the time the

virus was added, and we determined the protective effect of interferons. The experimental results revealed that plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons, as well as native leukocytic interferon, caused rapid development of antiviral resistance (see Figure). There was much slower development of resistance to virus in cells treated with  $\gamma$ -interferon.

Table 3. Stabilization of antiviral activity of human interferon with 0.01 M lanthanum chloride solution

CONDITIONS	INTERFERON ACTIVITY, U/ML							
	NATIVE				PLASMID			
	$\alpha$		$\gamma$		$\alpha$ -F		$\alpha$ -F/D	
	K	O	K	O	K	O	K	O
CONTROL	160	320	1280	2560	640	1280	640	1280
24 H, 37 °C	80	320	640	1280	640	1280	640	1280
48 H, 37 °C	40	320	160	320	640	1280	640	1280
72 H, 37 °C	40	160	10	10	320	640	320	640
96 H, 37 °C	20	20	10	10	320	640	320	640

Key: K) initial interferon preparation  
O) interferon with 0.01 M LaCl<sub>3</sub>.



Kinetics of development of resistance to viruses in HEDF cultures treated with native and plasmid human interferons.

Interferons: F (1), F/D (2),  $\gamma$  (3),  $\alpha$  (4).

Y-axis, interferon titer (units/ml) reflecting level of antiviral resistance of cells. X-axis, time (h) after addition of interferon.

embryo cells were found to be insensitive to both plasmid and native human interferons. Unlike plasmid and native  $\alpha$ -interferons, the antiviral activity of  $\gamma$ -interferon was manifested when only homologous cells were treated.

Activity of human plasmid interferon when used in combination with human  $\gamma$ -interferon: We mixed 20, 40 or 80 U/ml  $\gamma$ -interferon with aliquots of plasmid ( $\alpha$ -F and  $\alpha$ -F/D) interferons with known titers. The obtained mixture was used to treat a microculture of HEDF cells. It is only when  $\gamma$ -interferon

Sensitivity of homologous and heterologous cells to human plasmid and native leukocytic and immune interferons: Plasmid ( $\alpha$ -F and  $\alpha$ -F/D) and native ( $\alpha$ - and  $\gamma$ -) interferons were titrated in microcultures of HEDF, HeLa, Vero, PEKC, L<sub>929</sub>, MDCK, BHK-21 and CEF. The results are listed in Table 4. They indicate that human  $\alpha$ -interferon synthesized by recombinant bacteria induced resistance to viral infection in HEDF cells, HeLa and PEKC to the same extent as native  $\alpha$ -interferon. The protective effect of plasmid interferons in Vero cells was more marked than that of leukocytic  $\alpha$ -interferon. Moreover, plasmid interferons induced marked antiviral resistance in murine L<sub>929</sub> cells, whereas these cells were not sensitive to native  $\alpha$ -interferon. Canine, hamster and chick

is mixed with  $\beta$ -interferon that we observed the phenomenon of potentiation of antiviral activity. No increase in activity of the mixtures was demonstrable when plasmid and native  $\alpha$ -interferon were added to immune interferon.

Table 4.

Antiviral activity of human native and plasmid interferons in cultures of homologous and heterologous cells

CULTURE	INTERFERON TITER U/ML			
	NATIVE		PLASMID	
	$\alpha$	$\gamma$	$\alpha$ -F	$\alpha$ -F/D
HEDF	400	640	3200	3200
HeLa	100	160	400	400
VERO	20	10	400	400
PEKC	200	10	400	400
L929	10	10	3200	3200
MDCK	10	10	10	10
BHK-21	10	10	10	10
CEF	10	10	10	10

Table 5.

Activity of human native and plasmid interferons in HEDF culture when used in combination

ACTIVITY U/ML					
INDIVIDUAL					COMBINED (1:1)
NATIVE			PLASMID		
$\gamma$	$\beta$	$\alpha$	$\alpha$ -F	$\alpha$ -F/D	
80	640	---	---	---	2560
40	640	---	---	---	2560
20	640	---	---	---	2560
80	---	320	---	---	320-640
40	---	320	---	---	320-640
20	---	320	---	---	320
80	---	---	400	---	400-800
40	---	---	400	---	400
20	---	---	400	---	400
80	---	---	---	800	800
40	---	---	---	800	800
200	---	---	---	800	800

Table 6.

Sensitivity of VSV and EMC virus to human native and plasmid interferons in cultures of human cells

VIRUS	INTERFERON ACTIVITY U/ML			
	NATIVE		PLASMID	
	$\alpha$	$\gamma$	$\alpha$ -F	$\alpha$ -F/D
VSV	800	320	1600	3200
EMC	200	1280	800	1600
VEE	800	640	1600	3200
VACCINIA	16	320	32	32

Sensitivity of viruses to human plasmid and native interferons: Microcultures of HEDF were treated with different dilutions of plasmid  $\alpha$ -F and  $\alpha$ -F/D and native ( $\alpha$ - and  $\gamma$ -) interferons, after which they were infected with working solutions of viruses. Table 6 lists the results of determining interferon activity 20-24 h after addition of viruses. They indicate that plasmid and native  $\alpha$ -interferons induce more marked resistance in HEDF to CPA induced by VSV and VEE than when infected with EMC and vaccinia. The findings were different

when we compared sensitivity of viruses used in the experiment to human  $\gamma$ -interferon:  $\gamma$ -interferon induced 4 times more marked resistance of human diploid cells to EMC virus and protected the cells well against CPA induced by vaccinia virus.

Anticellular activity of human plasmid and native interferons: We added 20±5 HeLa cells to the nutrient medium of monolayer HEDF cultures grown in 96-well plastic panels. The cultures were incubated at 37°C in a moist chamber with 5% CO<sub>2</sub> for 2-5 days. We then counted the HeLa cell colonies. The results listed in Table 7 indicate that anticellular activity of plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons did not differ from that of native  $\alpha$ - and  $\beta$ -interferons, but was substantially lower than the activity of  $\gamma$ -interferon. Only 0.3 U/ml immune interferon was required for complete inhibition of HeLa cell growth under the

described experimental conditions, as compared to 10 U/ml for other types of interferon.

Influence of plasmid and native interferons on activity of native human killer cells (KC): KC activity was determined using a previously described method [11]. We isolated from heparinized blood of 6 donors lymphocytes, a suspension of which was decanted in 24-well plastic panels of the Nunc Firm, 0.5 ml in each. To each well we added 100 and 250 U/ml plasmid ( $\alpha$ -F and  $\alpha$ -F/D) and native ( $\alpha$ - and  $\gamma$ -) interferons in a volume of 0.5 ml, after which we incubated the cultures for 16-18 h in a moist chamber with 5% CO<sub>2</sub>. We mixed 0.1 ml suspension of lymphocytes free of interferon with 0.1 ml suspension of <sup>51</sup>Cr-labeled K-562 target cells. These cell mixtures were incubated at 37°C in a chamber with 5% CO<sub>2</sub> for 16-18 h, then we collected under conservative conditions 0.1 ml culture fluid and measured its radioactivity with a gamma counter. We calculated the cytotoxic index (CTI), as a percentage, using the formula:

$$CTI = \frac{E_1}{E_2} \cdot 100,$$

where E<sub>1</sub> is radioactivity of the supernatant of the mixture of target cells and lymphocytes treated with interferon, E<sub>2</sub> is radioactivity in the control (mixture of target cells with lymphocytes not treated with interferon). The findings are listed in Table 8. They indicate that plasmid and native interferons in doses of 100 and 250 U/ml stimulate to an equal degree the lytic activity of KC, more so in donors whose initial lymphocyte activity was low (data not listed).

Table 7. Anticellular activity of native and plasmid human interferons in human tumor cells\*

INTERFERON	NUMBER OF COLONIES OF HELA TARGET CELLS GROWN IN PRESENCE OF INDICATED DOSE OF INTERFERON, U/ML								
	20	10	5	2.5	1.25	0.6	0.3	1.15	0
<b>NATIVE:</b>									
$\gamma$	0	0	0	0	0	0	0	3	12
$\alpha$	0	0	3	4	7	10	12	10	11
$\beta$	0	0	4	10	10	13	11	12	12
<b>PLASMID:</b>									
$\alpha$ -F	0	6	8	10	11	12	10	9	10
$\alpha$ -F/D	0	2	4	11	10	9	13	12	13

\*HeLa cells were placed in the micropanel wells on a layer of HEDF and incubated in the presence of the indicated doses of interferon.

## Discussion

Interferons produced by human leukocytes consist of a mixture of several individual proteins [12]. Interferon gene expression in E. coli makes it possible to obtain individual interferons [13-15]. In addition, gene engineering makes it possible to design hybrid genes with preplanned combinations and to synthesize hybrid interferons [16, 17].

Table 8.

Stimulation of activity of human native killer cells by native and plasmid human interferons

DOSAGE OF INTERFERON	51CR RADIOACTIVITY (% OF CONTROL) IN NUTRIENT MEDIUM OF K-562 TARGET CELLS AND CULTURES OF LYMPHOCYTES TREATED WITH INTERFERONS			
	NATIVE		PLASMID	
	$\alpha$	$\gamma$	$\alpha$ -F	$\alpha$ -F/D
U/ML				
100	147	153	175	170
250	99	163	126	153

Note: Averaged results of experiments with lymphocytes from 6 donors.

We compared antiviral, anticellular [cytostatic] and immunomodulating activity, as well as other properties, of plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons (hybrid) to the properties of native human  $\alpha$ -,  $\beta$ - and  $\gamma$ -interferons.

In our experiments, plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons and native human  $\alpha$ -interferon were neutralized by antiserum to human  $\alpha$ -interferon and did not interact with antisera to human  $\alpha$ - [sic] and  $\gamma$ -interferons. These findings are indicative of the presence of the same antigenic determinants in plasmid and native human  $\alpha$ -interferon.

Plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons were found to be somewhat more stable when heated and incubated at 37°C, as compared to native human  $\alpha$ -interferon, and this is consistent with previously reported data [18]. Apparently, this is related to the nature of the protein admixtures contained in preparations of human  $\alpha$ -interferon.

Addition to lanthanum chloride solution to plasmid and native human interferons increased and stabilized their antiviral activity. Such an effect of rare-earth metal salts on activity of human interferon had already been described earlier [19]. However, the mechanisms of this phenomenon have not yet been identified.

The kinetics of development of antiviral resistance in HEDF treated with plasmid and native  $\alpha$ -interferon were virtually the same. It was induced during a short period of contact between these interferons and cells, and already reached a maximum after 2 h. Unlike  $\alpha$ -interferons produced by bacteria and human blood leukocytes,  $\gamma$ -interferon caused slower development of antiviral resistance in cells, which conforms to previously published data [20].

Plasmid  $\alpha$ -F and  $\alpha$ -F/D interferons and native  $\alpha$ -interferon induced antiviral resistance, not only in homologous cells (HEDF and HeLa), but in some heterologous ones (Vero, PEKC). In addition, plasmid interferons also produced a marked protective effect in L929 mouse cells, which were not sensitive to native  $\alpha$ -interferon. Evidently, this is related to the fact that in the mixture making up native  $\alpha$ -interferon there are components with narrower specificity than in plasmid interferons. This phenomenon was also perhaps attributable to the fact that some noninterferon proteins contained in the mixture of native interferon have an inhibitory effect on antiviral activity of  $\alpha$ -interferon molecules in heterologous cells. Human  $\gamma$ -interferon was active only in homologous cells, which confirms previous findings [20]. Demonstration of activity of  $\alpha$ -F and  $\alpha$ -F/D interferons in mouse cell cultures raises the question of using mice as a model for preclinical trials of human plasmid  $\alpha$ -interferons in *in vivo* experiments.

It was previously demonstrated that the protective effect of human  $\alpha$ -interferon is more marked on VSV than EMC virus [21]. In our experiments also, VSV was

more sensitive than EMC to human  $\alpha$ -interferons produced by both bacteria and leukocytes. The opposite was observed when cells were treated with  $\alpha$ -interferon, and this could serve as grounds for a more detailed study of virus-specific activity of human immune interferon.

No potentiation effect on antiviral activity was observed with the combined use of plasmid and native  $\alpha$ -interferons with human  $\gamma$ -interferons. Mutual activation, analogous to that described for murine interferons [22], was noted only when human  $\beta$ - and  $\gamma$ -interferons were combined. The mechanisms of mutual potentiation of antiviral activity when immune and fibroblast interferons are combined have not yet been identified. However, the design of recombinant bacteria producing simultaneously plasmid human  $\beta$ - and  $\gamma$ -interferons may hold promise.

Immune interferon has more marked anticellular activity than leukocytic and fibroblast interferons [23], which enables us to rate it as a promising agent for treatment of neoplastic diseases. In our experiments too, anticellular activity of  $\gamma$ -interferon was about 30 times more marked than that of plasmid and native  $\alpha$ - and  $\beta$ -interferons.

The immunomodulating properties, as demonstrated by stimulation of human KC activity, were similar in all of the tested native and plasmid interferons.

There are different views concerning the correlation between antiviral and other types of biological activity of interferon. In the opinion of a number of authors, antiviral and antiproliferative activity is related to different molecules [24, 25]. However, most researchers believe that antiviral, anticellular and others types of biological activity of interferon involve the same molecules [26-28]. Our data to the effect that plasmid interferons, particularly the individual  $\alpha$ -F interferon, have antiviral, anticellular and immunomodulating properties are indicative of the multifunctional nature of human  $\alpha$ -interferon molecules.

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CSO: 8144/1351

PREPARATION AND EPR-STUDY OF SPIN LABELED DERIVATIVES OF NEUROTOXIN II  
NAJA NAJA OXIANA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 4, Apr 83  
(manuscript received 14 Sep 82, after additional work 20 Oct 82) pp 437-449

UTKIN, Yu. N., PASHKOV, V. S., PLUZHNIKOV, K. A., KURYATOV, A. B.,  
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[Abstract] A series of mono- and di- spin-labeled derivatives of neurotoxin II (NT-II) from the venom of the Central Asian cobra *Naja Naja Oxiana* was synthesized. Using EPR spectroscopy, the separation between the labels in disubstituted derivatives was determined along with topography of the binding of monolabeled compounds to acetylcholine receptors. The spin-labeled reagents used to modify NT-II were N-hydroxysuccinimide esters of 2,2,6,6-tetramethyl-4-carboxymethylpiperidin-1-oxyl and 2,2,5,5-tetramethyl-3-carboxypyrrolin-1-oxyl, which reacted with lysine in positions 15, 25, 26, 44 and 46, and with leucine in position 1. Monolabeled compounds retained their biological activity; the activity of dilabeled derivatives was significantly decreased. The conformation of naturally-occurring NT-II was retained in the derivatives. It was established that the spacial structure of erabutoxin B determined in its crystalline state was identical with the structure of short neurotoxins in solution. Figures 8; references 25: 6 Russian, 19 Western: 5 Russian, 14 Western (6 by Soviet authors).  
[412-7813]

MULTIPLE FORMS OF VENOM NEUROTOXINS FROM MIDDLE ASIAN COBRA

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 6, Nov-Dec 82  
(manuscript received 28 Jun 82) pp 60-61

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[Abstract] Two principal toxins were isolated from the venom of *Naja Naja oxiana* cobra: a short one and a long toxin. Further chromatographic separation of the short toxin over Amberlite CG-50 ion exchange resin yielded eight fractions from which seven appeared to be toxic. One of them was the main toxin, the others were simply called minitoxins. The main toxin was not the most active component; two minitoxins eluting just ahead of it and just after the main toxin were the most active venoms. The presence of these multiple toxins must be the result of phlogenetic evolution. Figure 1; references 3: 2 Russian, 1 Western.  
[362-7813]

## PUBLIC HEALTH

### IMPORTANCE OF FELDSHER-MIDWIFE CENTERS IN RURAL AREAS

Minsk SEL'SKAYA GAZETA in Russian 5 Mar 83 p 1

[Article, unsigned: "The Health Service"]

[Excerpt] FAP's--feldsher-midwife centers--are the front line of the rural health service. The workers there live in villages permanently, and they are always ready to render first aid, they also do much to prevent diseases. In Mogilevskiy Rayon, for example, the Kostinskiy FAP enjoys a good name; it has been headed for 25 years by V. T. Demidenkova. Vera Timofeyevna administers treatment with both drugs and kind words. She works in close contact with the Ispolkom of the rural soviet, and has been elected as a deputy in it several times; there is also the support of the health aktiv.

A. G. Antonov has worked as chief physician of the Vysochanskiy Uchastok Hospital in Lioznenskiy rayon for 25 years, and he is chief not only in his job, but in experience, generosity and humanity. For his selfless performance of his duties, the high title of Hero of Socialist Labor has been bestowed upon Aleksey Gavrilovich, and his fellow citizens elected him deputy to the Supreme Soviet of Belorussian SSR.

We have many thousands of such people. True, there are instances, which are not common but intolerable all the more, when medical workers are not considerate of patients, the quality and sophistication of care are not on the required level in all areas. Expressly these facts, which occurred in the Pribytkovskiy Uchastok Hospital, were recently discussed by employees of medical institutions in Gomelskiy Rayon.

Unquestionably, the rural health service is growing stronger with each passing year; it is developing and making considerable strides. But it is also apparent that medical care of the rural population does not always conform to modern capabilities, and in this area there are quite a few oversights and weak points.

Let us see how public health facilities are built. We shall find that they are considered secondary in some areas, and there is constant failure to comply with stipulated completion dates. For example, the new building for the rayon hospital in Mstislavl has been under construction for 4 years already, and the hospital in Korelich has also become an incompleated project. Some facilities of the Belmezhkolkhozzdravnitsy [Belorussian Interkolkhoz hospital] are also in no better a condition. It is bad that not all rural health

institutions have reliable telephone service. They also experience a shortage of vehicles. Emergency care itself needs assistance.

Hundreds of graduates from medical VUZ's and secondary specialized educational establishments arrive annually in rural areas for work. Unfortunately, the migration of these specialists from rural areas is also quite intensive. The considerable personnel turnover is attributable to many causes, but perhaps the principal one is that appropriate working and living conditions are not always provided for medical workers.

In reorganizing rural hospitals, mistakes are sometimes made: local conditions are not taken into consideration--condition of roads, availability of transportation and, finally, location of inhabited localities. There is valid criticism of performance of pharmacies. In some regions, there is relaxation of medical-sanitary surveillance of use of toxic chemicals and other agents used to protect plants. All this ultimately has an adverse effect on our work, on the entire life set, as they say.

The decree, "On Additional Steps to Improve Public Health Care," of the CPSU Central Committee and USSR Council of Ministers defines the first and foremost tasks for rural medical workers. It refers, first of all, to further intensification of disease prevention and inculcating in the public a careful attitude toward their own health. There is still much to be done to improve working, living and recreational conditions, to ameliorate the environment and prevent traumatism. The very structure of the rural health care service must be improved; its material and technical base must be strengthened. After all, at present the possibilities for construction of medical institutions have increased, but at the state's expense and with the help of kolkhozes and sovkhozes.

The decree of the party's Central Committee and Council of Ministers is also aimed at strengthening medical personnel and it is permeated with concern about them. Farm administrators must make competent use of the right they have to reward physicians, feldshers and nurses who have made good achievements in their work using the funds for material incentives of agricultural enterprises and organizations.

What could be more honorable and nobler than to prolong people's period of active creative life, to return their health and enjoy each day? Representatives of the health service who are many thousand people strong must work with this in mind.

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CSO: 1840/507

## UPDATE ON HEALTH CARE IN UZBEKISTAN

Tashkent PRAVDA VOSTOKA in Russian 7 Apr 83 p 2

[Article by P. Chichenin, candidate of medical sciences, Honored Physician of Uzbek SSR, head of Health and Social Security Department, Administration of Affairs, Uzbek Council of Ministers: "International Health Day. The Countdown Has Begun"]

"Health for all by the year 2000: the countdown has begun."  
This is the slogan of this worldwide day of health.

The public health system of our country has become a major sector of the national economy, which provides all of the population with free and qualified medical care.

At the present time, over 6 million people are employed in this system, including more than 1,033,000 physicians. The medical workers of our republic are obtaining remarkable achievements.

In Uzbekistan, there has been a constant decline in morbidity referable to typhoid fever, typhus, paratyphoid, salmonellosis, and this was aided primarily by improved sanitary welfare of populated localities, improved quality of potable water and strengthening of sanitary discipline. This year there has also been a decline in incidence of viral hepatitis.

In Uzbekistan, where children constitute a considerable part of the population, special attention is devoted to their health care. The government allocations for this purpose were in excess of 90 million rubles under the 11th Five-Year Plan. This is almost one-third of all funds allocated for this republic's public health needs and twice as much as allocated under the 10th Five-Year Plan.

At the present time, there are seven large general [multispecialty] pediatric hospitals in this republic; in the last 5 years the number of pediatric beds has increased by 10,000, or almost 30%. For the first time, "Mother and Child" hospitals have been established, where both children and their mothers are treated, when they are in the hospitals to care for their children. The experience we have gained confirmed the high efficacy of such institutions, and has been disseminated extensively in the republic.

There has also been activation in recent years of work dealing with expansion of specialized pediatric care. In particular, resuscitation departments and

intensive care wards have become operative in all oblasts of this republic. The number of emergency care brigades has doubled. At the present time, we have about 100 such brigades.

Centers for pulmonology, allergology, nutrition, premature infant care, infant pathology have been opened at the largest clinics in the republic.

A special program, which is aimed at wiser organization of medical care of children, is being implemented in the republic's rural regions. Visiting pediatric and obstetric-gynecological brigades have been organized to render medical care at field camps and cattle grazing ranges.

Work is presently being completed in the republic on forming smaller pediatric uchastoks.

Prevention was and remains the general line of Soviet public health. Prevention of diseases, hygienic education and formation of a healthy life-style for the public are the most important tasks of the entire public health system. Problems of constant improvement of health protection and working conditions, implementation of sanitary and ameliorative measures, prevention of general and occupational morbidity, industrial traumatism, as well as improvement of living and recreational conditions for the working people are in the center of attention. Constant development and refinement of dispensary care is an important part of preventive work.

It is stressed in the decisions of the 25th and 26th CPSU Congresses that it is imperative to implement social measures aimed at providing active longevity to Soviet people, at involvement of elderly citizens in work and public service. Studies dealing with the most important theoretical and practical aspects of gerontology and geriatrics (discipline dealing with the distinctions of disease treatment and prevention among the elderly) are pursued by scientists at more than 120 scientific research institutes, medical VUZ's and other institutions in the nation. The principles of drug therapy have been elaborated. Studies are in progress of the role of sociohygienic factors in aging and longevity of man, as well as of the effects of various elements of life style on health, active longevity and work capacity.

In our country, the right to deserved rest and material security is guaranteed for the elderly. In the last 10 years, the pensions and expenses for social needs have increased in the USSR; medical care has improved, there has been expansion of the network of guest homes and boarding houses.

All of the conditions have been provided in our nation for active recreation for the elderly. Physical culture, particularly in health groups, social [public] services consistent with physical capacities and spiritual needs of each individual are a mandatory prerequisite for preserving health and active, full longevity.

The International Conference on Primary Medical and Health Care, which convened in Alma-Ata in 1978, issued a statement to the effect that primary medical and health [sanitary] care is the key to reach the set goal of "Health for all by the year 2000." There is every opportunity in our country to achieve this task. However, we should not dwell on what has been achieved, but concentrate on the unsolved problems.

## CHIEF PHYSICIAN'S PROBLEMS DISCUSSED

Moscow PRAVDA in Russian 15 Apr 83 p 3

[Article by V. Minakov, doctor of medical sciences, Moscow: "A Chief Physician Has a Hundred Problems--Problems and Thoughts"]

[Excerpt] The position of chief physician, its prestige and authority have long since concerned public health organizers. Several years ago, the rights of chief physicians were expanded. This helped "remove" a number of difficulties in their routine work. There were also "levers" for material incentives for those who performed the best--it was allowed to use for this part of the savings within the wage fund. Experimentally, this was found to be an effective measure. The chief physician is armed with more than the means of conviction. However, economy is possible only if the wage fund is allocated in full, in accordance with the regular staff roster. In practice, however, wage allocations are issued only for jobs that are filled....

In the medical centers of industrial enterprises, the right provided in the decree of the CPSU Central Committee and USSR Council of Ministers, "On Measures for Further Improvement of Public Health," is used extensively. According to this decree, the managers of plants and factories are allowed to award prizes to medical center personnel also for their achievements. And this is justified. After all, physicians, if not themselves but with the hands of their patients whom they have returned to socially useful labor, also make a contribution to the achievements of enterprises. In my opinion, it would be desirable to issue a prize [bonus] fund for all public health institutions, regardless of the agency to which they are subordinated.

At the present time, incidentally, another economic experiment is in progress, which is aimed at improving the efficiency of medical workers. Chief physicians at hospitals, where it is being conducted, are unanimous in stating that material incentives are effective. True, they are also surprised why the experiment is concerned only with hospital institutions. After all, 80% of all patients start and end their treatment at outpatient polyclinic institutions.

There are also other beneficial steps to improve interaction between different elements of the public health service. For example, district physicians have received some rather perceptible moral and material benefits. This is a necessary measure. But, for some reason, the heads of polyclinic departments

who directly organize their work and often perform it themselves turned out to be deprived of these benefits. The chief physicians are well aware of the cost of this oversight. Qualified specialists, people with organizational experience, do not want to head departments, they strive to go out into the district, where the wages of a physician are often appreciably higher. There are just as many problems with selecting department heads at hospitals.

These examples illustrate both the complexity of the problems and the fact that the approach to solving them must be repeatedly checked and, of necessity, comprehensive. Otherwise, the benefits for some categories of workers not only fail to lead to improvement of the matter, but could even worsen the general situation. Let us say that, in a number of sectors of the national economy, specialists with scientific degrees continue to work in industry and receive virtually the same bonus for their degree as at a scientific research institute or educational institutes. But candidates or doctors of sciences, who are employed in polyclinics or hospitals, receive a minimal bonus ["surcharge"]-- 10 and 20 rubles, respectively. Of course, at the first opportunity they transfer to research or pedagogic work.

Obviously, one cannot reduce everything to material incentives, no matter how important they are. Let us not overlook other causes. We believe that, among them, a rather important one is referable to the fact that quite a few young people who have no idea about their future profession and are subsequently disappointed with it enroll in medical VUZ's. When one enrolls in a medical institute, as in others, work at a plant, kolkhoz, any other enterprise or institution is counted in the work tenure subject to benefits. But it is extremely important for the future physician to go through expressly a medical institution, to see for himself what a difficult and, sometimes, selfless job it is. Perhaps, greater advantages should be provided for students who have at least 2 years tenure in the job of junior medical associate [worker]. Incidentally, this would help reduce the shortage of hospital attendants. It is also deemed desirable to allow medical institutes to enroll for the first year a certain percentage of student candidates and perform the final screening later. Of course, I am far from thinking that these are exhaustive measures, but they would serve as an additional perceptible barrier to medicine for people unsuitable for such work.

The questions raised here are far from simple. But they must be answered. Incidentally, the training of a reserve of administrative personnel depends on it. As a rule, already employed public health administrators are enrolled at institutes for advanced training of physicians. But we are referring expressly to a reserve. I think that one should start thinking about it already when the future physician is still sitting on the school bench. Quite a few students manifest an inclination for administrative work. We refer, for example, to many komsomol and trade-union activists, group and course leaders. It is very important for pedagogues to notice them in good time, develop in them the qualities of future administrators. But the prestige of the job of public health organizer must be increased for a young specialist to have the desire to become a chief physician in the future.

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CSO: 1840/510

## APPEAL FOR BETTER PATIENT CARE WITH ECONOMICAL USE OF RESOURCES

Moscow IZVESTIYA in Russian 19 Apr 83 p 2

[Article by Prof I. Mokerov, doctor of medical sciences, chief of demography sector at the Institute of Economics, Ural Research Center, USSR Academy of Sciences, Sverdlovsk: "In the Interests of the Patient"]

[Text] I recently had occasion to participate in a rather impressive meeting concerned with improvement of the quality of medical care. And this is what attracted my attention: in their speeches, many chief physicians of hospitals and department heads complained of the bed shortage. But, even though I listened attentively to the speakers, I did not find an appeal for more efficient use of the existing bed resources of hospitals.

Why was this most burning issue overlooked? I recall that IZVESTIYA (No 145 1975) reported on the progressive forms of work in the clinic of the well-known eye surgeon, S. Fedorov. How bed "turnover" was increased drastically there by reducing to a minimum the repetition of laboratory tests in the polyclinic and hospital. It also reported that maximum work-up of patients before hospitalization also shortens considerably the expensive stay at the clinic. Establishment of a system of work where the patient is seen at the polyclinic, worked up and then operated on by the same physician also serves the same purpose. This is called the brigade method. The physicians see to it that the patient does not spend a single extra day in the hospital, while maintaining a high quality of treatment.

Isn't this practice interesting? Very much so! Should it be introduced elsewhere? Of course! Here is just one figure. If the turnover per hospital bed in the nation were to be increased by only 1 day per year, an additional 150,000-200,000 patients could be admitted for hospital care without any additional expenses.

True, it also happens that the need for a specific type of medical care was not taken into consideration in advance, or else that it has increased. Then some department or the clinic has to be enlarged. Sometimes, the oversight is referable to incorrect planning of new hospitals and departments. For example, the existing principle of planning obstetric beds is based on the overall population size--women and men--regardless of the birth rate in a given region. It is our deep conviction that one should take into consideration first of all the actual birth rate.

To provide hospital beds for those who need them is only half the job. One should also obtain a good quality of treatment, and it must be properly organized. The overall bed resources could exceed the average norm, but it is still difficult to get in the hospital. This happens because the beds are not used purposefully ["zealously"] in all instances by far. In Sverdlovsk Oblast, bed availability is 10% higher than the average for the nation. In the city of Sverdlovsk the figure is even higher--1.3 times more beds. Yet the situation with hospitalization is not always good, as we were convinced by attending the above-mentioned meeting.

In recent times, the bed resources have grown primarily at the expense of large therapeutic and research medical centers. They are outfitted with modern therapeutic and diagnostic equipment. In our opinion, there should be greater responsibility for bed "turnover" in such a center than in a tiny 10-bed hospital with one physician.

There is no need to conceal the fact that, for the time being, the process of patient work-up and treatment at most hospitals is very uneven in the course of the week or even a day. Attending physicians work one shift in the departments. If a serious case was admitted as an emergency, the patient is usually worked up the same day. But the "routine" patient, who was admitted, for example, on Friday after lunch, has to wait 2 days, until Monday, to meet the attending physician, be examined and receive orders. Two days of "idle" hospitalization--is this not too wasteful?

Incidentally, it is not only the new admissions, but all patients do not receive treatments on holidays [days off], because the proper offices are closed. If a hospital stay lasts 1 month, for 8 days the patients are "forbidden" to go to the physiotherapy department, massage and therapeutic physical culture rooms.... Why?

People do not receive sufficient therapy. Then the concerned physician orders hospitalization for an extra week, and keeps a recovered person there for the sake of treatments, so that his labor would not be in vain. On the other hand, the negligent physician will discharge a patient before completion of the therapy course. Which decision is best? As they say, both are worse....

Why has the prewar sliding work schedule for physicians been forgotten, both in hospitals and polyclinics? And if we are talking about ambulatory care, again we have a question: At what time of day or week are billions of visits made each year? Statistics show that at least two-thirds are made in the daytime during work hours. The average visit takes 1 to 3 h. If this is multiplied by the number of visits, we shall find that a rather large city does not work the year round. Let me make a stipulation right away: there is loss of many hours, which cannot be avoided. A severe toothache or heart attack does not pick the time to happen, and the person who has asked for leave from the job for such a reason cannot be blamed for anything. But if he decided to undergo a preventive physical, or to have a better filling in a tooth, when does the physician see him? He does not always, by far, do so at a convenient time, not during work hours.

As a rule, specialists do not have office hours on Saturdays and Sundays. Physiotherapy, acupuncture, balneotherapy and other therapy rooms are locked on holidays at most polyclinics, as well as hospitals.

The physician serves the patients, not the other way around, and that should be the slogan of any health care institution. At one time, I had occasion to participate in the experimental conversion of one of the stomatology polyclinics in Sverdlovsk to a continuously open facility. At first, the physicians and paramedical personnel gave a hostile reception to the experiment. They thought this was all in vain, a patient will not come on a holiday, and if any do come there will be few of them. The conclusion of the proponents of the experiment was simple: if the patient does not accept the new form of services we shall cancel it. And, ... the public flocked in. The number of visitors grew literally in a geometric progression. The staff of stomatologists and prosthesis specialists even had to be somewhat enlarged. But the line of patients waiting to be seen soon disappeared, and part of the residents of the neighboring municipal district was attached to the polyclinic. As a result, with increase in staff by about one-third, there was 1.5-fold increase in efficiency of polyclinic work. And this was achieved using the same space, same equipment, but a new approach. Everyone benefited, and the State also.

One can improve the efficiency of hospital and polyclinic work only by introducing new, progressive work methods. One must revive interest in the brigade method, which we discussed above. Offices for preliminary ["prephysician"] visits have not yet been established at all polyclinics, where the patient's blood pressure, temperature and cardiogram can be taken. Yet such offices free time for the physician, that he needs so much for in-depth work, to talk with patients. Various analyzers and the latest diagnostic equipment should become of great help to large hospitals and polyclinics. They help make more accurate diagnoses and considerably faster than with existing methods.

There should be broad popularization of innovations and explanation of their advantages. Unfortunately, the literature dealing with the knowhow of progressive teams of physicians is being published is being published, but in a homeopathic printing. Yet medical men have an enormous thirst for it. Recently, for example, a book was published on the progressive knowhow of the Leningrad Polyclinic No 51 in 15,000 copies.... The book became a rarity right away.

It is time now to persistently adopt everything that has already earned a good name for itself. After all, the work of the health shop has a direct and immediate bearing on our work, on prolonging work capacity for many years.

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CSO: 1840/501

## SLOW EMERGENCY SERVICE RESPONSES DISCUSSED

Ashkhabad TURKMENSKAYA ISKRA in Russian 6 May 83 p 2

[Article by V. Kolyabin, correspondent for TURKMENSKAYA ISKRA: "Why Emergency Care is Slow"]

[Text] Each of us experiences a dual feeling at the sight of the speeding ambulance: anxiety for the unknown person to whom it is driving and certainty that help will arrive in time. And this is how it should be. Each year, the emergency service renders first aid to 400-450 residents of Ashkhabad daily, according to the statistics.

There is nothing to say but that this is an impressive figure. But it also happens that an individual, who is waiting for a long time for the medical brigade, starts to think about the medical red tape. It is not difficult to understand him. But is the emergency service always to blame? Who and what hold it up?

These questions are answered by G. A. Khanova, chief physician of the Emergency Hospital:

"In our job, every minute is very important. The norm allows us 50 min to respond to each call. In this time, we have to arrive to the address given, render the necessary care and admit the patient in a hospital if emergency intervention of the hospital medical service is required. However, because of many circumstances, we cannot always keep to the norm, although we try to act without delay.

"There are many reasons for this. The first is that there is a shortage of highly qualified personnel, which has been repeatedly discussed in republic departments. Specialized mobile brigades are being gradually manned with experienced specialists who have undergone retraining at various medical centers in our country. At the present time, the problem of mobile service pediatricians has been entirely resolved.

"But there are still plenty of problems. And, perhaps, the principal one is the crowdedness, the shortage of facilities."

At one of the meetings of the Ispolkom of the Ashkhabad municipal soviet, where there was discussion of issues dealing with improvement of emergency medicine,

the need to build substations in the Gaudan [mountains or forest] region was voiced. A section of one of the buildings in that densely populated region was allocated for this purpose. Immediately, there were complaints from the residents that the noise of the ambulances, leaving and returning, disturbs proper rest. This applies particularly to night time. By decisions of the Gorispolkom, the Ashgorproyekt Institute [Ashkhabad Municipal Planning Institute] must prepare estimates and plans for construction of the substation. This was to be done within the first quarter [3 months], and the time has already elapsed....

There was talk at the Gorispolkom of the need to improve working conditions for the mobile physicians. For this purpose, portable radio sets are being installed in most vehicles, so that there could be speedier responses to calls. Incidentally, at the present time, the Ashkhabad emergency service has a night frequency for operational radio communication, which is more convenient and there are no additional interferences in the atmosphere. Unfortunately, not all of the decisions of the Gorispolkom are implemented. For example, one of them pointed to the need to establish a central receiving department at the Republic Clinical Hospital imeni Pirogov. With such a department, there would be no further need for a watch service at other hospitals in the city. Such a department has started to function, but not in its optimum version by far. This is what O. Ovevberdyeva, cardiologist on the specialized emergency team, has to say on this score:

"I will probably not be alone in my opinion that the performance of the central receiving department is not yet helping the efficiency of our work. It often happens that we bring a patient there and much time is lost in searching for the appropriate medical specialist. That is something to think about!"

There are other factors that also have an adverse effect on the efficiency of the emergency service. As a rule, the dispatcher receives the calls, enters the necessary data and the entire conversation is recorded on tape. But there is still no direct special channel of communications, which was discussed in the decision of the ispolkom.

"We cannot manage without a special communication system," states G. A. Khanova. "With it we could rapidly contact any hospital in the city and, if necessary, the fire department or state motor vehicle inspection service. The ordinary municipal telephone is a poor assistant. In brief, without special communications it is like we were without hands."

We think that this republic's Ministry of Communications should listen to the opinion of the chief physician.

At the present time, we are faced with the acute problem of major repair of the emergency hospital. This job has been assigned to the personnel of Gorremstroytrest [city repair and construction trust]. The immediate executor of the work is the repair and construction administration of Leninskiy Rayon. Much time was spent on rebuilding the plumbing and sewage system, there was not enough manpower. At the present time, repair work has been put under the control of the Gorispolkom and it appears that its pace has increased. We should like to believe that this is how it will proceed in the future, although there is still much to be done and deadlines are short.

G. A. Khanova continues: "There is something else that worries us. The dispatchers receive at least 6-7 thousand false alarms per year. Children are the main culprits. Now we have ceased to take calls from them, and I wish to remind parents of this once more. There are also adults who are irresponsible. It is really ["humanly"] regrettable when a healthy person opens the door in answer to the knock of the specialized brigade. After all, at that same time it is awaited with high hopes in some other place. It would probably be proper to have false alarms labeled as malicious violation, with the appropriate punishment for it. Then there would be fewer individuals who would want to play jokes on people engaged in a serious and urgent job."

... The emergency service ambulance is dashing through the city. Physicians are toiling selflessly. We are aware of this. But the mobile service needs help to function even better.

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HEALTH AND REPRODUCTIVE BEHAVIOR OF WOMEN OVER THE AGE OF THIRTY

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 4, Apr 83 (manuscript received 20 Jul 82) pp 23-25

[Article by I. V. Polyakov, Ye. A. Boyarinova, N. S. Sokolova and O. A. Shishko, Department of Social Hygiene and Organization of Public Health Services (Chief--Professor V. A. Minyayev), First Leningrad Medical Institute imeni Academician I. P. Pavlov]

[Text] Our country is actively pursuing a demographic policy in the area of childbirth rate directed toward achieving an optimal number of children in the family and protection of their health and the health of the parents.

The birth rate level is affected the most by the reproductive behavior of women 20-29 years of age. It is particularly important to stress this, because at this age women have the best health indexes, the lowest levels of disease, invalidism and death rates. However, the group of women over the age of thirty also plays a definite role in the formation of the optimal birth rate index.

This is indicated by the data obtained in studying the reproductive behavior and health of women of the child-bearing age (15-49 years of age), residents of a large city. The 30-34 age group stands out among women over the age of thirty. Its birth rate index is somewhat higher than the average and somewhat lower than the average indexes of the overall disease and death rates.

In the older age groups, birth rate indexes drop sharply and at the same time increase in comparison with the average indexes of disease, invalidism and death rates (see table).

As a result of studies on the reproductive behavior of women conducted in one of the microrayons and one of the maternity hospitals of a large city in the last 14 years, stable and noticeable differences in the pregnancy termination and frequency ratio of women of different ages were found: those over thirty are characterized by the desire to limit the number of childbirths. Their number in the group of women who gave birth decreased considerably: among those repeatedly pregnant -- from 12.8 to 5.6%, those who repeatedly gave birth -- from 57.5 to 37.0%. This tendency indicates the limitation of the number of children in the family and formation of its size by the age of 30-35. And only various family circumstances make women give birth at older ages. In comparison with younger

women, their pregnancy and labor progress less favorably and there are more frequent cases of difficult obstetrical and somatic histories.

Table  
Comparison of Some Health Parameters of Women Older Than 30 Years of Age  
(in % of the average level of the corresponding indexes for women of  
15-49 years of age)

Возрастная группа, годы (1)	Рождаемость (2)	(3) Заболеваемость			Инвалидность (7)	Смертность (8)
		общая (4)	госпитализированная (5)	случаи временной нетрудоспособности (6)		
30-34	111,5	94,6	115,5	143,1	107,0	68,4
35-39	26,3	117,1	106,6	120,5	145,2	126,3
40-44	5,8	116,7	162,2	199,3	216,6	163,2
45-49	0,2	122,0	177,4	79,6	245,7	310,5

Key: 1. Age group  
2. Birth rate  
3. Disease rate  
4. Total  
5. Hospitalized  
6. Cases of temporary disability  
7. Invalidism  
8. Death Rate

Calculations show that among women who gave birth at the age of thirty and older, in comparison with the whole group of those who gave birth in 1980, the number of pregnancies in the histories was found to be 1.7 times higher, stillborn cases -- 1.6 times more, artificial abortions -- 2.4 times more, and spontaneous abortions -- 1.4 times more. In the majority of cases (66.5%), it was a repeated labor for women above the age of thirty and first labor in 33.5%. Among the women of the age of forty and older, 21.6% gave birth for the first time.

Women older than thirty years of age more frequently have a more difficult pregnancy with various complications, particularly those giving birth for the first time (39.6% against 30.8%); there are more frequent cases of nephropathy. At this age women frequently have accompanying pathology of female genital organs (24.8% against 15.4%) or extragenital diseases (38.5% against 35.9%) -- diseases of the blood circulation system, digestive organs and others.

The majority of women of the age of thirty and older had the cases of partus malurus (91.4%), 6.4% -- premature labor, and 1.9% -- delayed labor. This confirms the fact of a larger number of cases of delayed labor among older women in comparison with that of younger women. The analysis of the nature of anesthesia during labor did not reveal any noticeable peculiarity; medicamental anesthesia was used more often during labor for women giving birth for the first time.

Clear differences were revealed in the number of operations and various kinds of intervention during deliveries: for example, they are used 5.8% more frequently for women of the age of forty and older, and 23.9% more often for women giving birth for the first time at the age of thirty and older; they are given cesarean operations more often. Reasons for surgical intervention and obstetric aid were frequently a premature and early rupture of the fetal sac, nephropathy, placenta delay and anomalies of the pelvis. The same women had more frequent cases of complications during the postnatal period (6.0% more), particularly those who gave birth for the first time (10.7%).

The total time of hospitalization for obstetric aid among women older than 30 years of age was shorter (6.3 days against 10.2 as a whole); the average length of hospitalization before labor was also shorter for them (1.6 day against 1.7).

Less favorable health indexes of older pregnant women and their difficult pregnancy and labor are explained not only by the effect of the age factor, but also by insufficient completeness of observation at women's consultation clinics and lesser possibilities of using all means of the state medicosocial aid. This is connected with the fact that older pregnant women come later to women's consultation clinics. For example, among women who gave birth at the age of forty and later, only 27.0% were registered in women's consultation clinic before 12 weeks of pregnancy, 59.5% -- 12-28 weeks, 10.8% -- still later, and 2.7% were not registered at all. When women see a physician that late, it is natural that there are difficulties with their treatment and prophylactic care, job placement, preventive hospitalization, rational diet and rest.

Evaluating from demographic positions the obtained data on the health and reproductive behavior of women at the age of thirty and older, it should be stressed again that their number in the total group of women giving birth is relatively small and there is a considerable number of them among those who gave birth more than once. Nevertheless pregnant women at the age of thirty and older require special attention because they are a risk group. It is necessary to implement health improvement measures for nonpregnant women of this group and use various means of the state medicosocial aid when pregnancy occurs. With the low birth rate levels maintained in large cities, it can be considered necessary to preserve the desired pregnancy of each woman provided that there is a favorable prognosis and thorough treatment and prophylactic care for them. Moreover, it is necessary to strengthen the system of clinical services for these women not only during the time of pregnancy, but also after childbirth -- not less than in the course of one year. This period is usually sufficient for all medico-social rehabilitation measures, indicated health restoration treatment, advising regarding further reproductive behavior, the length of the intergenetic interval, way of life, the necessity of seeing a physician early when pregnancy occurs, etc. As was shown earlier, those repeatedly pregnant and giving birth more than once constitute the majority among all those who gave birth at the age of thirty and older, and, although the problem of the optimization of their reproductive behavior is complicated, it is quite solvable. A more complicated problem in this sense is the organization of early and rational observation of women pregnant for the first time, women who give birth for the first time at the age or thirty and older. The solution of this problem will be helped by the strengthening of continuity in the activity of women's consultation clinics, civil registry offices, polyclinics, medicosanitary departments and other treatment and prophylactic institutions, and by raising the level of health education work and integrated clinical help for women.

One of the ways to solve this problem in the future under the conditions of a general prophylactic medical examination system can be constant clinical observation of women of the child-bearing age by gynecologists. Participation of gynecologists in the observation of women's health during the entire course of the child-bearing period will help to determine the time optimal for the termination of pregnancy, the distribution of the interval between childbirths, early observation of the pregnant woman and her correct behavior if she wants (or does

not want) to have children. Participation of a gynecologist is also important in solving certain social and legal problems for women older than thirty years of age connected with their remarriage or the birth of a child in an incomplete family.

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ROLE OF PARATYPICAL FACTORS IN DETERMINING MULTIPLE PREGNANCIES IN WOMEN.  
PART 1. COMPARATIVE STATISTICAL ANALYSIS OF CERTAIN SOCIOBIOLOGIC MATERNAL  
CHARACTERISTICS

Moscow GENETIKA Vol 18, No 12, Dec 82

(manuscript received 17 Jun 81; in revised form 15 Apr 82) pp 2044-2049

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[Abstract] An analysis was conducted on 400 mothers of twins and 429 control women to determine certain of the sociobiological factors that may have a significance on twinning. The average age of mothers of dizygotic twins (M-DZ) was significantly higher (29.59 yr) than of the control group (27.59 yr), while that of the mothers of monozygotic twins (M-MZ) did not differ significantly from the control group (28.10 yr). Furthermore, M-DZ entered school at a later age, remained pupils for a shorter time, and entered the work force earlier than the control mothers. Mothers in the control group were largely engaged in white collar occupation (68.10%) while M-MZ and M-DZ were predominantly engaged in physical work (71.60%). In general, control group mothers showed a preference for meat dishes. Psychological studies showed that pregnancy was undesired in 34.51% of the mothers with twins, and in only 3.66% of the control mothers. These preliminary findings point to the complexity of biological and social factors that seem to have a bearing on the incidence of human twinning.

References 15: 9 Russian, 6 Western.

[358-12172]

AVERAGE LIFE EXPECTANCY AMONG VARIOUS SOCIAL GROUPS AND LIFE POTENTIAL  
OF URBAN POPULATION IN KIRGHIZ SSR

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 2, Mar-Apr 83 pp 15-17

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[Abstract] Average life expectancy of municipal population in Kirghiz SSR increased by 64% from 1938 to 1979. Currently this increase in life expectancy rises slowly because of the fact that diseases which are difficult to treat are the dominant causes of death. Men show a 13% lower life expectancy than women. Average life expectancy among various social groups was lowest among unemployed people; sick individuals, people with poor sanitary habits, singles (divorced, widowed, etc.). In respect to education, life expectancy increased with higher formal education. Cardiovascular diseases were the leading cause of death followed by cancer and respiratory diseases. The newly developed concept of "life potential" showed an increase from the 1938-39 period from 1.52 to 1.67 in 1978-79. This is due primarily to increased life expectancy, because the birth rate dropped during this period.

[355-7813]

EFFECT OF PRODUCTION ZONE ENVIRONMENT AT TOKTOGUL'SK HYDRO-ELECTRIC PLANT  
ON EMPLOYEE'S HEALTH

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 2, Mar-Apr 83 pp 18-22

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[Abstract] Clinical examination of 358 workers at the Toktogul'sk Hydro-Electric Plant were performed on two principal groups of individuals: those working in electro-hydro and turbo-divisions (the younger group) and the administrative-managerial staff (the older group). The administrative staff exhibited higher level of ischemic heart disease, arterial hypertension, bronchitis and obesity. Gastro-intestinal diseases appeared in both groups about equally. Problems in peripheral neurons system occurred predominantly among workers of the electro- and turbo-divisions; the administrators exhibited more functional disorders. Various disorders of the dental, respiratory, vascular and gynecological systems were noted among the examined workers. Some of these problems were possibly due to the effect of electro-magnetic fields at the worksites. No control group data were reported.

[355-7813]

QUALITY OF ORGANIZATION OF PROPHYLACTIC WORK WITH YOUNG CHILDREN AT  
CHILDREN'S MUNICIPAL POLYCLINICS

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 4, Apr 83  
(manuscript received 21 Jun 82) pp 15-18

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[Abstract] A study of the effectiveness of prophylactic work with children under the age of three years, the efficiency of district pediatricians in working with healthy children, mothers' knowledge of sanitation hygiene in relation to rearing healthy children and the role of the children's polyclinic in providing information for mothers on this subject made it possible to construct a detailed social-hygiene picture of the organization and quality of prophylactic work with young children and to make recommendations for change and improvement. Computer analysis of materials from 1316 reports, made during prophylactic work, showed some serious flaws in the organization and performance of prophylactic work with young children and indicated that these deficiencies were due to poor planning.

[342-2791]

UDC 614.1:313.13

PROCEDURAL PROBLEMS IN STUDY OF MORBIDITY AMONG MIGRANTS

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 4, Apr 83  
(manuscript received 3 Mar 82), pp 27-28

SARAYEVA, L. D., candidate of medical sciences, Department of Social Hygiene, Public Health Organization and History of Medicine, Ryazan' Medical Institute imeni I. P. Pavlov, (Professor L. V. Anokhin, Head of the Department)

[Abstract] A procedure for studying morbidity among migrants is described. (Migrants are defined to be, basically, young people--healthy, socially mobile, oriented to intensive labor. After migrating into a city they start to work at enterprises where the urban dwellers don't voluntarily work. They eventually adapt to city life, new kinds of jobs and living conditions and have children.) It includes a study of the composition and structure of a work force (especially migrants) to determine the distribution, dynamics and direction of migration; a study of the health of migrants in collectives at plants and institutions; a study of morbidity among migrants and demographic aspects of it and a quantitative assessment of the effect of migration on the morbidity of workers and employees. The procedure is only the first step in solving problems related to morbidity among migrants.

[342-2791]

## ORGANIZATION OF HOSPITALS IN INDUSTRIAL PLANTS TO PROVIDE CHILDREN'S DAY CARE

Tashkent MEDITSINSKIY ZHURNAL UZBEKISTANA in Russian No 6, Jun 82  
(manuscript received 23 Mar 81) pp 66-67

ROZHKOVA, N. I. and SHAPIROVA, N. D., Public Health Division, Bukharskaya Oblast

[Abstract] An increased absenteeism among women was noted at the plant and traced to their taking care of sick children. To remedy this situation, a 10 bed "hospital" was organized at the Bukhara City textile plant to take care of sick children aged 1-14 years during the working days. The hospital was financed jointly by the plant and by local Public Health organs. In 1980, 76 children spent 880 bed-days in this unit. The absenteeism among their mothers dropped from 265.9 days to 153.6--a 35% time saving. In addition to this, the children received qualified medical attention during their stay in the day-care hospital.

[363-7813]

## PRIVILEGES FOR WOMEN AND MOTHERS

Moscow ZDOROV'YE in Russian No 3, Mar 83, p 5

[Abstract] Four measures for improving occupational and personal conditions for women were discussed briefly. Measures For Increasing State Aid to Families With Children provides for higher child support payments to mothers, better vacation and sick-leave plans, better work schedules and pension plans for them. A Decree of the Presidium of the USSR Supreme Soviet of 7 January 1980 provides for increases in pension payments. Supplemental Measures For Improving Conditions For Women Working in the National Economy includes a list of dangerous and strenuous occupations from which women are excluded and provides for retraining, reassignment and protection of their present job benefits. Introduction of New Norms of Maximal Loads To Be Handled By Women Manually describes the limits of weight to be handled and procedures for different operations involved in heavy manual labor.

[499-2791]

## CONFERENCES

UDC 578.245:(61.3(47+57))"1982"

### ALL-UNION MEETING ON INTERFERON INDUCTORS

F. I. Yershov and L. S. Priymyagi

Moscow VOPROSY VIRUSOLOGII in Russian No 1, Jan-Feb 83 pp 113-114

[Text] On June 2-3, 1982 at the Tallinn Scientific Research Institute for Epidemiology, Microbiology and Hygiene (TSRIEMH), ESSR Ministry of Health, the 4th All-Union Working Conference on Interferon Inductors was held. Participants in the meeting represented Moscow, Leningrad, Tallinn, Riga, Vilnius, Minsk, L'vov, Novosibirsk and Obninsk. The 15 papers that were heard and discussed were devoted to the most timely questions in the synthesis, selection, investigation and clinical use of interferon inductors.

In the introductory address, L. S. Priymyagi, doctor of medical sciences, head of TSRIEMH, remarked that interferon inductors are among the promising antiviral agents of today. Along with interferon itself, its inductors belong in the center of the medical community's attention in connection with the demonstrated effectiveness of these preparations in the treatment of tumorous diseases.

The paper given by F. I. Yershov (Moscow) was devoted to clinically promising interferon inductors. Among the hundreds now known, only certain inductors meet all the demands of medicaments. These are polyguacyl, dsRNA, poludane, dextran sulfate, levamisole, proditozane, gossypol analogues and some others.

The prophylactic and therapeutic spectrum of activity of these preparations is similar to that of exogenous interferon. In fact, the first clinical trials of selected inductors of interferon demonstrated that they were effective against respiratory viral infections, recurrent herpesvirus disorders and some neoplastic disorders.

Among the fundamental tasks for the near future are the optimization of plans to use inductors, to find preparations suitable for oral administration and to combine the use of interferon inductors with vaccines and chemotherapeutic agents.

I. F. Barinskiy (Moscow) analyzed the reactions of cellular immunity in the research being carried out on neuroviral infections. Data from comparative research on four investigational interferon inductors (RF f2, dsRNA, poly-I·poly-C and tilorone) were presented.

These agents are activators of cellular immunity in Russian spring-summer encephalitis, herpes and acute encephalomyelitis and rabies. The use of inductors in combination with specific vaccines greatly increases the rate of survival of infected animals.

A. N. Fomina (Moscow) presented results from studies of immunomodelling activity of interferon inductors. Synthetic polyribonucleotides have been shown to decrease, and natural dsRNA and low-molecular inductors (tilorone, pirane and levamisole), to increase the proliferative activity of splenocytes from mice for two months after the administration of a single dose of the preparations.

The subject treated by N. N. Nosik (Moscow) was production of interferon with a view to use of inductors of different types and different methods for their use. It has been demonstrated that, independent of the nature of inductors, when they are used once, a refractory condition develops that can be eliminated only by a change of inductor.

N. P. Chizhova (Leningrad) presented a description of the range of antiviral activity of inductors with relation to different experimental viral infections. This makes it possible to find an area for future clinical use of a preparation.

The paper given by G. Ya. Fel'dmane (Riga) was devoted to the obtaining and testing of natural dsRNA--the active inductor of interferon originating at the Institute of Microbiology imeni A. Kirchenstein, LaSSR Academy of Sciences.

A. L. Timkovskiy (Leningrad) explained results of the 10-year study of the polyribonucleotide poly-G·poly-C complex, one of the most promising inductors being developed in the USSR.

A. M. Poverenny (Obninsk) presented results of research on interferon inductors enclosed in liposomes. The substantial advantages of this approach were pointed out (reduction of the inductor dosage, increase in circulation of interferon and delivery of the preparation to the organ or muscle, among others).

At the meeting, results of clinical use of interferon inductors were discussed.

Thus, the subject of talks by L. S. Priymyagi (Tallinn) and A. B. Raynite-Audinene (Vilnius) was the use of prodigiosane for prevention and treatment of acute respiratory viral infections in preschool institutions for children. The results of combined use of prodigiosane, leukocytaric interferon, and eleutherococcus extract were especially interesting. It has been shown that the incidence of such viral infections was lowered 2.6-3.1, 1.9-2.3 and 1.4-1.5 fold that of the previous value when these agents were used. The administration of the preparations did not evoke similar reactions and recurrences of somatic disorders.

M. A. Samgin (Moscow) presented data on the treatment of skin disorders with a new interferon inductor--megosyne. In a 3% smear, the preparation was shown effective against simple lichen pemphigoides, recurring herpes and herpes zoster.

The pharmacokinetics of interferon with different routes of administration in children suffering from various forms of leukemia was the subject treated by T. G. Orlova (Moscow).

Having discussed these research results, the participants came to the conclusion that there have been many difficulties thus far in the study of interferon inducers; these as yet unsolved problems were found to be related largely to the fact that no clinically promising preparations of this type are being produced in industry and that their pharmaco-toxicological properties are being given insufficient study.

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## SCIENTIFIC ORBITS OF MEDICINE

Kiev PRAVDA UKRAINY in Russian 19 Feb 83 p 3

[Interview with V. I. Skok by Yu. Vilenskiy; date and place not specified; passages enclosed in slantlines printed in boldface]

[Text] The growth in the UkSSR of scientific research in the area of medicine and ways of raising its effectiveness were discussed at a joint conference of the presidia of the USSR Academy of Medical Sciences (AMS USSR), the AN USSR and the board of the UkSSR Ministry of Health, which took place in Kiev on February 18.

Academician B. Ye. Paton, president of the UkSSR Academy of Sciences (AN UkSSR), opened the conference. In his opening address, the president of the AMS USSR, Academician N. N. Blokhin, spoke to the conference participants.

Speeches at the conference were given by A. Ye. Romanenko, UkSSR Minister of Health; AN UkSSR Academician F. S. Babichev, Vice-President of the AN UkSSR and AMS USSR Academician A. P. Romodanov, member of the Presidium of the USSR Academy of Medical Sciences.

A plan for joint complex scientific research was discussed at the session and the composition of an interdepartmental commission to coordinate this research was confirmed.

Participants in the session were M. A. Orlik, deputy chairman of the UkSSR Council of Ministers, P. P. Shirinskiy, deputy head of the Department of the CPSU Central Committee, responsible workers of the UkSSR Communist Party Central Committee and a number of representatives of ministries and departments on the all-union and republic levels.

Questions from the correspondent of PRAVDA UKRAINY will be answered by AN UkSSR Academician V. I. Skok, academician-secretary of the Department of Biochemistry, Physiology and Theoretical Medicine of the UkSSR Academy of Sciences.

/Vladimir Ivanovich, what is the significance of the joint conference on the most pressing problems in medicine?/

At present, the situation is such that further progress in medicine is largely determined by our advances in basic areas, chiefly molecular biology, bio-organic chemistry, biophysics. For example let us regard the problems of oncology: in great measure, success depends on unraveling the molecular mechanisms of cellular regeneration.

All these difficult tasks demand a true synthesis of knowledge for which the most varied resources in research, prophylactics and clinical medicine will be drawn on. Thus there has arisen a union of scholars of the AN UkSSR, AMS USSR and UkSSR Ministry of Health.

/In many ways, one may say that the AN UkSSR has followed traditional lines in its attitude toward public health. What are the trends in modern interaction between the Academy of Sciences and the development of medicine in the republic?/

They follow contemporary problems: development of new directions in prevention and treatment of cardiovascular disease, establishing contemporary positions in the molecular mechanisms of reactivity and immune systems of the organism and thus the provision of effective methods of healing to the physician. Along with groups of academicians in strictly medical and biological areas like physiology, biochemistry, oncology, molecular biology and genetics and virology and microbiology, participants include institutes of cybernetics, physics, superhard materials, problems of materials technology and organic chemistry.

I shall name only a few successes of joint investigations. One discovery has been the proteins responsible for the growth of normal and tumorous cells which, in particular, opens the way for development of antineoplastic vaccines. There has been manmade origination of the gene, synthesis of insulin and interferon. With the simulation of the algorithm of regulation of carbohydrate metabolism we have one precondition for the creation of an artificial pancreas. New adhesives developed by chemists are replacing surgical stitches, while new suture materials are absorbed in strictly regulated time periods. Basically new types of anti-inflammatory agents, antimicrobials, antineoplastic agents and antidiabetic agents are being investigated. Many of these, for example, antibiotics from higher plant forms, are already developed and have been introduced.

/It is above all in the name of clinical medicine that scientific research is being carried on. What are the successes achieved in this area?/

I shall begin with a concrete example--hemisorption, allowing a number of medical procedures to be carried out. In some severe intoxications and diseases traditional therapeutic methods are useless; only "purification" of the patient's blood will help. Thanks to collaboration among institutions of the AN USSR and the UkSSR Ministry of Health, new hemisorbents have been created and introduced; their use is spreading. This area is under the direction of Academician of the AN UkSSR K. S. Ternovoy, deputy minister of health of the UkSSR.

Cooperation among the Kiev Scientific Research Institute of Pediatrics, Obstetrics and Gynecology of the UkSSR Ministry of Health with academic institutes of biochemistry and physiology has made possible the development of effective methods of prevention and treatment of a number of illnesses of pregnant women and children. Cryoinstruments occupy a growing place in medicine. Cold has been put in the service of health care by the An UkSSR Institute of problems in cryobiology and cryomedicine, working in collaboration with scores of major medical institutions. Ukrainian scientists are participating in major medical and biological programs - "Ion Channel", "Gene", "Supersonics" and "Prolongation of Life".

Difficult decisions lie ahead; success in making them will come through the continued unification of medical science with modern chemistry, physics, biology and mathematics.

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FOURTH INTERNATIONAL SYMPOSIUM ON "GENETICS OF INDUSTRIAL MICROORGANISMS"  
AND INTERNATIONAL CONFERENCE ON "RESEARCH PERSPECTIVES IN ANTIBIOTICS"

Moscow ANTIBIOTIKI in Russian Vol 28, No 3, Mar 83 pp 230-236

NAVASHIN, S. M., BORONIN, A. M. and BARTOSHEVICH, Yu. E.

[Abstract] The 4th International Symposium on Genetics of Industrial Microorganisms was held in June 1982 in Kyoto, Japan. The participants consisted of approximately 900 scientists from around the world, of whom 550 were from Japan. The Symposium was organized by the International Union of Microbiological Societies and the Japanese Association of Microbiological Societies. This particular Symposium emphasized various biotechnological problems of industrial microorganisms, including the genetic and biochemical control of metabolite synthesis, techniques of genetic engineering, the structure and function of chromosomal and plasmid genomes, and the use of various plasmid vectors for the creation of new genome material. It was decided to hold the 5th Symposium in Yugoslavia in 1986. Within the framework of the Symposium an International Conference on Research Perspectives in Antibiotics was held in Tokyo. This conference was attended by 240 delegates from 19 countries. The major points addressed by the Conference dealt with screening of microorganisms, genetics of antibiotic producers, regulation and biosynthesis of metabolites, mechanism of action of antibiotics, and the description of novel substances.

[362-12172]

11TH ALL-UNION CONGRESS OF PEDIATRICIANS

Moscow ZDOROV'YE in Russian No 3, Mar 83 p 7

[Article entitled "In Order That Children Will Stay Healthy As They Grow"  
by I. Bykova]

[Abstract] The 11th All-Union Congress of Pediatricians attracted the attention of many foreign scientists and guests from 17 countries and

directors of some international medical institutions attended. S. P. Burenko, USSR Minister of Health, characterized health care for children as a united complex of government, medical and social agencies and called for further improvement in this area. Ye. Ch. Novikova, USSR Deputy Minister of Health reviewed progress made in child health care since the 10th Congress of Pediatricians. Subjects discussed included advances in intensive care for ill neonates, diseases of the fetus and neonates, the superiority of breast feeding over bottle feeding, control of allergic diseases and problems of infertility and the paramount role of the family in providing health care for the growing child.  
[499-2791]

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