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Disseminate Medical Knowledge Among the Soldiers
(an editorial)

The care and improvement of the soldiers health requires the active participation in preventive treatment on the part of each serviceman, the maintenance of measures designed to improve the service and living conditions of the troops and the wide support of the army and navy community. The care of health and the fight against diseases is an important and complicated business. The proper organization of this work and its effectiveness should be the major goal of a unit, formation and military hospital doctor.

The dissemination of medical and hygienic knowledge as one of the features of Soviet health service should play a leading part in the formation of a materialistic conception of natural phenomena, and in overcoming the survivals, religious prejudices, habits and superstitions that are injurious to health. It is difficult to overestimate the importance of medical propaganda in the training of physically strong soldiers, in the prevention and reduction of the incidence of diseases and in raising the cultural level of the army and navy men.

A great deal of attention is being devoted to the dissemination of medical knowledge in most of the military districts, armies and fleets; efforts are being made to associate this type of propaganda with prophylactic work and ideological education. Universities and faculties of health are functioning almost every military district, in the officers clubs and hospitals. The students of these universities are servicemen, members of the officers' families, workers and employees of the Soviet army and navy as well as the civilian population of the garrisons.

The lectures delivered in these universities by medical specialists deal with the achievements of medical science, the prophylaxis and treatment of the most common diseases, protection against mass destruction weapons and the administration of medical aid in cases of acute diseases and trauma. The most active propagandists who consider it as their duty to disseminate medical knowledge among the masses include professors N. S. Molchanov, Lt. Gen. of the medical service, P. A. Alisov, K. S. Petrovskiy and I. S. Kolesnikov, Major. Gen. of the medical service, as well as the following medical specialists of the hospitals and army units: G. I. Mitskevich, Lt. Col. of the medical service, G. T. Abayev, Capt. of the medical service, G. D. Russkikh, Sr. Lt. of the medical service, V. P. Polishchuk, Capt. of the medical service, etc. They skillfully combine their scientific and practical work in the clinics, hospitals and units with their speeches on medical subjects in the officers and soldiers clubs and at enterprises.

The authors of popular science types of medical publications include professor V. A. Vasil'yev, Col. of the medical service, docent L. A. Korolev, Lt. Col. of the medical service, etc.

The performance of the medical "aktiv" trained by the medical service of certain units in the Carpathian, Baltic and other military districts is worthy of approval and emulation. Assisted by the medical "aktiv" and supported by the military community, many units and formations of these districts were able to establish excellent conditions in their barracks, unit compounds and daily life, for which they were cited in the orders issued by the command. In a number of units of the Soviet army group in Germany, the medical "aktiva" exercised control over the sanitary conditions of the barracks, parks, combat equipment, repair shops and kitchen-dining rooms. The medical activists help the doctors in the implementation of prophylactic, sanitary and hygienic measures and participate in the preparation of visual propaganda aids, and in the publication of leaflets and wall newspapers dealing with health problems, and the fight for a healthy life.

The press, movies and radio play an exceptionally important part in the dissemination of medical and hygienic knowledge. The number of articles on medical and natural science subjects published in the district and fleet

press has been increasing from year to year, and their ideological and conceptual level has been steadily rising. A soldier's lecture hall for health subjects was established under the auspices of the newspaper Za Rodinu (For the Fatherland) in the Volga military district, and a supernumerary editorial collegium was organized for that lecture hall by the military medical department of that district. Articles on medical subjects are published four times a month in the district. Special bulletins on medical education are sponsored by a number of garrison doctors and political organizations of the Carpathian military district, while the large circulation newspapers devote entire pages to problems of medicine and hygiene from time to time.

The local publication of leaflets, slogans, memos and placards reflecting certain problems in the combat training of the troops and the preventive treatment of diseases that happen to be prevalent in a particular period and location of a unit or formation play a very important part in the propaganda of a healthy life and personal and public hygiene. Such publications have already been introduced in the Baltic, Carpathian and two other military districts.

These are not isolated examples. But there are still units and institutions where medical propaganda is not very popular. The talks and lectures given in such units are monotonous and uninteresting, and motion picture films on medical themes are not demonstrated even though enough of them are available in every district and fleet. It would seem that if a lecture by a specialist were scheduled, such a lecture should be accompanied by the showing of an appropriate film. But the medical service of certain units shows little interest in this important effort, and the film distributing organizations of the military districts and fleets therefore use such films along with artistic ones without regard to medical subjects. The fact that in certain units the state of medical propaganda is judged by the number of talks and lectures, without regard to the urgent and topical themes and the extent of the propaganda, is inadmissible.

In present-day conditions, the doctor of a unit or a ship should not restrict his efforts to the dissemination of information on personal hygiene and the preventive treatment of acute intestinal and catarrhal diseases. The organization of combat training and the instruction of the men in the use of the new and very complicated combat materiel requires the medical service to use various forms of propaganda and a skillful outline of the required medical information. The dissemination of medical knowledge should be made an integral part of the combat and physical training of the troops. The right approach in this direction is made by the military doctors who train their soldiers and sergeants in medical problems which are germane to the nature and specific characteristics of their work. In these exercises the servicemen acquire certain knowledge in the field of the physiology and hygiene of military work, safety measures and the preventive treatment of occupational diseases which has a beneficial effect on the health of the men and combat readiness of the troops.

The dissemination of medical and hygienic knowledge among the officers, their families, the workers and employees of the Soviet army and navy, and first of all in the garrisons where the mentioned families are under the care of the military medical service, deserves a great deal of attention. The solution of problems involving the dissemination of medical, natural science and hygienic problems requires initiative, originality and a serious attitude to that work on the part of each doctor, feldsher and medical instructor. We must use every means at our disposal -- conferences and refresher training of the medical personnel, the press, radio and the publication of special bulletins -- to publicize the positive achievements in the organization of medical propaganda and the activists in this field.

The educational and explanatory work in the units, ships and military institutions should be combined with the Marxist-Leninist training and political education of the medical personnel. The military doctors -- chiefs of the medical service -- are called upon to set a personal example in the

systematic and purposeful study of the urgent problems of Marxist-Leninist theory, and take an active part in the political education of their subordinates. The party, trade union and Komsomol organizations should participate in the efforts of the medical service to educate the soldiers and disseminate medical knowledge among the servicemen, military builders, their families, and the workers and employees of the armed forces.

The use of every possible method of disseminating medical knowledge available in particular units, ships, schools and medical institutions is an indispensable and important prerequisite for a successful struggle for a healthy life and for a higher medical culture among the servicemen.

The Biomedical Investigations on the Multiseater
Space Ship Voskhod

Lt.Gen. of the Medical Service
Yu. M. Volynkin,
Major of the Medical Service
A.D. Voskresenskiy

It was with a feeling of great jubilation and pride in its socialist Fatherland that the Soviet people reacted to the new scientific achievement -- the flight of the multiseater spaceship Voskhod, the first in the history of mankind. Accompanying the commander of the ship, engineer-colonel V. M. Komarov, were scientist-cosmonaut K. P. Feoktistov and doctor-cosmonaut B. D. Yegorov. The spaceship Voskhod was launched into orbit on October 12, 1964, and it circled the earth 16 times covering a distance of about 700,000 kilometers in the 24 hours spent in space. The flight of the Soviet cosmonauts has opened a new stage in the conquest of outer space.

The flight into outer space by an entire crew on an improved multiseater space vehicle has emphasized once again the enormous achievements made by our socialist economy, science and technology, the indisputable superiority of the socialist system to capitalism and the unlimited possibilities at the disposal of the Soviet people who were liberated from the yoke of capitalism. The greatness of our Fatherland marching in the forefront of social, scientific and technical progress of the whole of mankind was reflected in that exploit as in a mirror.

The successful flight of the multiseater spaceship Voskhod was a new and highly important step in the development of space biology and medicine. The concerted efforts made aboard that ship by specialists in various fields opens unusually broad vistas for the investigation of outer space and the effect of space flight on the human organism.

The presence of a research physician on the ship made possible direct observations of the condition of the crew members, as well as self-observations designed to check the already known human reactions to the effect of specific flight factors. That flight made it possible to carry out experiments and investigations which cannot be done by the use of automatic systems at present or are too complicated and require the participation of a skilled specialist. Of exceptional importance was the fact that the doctor-cosmonaut was able to select a favorable moment for recording the particular physiological functions produced by the changing flight conditions, and the individual characteristics of the reactions by each member of the crew. Finally, the doctor's duties included medical assistance to the crew and, if necessary, special assistance as well as control over the hygienic conditions of the medium.

As in the previous flights, the medical system of watching the health of the cosmonauts included a telemetric recording of electrocardiograms in one chest lead, pneumograms and seismocardiograms. The latter two functions were transmitted and recorded in one channel (pneumocardiogram). Information on the cosmonauts' pulse and respiration frequencies was transmitted constantly to earth by a "signal" KV-transmitter.

The presence of a doctor on the vehicle Voskhod made it possible to restrict the telemetry of the physiological information to the above-mentioned parameters. The doctor was also able to record the following physiological characteristics of the crew and his own by the use of the on-board instruments: the cerebral biological currents; the electric potentials produced by voluntary and involuntary eye movements; the parameters characterizing the coordination of movement in writing and drawing the required diagrams as well as the muscular capacity manifested by rhythmic movements of the wrist. The recording of these parameters by a doctor on the spot in the ship is undoubtedly of great advantage from the point of view of reliability and quality as compared to telemetry.

A great deal of attention was focused on the information on the functions of the blood circulation, respiration and metabolic reactions. Included in this program of investigations was the measurement of arterial pressure.

Special instruments were used to investigate the functions of the visual analyser and make tests with stimulants of the vestibular apparatuses with a view to determining the working capacity of human beings in space life. The visual acuity was determined by the use of tables. A portable "adaptation and resolution meter" (Russian term: adapto-rezol'vometr) was used to determine the sensitivity to light and the capacity to differentiate various degrees of brightness. The condition of the vestibular apparatus was examined by determining the threshold of its excitability by means of a galvanic current, as well as by the reaction to the kinetic vestibular tests. Certain psychological tests were also made during the flight.

The list of the applied methods alone emphasizes the value and volume of the information obtained during the flight of the spaceship Voskhod. The biomedical information obtained during the flight is now being processed and analyzed, but we are tempted to dwell briefly on some of the facts even before that process is completed. First of all we should point out the exceptional reliability and stable functioning of the systems that make life on the ship possible. The temperature in the cabin was maintained at 18-21°, and the humidity between 45 and 60%; the concentration of oxygen and carbon-dioxide did not exceed the preset levels, and the pressure was close to the atmospheric pressure. As the cosmonauts pointed out, the air felt like fresh air, and the temperature conditions were comfortable enough for work and rest in lightweight sports-type suits.

The cosmonauts said that the "form-fitting" chairs were highly satisfactory. The tilt angles of the chairs facilitated a high degree of overload tolerance during the ascent to the orbit and descent to the earth.

The impression gained by the cosmonauts of the state of weightlessness is very interesting. In the second orbital flight by the spaceship Vostok-2, G. S. Titov first became conscious of the fact that a lengthy weightlessness could produce certain sensations reflecting the development of a unique type of airsickness. Special efforts were therefore made in all the following flights to obtain some information on the effect of weightlessness on the functions of the vestibular and concomitant analyzers.

B. B. Yegorov succeeded in recording a number of new features characterizing the human sensory reactions during orbital flight. No essential changes were noted in the visual functions. Visual acuity, photosensitivity and the tonus of the eye muscles retained the same characteristics as on the earth.

The performance of the cardiovascular and respiratory systems was characterized by the normal range of physiological fluctuations. The maximum frequency of cardiac contractions recorded in the cosmonauts during the orbital flight amounted to 86-90 per minute. Most of the time during the flight the cardiac contraction frequency in all the cosmonauts was close to the usual frequency on the earth. V. M. Komarov's respiration frequency fluctuated between 14 and 20 cycles per minute, K.P. Feoktistov's between 13 and 21 and B. P. Yegorov's between 19 and 25 cycles per minute.

The cosmonauts felt well throughout the trip. They maintained a fairly high degree of working capacity, as indicated by the implementation of their flight tasks and the special tests. The heavy schedule of work during the flight restricted the cosmonauts' sleep to 3-5 hours. They all noted that they slept very soundly and woke up feeling refreshed.

The cosmonauts withstood the G-force on the descent path without any pathological reactions, but the subjective sensations were more pronounced than under the effect of similar load factors in a centrifugal machine. This may have been due to the specific reconstruction of the organism's

functions under the effect of weightlessness and other factors of the orbital flight. As pointed out in the cosmonauts' reports, the landing of the vehicle was so soft that it was barely felt.

A careful postflight examination of V. M. Komarov, K. P. Feoktistov and B. B. Yegorov failed to detect any adverse effect on their condition. The changes found in the central nervous system, blood circulation, morphological picture of the blood and the hydro-salt metabolism were nonspecific and transitional in nature; they could have resulted from the reaction to the strain and fatigue connected with the effect of physical and psychological factors of the flight.

Undergoing processing at present are the data obtained from the physiological and biological investigations characterizing the type and extent of the effect on the human being produced by cosmic flight. But even a preliminary familiarity with the experimental information points to a large variety and complexity of the medical problems connected with the health and working capacity of the cosmonauts.

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Foremost Personalities of the Military Medical Service

A Purposeful Drive

Colonel G. Yu. Korol' and
Lt.Col. of the Medical Service
S. Ye. Kabanov

The movement for a "Communist type of work" born in the masses of the people and actively supported by our party has taken on an enormous scope. Millions of Soviet people working in material production and enterprises and institutions of the service industry are now participating in it.

The doctors, nurses, orderlies, workers and employees in other fields of the Sochi sanatorium imeni Fabritsiusa of the Defense Ministry (sanatorium chief is N. N. Chukalin, col. of the Medical Service) joined in the competition for communist-type work, and achieved substantial results by the spring of 1964. This sanatorium was the first organization in the armed forces to be awarded the high honorary title of "Communist Work Personnel" on May 9, 1964 for the successes it achieved in its therapeutic, diagnostic, economic, cultural and political-education work.

The mentioned achievements were made possible by the well organized and creative competition for communist-type work. This type of competition has become an important factor in the improvement of prophylactic therapy and the cultural and daily services for the vacationers. This socialist competition is based on collective and individual obligations that make it possible to judge the performance of the entire personnel as a whole as well as each of its individual members. The main purposes of these obligations include the improvement of therapeutic and diagnostic work, a higher skill, the acquisition of related skills and new methods of diagnosis and treatment, the participation in scientific, practical and efficiency work, etc.

The therapy and diagnostic departments have done a great deal to introduce new methods of diagnosis and therapy. This was made easier by the equipment of the sanatorium with modern medical apparatuses. This sanatorium was the first in the health resort to introduce the following new therapeutic and diagnostic methods: vector cardiography, phonocardiography, ballistocardiography, diadynamic therapy, etc.

The development of a higher skill is one of the major preconditions for the further improvement of the performance in every branch of the institution. The sanatorium therefore offers regular special training and takes practical measures designed to teach related skills. All the doctors, nurses, fitters and other specialists now have two-three related skills.

The doctors take an active part in the scientific effort which is guided by the Bureau of Scientific Methods. The most fruitful scientific research is being done by doctors I. T. Karasev, M. I. Beznosov and L. A. Kunichev. Scientific research has become an integral part of their service duties. Eight scientific projects, published in the medical journal and reported to the medical conferences, have been completed in the hospital in the last two years alone. The conclusions and recommendations of the authors of these projects as well as the achievements of medical science are being successfully introduced into practice. Much is being done at this sanatorium to generalize and introduce the advanced experience of the Communist Shock workers by way of organizing conferences. The two conferences of the complete staff held this year alone were addressed by Dr. Ye. G. Kontopulo, head nurse I. I. Bedina, chauffeur A. T. Molodov, electrician Ye. V. Maslov, etc. The newly acquired experience in the various departments is usually passed on to the others on the spot. Individual methods of sharing all the new and progressive developments are used on a wide scale. The foremost people of the sanatorium share their experience with the workers of other sanatoria in this health resort. Thus 15 doctors and six nurses received advanced training in the physiotherapy department of the sanatorium in 1963, and six doctors and 18 nurses in 1964.

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The personnel of the Sochi sanatorium also is interested in the work and achievements of the other sanatoria. The doctors of this sanatorium have visited 18 other sanatoria of this health resort in the past with a view to studying their advanced methods. They are also frequent visitors to the Sochi Institute of health resort science and physiotherapy. This is a highly useful practice which broadens the doctor's outlook.

The chief method used in this complex treatment of patients consists of reducing baths (Russian term: Matsestinskiye vanny) which are used by more than 70% of all the inmates, and up to 90% of those suffering from diseases affecting the skin, joints and peripheral nervous system. Such physiotherapy methods as ultrasound, diadynamic therapy, underwater massage, etc. are used in the balneological treatment of 87.4% of all the patients.

Wide use is made of the continuity principle of diagnosis and treatment of the patients which is facilitated by the diagnostic information of the polyclinics and hospitals. This makes it possible to avoid unnecessary examinations of the patients. The treatment begun in a hospital or polyclinic can be continued in the sanatorium if necessary. The sanatorium maintains a constant liaison with the central military medical institutions. All this has produced positive results. Ninety-nine percent of the patients are checked out of the sanatorium in much better health.

The personnel of the administrative service is also fighting for the glory of the sanatorium. The buildings, wards and doctors' offices are clean and comfortable; there are flower beds all around the sanatorium. The workers of the nutrition department are highly skillful in their performance. They are attentive to the demands and wishes of the patients. The patients enjoy the performances of the friendly and cheerful permanent amateur art circle whose concerts are widely popular. Sixteen of the sanatorium's workers and employees were awarded the honor scroll of the Military Council of the North Caucasus Military District for their active participation in amateur art and high artistic skill.

The well organized political education system contributes to the development of an honest attitude toward work, service and social activity on the part of the personnel, and to their education in the spirit of the moral code of the builders of Communism. The methods used in this effort include a system of political education, lecture propaganda, oral and visual agitation, the press, movies and radio.

The following Communist members of the sanatorium are highly active in the education of the staff: colonel of the medical service N. N. Chukalin, colonel of the medical service M. I. Beznosov, colonel of the quartermasters corps M. Ye. Fedorov, and employees A. D. Klimanov, Z. P. Kuznetsova, P. A. Antipov, etc.

In addition to setting an example in conscientious work and high discipline and organization, the sanatorium workers also reveal a new attitude to production and public life. They are trying to take good care of all the properties and prevent any waste of foodstuffs and other materials. These efforts have led to the overfulfillment of the economy plan for 1963 and the first half of 1964.

All the officers, communists and komsomols as well as the majority of the trade union members take an active part in social work. Some of them are members of the group for the cooperation with the party and government control and other control commissions. All the sanatorium staff members volunteer some of their free time to help in the landscaping, repairing the buildings and beach installations, storing the fruit and vegetables, mineral water, etc. Their social activities are not confined to the sanatorium alone. Many members participate in the construction of the city stadium and the modernization of the city.

Marching in the front ranks of the socialist competition in the sanatorium are the communists, the active champions of the party and government program. All of them have been awarded the title of Communist shockworker.

Responding to the concern of the communist party and the Soviet government for the medical workers, the well organized personnel of the military sanatorium is doing everything in its power to improve the treatment and service of the generals and officers of the Soviet army and navy.

Organizing Medical Service for the Troops

Once Again About the Medical Aid in the Medical
Battalions and Medical Service OrganizationsCol. of the Medical Service
Prof. M.F. Voytenko

The problem of medical service and the sorting of the sick and wounded in the various stages of medical evacuation has frequently been discussed in the military medical circles and in the press. We find it necessary, however, to raise this question again in this periodical as one of the most important problems in the organization of medical service for the troops. In bringing up this question we are guided by the following considerations. It is the accepted belief of the absolute majority of those dealing with this problem that in cases of mass losses due to lack of medical attention the volume of medical assistance in the various stages of medical evacuation should be reduced to the required emergency measures. Furthermore, A. A. Vishnevskiy and M. M. Shreter believe that even certain urgent surgical interference may have to be eliminated from the overall medical assistance in the various stages of medical evacuation in modern warfare. In an article under the title "Certain Urgent Problems of Modern Military Field Surgery" (See note) They write that "Under certain conditions, the men wounded in the chest and abdomen and needing urgent operations may have to be evacuated by air from the medical battalion to a base hospital". They recommend similar tactics in their textbook on military field surgery published in 1962.

(Note. Military Medical Journal No. 6, 1960).

At the same time it is rightly believed that the reduction of the medical service in the various stages of medical evacuation is a forced measure which in some way or other produces an adverse effect on the further course of the wound or disease. The attempt of certain authors to prove the practicability of surgical assistance under "cover" of antibiotics, particularly the primary surgical treatment of wounds, has not been successful. This viewpoint was also rejected by the XV Plenary Session of the Council of Scientific Method. and the press as unsubstantiated from a scientific point of view.

Consequently, now that the large-scale use of antibiotics in the preventive treatment of vulnerary infections is made possible, early medical assistance and particularly surgical assistance remains just as urgent as before; otherwise various complications would be inevitable. I. S. Kolesnikov and N. V. Putov, for example, use a great deal of factual material to show that infectious complications were found in 25% of the men whose severely wounded soft tissues were treated on the fourth day even though they had been given penicillin until then. (See note).

[Note. I. S. Kolesnikov and N. V. Putov. Certain problems in the treatment of wounds. Military Medical Journal, No. 6, 1961.

The presence of a large number of wounded and burnt men subjected to various effects, particularly ionizing radiation, calls for even more prompt surgical assistance. The requirements for early medical assistance makes it necessary to widen the scope of such assistance in the various stages of medical evacuation, especially in the medical battalions and the medical service organizations. But the expansion of the volume of medical assistance in the medical battalions and medical service organizations, even in difficult conditions, is determined not only by purely medical considerations; we may be forced to it by the situation existing in the next stage of the medical evacuation. The sharp reduction in the extent of medical assistance in the medical battalions and medical service organizations and the mass evacuation to the rear areas will inevitably lead to the concentration of large numbers of wounded needing medical assistance including the type of assistance that could have been offered by the battalions and the medical service organizations.

Under such conditions the various medical evacuation centers receiving the wounded from the medical battalions and the medical service organizations will be greatly overloaded and, of course, unable to offer medical service to all those who need it and on time. At one of the exercises, for example, these evacuation points were so overloaded that the wounded men were unable to get any surgical assistance before the fourth or fifth day. Surgery carried out at such late periods could naturally have an adverse effect on the treatment of certain wounded men.

It should be added here that under the present organizational setup and the available facilities intended for medical services among the troops, the possibilities at hand could frequently exceed those of the next stage in the medical evacuation. The failure to make use of such possibilities in the various formations would, of course, mean an inexcusably poor administration.

It follows from the above that the solution of the problem involving the extent of medical assistance to be offered at the various stages of medical evacuation should take into account all the conditions existing at the time. And the primary objective should be to increase the volume of necessary medical assistance to the largest possible number of wounded and sick men. The reduction and extent of medical service to the sick and wounded men in modern warfare may be justified only when the existing situation actually does not permit such services. Ye. B. Zakrzhevskiy is quite right when he writes that: "It seems to us that the attempt to offer maximum medical service to those who need it should be the slogan of any medical evacuation center, and any limitations in that service should come only as a result of forced circumstances" (Military Medical Journal No. 12, 1961).

In its training and practical exercises, however, the medical service has developed a unique method of medical assistance in the various stages of the medical evacuation, and that is to limit all the medical service to urgent cases alone. We have not seen any decisions to extend the scope of medical services in the evacuation centers, particularly in the medical battalions and in medical service organizations, on any of the maps, in the war games or tactical exercises. One of the reasons for the existing standard decisions is the frequent emphasis found in literature and tactical exercises to the effect that a "gap" between the requirements and possibilities will be inevitable in the complicated operational conditions of the medical service in modern warfare.

Emphasis is also placed on another aspect of the problem, and that is the extension of medical assistance within the shortest possible time depending on the situation in the base hospitals, and this desire should be reflected in the expansion of the medical service whenever possible. The other questions discussed in literature include also the possible frequency of the conditions requiring a sharp reduction in the extent of medical service, and whether even a mass influx of wounded men into the medical battalions (medical service organizations) would justify such a reduction.

But one of the most important reasons why the people in charge of the exercises are so quick to reduce the extent of medical assistance in the medical evacuation centers is, in our opinion, the lack of definitive data on the structure of the patients to be evacuated by stages, especially to the medical battalions and medical service organizations. We cannot accuse the medical service of failing to look into the problems involving losses because of lack of medical attention. A great deal of attention is always devoted to such possible losses at various training exercises and war games. But this problem is frequently considered in the context of the total expected losses as well as the losses produced by various types of weapons. But the people participating in those exercises do not have an overall picture of the losses by group (category) or wounded and sick men. It is very important therefore to develop a method of determining the structure of the mentioned losses in percentages of the various categories of the sick and wounded.

We realize the difficulties involved in the solution of that problem:

such difficulties may be due the large number of multiple wounds and the required use of such rather vague term as the "major affliction". But this will have to be done anyway because, as is quite obvious, not only the number but also the composition of the sick and wounded men coming to the various medical evacuation centers will determine the need of particular therapeutic and prophylactic measures, will make it possible to estimate the actual possibilities of those centers and solve the problem of the extent of medical services to be received there.

In this article we cannot discuss all the problems connected with the structure of all the losses by category of the sick and wounded and draw the appropriate conclusions in regard to the possible extent of medical service in the medical battalions and medical service organizations. The information outlined below merely provides the ground for raising such questions.

As is known, the overwhelming majority of the losses in the Great Patriotic War due to lack of medical attention consisted of wounded men, 96-97%; the other 3-4% included burnt, frozen and contused men. The men brought to the divisional medical aid centers also included considerably more wounded than other categories of losses, especially during active combat operations.

There is reason for the belief that the structure of losses due to lack of medical attention will now be different. It may be assumed, on the basis of a number of foreign sources, that people with visible wounds and those suffering from a closed trauma in modern warfare will account for about 30-35% of all those affected, burns 25-30%, ionizing radiation ("pure" forms) 3-12%, poisonous substances 10-15%, somatic complaints, toxin botulinus and non-contagious forms of a microbial disease 8-10%, contusions and nervous and mental diseases 3-5%, infectious diseases produced by very dangerous forms of bacteriological weapons 2-4% and other other categories 1-2%.

The composition of the sick and wounded, including those brought to the medical battalions (medical service organization) in modern warfare will obviously be different from that of the Great Patriotic War. Particular emphasis should be made of two possibilities. In the first place, there will be a considerable increase in the relative number of therapeutic contingents -- up to 35-40%, and a reduction in the number of surgical forces to 60-65%, as compared with the 15-20% and 80-85%, respectively, during the last war (see note). Secondly, there will be a radical change in the composition of the surgical contingents: while in the last war the only category requiring surgical assistance consisted of wounded, as the other categories (the burnt and frozen) accounted for only several tenths of one percent, the men requiring surgical assistance in the future will amount to only 50-60% because of the sharp increase in the number of burnt people; the remaining casualties will consist of patients with burns.

(Note. The period under consideration is one of active combat operations, such as during offensive operations. The share of the men requiring therapy between the battles was considerably increased through the reduction in the losses of wounded men).

All this means that the requirement for skilled medical assistants can no longer be determined on the basis of the experience in the Great Patriotic War which we are, in effect, still using. In particular, it is now absolutely inadmissible to determine the number of wounded requiring surgical assistance by the total number of men entering the medical battalions (medical service organizations). The calculations should be made to apply to the major categories on the basis of a preliminary determination of the structure and composition of the losses among those entering the medical battalions and the medical service organizations. In this respect, the experience of the past war can be applied only to one category of the losses, to the wounded.

By way of example let us consider the contingent of 300 sick and wounded men brought to a medical battalion. According to the above-mentioned structure,

this group should consist of about 100 wounded, 20 burnt and the remaining 120 men those in need of various degrees of therapy. What number of the wounded men will be in need of immediate surgical assistance in these conditions? During the Great Patriotic War, the number of wounded requiring surgical operations at the divisional medical aid center fluctuated within a considerable range. In January 1945, for example, the number of such people in all the divisional medical aid centers of the First Belorussian Front amounted to 50.6%, on the Second Belorussian Front 53.2% and the Third Belorussian Front 63.2%. The average number of the wounded men that could be operated on at the divisional medical aid centers was about 42.2% (see Divisional Medical Aid Center. Encyclopedic Dictionary of Military Medicine, Vol. II, column 492-943). Serious wounds accounted for about 25% of the total number of operations (laparotomy; sewing up open pneumothoraxes, decompressive trepanation of the cranium, amputation of extremities, etc.), the other operations consisting of surgical treatment of soft tissue wounds.

Thus about 10-12% of the wounded men brought to the divisional medical aid centers had to be operated on for abdominal and other severe wounds, and this agreed with the present-day conception of the number of men requiring urgent surgical assistance. A. A. Vishnevskiy and M. I. Shreiber cite certain data in the above-mentioned article to show that if the medical battalions and medical service organizations were to offer only emergency assistance, only 20-25% of those needing surgery will get it; half of these will need conservative antishock treatment, and the other half will require urgent surgery. It is not difficult to estimate that on the basis of these initial data, that only 40-45 of the men mentioned in our example as needing surgical treatment (wounded and burnt) will require emergency measures; 20-22 of them will require surgery and a similar number will need antishock treatment. But if we classify all the contingents delivered to the medical battalion as needing emergency surgery, as is often done now, it would mean that 60-75 of the men would require such surgery, which is not correct.

Another very important reason why the range of medical assistance at the medical battalions and medical service organizations is frequently narrowed is the inadequate understanding of the therapeutic and prophylactic measures required by various groups of sick and wounded men, as well as the lack of information on the medical forces and time required for the introduction of such measures. Of course, the operations on the wounded men are highly complicated. But when determining the possibilities of the post operative bandaging department of the medical battalions it should be borne in mind that not all the wounded men requiring surgery will be operated on in the operating room. An analysis of the information furnished by the divisional medical aid centers of the three Belorussian fronts revealed that the severely wounded requiring operations (damaged cranium and jaws, eyes, penetrating chest and abdominal wounds, wounded spine and pelvis including damaged bones, damaged urogenital organs and rectum) amounted to 6.2% to 8.3% of the total number of wounded men brought to the divisional medical aid centers. These data would justify the assumption that about two-thirds of the wounded men (about 15 people in our case) requiring emergency surgery will be assisted in the operating room, while all the others requiring surgical attention (stopping external bleeding, the amputation of an atrophied portion of a extremity, etc.) may receive it in the bandaging room.

The calculations made in the above-cited example show that the required surgical assistance to the wounded men could be offered in eight to ten hours even in the case of a simultaneous influx of 300 men to the medical battalions (medical service organization). This means that the surgeons working in the operating and bandaging rooms can use some of their time to extend surgical attention to the wounded men who do not require emergency treatment.

In modern warfare the sick and wounded men brought to the medical battalions and medical service organizations will include an increasing number of men suffering from burns. But at the present state of medical science, the measures to be applied to the burnt men at the medical battalions and

medical service organizations will not be complicated or time consuming. A. S. Georgiyevskiy, T. Ya. Ar'yev and V. N. Shaynis point out that very simple antishock measures should be applied to the burn victims (anesthesia by the use of injector tubes or pain-killing tablets and novocain), as well as measures designed to compensate for the loss of fluid (drinking large quantities of tea and particularly an alkali-salt solution, intravenous injection of high molecular substitutes, such as polyglucin), bandaging, etc. Operations (such as tracheotomy) will be required only by people with burnt upper respiratory tracts (see note). The most time-consuming will be the antishock measures. It should be pointed out, however, that many of these measures can and should be carried out by the intermediate medical personnel under the supervision of a physician. It is a known fact, for example, that during the last war a senior nurse was always on duty in the antishock ward while the surgeons exercised general supervision which included her work also. It is our firm conviction that the presence of anesthesiologists and surgeons in the antishock department and the wide use of the intermediate medical personnel will be sufficient to take care of all the antishock measures both in the case of the wounded and the burnt patients.

(Note. A. S. Georgiyevskiy, T. Ya. Ar'yev and V. N. Shaynis. The Organization and clinical principles in the treatment of burns in modern warfare. Military Medical Journal No. 10, 1961).

As for the other measures applicable to burns, they are not complicated (bandaging and the introduction of pain-killing medicines), and should be implemented largely by the intermediate medical personnel. Even if the extent of medical assistance in the medical battalions (medical service organizations) is increased to include the treatment and cleaning of the burnt surface, the opening of blisters and determining the affected area, a proper organization of such operations will not require a great deal of surgery. N. G. Katerinich, for example, believes that a single brigade consisting of one doctor, four nurses, one instructor of sanitary matters, a recorded, a corpsman and four stretcher bearers could handle three patients with burns within one hour (see note).

(Note. N. S. Katerinich. The organization of surgical treatment of burns in case of a mass influx of men. Military Medical Journal No. 3, 1961).

In regard to the various categories of therapy-requiring contingents of wounded men, the medical attention will, as a rule, not be time consuming. True, the medical service has not had sufficient practical experience of treating a mass influx of therapy-requiring contingents such as those affected by poison gas. But there is no doubt, however, that in such cases medical assistance will be offered not only by therapists but also by surgeons; nor is there any doubt that quite a few manipulations (such as the introduction of antidotes) can be carried out by the intermediate medical personnel thereby releasing the doctors to work on strictly medical measures. All this will make medical assistance available to all the therapy-requiring contingents according to necessity.

In this connection we would like to emphasize N. S. Molchanov's unique and, in our opinion, correct interpretation of the meaning of "urgent" and "delayed" measures. He writes: "The first term implies vital need which, if delayed, could lead to a fatal outcome. The second term applies to measures which can be applied to the patients a little later without considerable damage to their health" (see note). Consequently, according to N. S. Molchanov, the division of therapy into urgent and delayed measures does not provide for a transfer of the latter to a base hospital; the point under consideration is the possible implementation of these measures at a later period but within the same stage of the medical evacuation.

(Note. N. S. Molchanov. Some urgent problems of military field therapy. Military Medical Journal No. 6, 1961).

Add to the above-said the fact that the modern organization of medical

service makes it possible for the fully equipped medical battalions (medical service organizations) to follow behind the advancing troops thereby enabling the previously established evacuation centers to remain in one place for 1½-2 days, and you come to the conclusion that in modern warfare the medical battalions and separate medical detachments will be frequently able to offer surgical assistance and therapy on a wider scale than is now believed possible.

The objection may be raised that the composition of the sick and wounded brought to the medical battalions and medical service organizations mentioned before will not always be the same. Of course, the above-cited figures on the structure of the losses are averages and apply to conditions in which every type of weapon is used in a certain ratio. However, the men affected by some single type of mass destruction weapon will frequently predominate the contingents brought to the medical battalions and medical service organizations. But such "homogeneous" contingents will not greatly tax the possibilities of the medical service battalions (medical service organizations). Let us take the contingents brought from an area attacked by nuclear weapons, for example. It is a known fact that people with burns will be predominant among those affected by nuclear weapons, while the number of wounded men will be still smaller than the above-discussed average losses. The handling capacity of the medical battalions (medical service organizations) in such cases will therefore be still greater.

Only a mass inflow of men with gunshot wounds, an absolute majority of whom consist of ordinary wounded men, may considerably complicate the work of these medical evacuation centers inasmuch as many of these incoming men will require complicated and urgent operations. But here it should be borne in mind that a simultaneous inflow of a large number of men with gunshot wounds alone will be a very rare occurrence, as the overall losses produced by the enemy's use of only this type of weapon will be much smaller than those occasioned by nuclear and chemical weapons.

It may also be objected that in our example we referred to only 300 men as being brought to the medical battalion (medical service organization), whereas actually the number of affected men might be much greater. Naturally, in these conditions the battalions and the medical service organizations will not be able to offer the required professional medical assistance, and such assistance will have to be delayed. But in such cases the senior chief of the medical service can and should resort to a variety of manipulations which, incidentally, are not always emphasized in the training exercises. But the possibility for such a maneuver has now been greatly enhanced. All we have to do is to develop the possible methods of such a maneuver.

In conclusion, we should like to emphasize that it was not the purpose of this article to revise the basic regulations governing the range of medical service at the various stages of medical evacuation which are now commonly accepted. There is no doubt that it is extremely important to retain the division of medical service into emergency and postponable assistance; nor is there any doubt that in the case of mass losses the medical battalions and medical service organizations may occasionally be able to offer medical assistance only in emergency cases. We merely wish to emphasize that it has already become necessary, and frequently also possible, to offer professional medical attention on a larger scale than has been shown in various exercises.

The information outlined above does not, of course, solve the whole complicated problem involving the capacity of the medical battalions and medical service organizations to increase the scale of medical assistance; the investigation into this problem should be continued. These investigations, it seems to us, should pursue the following major objectives: the development of methods designed to determine the structure of losses by the category of the sick and wounded, and determine the factual data on this structure; the concretization of the data on the requirements for professional medical service by various categories of sick and wounded, and the maintenance of that assistance; determining the time required for the implementation of particular therapeutic

and prophylactic measures; determining the measures to be implemented only by a doctor, and those that can be carried out by the intermediate medical personnel; the development of the most rational system of operation at the medical evacuation centers; the development of measures designed to prevent the detention of the sick and wounded at the medical battalions and medical service organizations as untransportable, or at least to reduce their number and the period of their hospitalization; the manipulation of the manpower and facilities of the medical service in such a way as to make the best use of them under various conditions and situations.

The solution of these problems will facilitate a more concrete definition of the actual requirements for professional medical assistance at the medical battalions and medical service organizations, and the actual possibilities of these medical evacuation centers.

Therapeutic And Prophylactic Problems

The Treatment of Infectious Hepatitis by the
Transfusion of Fibrinolytic and Preserved
Blood Plasma

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Lt. Col. of the Medical Service
P. D. Starshov and
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Infectious hepatitis (Botkin's Disease); it frequently results in the development of chronic hepatitis, and occasionally also cirrhosis of the liver (Y. M. Tareyev, P. Ya. Grigor'yev, Sh. S. Khalfen, M. A. Yasinovskiy, A. F. Bluger, etc.). A specific treatment of that disease has not yet been developed, and particular attention is therefore being devoted to the search for rational methods of the pathogenetic therapy.

The transfusion of plasma obtained from preserved (donor) blood plays an important part in the complex therapy of infectious hepatitis (P. A. Al'perin, R. I. Lepskaya, K. I. Stepashkina, Kh. Kh. Vlados, Sh. A. Anan'yev, F. S. Drampyan, O. G. Mikhailovskaya, G. S. Levin, Gallon, Levy, Dzhurney, Goldvasser, etc.). All the authors note the distinct therapeutic effect produced by repeated transfusions of donor blood plasma in cases of infectious hepatitis: a relatively rapid onset of a pigmentary crisis, a reduction of the subjective and objective symptoms of the disease, and a normalization of the proteinic, antitoxic, pigmentary and other liver functions.

The use of native donor blood plasma against infectious hepatitis is fully justifiable from a pathogenetic point of view. Native plasma has a pronounced disintoxicating and desensitizing effect, a general stimulating effect and a positive influence on the functions of the nervous, endocrine, cardiovascular, hemopoietic and secretory systems (A. A. Bogomolets, I. I. Fedorov, B. F. Petrovskiy, S. I. Sherman, etc.). Plasma transfusions facilitate the normalization of the disrupted proteinic metabolism, strengthen the protein-synthesis function of the liver and improve the regenerative processes in that organ (K. A. Dryagin, F. V. Arsent'yev, 1960). Finally, a certain amount of importance is attached also to the substitution effect produced by the introduction to the patient's organism of rich protein, immune bodies, hormones, ferments, etc., together with the transfused plasma.

The above reference to donor blood plasma applies equally to the plasma obtained from fibrinolytic (cadaveric) blood. At the same time, the fibrinolytic blood plasma is superior to the donor type in that it produces a greater stimulating effect (Ye. G. Tsurinova, 1960; Yu. Ya. Kuleshov, 1963; G. A. Pafonov, 1963). Furthermore, the fibrinolytic blood plasma does not contain any anticoagulants or preservatives and is not conducive to blood coagulation in the recipient's system. Finally, the preparation of the fibrinolytic blood plasma is much cheaper than the donor type plasma.

The purpose of this report is to compare the therapeutic effect of the fibrinolytic and donor blood plasma transfusion on patients suffering from infectious hepatitis. We have been unable to find a single reference to this subject in available publications.

Under observation were 50 patients suffering from medium to severe infectious hepatitis, mostly young and middle-aged people (20-50 years). These included 23 men and 27 women. The patients were divided into two groups, one of which (35) was treated with fibrinolytic blood plasma transfusions, and the other (15) with donor blood plasma. The gravity of the disease was approximately the same in both groups. For example, the patients treated with fibrinolytic blood plasma transfusions included 27 medium and eight severe cases of the disease, and the other group consisted of 12 medium and three severe cases, respectively. The severity of the disease was estimated by the prominence of the intoxication syndrome, the clinical manifestations and the degree of deviation of the biochemical indexes (see Table).

Symptoms	Number of patients Receiving blood plasma	
	Fibrinolytic	Donor
Languor, general weakness	33	13
Depressed appetite	31	12
Nausea	11	4
Vomiting	10	3
Pain in the liver area	22	9
Enlarged liver	35	15
Enlarged spleen	22	10
Bradycardia	25	11
Hypotonia	27	10
Dark-colored urine	35	15
Light-colored feces	35	15

The majority of the patients entered the clinic in the first week of the icteric period or on the second and third week after the beginning of the disease. All the patients were given the same medical diet No. 5 and a selection of vitamins. The treatment with plasma transfusion began in the first two-four days in the clinic. The blood groups of the recipients and the donors were frequently incompatible. The fibrinolytic or donor blood plasma was introduced in doses of 60-100 milliliters in a 400-milliliter 5% glucose solution 2-3 times a week intravenously by the drip method. Each patient received a series of 2 to 10 transfusions and more, averaging 4-5 transfusions per patient. There was a total of 158 transfusions of fibrinolytic blood plasma and 70 transfusions of donor blood plasma. The bilirubin of the fibrinolytic blood serum did not exceed 0.8-0.9 mg %, and the bacteriological inoculations and the Wasserman reaction were negative.

Mild after-transfusion reactions (a temperature rise to subfebrile figures, a slight dysphoria, headaches and occasional urticaria) were observed in eight of the 158 cases of fibrinolytic blood transfusions, and in six of the 70 cases of donor blood transfusion. Reactions of medium severity (a temperature rise above 38°, chills and moderate headaches) were observed in four and three cases, respectively.

Post transfusion reactions were observed in a total of six patients treated with fibrinolytic blood plasma and four with donor blood plasma. There were no cases of severe reactions to the plasma transfusions. The reactions normally occurred one-two hours after the transfusion and lasted not more than one-three hours. The reactions were quite independent of the incompatibility of the donor and recipient blood type, and were observed only in the repeated transfusions. The transfusion reactions were never followed by an aggravation of the disease.

After the first transfusion, fibrinolytic or donor blood, the patients as a rule felt an overall improvement, the weakness and dyspeptic manifestations were reduced in most of them, and the appetite and sleep improved. One of the most important clinical criteria that can be used to estimate the effectiveness of a particular type of therapy is the time of the so-called crisis, that is a definite change of the disease for the better. In the group of patients treated with fibrinolytic blood plasma the crisis occurred usually on the 17th day of the disease, one the eighth day of the jaundice and the sixth day of the hospitalization. In the case of the patients treated with donor blood plasma transfusions, a definite improvement occurred on the average on the 17, 10th and 7th day, respectively. In both groups of patients the intoxication symptoms (nausea, vomiting, headache, weakness, anorexia, etc.) disappeared at about the same time.

The use of fibrinolytic and donor blood plasma led to a definite

reduction in the general bilirubin level in the blood of the patients suffering from infectious hepatitis (Fig. 1). The dynamics of the action of serumal aldolase and transaminase (glutamin-pyruvic and glutamin-oxalo-acetic) revealed that the activity of the serumal ferments in the patients of both groups becomes normalized at the same time. The mercuric chloride, thymol and zinc-sulfate tests also revealed approximately the same changes in the patients of both groups (Fig. 2).

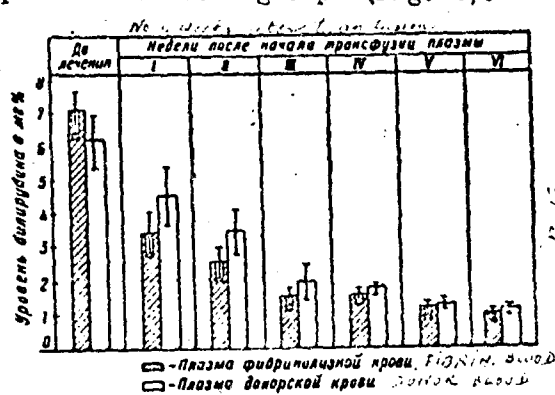


Рис. 1. Динамика общего билирубина в крови больных инфекционным гепатитом, лечившихся трансфузиями плазмы фибринолитической и донорской крови. (Средние и ошибки средних).

Fig. 1. Dynamics of the total bilirubin in the blood of patients with infectious hepatitis treated by transfusions of fibrinolytic and donor blood plasma (Averages and average errors)

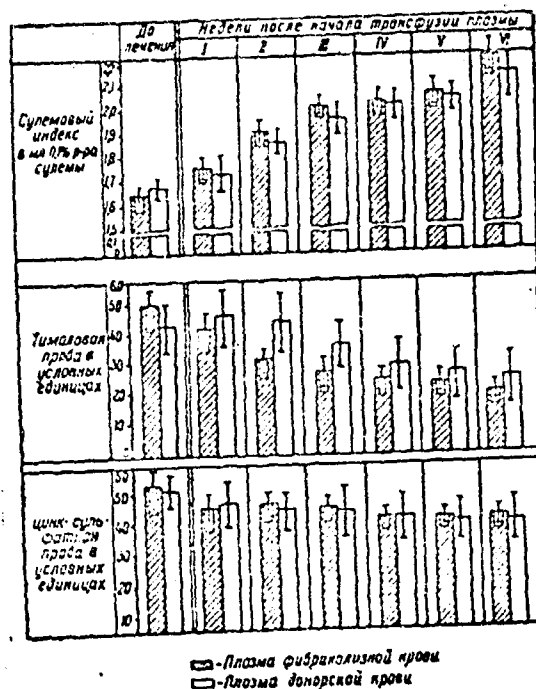


Рис. 2. Динамика осадочных проб у больных инфекционным гепатитом, лечившихся трансфузиями плазмы фибринолитической и донорской крови. (Средние и ошибки средних).

Fig. 2. Dynamics of the residual tests of patients with infectious hepatitis treated by transfusions of fibrinolytic and donor blood plasma. (Averages and average errors)

The sedimentation reactions merely reflect in general terms the state of the proteinic function of the liver, indicating a particular degree of disproteinemia. Electrophorograms of the serumal proteins were therefore studied in addition to the determination of the general protein, fibrinogen and beta-lipoprotein index, with a view to estimating the minor deviations of the proteinic metabolism. The total amount of protein did not undergo any changes in the severe phase of the disease nor during the convalescence and remained at the lower level of the norm. Soon after the transfusions began, the fibrinogen level revealed a slight increase, but came closer to the initial level between the fourth and fifth weeks. The most distinct changes were observed in the protein fraction content of the serum. Thus the most activated phase of the disease was accompanied by a reduction in the protein level, and increase in the gamma-globulin content and, to a lesser extent, also in the beta-globulin content. The systematic increase of the beta-lipoprotein index during the aggravated phase of the disease was a reflection of the rising beta-globulin fraction. The albumino-globulin and particularly the albumino-gamma-globulin coefficients were, at the same time reduced. As the patients recovered under the effect of fibrinolytic and donor blood transfusions, all the mentioned deviations of the albuminous fractions of the serum revealed a distinct tendency to a similar normalization in both comparable groups.

A look at the arithmetical mean of the various biochemical indexes (the level of bilirubin, fermentemia, sedimentation reactions and albuminous fractions) produces the impression that the majority of these indexes reach a normal point faster in the case of the patients treated with fibrinolytic blood plasma. But the statistical processing of the resulting data including the calculation of the authenticity coefficient (t) and probability index (p) did not reveal any essential differences of the average biochemical indexes in the patients of the two comparable groups. There was practically no difference between the average bed-day in both groups: in the case of those treated with fibrinolytic blood plasma it amounted to 39.4, and donor blood plasma 40.9. There was not a single case of aggravation or relapse of the disease. It is still premature to estimate the long-range results of the treatment, as the observation period following the patients' check-out of the hospital was relatively short (one-six months).

It is thus possible to conclude that fibrinolytic blood plasma is just as effective a method of pathogenetic treatment of infectious hepatitis as donor blood plasma, and perhaps even a little better. The impression is that the post-transfusion reactions were somewhat less frequent in the case of fibrinolytic blood plasma. There are practically no counter-indications to the transfusion of fibrinolytic blood plasma in the case of infectious hepatitis. The treatment involving the use of fibrinolytic blood plasma is more advantageous from an economic point of view than donor blood. We believe that fibrinolytic blood plasma should find wide application within the complex of therapeutic measures used against infectious hepatitis in peacetime, and particularly in war time.

Dispensary Service for, and Expert Medical
Opinion on, Servicemen Recovered from
Botkin's Disease

Col. of the Medical Service
K. A. Popov and
Lt. Col. of the Medical Service
A. K. Sverdlov

We studied 285 cases of former Botkin's Disease patients, brought to the Military Medical Commission in recent years for observation purposes, with a view to developing the basic criteria for estimating the restoration of the damaged organs, and analyzing the mistakes made by the hospital and garrison medical commissions. Some of the patients were observed by us personally.

This is how the patients were classified by the degree of severity of their disease: mild 89, medium-severe 146 and severe 50 patients. The treatment and regimen of the patients were standard, and the hospitalization periods fairly long: 77% of the patients were kept more than one month, and 40% one and a half months and longer.

All the convalescents were, as a rule, released from the hospital and examined after the complete disappearance of the jaundice, the reduction of the liver and spleen to normal size, the normalization of the urine and feces coloring and the bilirubin content in the blood serum; a subicteric tint of the skin remained in only 0.4% of the patients and subicteric sclera in 9%. No pathology was found in the cardiovascular system. The spleen did not palpitate. But in 20% of the convalescents the liver extended from under the arcus costarum up to 1 cm. An examination of about 90% of the recovered people revealed a normal bilirubin level in the blood, the others a slight increase of it (1-1.2 mg % according to van den Berg). But in one-third of the patients the course of the reaction remained straight and rapid. At the time of their release, the reaction of almost all the convalescents to the bile pigment was negative, in 85% of them the mercuric chloride test was normal, and the thymol-veronal test revealed a normal level in a smaller number of patients. Eighteen percent of the convalescents revealed leucopenia or a tendency to it the time of their release.

Our observations (A. K. Sverdlov) showed that 26 of the 45 dispensary-treated former Botkin's disease patients had disproteinemia one-and-a-half-three months after their release from the hospital, 13 patients still had it four-six months later and eight of them had it seven-twelve months later. No other subjective, objective or laboratory changes were noted in the majority of the convalescents of this group. Thus despite the lack of specificity of the given changes, they undoubtedly represent a reaction of the organism, and should be properly interpreted for prognostic purposes and expert conclusions to be made in connection with the other clinical and laboratory investigations.

After a mild course of the disease, the convalescents were given a month sick leave, and in fewer cases 45-60 days; after a medium-severe form of the disease the leave was frequently extended to one and half months, and after a severe disease to one and a half-two months (on an individual basis). There were no discharges from the army of any patients after a mild form of the disease, but only one man was discharged after a medium-severe form and four after a severe form. According to our information, the total number of men discharged from the army because of a severe form of Botkin's disease is 1.8%.

An analysis of the diagnosis of the men recovered from Botkin's disease revealed that many doctors of the military-medical commissions base their decisions primarily on the complaints and clinical data and do not make adequate use of the laboratory and especially biochemical examinations to estimate the extent of respiration of the damaged organs. It should be

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borne in mind that the ground for extending sick leave, in addition to the normalization of all the clinical indexes, are the normal indexes of the bilirubin content in the blood serum and several sedimentation tests (allowances are made for the different results revealed by every second or third test). It is desirable to determine the total amount of protein in the blood and fraction of the convalescents.

Up to 1961 the military doctors did not use the same approach to the men recovered from Botkin's disease. For example, some doctors releasing a former Botkin's disease patient from a hospital extended to him a 10-15 rest period in their unit. On the basis of the information found in literature and our personal experience, we consider it absolutely necessary to extend sick leave to all the convalescents for one-two months with strict recommendations to observe a certain dietary regimen and limited physical exertion during that period. Unfortunately, there are certain cases when the decision of the medical commission to extend sick leave to a convalescent is not carried out in time by the command while the doctor is not persistent enough about the implementation of his decision.

Profound and lasting disturbances of the liver functions are frequently observed in persons recovering from Botkin's disease. A dispensary examination of such persons carried out at different periods after their release from the hospital reveals a considerable number of people with residual symptoms. M. A. Yasinovskiy reports that only 13.1% of the 627 examined persons were found to be well; of the 300 examined persons A. I. Khasanov found only 129 to be well, and in the case of V. I. Shishko the figures were only 65 out of 400. Our data also coincides with these and the other information found in literature. Residual symptoms are frequently observed in former Botkin's disease patients after an aggravated or chronic course of the disease. But even mild forms of the disease may lead to the development of residual symptoms, especially when the periods and conditions of the treatment are not observed when they are released from the hospital too early, when the dietary regimen is not observed, and in cases of great physical and nervous strain during the period of convalescence. Such residual symptoms should be particularly emphasized, as the fate of the convalescents depends large on his working conditions and diet after the hospital. This circumstance is particularly significant in conditions of military service.

Unfortunately, there are still no specific recommendations for dispensary examinations and required conditions to be observed by servicemen recovering from Botkin's disease. A study of the medical literature and our own observations justify our recommendation of more frequent examinations of convalescents after Botkin's disease. This would make possible to detect any particular changes in them on time and to treat them, which would help to prevent the development of chronic hepatitis and other complications following that disease.

In our own practice we suggest the convalescent to the first dispensary examination upon his return from his sick leave, that is one and a half-two months after his release from the hospital, and the following examinations depend on his condition but not less than one in three months. The examination of the convalescent includes: questioning, actual examination, testing the blood serum for bilirubin, sedimentation tests, an analysis of the urine or bile pigments and urobilin, and, if indicated, an examination of the bile. Whenever necessary, the convalescent is subjected to a hospital examination and treatment. The resulting clinical data and laboratory investigations of the functional condition of the liver in the convalescents justify the belief that the objective indicators we used as a guide in our diagnoses of the men recovered from an acute form of Botkin's disease following a certain period of hospital treatment, are correct, and the expert decision to extend to them sick leave is justified.

In our dispensary practice we observed 75 convalescents who continued their military service. But some of them were found to have certain

residual symptoms. The normalization of certain laboratory indexes, particularly the albuminous fractions of the blood, was especially slow. We therefore find it expedient to suggest to the military medical commission examining the former Botkin's disease patients returning from their sick leave to assign them to noncombat duty for four-six months, and relieve them of hard physical work and night duties. During that period the unit doctors should place the convalescents on a special diet and exempt them from vaccination. Then if the following dispensary examinations fail to reveal any pathology the doctor should decide when the persons in question are fit for combat duty without any restrictions. The certificates issued to the convalescents discharged from the army for medical reasons or upon the expiration of their service period should contain a detailed record of the dispensary treatment in order to insure a continuity of the outpatient observation on the part of the public health organization in their respective residential areas.

The Long-Range Results of the Treatment
of Epidemic Hepatitis

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It has been established on the basis of numerous special investigations that Botkin's disease is frequently followed by a variety of pathological conditions. The absence of such conditions, according to M. A. Yasinovskiy, was observed in only 18.6% of the persons recovered from that disease. A detailed study of the consequences of Botkin's disease led to the establishment of five basic types of pathological conditions: a chronic benign hepatitis without the development into cirrhosis (A. I. Khebanov, Ye. M. Khitrova), a chronic and icteric hepatitis developing into cirrhosis (Ye. M. Tareyev), hepato-cholangitis and hepato-cholecystitis (I. A. Savelyev and S. M. Ryss), macronodular and atrophic cirrhosis of the liver (N. N. Kirikov) and, finally, other less frequent pathological processes (gastritis, gastroduodenitis, pancreatitis, etc.). At the same time, some of the convalescents reveal a more or less lengthy period of minor and transitional functional disturbances of the liver without any symptoms of organic damage to it.

It is quite clear that one of the most important problems is the prevention of such pathological conditions some of which are quite dangerous (for example, the cirrhosis that develops into a cancer of the liver -- Ye. M. Tareyev). The solution of this problem depends not only on the clinical physicians treating epidemic hepatitis in the hospital, but also on the doctors making an early diagnosis and hospitalizing the patients in time, as well as a careful posthospital outpatient observation of the convalescents. This general rule, naturally, requires some elaboration and the selection of the most essential practical features affecting the outcome of the disease. In this connection we made observations in a hospital of 100 men who had recovered from Botkin's disease (60 of them in 6 to 12 months, and 40 from 12 to 18 months). Participating in the observations of the convalescents were I. S. Il'in, A. G. Borisov, M. I. Trostenetskiy, M. N. Chernomyza, V. G. Vaskov, V. N. Ryskov, etc.

The results of the observations revealed that only 36% of the convalescents were in good health, that is they made no complaints and revealed no functional or organic disruptions on the part of the liver and the other organs. Observable in the majority of cases (64%), however, were disturbances of the liver functions (41%) or symptoms of chronic hepatitis (11%) usually combined with frequent functional disturbances of the stomach, cardiovascular and nervous systems (47% as well as cholecystitis, cholangitis and dyskinesia of the biliary tracts (17%).

Functional disturbances of the liver were most frequently observed (41%). In the course of time the frequency of these disturbances was reduced. If in 6-12 months after a case of Botkin's disease they occurred in half of the men under investigation (30 out of 60), they did not exceed one-fourth of the men (11 out of 40) in periods exceeding 12 months. The disruption of the albuminous function of the liver was frequently expressed in the elongation of the "Weltman Band" to 8-10 test tubes (51%). Considerably less often were the mildly positive or positive results of the Takata-Ara reaction (26%). Disturbances of the antitoxic liver functions, discovered by the Quick-Pytel test, occurred in 23% of the cases (57-65% isolated hippuric acid). Most seldom observed were the disturbances of the pigmentation function of the liver. An increase in the bilirubin content of the blood to 0.9-1.5 mg%, by the van den Berg method, was recorded in only 6% of the cases. Just as rare (6%) was the disturbance of the prothrombin-forming function of the liver. The activity of the serumal aldolase did not exceed 20 units, that is it was normal. Two-three functional tests were usually found to be disrupted; a deviation of all or most of the tests from the norm was noted in only 8% of the cases.

An increase in the size of the liver (by 2-5 cm of the transverse diameter) was observed in 11% of the cases; the liver function in such cases was usually found to be disturbed, and complaints were made mostly of minor pains in the right hypochondrium. In other words, these cases revealed a picture of a lingering or chronic hepatitis resulting from a former attack of Botkin's disease. The frequency of such hepatitis during the time that has elapsed since the disease has been increasing: four of the 60 men examined in periods of 6-12 months after being ill with Botkin's disease revealed symptoms of hepatitis, as did seven of the 40 men examined after 12 months and longer. Symptoms of cholecystitis, cholangitis or dyskinesia of the biliary tracts were found in 17 people. In seven of them the mentioned symptoms were due not only to a former epidemic hepatitis but also to accompanying lambliosis.

As pointed out earlier, disrupted functions of the stomach as well as the cardiovascular and nervous systems were found in 47% of the examined persons in addition to the pathological changes in the liver. In 22 of the persons the functional disturbances of the stomach appeared in the form of a depressed secretory function (19) and less often in an increase of that function (3). Twelve of the men revealed clinical and roentgenological signs of gastritis. Very frequently the convalescents revealed an insignificant hypotonia (30), even six months or longer after the treatment, which usually represented one of the components of the neurocirculatory dystonia of a hypotonic type. Insignificant and gradually disappearing manifestations of toxic infection and metabolic myocardial dystrophy were frequently found in such cases. Minor disruptions on the part of the nervous system in the form of asthenic conditions, of vegetative disruptions, were noted in 13% of the examined persons. We did not find any distinct changes in the peripheral blood; it should merely be pointed out that a retarded erythrocyte sedimentation reaction to 2-3 mm per hour, which is typical of an epidemic hepatitis, was found in 18% of the cases over long periods of time.

Such are the basic results of the study of the remote consequences of epidemic hepatitis. To complete the picture, it should be pointed out that in a number of patients the pathological conditions following Botkin's disease were determined immediately after a severe attack rather than after a long period. Thus the development of Botkin's disease into a chronic hepatitis was noted in 1.6% of the patients, and an early cirrhosis of the liver in 0.55%.

We will now analyze the elements affecting the long-range results of the treatment of epidemic hepatitis. First of all, we will look at the hospitalization periods of the patients. A remote examination of the 58 patients entering the hospital in the first 10 days of the disease revealed symptoms of chronic hepatitis in four of them, and disrupted liver functions in 17. Pathological changes in the liver over long periods of time were more frequent among the patients entering the hospital after 10 days of the disease: of the 42 examined persons, seven had chronic hepatitis and 24 disrupted liver functions.

The adequate duration of the hospitalization should be emphasized as the second important element. The effect of the average number of bed-days on the complete recovery hardly applies in this case. Such a comparison in our experience failed to produce any definite results, nor could they be expected. The decisive condition, as it seems to us, is not the formal period of treatment but the adequacy of that period. In other words, the point is not so much the average number of bed-days as the complete recovery of the released convalescents. All the patients we studied were released from the hospital when they no longer made any complaints, when their jaundice had completely disappeared and their liver had returned to normal size. But the same cannot be said about the complete recovery of the liver functions. Forty-five percent of the convalescents were released from the hospital with some, though minor, disturbances of the liver functions.

This is how it affected the remote results of that treatment. Of the

55 patients released from the hospital without any disturbances of the liver functions, chronic hepatitis was discovered in only one, and functional disturbances in 12. An entirely different picture was noted among the 45 men released from the hospital with minor disturbances of the "liver tests". Symptoms of chronic hepatitis were found in 10 of them, and disturbed liver functions in 29. Emphasis should therefore be placed on the great importance of preventing an unfavorable long-range outcome by an adequate period of in-hospital treatment until the basic liver functions are completely recovered.

The third element is the observance of the rational advice given by the treating physicians at the time of the release from the hospital. We were unable to observe any pronounced effect of the patients' diet in the post-hospital period; true, all the released convalescents were given the usual soldiers food, which is basically rational, or a lighter diet. But the harmful effect of alcohol which was used in some individual cases was quite obvious.

The expediency of extending sick leave to convalescents released from the hospital, a still unresolved problem, may be illustrated by the following data. Fifty-three of the released persons were given short leaves (up to 14 days) within their unit. Chronic hepatitis and disturbed liver functions were detected over long periods of time in 13 of them. Thirteen men recovered from a severe form of the disease were given 30 to 45 days sick leave. Chronic hepatitis and disturbed liver functions were found in seven of them, that is less often than in the above group despite the greater severity of their illness. The outcome of the disease was considerably more unfavorable in a few cases (9) where the released patients were not given any leave at all. Chronic hepatitis was noted in three of them and functional disturbances in two of that group.

Thus the majority of the patients, after a long time following an attack of Botkin's disease, revealed a gradually diminishing disturbance of the liver functions and disappearing functional disturbances of the biliary tracts, cardiovascular and nervous systems. With rare exceptions, these disturbances did not require any treatment and do not affect the men's working capacity. But constant medical supervision and the observance of prescribed conditions are required during the period of restoration of the organism's physiological equilibrium which was disturbed by the disease. Still more infrequent are the cases of prolonged or chronic hepatitis requiring special treatment after Botkin's disease, especially when hospitalization has been delayed and the treatment has been inadequate. Late hospitalization and premature release of the patients from the hospital with disturbed liver functions contribute to the formation of residual symptoms and pathological conditions after an epidemic hepatitis. The extension of sick leave to the convalescents and outpatient observation are the rational measures designed to prevent the unfavorable long-range outcome of the treatment.

The Outcome and Remote Consequences of
Botkin's Disease

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We know from numerous observations and published information that what appears to be a normal liver function following an attack of Botkin's disease is not always indicative of a stable recovery. Relapses and symptoms of chronic hepatitis frequently develop shortly after the release from a hospital even in cases where laboratory investigations failed to find any disturbance of the liver functions by the end of the hospital treatment. Thus our examinations of Botkin's disease patients are still inadequate to establish the criteria for recovery. In these conditions, the observations of persons recovered from Botkin's disease assumes particular importance.

Twenty-six patients, aged 21 to 25, suffering from Botkin's disease were under our observation in 1961-1962. The illness was serious in seven cases; 14 people recovered from a medium-severe case of Botkin's disease and five had only a mild form of that illness. The patients, as a rule, entered the hospital between the fifth and seventh day of the disease, as the icteric condition of the sclera and skin was beginning to develop. There were two recurrences of the disease -- in one case after five years and the other after nine years following the original attack -- but no relapses between the first and second attacks of the disease.

The treatment of all the patients included the intravenous introduction of a 5% solution of glucose with ascorbic acid by the drip method, the parenteral introduction of vitamin B₁ and B₁₂ and the use of corticosteroids (ACTH, prednisolone). All the patients were confined to bed during the first 30 days of the treatment. All of them used diet No. 5 throughout the entire period of treatment. The average number of bed-days was 60. The patients were released after the complete restoration of the liver functions, the absence of dyspeptic disturbances or painful syndrome.

These were the results. Seven of the 26 patients under our observation revealed symptoms of a moderately pronounced chronic hepatitis with disrupted pigmentation, carbohydrate and antitoxic functions of the liver. The most persistent symptoms following a lengthy treatment of these patients were bilirubinemia to 2.5 mg%, an enlargement of the liver, a subicteric condition of the sclera and skin, a dark color of the morning urine, dyspeptic disturbances, and a feeling of heaviness in the right hypochondrium. All these patients were given a medical discharge from the army whereupon our observations were discontinued. It should be pointed out that the symptoms of chronic hepatitis observable in five of our patients resulted from a severe form of Botkin's disease, and in two of them from a recurrence of epidemic hepatitis. The other 19 patients were released after a complete clinical recovery, and 10 of them were given 60 days sick leave, five 30 days and four 15 days.

The further observation of these patients covered an average period of about six months. Since most of the former patients were servicemen of second and third year of service, the observations were interrupted after their discharge from the army. But the observations in the few months following their release from the hospital revealed a number of disturbances in their state of being and some deviations from the norm during an objective examination. The mentioned disturbances as a rule appeared one-two months after their return from their sick leave.

The intensity of the symptoms did not correspond to the gravity of Botkin's disease. The symptoms were relatively mild in those who had recovered from a medium-severe case of the disease, and quite intensive after a mild case. Various types of complaints were made by 15 of the 19 former patients during repeated examinations. Their major complaints were: pain in the right hypochondrium growing worse under a physical exertion, dyspeptic

disturbances, occasional dark colored urine in the morning and after physical exertion, headaches, disposition to perspire, and weakness. All the recovered men noted an intensification of these symptoms after running, doing heavy physical work, taking lengthy trips in trucks on bad roads and discontinuing their special diet.

All the complaints were made by the recovered patients throughout the observation period. The most frequent symptoms of those examined were a slight enlargement of the liver, and the area of the right hypochondrium was painful to the touch. The liver could be felt at the edge of the arcus costarum in 10 of the former patients. A persistent mild subicteric condition of the sclera and skin was found in five cases. But a slight disruption of the pigmentation function of the liver was observed in only two cases in which the amount of bilirubin was increased to 1.2 mg%. Sugar tests and Quick-Pyral tests failed to discover any deviations. A second hospitalization revealed mild symptoms of chronic hepatitis in two patients, and they were discharged from the army.

The Prophylaxis, Diagnosis and Expertise of
Rheumatism and Vitium Cordis of Young
Servicemen

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There have been numerous reports in recent years on the effectiveness of the preventive treatment of rheumatism which is the major cause of heart conditions at an early age. Although the incidence of rheumatism among the young servicemen is not very high, the development of vitium Cordis and the resulting large losses of workdays make the preventive treatment of rheumatism in the army a matter of urgency.

We have developed clinical data on 634 servicemen who have recovered from the active phase of rheumatism. According to our observations, the incidence of rheumatism among the servicemen in the first year of service is considerably greater than in the following years. It amounted to 61% in the first year, 24.4% in the second and 14.6% in the third year. The reduced incidence of the disease in the course of the military service is indicative of the positive effect of physical exercise and the increased resistance of the organism. According to anamnestic data, 15% of the men recovered from recurrent attack of the disease had previously been deferred from the draft or given sick leave. All this serves to emphasize the importance of the preventive treatment of rheumatism among the servicemen, particularly among the soldiers serving their first year. It would be practical to introduce uniform methods of preventive and anti-relapse treatment of rheumatism in the dispensary service of predraft young men and servicemen.

Of practical interest is the information obtained by the military medical experts in cases of rheumatic heart condition among young servicemen. The 364 cardiac patients included 80.8% of servicemen of the first year of service, 13% of the second and 6.2% of the third year of service. The above figures show that the majority of the patients are young soldiers who had contracted the disease even before the draft. This is also confirmed by the fact that up to 33% of all the cardiac patients had been deferred from the draft or called up for service after a repeated examination. It appears that former rheumatic patients should undergo a more thorough examination before being drafted into the army. The most rational thing to do in such cases is to decide whether the draftee is suitable for military service only after a hospital examination.

The men found to have heart conditions in the second and third year of service were suffering from mitral insufficiency; they developed some disturbances in the blood circulation or an aggravation of the rheumatic process. The men suffering from an insufficiency of the mitral valve were predominant among all the cardiac patients. They accounted for 55% of all the vitium cordis patients. Thirty-six percent of them suffered from associated mitral failure, 6% aortal deficiency and 3% from all other types of vitium cordis.

The frequency of mitral insufficiency cases makes a proper diagnosis of that disease by the military medical experts particularly important. But the diagnostic difficulty in such cases is due to the fact that some of the symptoms of that disease cannot always be detected. One of the important symptoms of mitral insufficiency, as is known, is the changing configuration of the heart (an enlargement of the atrium sinistrum) revealed by an X-ray examination. But according to the military medical experts and our own clinical observations, changes in the size of the heart do not always occur. An X-ray examination of 200 patients suffering from a mitral insufficiency failed to find any pathology in 37% of the cases. The explanation for this lies not so much in the wrong diagnosis of the given disease as in the inconstancy of that symptom, particularly among the young men in the initial stages of mitral insufficiency. Obviously, we must carry out a more thorough X-ray examination of the heart and contrast the esophagus in order to determine

the enlargement of the atrium sinistrum, and study the hemodynamics, particularly the regurgitation symptom, and make use of roentgeno-kymography.

In an earlier publication (Military Medical Journal No. 5, 1960) we referred to the difficulties involved in a differential diagnosis of systolic murmurs of various origins and the frequency of the faulty diagnosis of vitium cordis, especially mitral insufficiency. We also pointed out that the presence of one systolic murmur could provide sufficient reason for the doctors of the draft commissions to diagnosis heart failures even in healthy people or those suffering from neurovascular instability, chronic tonsillitis and myocardial dystrophy. These observations agree with a number of studies made by Soviet and foreign authors indicating a high frequency of functional systolic murmurs during numerous diseases even in healthy people, especially young people. Observations made of sportsmen and students with the use of phonocardiography (R. D. Dibner, V. V. Solov'yev and V. V. Bulychev) confirmed the presence of systolic murmurs in a considerable number (48 to 84%) of healthy people. It is important that the therapists included in the military-medical commission of experts know about it.

There are definite symptoms requiring a differential diagnosis of organic mitral insufficiency from functional systolic murmurs. But these symptoms are frequently subjective which makes us look for new diagnostic methods. One of them is phonocardiography. The published information on the importance of this method in a differential diagnosis of systolic murmurs is contradictory. Some authors believe that phonocardiography cannot be used as a basis for defining the nature of the systolic murmur. But phonocardiography is used on an increasingly wider scale in actual practice and, particularly, in the diagnosis of vitium cordis.

A systolic murmur of a functional nature has a number of distinctive features on a phonocardiogram: it is very distinct in medium frequencies, it is more often fusiform than in the case of heart failure and it begins with the interval following the first tone; one important sign is that it is recorded mostly on the level of the second-third intercostal area near the left edge of the sternum. The functional systolic murmurs of short duration do not last more than two-thirds of a systole, and are characterized by an inconstant duration and intensity. Unlike these murmurs, a phonocardiogram of a mitral failure -- insufficiency of the mitral valve -- has the following characteristics: a systolic murmur of a high intensity and long duration blending with the first tone and lasting through the entire systole in cases of pronounced failure; the murmur is recorded on a high frequency filter; the first tone may be of a reduced amplitude or even missing.

We examined 107 young servicemen with systolic murmurs of various origins. Thirty-two of them suffered from mitral insufficiency, 17 revealed a cardiotonsillar syndrome, 10 had rheumatism without any signs of developing vitium cordis, 24 had neurovascular dystonia and 25 were healthy. Our observations have confirmed the great importance of a phonocardiogram for determining the duration and intensity of the systolic murmur and its connection with the first tone. It is also important to determine the location of the maximum systolic murmur.

To objectivize the intensity of the systolic murmur, we used a certain ratio of the amplitude of the systolic murmur to the amplitude of the first tone, in view of the fact that in the case of a mitral insufficiency of an organic nature, the first tone is frequently weakened and the systolic murmur has a considerable amplitude. The systolic murmur index was computed for all the 107. It was defined on a medium frequency filter as it was recorded from the apex of the heart or the Botkin-Erb point. In a mitral vitium cordis this index fluctuated between 0.5 and 1.2, and only in some individual cases was it less than 0.5; in functional systolic murmurs it was within the 0.15-0.35 range, and considerably less often 0.4-0.5. Another analyzed index was the duration of the murmur in these people. In one-third of the patients with mitral insufficiency, the systolic murmur covered the

entire systole, and the others two-thirds of a systole and only in a few individual cases one-half of a systole. The duration of the functional systolic murmur did not exceed one-half or two-thirds of the systole, and not in a single case did it cover the entire systole.

Characteristic of the patients suffering from mitral vitium cordis was the fact that the systolic murmur as a rule began immediately after the first tone in 27 out of 32 patients, whereas in 25 out of 75 the systolic murmur of a functional nature blended with the first tone.

Another important symptom of mitral insufficiency is the weakening of the first tone. A pronounced mitral insufficiency, as a rule, reveals a lower amplitude of the first tone on the phonocardiogram. According to our observations, a weaker first tone in mitral insufficiency is considerably more frequent than in functional systolic murmur. But four people engaging in sports and showing no clinical signs of vitium cordis also revealed a considerable reduction of the first tone. One characteristic features is that the maximum systolic murmur of a functional nature is localized in the second intercostal area to the left of the sternum. Our information also indicates that such localization of the systolic murmur is quite characteristic of functional systolic murmurs. Our observations show that phonocardiography, as an auxiliary method used in connection with a general clinical examination, facilitates the definition of the nature of systolic murmur.

We believe that a practical diagnosis should be introduced for certain types of functional murmurs. The practicing physician is frequently faced with the dilemma of defining a syndrome of a patient who has recovered from an infectious disease, intoxication or excessive physical strain revealing systolic murmur which in such cases is not a variation of the usual heart rhythm but a result of changes in the myocardium. In such cases there would be justification to follow G. F. Lang's conception of a myocardial dystrophy and treat that systolic murmur as a manifestation of myocardial dystrophy with a relative mitral insufficiency. The practicing physician must be able to define a condition developing during acute diseases which are accompanied by systolic murmurs. This would also reduce the number of unjustified diagnoses of "mitral insufficiency" which, unfortunately, is still being made by many therapists.

The Treatment of Linear and Gunshot Fractures of the Mandible

(An experimental clinical investigation)

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The treatment of mandibular fractures by fastening the broken pieces together receives a great deal of attention in the studies of numerous authors (Yu. P. Gorskiy, B. B. Kabakov, V. I. Luk'yanenko, M. V. Mukhin, A. I. Rybakov, etc.). It should be pointed out, however, that certain aspects of this problem still require a further study and improvement. In particular, not enough is known about the changes in the tissues produced by the use of various materials for osteosynthesis, or the possibility and practicability of using new materials, such as new types of plastics (polyamides, caprone, polyethylene, etc.). A study of this problem is also important because many medical institutions have in recent years initiated the use of various plastic threads, plates, etc. in the treatment of mandibular fractures.

The most popular of the numerous materials suggested for use in osteosynthesis are stainless steel, tantalum and plastics. The rods, threads and plates made of these materials produce a very slight biological reaction which is expressed in the formation around them of a thin connective tissue capsule. After the consolidation of the broken pieces, the metal rods and plates should be extracted in order to prevent the possible development of decubitus ulcers in the tissues. Light plastic plates may be left as there is practically no danger of decubitus ulcers developing around them.

We decided to study and, if possible, improve some of the operational and technical details of the already existing methods of treating mandibular fractures, and to ascertain the possibility of using polyamide, caprone and polyethylene threads in the osteosynthesis. We therefore experimented with 60 dogs which underwent 70 different operations involving the osteosynthesis of the mandible. The clinical end of the experiment consisted in observations of the 60 "patients". All of them underwent surgical treatment of the mandibular fracture. Forty of them were treated in a hospital, and 20 in the clinic of maxillofacial surgery of the Military Medical Academy.

We made experiments with 30 adult dogs of both sexes in a comparative study of certain methods of treating the linear (not gunshot) mandibular fractures. After drugging them with morphine, a small hammer was used to break the dogs' lower jaws at the level of the fourth and fifth small molars. In most cases the hammer blow broke the mucous membrane of the alveolar process in the fracture area. The osteosynthesis was performed on the third day after the trauma. Antibiotics were not used before the operation and the broken pieces were not splinted. Antibiotics (penicillin and streptomycin) were used during the operation and in the postoperative period for eight-ten days.

The experiments with this group of animals consisted of four series. In the first series (10 dogs) the broken pieces were fastened with polyamide thread, in the second (10 dogs) with caprone thread, in the third (five dogs) with polyethylene thread, and in the fourth (five dogs) with thin stainless wire. The plastic thread was 0.7-0.8 mm thick, and the stainless steel 0.5-0.6 mm. The observation period of each animal after the operation ranged from 45 days to one year.

Our experiments revealed that the bone suture involving the use of plastic thread or steel wire was, on the whole, a reliable method of fixing the broken pieces of the lower jaw. There were no complications in the fracture-healing process in most of the animals. The bones failed to accrete in only four out of the thirty animals, even though there were no visible clinical inflammations. According to the control X-ray pictures, the formation of a callous was completed by the end of the third month.

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An X-ray study of the callus formation following the osteosynthesis with a steel wire has led us to the conclusion that the closer the suture to the central line of the jaw the faster the fracture-healing process; but placing the suture closer to the angle of the jaw was followed by pronounced destructive changes around the wire. Although it is believed that closed or open mandibular fractures are considerably different from one another, we consider the results of our experiments as applying to all of them. This was justified by the fact that the use of antibiotics in connection with the immobilization of the broken pieces during and after the operation made it possible to prevent the development of an infection. As a result, the clinical course of the open fractures was similar to that of the closed ones. This was confirmed by the data produced by the pathohistological investigations. In the majority of our experiments the regeneration processes were identical in the closed and open fractures. The few individual failures of the experiments may be explained by the trophic disturbances connected with the damages to the vasculo-nervous bundle (Fig. 1). Other elements apparently also had an adverse effect on this: the insufficient immobilization of the broken pieces, the type of material used in the osteosynthesis, etc. As for the microbial factor, we were unable to detect any important part played by it in the complications developing in our experiments.

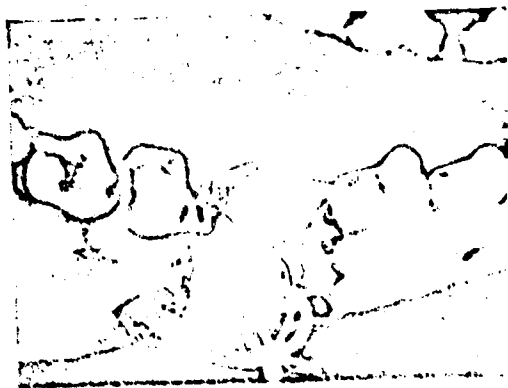


Fig. 1. The use of a polyamide thread to fasten the broken pieces produced by a nongunshot fracture of the mandible. The thread extends to the neurovascular nodule producing local trophic disturbances and eventual necrosis of the bone. The condition is 90 days after the operation.

Рис. 1. Фиксация отломков неогнестрельного перелома нижней челюсти полиамидной нитью. Нитью захвачен сосудисто-нервный пучок, что вызвало местные трофические расстройства с исходом в некроз кости. Состояние через 90 дней после операции.

A macroscopic study of the final results produced by the use of various bone suturing methods in the osteosynthesis of the mandible revealed that all of them are acceptable for practical purposes but all of them have their own characteristics. For example, it is difficult to extract the elastic wire and the plastic thread after the consolidation of the fracture. The reason for that is that the shape and the direction of the canal through which the wire runs during the formation of the callus are undergoing changes. Another reason is that the various bends and unevenness of the wire are caught in the cicatricial area and bone tissues. It is difficult to extract the polyethylene, polyamide and caprone threads; they were frequently found to have been broken even in the process of the callus formation.

A microscopic examination (see note) made it possible to establish what we believe to be very important patterns governing the tissue reaction to the materials used in osteosynthesis. Stainless steel and plastics produced the least biological reaction. It should be pointed out, however, that the steel wire was always surrounded with a thicker connective tissue capsule than the plastic threads.

(Note. B. V. Krukovskiy was consulted on the histological preparations).

- A comparative study of some of the methods of osteosynthesis applied to gunshot fractures of the mandible involved five series of tests with 30 adult dogs.

The mandible was fractured by firing a small caliber rifle from the sub-maxillary side. The fractures in all cases were fragmentary penetrating into the oral cavity. The fracture put many of the animals in a state of shock which was first manifested in irritation and changed to a state of torpidity a few months later (complete adynamia, a weak and frequent pulse beat, uncontrolled urination). In such cases the animals were given a shot of morphine and some cardiac medicines. Immediately after the gunshot, the wound was contaminated with manure-containing soil, an X-ray picture taken of the damaged jaw which was then covered with an aseptic bandage. The wounded animal was placed in a separate cage. It was given liquid food (soup, cereal, etc.). No antibiotics were given to the animals before the operation.

On the third day after the fracture, a bacteriological examination was made of the wound and the sensitivity of the isolated microflora to antibiotics determined. Most cases revealed a mixed microflora which was sensitive to penicillin and streptomycin. By that time all the animals revealed definite signs of inflammation of the wound and symptoms of general disturbances (a rising temperature, a higher pulse frequency, and changes in the blood). The wound was surgically treated on the third day after the fracture. The broken pieces were fastened together by various methods.

The first series of tests (six dogs) involved the use of a specially prepared plate from AKR-7 which was fastened to the broken pieces of the jaw with a polyamide thread. The second series (six dogs) included the intra-osseous fixation of the broken pieces with metal rods (three dogs) or a long steel needle (three dogs) in combination with osteoplasty and an autotransplant which was fastened to the ends of the broken pieces with polyamide thread. In the third series (six dogs) metal plates were fastened to the bone with steel screws at a considerable distance from the fracture line. In the fourth series (six dogs) the broken pieces were fastened in place with a metal rods and polyamide thread. The bone fragments, whether or not they had lost their connection with the periosteum and the surrounding soft tissues, were sewn with polyamide thread to the major bone fragments and the metal rod.

The fifth series (six dogs) involved the use of long stainless steel needles (Fig. 2); the unattached bone fragments were fastened with polyamide thread to the steel needle which was passed through the major fragments. The use of antibiotics and the duration of the observations were the same as in the first group of animals with nongunshot fractures.

A study of the clinical picture and the X-ray data as well as the macro- and micro preparations revealed that the methods of osteosynthesis we used were quite adequate for the treatment of gunshot fractures of the mandible and produced positive results. The unsuccessful operations on four dogs in this groups of tests were due to the unsatisfactory immobilization of the broken pieces. Important elements in this connection were the localization and characteristics of the fracture, the size of the damage to the jaw as well as the method of immobilization. In the case of two dogs the unsuccessful outcome was due to a stable inflammatory process in the fracture area, and in two other dogs a disruption of the trophical system followed by a necrosis of the fragment ends or in the area of the bone suture. Furthermore, one dog died in accidental circumstances in the first week following the operation before the outcome could be determined.

The AKR-7 plastic plate used for the periosteal synthesis not only did not inhibit the bone formation process, but to some extent also directed and facilitated the extension of the callus to the fragments. This was particularly obvious when the plastic plate was placed directly into the bone defect. The newly formed bone tissue in such cases extended under and over the break as if creeping over it (Fig. 3). This "creep" of the newly formed bone tissue onto the plastic plate is, in the final analysis, undesirable as it makes the bone considerably thicker.



Рис. 2. Фиксация отломков огнестрельного перелома нижней челюсти собаки спицей из нержавеющей стали и полиамидной нитью. Свободные осколки кости фиксированы к основным отломкам и спице полиамидной нитью. Состояние через 6 дней после операции.

Fig. 2. Using a stainless steel needle with polyamide thread to fix the broken pieces of a dog's mandible produced by a gunshot fracture. The loose bone fragments are fastened to the large pieces and the needle with polyamide thread. This condition is 6 days after the operation



Рис. 3. Фиксация отломков нижней челюсти накладной пластмассовой пластинкой. Состояние через 8 месяцев после операции.

Fig. 3. The fixation of the broke pieces of the lower jaw with a plastic plate. This condition is eight months after the operation



Рис. 4. Фиксация отломков нижней челюсти накладной металлической пластинкой. Показано состояние через 8 месяцев после операции. Под накладной металлической пластинкой область перелома не заполнилась новой костью.

Fig. 4. Using a metal plate to fix the broken pieces of the lower jaw. The condition shown here was eight months after the operation. The fracture area under the metal plate was not filled with new bone.

When a metal plate was used, the callus was formed at some distance away from it. (Fig. 4). The bone autoplasty proved to be quite satisfactory in the experimental treatment of mandibular gunshot fractures. A bone plate taken from a healthy jaw and transplanted to the area of a gunshot fracture showed a good accretion and only an insignificant resorption along the edges. The best result was achieved when the autotransplant was fitted to the area of the bone defect. A small source of osteomyelitis next to the accreted bone autotransplant was found in only one case, but this could have been due to the characteristic features of the fracture itself.

Investigations revealed that the thickness of the connective tissue capsule around the rods, plates and thread was found to vary in this group of experiments also. That depended not only on the type of material used in the osteosynthesis but also on its shape and thickness. Thin materials (such as plastic thread) were encircled with a thinner fibrous capsule, while the heavy metal rods and AKR-7 plates were surrounded by a thicker capsule.

The development of a fibrous capsule around a tetrahedral metal rod is a matter of great interest. That capsule at first took on the shape of a fibrous ring but later became more compact and contracted.

Areas of increased pressure were produced on the sharp edges of the tetrahedral rod. In these areas the capsule was considerably thinner and in some places even broken. These breaks led to the formation of a wall of new granulation tissue. All the parts of the capsule surrounding the round rod were

under even pressure, and the gradual extraction of the rod left them the same everywhere. This indicates that round-surface facilities should be used for periosteal and intra-osseous synthesis.

The experimental results obtained by the various methods of osteosynthesis of nongunshot fractures of the lower jaw enabled us to recommend a wider use of surgery in the treatment of mandibular fractures. In our surgery, designed to fasten the broken pieces of the lower jaw, we made use of the following: bone suture with polyethylene, polyamide and caprone thread or steel wire, intra-osseous metal rods and periosteal Rud'ko clamps. All the patients entering the hospital as well as the clinic for treatment had their fragments of the mantle sling immobilized for several hours; in the hospital we also applied a head cap made of a head kerchief of our own design. Such a method of immobilization is simple and reliable; it can easily be applied in all cases when standard splints are not available. In some cases the broken parts were temporarily fastened by the "Ivy method". Whenever the broken pieces moved out of position, the lower jaw was temporarily immobilized by the use of smooth aluminum splints on the teeth and an inter-maxillary fastening with polyamide or caprone thread. The surgical fastening of the broken pieces of the lower jaw took place on the day following the patient's entry into the hospital.

Osteosynthesis with a bone suture was used on 40 patients: polyamide thread was used in 14 cases, caprone thread in 15, polyethylene thread in four, steel wire in three and caprone thread with a metal rod in four cases. In the first 7-8 days following the operation, antibiotics were introduced locally and intramuscularly in all the patients -- a total of about 5 million units of penicillin and 4 million units of streptomycin. Complications developed in three of the patients. One of them developed a fistula in the fracture area which required sequestrectomy and the removal of the caprone thread; that was followed by a complete recovery. Another patient whose osteosynthesis had involved a bone suture with a steel wire began to feel pain and a burning sensation in the area of the former fracture two years after the operation. The pain ceased following the removal of the wire and the patient fully recovered. A third patient entered the hospital with bilateral false joints of the lower jaw following an osteotomy which had been performed in connection with the progenia of the lower jaw. The wire sutures were removed in the hospital and an osteoplasty was performed by the use of the external costal plate. The bone transplants were fastened together with the caprone thread. The accretion of the bone was observed a month later.

In 39 patients the wounds healed under the original tension, and only one patient, as was already pointed out, developed a fistula; after the removal of the sequestrum and the caprone thread, his wound was healed by a repeated tightening. The clinical consolidation of the broken pieces was noted in periods of 30 to 45 days, and an X-ray revealed the formation of a callus at the end of the second month. Eight of the 16 patients treated with metal rods had double linear fractures, four single fragmentary fractures and four single linear fractures.

The rods were rectangular and oval in shape and were made of the 1 x 18H19t brand of stainless steel. We designed a guiding insert with a cushioning device to be used for introducing the metal pin into the bone. We used that device 20 times; it considerably facilitated the introduction of the metal pins and reduced the operation time. The rods were removed 30-90 days after the osteosynthesis, depending on the time the patients reported for that operation.

The Rud'ko apparatus for the fixation of the broken parts of the mandible was used on four patients. The formation of a callus by this method was noted between the 35th and 40th day after the operation. Although it has a number of good qualities, the Rud'ko apparatus is, according to our observations, not very strong. The screws on two of its nine clamps broke, and it required an additional operation to extract them. Two more screws broke when the clamps were being removed, and they could be removed only by an operation.

The above-cited experimental investigations and clinical observations of the use of various materials in the osteosynthesis of mandibular fractures (bone suture with steel wire, plastic thread, metal rods, needles and pereosteal Rud'ko clamps) showed them to be effective in the treatment of both gunshot and other fractures. These methods are considerably superior to the previous ones, as they obviate the necessity of dental bars in the mouth, facilitate the care of the oral cavity and the feeding of the patient, and make it possible to initiate early movement of the lower jaw without fear of displacing the broken parts. These methods should find a wide application in clinical practice.

The Pathogenesis of a Gunshot Osteomyelitis
of the Mandible

(An experimental investigation)

Col. of the Medical Service
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The treatment of maxillofacial wounds in the past wars and the clinical observations of the postwar period show that the most common and aggravated gunshot wounds of the lower jaw is the gunshot osteomyelitis which poses a very urgent and complex problem in the field of maxillofacial surgery despite the wide use of antibiotics. These complications are due to the fact that many important aspects of the pathogenesis of gunshot osteomyelitis of the lower jaw have not been adequately studied and this makes it difficult to develop specific pathogenetic methods of preventive treatment and therapy of a slow vulnerary process.

The pathogenesis of a gunshot osteomyelitis of the lower jaw as well as a prophylactic and therapy principle are still interpreted primarily on the basis of the facts obtained by I. V. Davidovskiy (1946), A. V. Smol'yannikov (1946), T. Ya. Ar'yev (1949), P. G. Korneyev (1951) and other authors in their study of this process on long tubular bones and the chronic odontogenic osteomyelitis on the jaws (I. G. Lyukomskiy, 1942 and 1943; V. M. Uvarov, 1947 and 1959; V. M. Uvarov and D. A. Entin, 1951 etc.). But it is a known fact that the etiology and pathogenesis of the two mentioned processes are quite different, and the lower jaw is considerably different from the other bones of the human skeleton. This not only resulted in a different understanding of the essence and even frequency of gunshot osteomyelitis of the lower jaw, but also had an adverse effect on the selection of prophylactic and therapy methods in cases of a complicated vulnerary process.

It is therefore necessary to study the characteristic features of the pathogenesis of gunshot osteomyelitis of the lower jaw in connection with the shape, structural and functional characteristics of that bone, and that can be done only in experimental conditions.

B. D. Kabakov (1960) was the first and only researcher who had succeeded in obtaining the model of a true gunshot osteomyelitis of the lower jaw in his experiments. But he studied that process from the point of view of possible osteoplasty in the period of a chronic gunshot osteomyelitis. As for the pathogenesis of osteomyelitis, no experimental study has yet been made of it.

We carried out experiments on 60 adult dogs of both sexes with a view to ascertaining the characteristic features of the pathogenesis of gunshot osteomyelitis of the lower jaw.

The dogs are the most suitable animals for such purposes. Their teeth are interchangeable, the blood to the lower jaw is supplied from a central source and, finally, it is possible to reproduce various odontogenic infectious sources in their jaws, that is to achieve the type of initial condition which is observable in the clinic.

The methods. The animal's lower jaw was broken (within the area of the lower teeth) by firing a 5.6 mm caliber Margolin pistol which uses a 2.5 gram bullet.

A special rigging device was used to protect the dog's cranium from being accidentally wounded, and a steel plate was placed between the jaws of some of the dogs. The test animals were divided into three groups according to the condition of their maxillofacial apparatus. The first group of animals (40 dogs) had healthy teeth before the wound was inflicted; various odontogenic infections in the jaws, usually in the form of pulp gangrene, periodontitis and granuloma, had been reproduced in the second group (15 dogs) three to six months before wounding them. The third group of animals (5 dogs)

had their teeth removed three to five months before inflicting the wound, and the shotgun fracture inflicted on the toothless jaw.

These wounds produced large and small fragmentary fractures in the lower jaw of 56 animals, and perforated fractures in four.

The observations of the animals after the wounds were based on numerous indexes. A careful study was made of the clinical picture of the vulnerary process and the changing general condition of the animals during the experiment; the nature of the microflora of the wounds and its sensitivity to antibiotics during various periods of the vulnerary process; an X-ray picture of the changes in the bone tissue of the lower jaw; histological changes in the soft, and particularly bone tissue of the jaw by preparing "Christaller" sections (Russian term: khristellerovskiye srezy) and a histotopographic study of each layer of the entire organ.

Two X-ray pictures under the same exposure conditions were taken of the jaws before the wound, directly after the shot and in 3, 7, 15, 21, 30, 45, 60, 75, 90 and 120 days after the wound (in accordance with the duration of the experiment). X-ray pictures were taken also on the 5th, 9th and 12th day after the wound in the case of the animals under short periods of observation (up to 15 days). The animals were not treated in any other way after they were wounded (except for being kept on a liquid and semiliquid diet) which prevented any side effects on the test results.

After inflicting the wounds, the animals were divided into the following groups according to the duration of the observation period: 10 dogs were observed up to 7 days, 10 8 to 15 days, 5 dogs 21 days, five dogs 30 days, 5 45 days, 5 dogs 60 days, 10 dogs 90 days, and 10 dogs were observed 120 days and longer.

Upon the expiration of the mentioned periods the animals were killed and their jaws and perimaxillary tissue examined by macro- and microscopic methods; also their internal organs if they revealed any pathological changes.

Cited below are the results of the experiments according to the basic observation indexes.

The clinical picture of the process. Twenty-four-forty-eight hours after being wounded the animals developed an inflammation in the tissues surrounding the wound in the submaxillary region, increasing in intensity up to the 7th-10th day. The copious vulnerary secretion of a sanguinolent-sanious nature appearing in the first day following the infliction of the wound became meager after the 4th or 5th day, purulent and malodorous. On the second week the animals developed a copious suppuration in the perimaxillary tissues accompanied by the secretion of large quantities of pus, an outflow of foreign bodies (bullet fragments) and bone fragments.

By the end of the 3rd week the skin wounds were healed in most of the animals. At the same time numerous fistulas formed in the fundus and vestibule of the mouth discharging pus, sequestra and foreign bodies. The fistulas did not close till the end of the experiments. An exception in this respect were the dogs with the fractured toothless jaws. In three out of five dogs the fistulas closed not only on the skin but also in the oral cavity after the outflow of the sequestra. The inflammation processes were less intensive in the dogs whose teeth had been devitalized, but they lasted longer; the teeth along the fracture line fell out faster than the healthy teeth, and the periosteal reaction was milder.

The general condition of the animals in the first 7-10 days after the infliction of the wound was grave, their temperature rose to 40-41°, the animals lost up to 3 kilograms of weight, a leucocytosis was noted in their blood (up to 20,000 with a displacement to the left), the number of erythrocytes and the hemoglobin content were reduced, and the erythrocyte sedimentation reaction was accelerated to 50 mm per hour. These indexes gradually

returned to the initial figures before the experiment following the copious suppuration. The changes in the picture of the blood and temperature fluctuation were particularly pronounced in the dogs with healthy teeth which is probably due to a higher reactive capacity of their paradontium.

The microflora of the wounds. Staphylococci and streptococci were predominant in the vulnerary secretion in the first two weeks after the infliction of the wound; eventually, streptococci, various bacilli, Proteus or their combinations became predominant. The microflora sensitivity to antibiotics in various periods of the vulnerary process was not constant either. In the first 10-15 days after the wound had been inflicted, the microflora in most of the animals was sensitive to penicillin, biomycin and levomycetin, and partially sensitive to streptomycin. In the following 15-20 days the sensitivity to antibiotics was reduced to the vanishing point. After 30-40 days and longer following the infliction of the wound the microflora was found to be sensitive to antibiotics again, especially to biomycin and levomycetin, and partially sensitive to penicillin. The insensitivity of the microflora to streptomycin continued to the end of the experiments.

The X-ray picture of the process. The vulnerary process in the mandibular bone, damaged by a gunshot wound, can be represented by three basic forms of changes determined by roentgenological methods.

The first form. The X-ray pictures taken on the 3rd-5th-7th-9th day after the wounding revealed a shift of the foreign bodies and small bone fractures and the disappearance of their shadow as a result of their separation by the wound. No substantial changes were found during this time in the major jaw fragments and the large loose bone fragments. Coming into view between the 12th and 15th day on the ends of the main broken pieces were areas of marginal necrosis of the bone measuring from 0.5 to 2.5 cm and circumscribed by a more or less distinct demarcation line. The formation of a delicate shadow of osteoid tissue in the periosteum, enveloping the necrotic areas, was noted at the same time on the internal surface of the jaw beginning with the demarcation line.

After the end of the 3rd week, periosteal incrustations were found also on the external surface of the jaw. By that time the large free fragments were either detached or had become embedded in these periosteal incrustations. The formation of considerable osseous conglomerates on the end of the broken pieces, with sequestra in the center, was noted between the 4th and 6th week. Hollow calluses were opened toward the top, in the direction of the alveolar processes. It was in this particular direction that the sequestra were eliminated.

Thus in this form of the process the formation of new bone prevails over the processes whereby the necrotic portions of the bone are detached and dissolved and finally become embedded in the sequestrum capsule. The process was not completed even 3-4 months after the wound had been inflicted.

The second form. The bone changes in this form of vulnerary process were practically the same as in the first one. But the osteonecrotic and osteolytic processes and the detachment of the necrotic bone areas at the end of the broken pieces occurred almost simultaneously with the plastic processes or even before them. As a result, most of the sequestra became detached by the end of the second month, and the osseous conglomerates at the end of the broken pieces had a more or less regular structure.

The third form. In this form of the vulnerary process, the osteonecrotic events prevailed over the plastic processes. The fragmentation and osteolytic processes were depressed. The necrotic portions of the bone were not detached from the major broken pieces and were detained in the damaged zone for a long time after the wound had been cleaned. The process was sluggish and there was no formation of sequestral cavities; a slight shadow of newly formed bone could be noted only by the end of the 3rd-4th month on the ends of the broken pieces.

Condition of teeth and jaws before wound	Form of vulnerary process		
	First	Second	Third
Jaws with healthy teeth	21	5	4
Jaws with pulpectomized teeth and granulomas	1	8	3
Toothless jaws	-	3	2

The first form of the vulnerary process was observed in 22 of the dogs, the second in 16 and the third in 9. In the case of 13 dogs it was impossible to determine the vulnerary process because of the short observation period. The data on the relationship between this form of the process and the condition of the teeth and jaws are shown in the table.

The figures in the table show that the first form of the vulnerary process was observed primarily in the dogs with healthy teeth, and the second and third forms on the jaws with pulpectomized teeth and the toothless jaws.

Thus an X-ray picture makes it possible to distinguish two extreme forms of the vulnerary process in the mandibular bone: destructive plastic (Fig. 1) and destructive-necrotic (Fig. 2). Between them are transitional forms in which particular features of the vulnerary process are predominant.



Рис. 1. Рентгенограммы нижней челюсти собаки «Рыжук»:
а — непосредственно после ранения; б — через 2 недели после ранения; в — через 3 недели после ранения; г — через 3 месяца после ранения. На рентгенограмме видна демаркационная борозда и перистальное наложение на внутренней поверхности челюсти; в — через 3 недели после ранения выражена кляпка вокруг секвестра; г — через 3 недели после ранения отщепляется фрагмент секвестра.

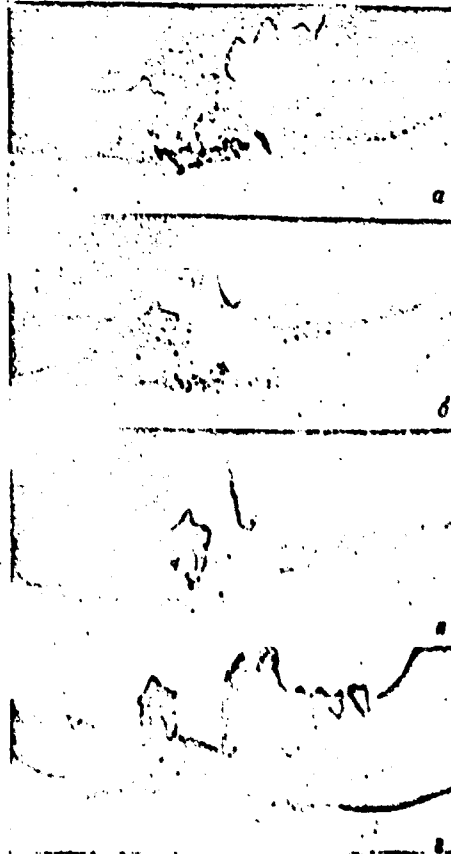


Рис. 2. Рентгенограмма нижней челюсти собаки «Сурок»:

а — непосредственно после ранения; б — через 2 недели после ранения; в — через 3 месяца после ранения (с препарата челюсти).

The histotopographic picture of the process. In the area of the vulnerary canal of a fresh gunshot wound of the mandible we found the usual vulnerary substrate (hematoma, tissue fragments, and bone fragments), and at the end of the largest broken pieces cracks of various depth filled with blood, tissular fluid or entirely empty ones. Dilated vessels with thrombotic events were found here and there on the ends of the broken pieces. Suppuration foci and a granulation torus were found in the vulnerary canal zone, particularly in the soft tissue surrounding the bone pieces and fragments, between the 3rd and 5th day after the wounding. A demarcation fissure separating the necrotic portions of the bone from the major piece appeared between the 5th and 7th day at various distances from the fracture line. The sizes of the necrotic portions varied with the different levels, amounting to from parts of a centimeter to 2.2 cm.

In the early stages the demarcation fissure was made up of granulations which occasionally contained osteoplasts (along the edge of the necrotic bone). This was later followed by the formation of a scarred tissue containing osteoplasts, young osseous "beams" (Russian term: balki) and cartillaginoid tissue (Fig. 3). But the most intensive formation of young bone occurred on the boundary between the periosteum and the necrotizing bone. Large areas of newly formed bone consisting of thin osseous beams, which were subjected to necrosis and resorption in some areas and regeneration in others (Fig. 4) were found here between the 10th and 15th day.

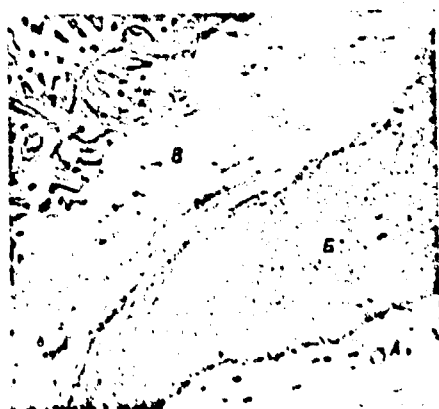


Рис. 3. Микрофотограмма с препарата нижней челюсти собаки «Бабетта». Срок наблюдения — 4 недели:
а — сеquestrum, б — грануляции, в — рубцовая ткань, г — молодые костные балки.

Fig. 3. Microphotograph of Babetto's lower jaw preparation. Observation period: 4 weeks:

a-sequestrum, b-granulations, c-scarred tissue, d-young bone formations



Рис. 4. Микрофотограмма с препарата нижней челюсти собаки «Мирдза». Срок наблюдения — 2 недели:
а — надкостница, б — новообразованная кость, в — старая кость.

Fig. 4. Microphotograph of Mirdza's lower jaw preparation. Observation period: 2 weeks:

a-periosteum, b-new bone formation, c-old bone.

The marrow of the newly formed bone was porous and adematous, the periosteum was enlarged and in some places infiltrated by cellular elements. The formation of a sequestral cavity which was more or less wide open at the top and contained sequestra detached from both broken pieces was completed in three-four weeks. The sequestral cavities were occasionally found only on the distal (frontal) piece, and massive granulation layers containing military sequestra on the rear piece. Such a picture was very rarely observed on both pieces. Granuloma and even cysts with an epithelium lining were found on the apices of the pulpectomized teeth. But they seldom had any direct connection with the suppuration foci if the routes of these teeth were not adjacent to the areas of the necrotizing bone. Thus the gunshot mandibular fracture of the dogs left without treatment was followed by the development of a pathological process in the soft and bony tissues corresponding to the picture of a gunshot osteomyelitis as interpreted by T. Ya. Ar'yev (1951), P. G. Korneyev (1951) and other authors, but with its own specific characteristics conditioned by the

morphological and functional differences of that bone as well as by the condition of the dental chewing apparatus before the wound.

The limited space of this article prevents us from a detailed discussion of the mechanisms producing these characteristics. There is no doubt, however, that these characteristics require a new approach to the selection of the prophylaxis and therapy of a gunshot osteomyelitis of the mandible that would take into account the phases and stages of the process, the condition of the dental chewing apparatus before the wound, etc. This applies primarily to the extent of the surgical intervention in the primary treatment of the wound, the prescription of antibiotics and certain measures. All these problems require a separate review and an additional study.

Conclusions

1. The process of suppuration in the area of the gunshot damage to the bone, combined with the formation of sequestra and the regeneration of the tissue (gunshot osteomyelitis), occurs also in gunshot fractures of the mandible. But in its manifestation in the lower jaw, this process reveals a number of very important characteristics which are determined by both the morphological differences of the bone itself and the condition of the dental chewing apparatus before the wound.
2. A gunshot osteomyelitis of the lower jaw is characterized by a faster development of the process, its location on the lower internal surface of the bone, the formation of unique sequestral cavities open at the top in the direction of the alveolar processes, and the restriction of the process almost exclusively to the area of the immediate damage to the jaw.
3. Other conditions being equal, the presence or absence of teeth on the broken pieces and the condition of the pulp and periapical tissue before the infliction of the wound have a decisive effect on the clinical picture of the process, the nature and dynamics of the microflora and especially the morphological substrate of the process.
4. A comparison of the clinical-anatomical, X-ray and histotopographic data makes it possible to single out two extreme forms of gunshot osteomyelitis of the mandible by the morphological substrate of the process: destructive-necrotic and destructive-plastic. Between them are transitional forms predominated by particular features of the vulnerary process.
5. Experiments have confirmed the existence of two extreme forms of gunshot osteomyelitis of the mandible also on the basis of the clinical course, that is acute and chronic. The existence of a transitional form, subacute form, is of course theoretically also possible; we have not been able to define and single it out in our experiments.

Hygiene And Epidemiology

The Prophylaxis of Influenza And Catarrhal
Diseases Among the TroopsCol. of the Medical Service
V. I. Agafonov

One of the most important problems of the medical service in the care of the health of the servicemen is the prevention of influenza and other acute respiratory diseases among the armed forces. The incidence of these infections in the armed forces is still relatively high. This emphasizes the importance of a sharp reduction in the incidence of the disease and the losses of time occasioned by these infections. Furthermore, the etiology of the acute respiratory diseases has not been adequately studied; the clinical symptoms of these infections vary a great deal, and no effective specific prophylactic and therapeutic measures have yet been developed. The study of the fight against and preventive treatment of influenza and other acute respiratory diseases should attract a great deal of attention on the part of military epidemiologists, virologists, specialists in infectious diseases and other specialists of the military medical service.

The experience the military medical service acquired during the pandemic outbreak of influenza in 1957-1959 revealed that the system of anti-influenza measures among the troops should be further improved; scientific research into the causes of the incidence of influenza and other acute respiratory infections in the army should be initiated on a wider scale, and medical control over the conditions of work in the army and the body conditioning of the personnel should be intensified.

It is a known fact that the supercooling of the organism, particularly of soldiers and sailors in the first year of service before they have been conditioned to the service and life in the army, may be the cause of acute respiratory diseases, angina and other so-called catarrhal diseases. The army doctor as well as the commander and administrator should be equally interested in the preventive treatment of such diseases among the troops. Many years of experience have shown that the fight against these diseases among the troops carried out by the concerted efforts of the commanders, army administrators and doctors has always produced positive results.

This year the incidence of influenza and other acute respiratory infections in the country were seasonal in character and did not exceed the usual level of the inter-epidemic years. According to the Regional Center of the USSR for influenza, the incidence of that disease did not exceed the inter-epidemic level in any of the 27 cities of the country which regularly report to the mentioned center. A study of the antiinfluenza immunity among the population of the USSR, by the changing titer of the antibodies in the serum of healthy people to various strains of influenzal viruses, carried out by 16 laboratories in different cities, revealed a considerable drop in the immunity to A₂ influenza. Thus the average titers of influenzal antibodies among the USSR population in 1964 to the type B virus was 54.8, type A 28.67, type A₁ 21.57 and type A₂ 10.31 (the figures of the Regional Center of the USSR for influenza). That showed an almost total loss of the humoral immunity to influenza, produced by type A₂ virus, on the part of the USSR population. A possible outbreak of a new epidemic of type A₂ influenza in the very near future is therefore not ruled out. The more intensive immunization against type B influenza is explained by the rising incidence of influenza produced by the type B virus in 1963. But a large-scale epidemic of A₂ influenza can hardly be expected inasmuch as considerable influenza epidemics produced by this type of virus already took place in most of the European and American countries in 1960.

How is our public health service equipped for the preventive treatment of influenza and other acute respiratory diseases? Obviously, the immunization of the troops with anti-influenza vaccine must play a decisive part in

the prophylaxis of influenza. But it is a known fact that the effectiveness of the available anti-influenza vaccine leaves a great deal to be desired. In the past two-three years, some scientists and practicing physicians have even begun to doubt the wisdom of a specific prophylaxis of influenza; this has led to the reduction in the number of vaccine people, a lower immunity level among the population and a possible threat of an influenza epidemic.

The problem of the rapid development of effective measures to fight influenza and other respiratory diseases among the population of the USSR was raised in the 13th session of the USSR Academy of Medical Sciences held in 1963 to discuss virus diseases. The Soviet and foreign researchers proved the necessity of improving the antigenic composition of the vaccine and changing the anti-influenza immunization scheme by using three inoculations instead of one.

In July 1964 Professor V. M. Zhdanov and Professor A. A. Smorodintsev reported on the effectiveness of the contemporary live influenza vaccine to the Department of Hygiene, Microbiology and Epidemiology of the USSR Academy of Medical Sciences. The speakers pointed out that the production institutes of the public Health Ministry of the USSR, responsible for the output of live influenzal vaccine, had eliminated a number of important shortcomings that had in the past resulted in the production of low standard and highly reactive preparations. Since 1963 live anti-influenza vaccine has been prepared from immunogenic and uniform vaccinal strains of type A₂ and B influenzal viruses whose use is under the supervision of the State Control Institute. Among the other conditions facilitating a higher effectiveness of anti-influenza inoculation is a series of three vaccinations to be applied at 10-12 day intervals. The reports cited figures obtained in the scientific experiments carried out in recent years in the USSR, Yugoslavia, FRG, Bulgaria, as well as Britain, the U. S. and Egypt to prove the high immunological activity of the live Soviet anti-influenza vaccine and its capacity to reduce the incidence of the disease among the inoculated to a reliable index of three.

A check-up on the recommendations made by the session of the USSR Academy of Medical Sciences designed to improve the effectiveness of anti-influenza vaccination, revealed the good qualities of the vaccine and the methods of its application. Intranasal and aerosole influenzal vaccines were inoculated once, twice and three times. The preliminary results showed a higher immunological level in the groups inoculated three times as compared to those with one and two inoculations. Thus according to S. A. Burov, G. M. Dokuchayev, etc., the change of the negative sera (with an initial titer of 1:10) into positive ones including an increase in the titer of influenzal antibodies of four times and over, following a single intranasal vaccination, amounted to about 65% of the total number of inoculated. A double and triple inoculation of the vaccine increased that index to 90-95%.

The capacity of a repeated vaccination to stimulate a higher degree of humoral immunity applies not only to persons with a minimum titer of antibodies to vaccination (highly susceptible to influenza), but also to those with an average level of humoral immunity before the immunization. This circumstance justifies the expectation of a highly stable postvaccinal immunity among those reinoculated with a live influenzal vaccine. The secretion of the vaccinal strains was also found to be better after three inoculations.

We have not been able to estimate the epidemiological effectiveness, that is the effect of vaccination on the reduction of the incidence of influenza as the outbreak of the latter in the country this year has been in the form of isolated sporadic cases. Outbreaks of influenza varying in intensity and etiology occurred only in foreign countries early in 1964. In American, Canada and some European countries (England, Yugoslavia, Czechoslovakia, etc.), they were produced by the grippe virus A₂, and in Asia by the grippe virus B.

It is still impossible to estimate the effectiveness of the aerosole method anti-influenza immunization, as the use of pulverulent aerosole influenzal vaccine has only just begun. The positive results obtained from

the use of pulverulent aerosole vaccines against a number of infectious diseases (tularemia, brucellosis, anthrax, etc.) in recent years by N. I. Aleksandrov and N. Ye. Gefen, et al are indicative of the possible effectiveness of this method against acute respiratory infections.

While improving the methods and facilities for the specific prophylaxis of influenza and other acute respiratory infections, we must not relax our efforts in the development of measures designed to raise the nonspecific resistance of the servicemen. The prevention of chills, and the use of various measures designed to condition the body, particular of the soldiers and sailors in the first year of service, the implementation of the statutory requirements applying to barrack and camp life and other problems of the daily life of the servicemen must remain in the center of the attention of the commanders, administrators and army doctors. The above-listed measures to raise the nonspecific resistance of the organism are very important in the fight against the incidence of acute diseases of the respiratory tracts, anginas and other so-called catarrhal diseases among the servicemen.

The servicemen serving their first year require particular attention and care. A proper and gradual adaptation to military service and life, and a skillful organization of physical training are very important for the prophylaxis of catarrhal diseases among this contingent of servicemen. It is important also because the relative number of the new men (soldiers and sailors in the first year of service) succumbing to influenza and acute diseases of the respiratory tracts is still high. Thus the soldiers and sailors of the first year of service account for 60-70% of all the influenza cases in 1962-1963, and about 80% of the acute diseases of respiratory tracts.

The gradual conditioning of the organism produces conditioned reflexes facilitating its adaptation to changing external conditions, and improves the thermoregulation processes which enhance the organism's resistance to catarrhal diseases. The conditioning process requires a strict set of regulations and methods (low temperature, the use of cold water, etc.). The gradual, systematic and continuous introduction of body-conditioning procedures, with allowances for individual characteristics and climatic conditions in which the particular army unit is found, will guarantee a higher resistance to various catarrhal diseases. We should also bear in mind that the errors made in the body conditioning system and the medical supervision and the violation of the methodical rules frequently lead to serious consequences. An overdose of the intensity or duration of the body conditioning methods may easily conduce to lower resistance of the organism and a larger number of catarrhal diseases instead of the expected reduction.

The studies made by Soviet physiologists (I. M. Sechenov, N. Ye. Vvedenskiy and A. A. Ukhtomskiy) have proved that the body-conditioning process can be developed under the repeated effect of a particular meteorological factor: cold, heat, low or high atmospheric pressure, etc. When the same irritant is repeatedly applied, the following stimulation becomes stratified on the lingering after effect of the preceding stimulation. This after effect facilitates the development of conditioned reflex associations under the repeated effect of meteorological factors.

The practical question is how often should the stimulants be repeated and how long should they last to produce positive conditioning results? The after effect of a particular irritant lasts a certain period of time, and if the following stimulation is applied after the after effect, it will naturally fail to improve the body condition. It has been proved that the exposure to cold even for several minutes a day or every other day will gradually increase the organism's resistance to cold. It has been proved experimentally that it pays to reduce the time between the individual stimulants by reducing their duration. For example, the resistance to cold can be developed faster if the exposure to it lasts 10 minutes daily than 20 minutes every other day.

It is generally believed that the conditioning process enhances the resistance of the organism to the effect of meteorological factors. Actually,

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the resistance of the organism is increased to only one stimulant (cold, heat, etc.) to which it has been repeatedly exposed. Each individual case of conditioning involves only a change in the organism's reaction to a specific irritant. In this case, the individual sensitivity to a certain stimulant depends on the frequency and duration of the effect of such a stimulant on the human organism.

The continuity of various measures must be strictly observed in the body-conditioning process, and allowances made for the physical characteristics and conditions of the individual serviceman, particularly those coming from different climates. In these cases as well as after forced interruptions (sickness, etc.), a gradual and continuous application of body-conditioning measures is particularly important.

We have dwelt at some length on these questions because they are of great practical importance for the proper conditioning of servicemen. Of course, some conditioning should be combined with good training and regular exercises in various types of sports. The approaching autumn-winter field training season calls for the preparation of the barracks, the maintenance of the required temperature in them, the timely repair of the drying facilities, and the washrooms, the testing of the ventilation system, etc. The proper organization of exercise and rest in the open air during the autumn-winter field training season is very important. Unfortunately, the statutory requirements are still being violated in this respect by a number of units.

A large number of cases of angina and acute diseases of the respiratory tracts was recorded for a long time in 1963 in one of the training units of the Black Sea Fleet. A look into the causes behind the angina cases revealed the following: Large quantities of icecream were sold near the gates of the cantonment where daily training exercises were in progress. Between the exercises, the overheated sailors would buy and consume several portions of icecream. Soon after the icecream sales were discontinued, the incidence of angina among the servicemen showed a drop. A regular increase in the number of cases of acute infection of the respiratory tracts was noted every Monday in another training unit of the same fleet in October-November 1963. The reason for that was on Saturdays (usually after their bath) the servicemen would go to the open-air movies nearby. A number of soldiers mess halls are not equipped with cloakrooms where the men can keep their outdoor clothes (greatcoats, jackets) while eating. Those soldiers therefore leave their greatcoats (jackets) in the barracks and walk to the mess hall even in bad weather without the appropriate clothing, which is conducive to colds.

The present state of our knowledge and the experience accumulated over the years in the prophylaxis of catarrhal diseases among the troops justify the belief that it is possible to reduce the incidence of the disease and the loss of working time associated with these infections. Success in this connection can be guaranteed by a strict observance of the military statutes as well as the regulations governing individual and public prophylaxis.

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Disinfection Applied to Virus Diseases

(A review of literature)

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Viruses diseases, particularly respiratory infections, are highly detrimental to the health of the population and the country's economy. The fight against virus infections has therefore become a matter of great importance.

Disinfection should receive increasing attention as a measure of fighting virus infections. The point is that other antiepidemic measures are frequently inadequate against virus diseases. Antibiotics and sulfanilamides used in the specific treatment of bacterial infectious diseases have proved to be ineffective against virus infections. The existing specific prophylactic methods cannot be used against all the virus diseases, and even many of the available methods are far from perfect. The infective agents of the virus diseases are more resistant to the external medium than bacteria.

But despite the urgency of the problem, the question of disinfection receives far too little attention. Bacterial disinfection cannot be used against viruses for a number of reasons. First of all, the study of virucidal activity is considerably more complicated than the study of bactericides; it requires the use of such labor-consuming methods as tissue cultures, the infection of chicken embryos, experiments with suckling mice, etc. Biological investigations are also complicated by the toxic effect produced on tissular culture cells by the residues of disinfectant⁵, the neutralization products of disinfectants, etc. (Bingel, 1957).

The bacteria are divided into type groups, according to their resistance to chemical and temperature effects, which are represented by the bacillus coli, staphylococcus aureus, anthracoid spores and the acid-resistant bacillus. An effective dosage of disinfectant established for a particular representative of a group, is considered to be suitable for all the other members of that group. The division of viruses into such groups is impossible because of the extreme variety of resistances on the part of individual species. The disinfectant under investigation should therefore be tested with all the viruses against which it is intended (Albrecht, 1962).

Many viruses can last a long time in the external medium, and survive in water and soil for a number of months (G. A. Bagdasar'yan, 1962; A. K. Shubladze and S. Ya. Gaydamovich, 1954). The heat tolerance of viruses fluctuates within a wide range. Most of them become inactive at 50-60°, but some of them are capable of surviving a boiling temperature for a short while.. Viruses can easily tolerate temperatures to -70° and lower. When frozen, they can be preserved for years (Mel'nik, 1946; A. L. Belyayev, 1963, etc.). The higher resistance of the viruses is due to the fact that their structure is simpler than that of the bacteria. Furthermore, they are biologically inactive and do not multiply outside of the host cells, and are therefore less subject to noxious external influences. Finally, outside of the organism the viruses are surrounded with biological substrates protecting them against disinfectants more often than bacteria.

A number of theories have been proposed to explain the bactericidal action mechanism -- adsorptive, lipid, receptor, fermentative, etc. The most plausible from a scientific point of view are the fermentative theories (G. N. Pershin, 1952, 1964; V. N. Gladkova, 1957, 1962, etc.) which explains the disinfection mechanism as a suppression of the important bacterial cell ferments (dehydrogenase, amylase, protease, etc.), but fail to explain the virucidal action mechanism inasmuch as the viruses do not have the same ferments as the bacteria.

A number of authors have tried to explain the virucidal action mechanism

on the basis of the viral structure. All the viruses consist of a nucleic acid nucleus or occasionally of a nucleoprotein contained in a membrane which consists primarily of a protein (Gard, 1960) and contain some special enzymes (two "entering" enzymes, ERR and ERKS, according to V. N. Zhdanov, 1961) which facilitate the penetration of the virus into the cell of the host. The nucleic acid is the bearer of genetic information, and it conditions the infection (Pollard, 1960; O. G. Andzhaparidze, etc., 1962). The protein membrane is highly resistant to chemical substances and other effects, and it protects the labile nucleic acid. Furthermore, the protein is the bearer of the receptor mechanisms which facilitate the penetration of the virus into the host's cell (Gard, 1960). Thus the complete disinfection of the virus should be accompanied by the destruction of the protein membrane as well as the irreversible changes in the nucleic acid involving the loss of infective capacity. The general rule is that the inactivating agent should change both the protein and the nucleic acid of the virus.

The following methods were tested with a view to inactivating the virus: heating, ultraviolet irradiation, penetrating irradiation, ultrasound, pressure, and chemical substances. It has been established that neither penetrating radiation nor high pressure nor even ultrasound can be used for the practical disinfection of viruses.

Many viruses (of psittacosis, epidemic parotitis, influenza, smallpox, coxaki, poliomyelitis, measles, etc.) are not very resistant to high temperatures, and die at 50-60° within 30 minutes (Kaplan and Mel'nik, 1962, etc.). There is no consensus of opinion on the thermal stability of virus A of epidemic hepatitis. That virus can tolerate a temperature up to 56° for 30 minutes (Havens, 1947). According to some information, the virus is inactivated instantaneously by boiling, but Henle and Stokes believe that a guaranteed disinfection would require a 15-minute boiling period. The virus is more stable in a protein medium, and is inactivated at 60° only in 10 hours. A 4-hour heating at that temperature is not enough for inactivation. All the viruses have a higher thermal tolerance in protein substrates. The dried viruses are particularly stable. Thus a humid stomatitis aphthosa virus dies at 60° within 10-30 minutes, while a dry one can stand a temperature of 116° for 8 minutes, and 70° for 2½ hours (according to Bingel, 1957).

The thermal inactivation mechanism has not yet been thoroughly studied. It is assumed that heat stretches the spirals of the coiled nucleic acid molecules which are finally injured in the process (Pollard, 1960). The different results obtained by the authors in the study of the thermotolerance of viruses are possibly determined by the ballast substances with a low thermal conductivity always surrounding the virus particles. The investigation of the protective functions of ballast tissues is still underway, and the thermal disinfection of viruses should therefore be carried out at high temperature and for lengthy periods of time. It would be best to keep the virus-infected materials (including the virus of epidemic hepatitis) in an autoclave for 30 minutes at 120° (Albrecht, 1962).

All viruses are killed by ultraviolet rays (Eyer, 1953). Long-wave rays from 2,300 to 5,720 Å are most active (Nicolau and Galloway, 1927; Fluke and Pollard, 1949). The influenza virus is highly sensitive to ultraviolet rays (L. Zakstel'skaya, 1951; O. Smorodintseva, 1953). But Henle's experiments (1946) revealed that the influenza virus at first dies very rapidly with only 0.03% of the initial material left after an hour, but insignificant quantities of the virus are found also after a 3-hour radiation. Viruses are inactivated under the combined effect of light and dyes, (methylene blue, thionine, safranin, etc.). E. Grayevskiy (1951) assumes that the virucidal mechanism is connected with the formation of hydrogen peroxide in an irradiated dye solution. In a mixture containing methylene blue (1:25,000) the encephalitis virus dies in 15 minutes if illuminated by a 100-watt bulb at a distance of 15 cm (A. K. Shubladze, 1937; A. K. Shubladze and M. Anan'in, 1943). The best results can be achieved by the selection of various dye solutions. A photodynamic disinfection, however, is still far from practical application.

There is still very little known about the disinfection effect produced by chemical substances on viruses. This is apparently due to some chemical changes occurring in both the protein membrane of the virus and the nucleic acid. The pH of the medium, temperature, exposure and especially the presence of ballast substances have a great effect on the nature of the disinfecting action.

Chlorine-containing substances (chloramine, bleaching powder), as a rule, produce good results in connection with all viruses. They act as oxidizers, but they can also chlorinate organic compounds; they are used for general disinfections. The disinfectant should be used in excessive amounts in view of the presence of ballast substances. Different poliomyelitis virus strains are inactivated by residual chlorine ranging from 0.37 to 0.92 milligrams/liter (N. A. Zeitlenok et al, 1961). A greater virucidal effect is produced by iodine compounds, especially iodopolyvinyl alcohol (iodinol?), which depresses the staphylococcal bacteriophage in a 1:100,000 concentration (according to V. O. Mokhnach, 1962).

Beta-propiolactone is effective against all viruses as well as against bacteria, fungi and rickettsia. It acts fast and deteriorates just as fast without forming any toxic products. It inactivates the yellow fever, smallpox and psittacosis viruses in a concentration of 1 mg/liter of air (Dawson, Jansen and Hoffman, 1960). It kills the herpes and infectious hepatitis virus of dogs in a concentration of 6.4 mg/milliliter (in a serumal medium) within one hour. In tests made on volunteers, the serum of hepatitis patients treated with 2,250 mg/liter beta-propiolactone did not produce any disease, but a concentration of 1,250 mg/liter and lower was found to be insufficient. Beta-propiolactone is successfully used for the disinfection of complicated apparatuses (anesthetic facilities, "artificial heart", etc.). It is not suitable for a general disinfection because of the instability of the water solutions (Albrecht, 1962). La Grippo (1960) recommends the use of beta-propiolactone in combination with ultraviolet radiation which makes it possible to reduce the dose of the preparation. Ethylene oxide has a pronounced virucidal effect on all the viruses, and does not spoil the disinfected articles but it is inflammable and therefore should be used together with carbondioxide or freon (1:10). Doses of 0.4-0.5 liter/m³ are virucidal when exposed 3-5 hours (Tessler et al, 1961).

Already known is the effect of hydrogen peroxide in an air and liquid medium on the virus of influenza (N. I. Val'vachev et al, 1963), tick encephalitis (V. A. Anan'yev, 1959) and coxaki (M. A. Zolochovski, 1963). Formaldehyde inactivates all viruses, except phages. It penetrates through the protein membrane of the virus and interacts with the nucleic acid; in high concentrations it also changes the virus protein. In the course of the formaldehyde action the protein membrane is blocked and the inactivation rate slowed down (Albrecht, 1962). Formaldehyde becomes actively bound to the albuminous substances which sharply reduces its virucidal effect. The doses used for disinfection are much larger (10 times) than for the inactivation of vaccines. The usual dose is a 3% formalin and a 4-6 hour exposure. A steam-formalin mixture may be used to disinfect uniforms.

Alcohol (ethyl, propyl) is effective against the smallpox virus but has no effect on enteral viruses. The use of alcohol is restricted primarily to the disinfection of skin.

Phenol and lysol are unsuitable for virus disinfection. The parotitis virus can survive in 0.5% phenol for 24 hours (M. Selimov, 1953); 5% lysol does not effect the poliomyelitis virus (O. P. Timonich, M. N. Batina, 1960). The virus of the St. Louis encephalitis can survive the effect of 1% phenol for 25 days (Olitskiy, Kazal's et al, 1949). The bacterial capacity of phenol is associated with the injuries to the walls of the bacterial cell and the inhibition of the bacterial ferments. This apparently explains the low virucidal activity of phenol. Little effect on the viruses is produced by the salts of heavy metals, especially mercury and silver, because of their bonding to the ballast proteins. The use of phenyl-mercuric salt produces

the best results (Albrecht, 1962). An insignificant virucidal capacity was found in certain cation-active surface-active substances (V. Tovarnitskiy and N. Karlina, 1948). Theoretically, the use of surface-active substances should not be expected to produce good results inasmuch as the effect of their bactericidal mechanism is based on a higher penetrability of the cellular membrane and the inhibition of the ferments, which do affect the viruses.

Viruses are easily inactivated by acids and alkalis when the pH of the medium is below 4 or above 11. The viruses of the rabies vaccine, for example, are rapidly destroyed in 0.1 normal HCl. But the excess acid can produce a protein coagulation and result in the formation of a protective capsule (Albrecht, 1962). Two percent caustic soda is widely used in veterinary disinfection in the fight against stomatitis aphthosa (hoof and mouth disease) (M. S. Gannushkin, 1952).

The absolute requirement of this action in cases of certain virus infections have been officially documented (in instructions, etc.) and leave no doubt. More complicated is the case of the less known virus infections, as for example the diseases produced by the ECCHO and coxaki (?) viruses, adenoviruses, etc. In such cases disinfection should be prescribed by and carried out under the supervision of an epidemiologist depending on the nature of the disease, on how widespread it is, on its course, etc.

In the case of smallpox, all the patient's secretions, personal belongings and the buildings he has visited should be disinfected. His dishes should be boiled for 15 minutes or kept for one hour in a 1% chloramine. His underwear should be soaked in a 3% chloramine for two hours. The same solution is to be used to disinfect the building which is to be aired for two hours. The uniforms are disinfected in chambers by the steam-formalin method. The sputum should be covered by twice its volume with 2% calcium hypochlorite for 30 minutes.

In case of poliomyelitis the disinfection consists in soaking the underwear in a 3% chloramine for four hours, or boiling it for 30 minutes, and the disinfection of the uniform by the steam or steam-formalin method in a chamber (applicable to vegetative form of bacteria). Surfaces are disinfected with 2-3% chloramine and exposed for one hour (O. P. Timonich and M. N. Batina, 1960). The fecal matter is covered with half its volume of dry bleaching powder or with a 10% solution of that preparation to be stirred up and left for one hour. The flies should be eliminated. In case of ornithosis, the patient's secretions, building and underwear and other items are disinfected with a 2% solution of chloramine or 2% bleaching powder (except his underwear). His sputum and fecal matter should be treated with a 10-15% solution of calcium hypochlorite for at least one hour.

Disinfection in cases of influenza consists of cleaning the room with a 0.5% solution of calcium hypochlorite or 1% chloramine and boiling the dishes for 5 minutes (or immersing them in 1% chloramine for 30 minutes). The influenza virus dies in 0.1% chloramine solution within two minutes (Henneberg and Hoppner, 1960). The air is disinfected with lactic acid, triethylene glycol (10 mg/m³), and 2 ml/m³ of 0.6% hydrogen peroxide (N. I. Val'vachev et al, 1963), or ultraviolet radiation by the use of BUV-15 or BUV-30 lamps: 1 lamp per 15-30 m² of building space (B. P. Fedysayev, 1957).

Disinfection in cases of epidemic hepatitis includes the use of chlorine-containing preparations. The underwear is immersed in 1% chloramine for one hour. The dishes are put in 3% chloramine or boiled for 30 minutes. The fecal matter is mixed with two-fifths of its own volume of dry bleaching powder, or covered with 20% bleaching powder powder for one hour. The uniforms are disinfected in chambers by the steam-formalin method as in the case of vegetative types of microbes (V. I. Vashkov, 1956). The flies are exterminated.

In cases of mumps, the disinfection may include the usual wet disinfecting facilities (except phenol), just as in the droplet bacterial infections. In

case of measles, the disinfection may be reduced to airing the building. Rabies, as a rule, does not involve disinfection. The items coming in contact with the sick animal's saliva are boiled, washed and ironed or treated with 2% caustic soda or 2% formalin. Yellow and papataci fever, seasonal encephalitis and equine encephalomyelitis under natural conditions do not require disinfection as these diseases are not communicated from one person to another without a carrier. All the anthropoda, the obligate carriers of this disease, should be destroyed in the patient's room.

In diseases produced by ECCHO and coxaki viruses, only the patient's excretion and furniture should be disinfected. Such infection involves the use of chlorine-containing preparations in the same doses as in intestinal and droplet bacterial infections. One reliable disinfection method is boiling for 5-10 minutes. The items that cannot be boiled should be treated with 0.1 normal solution of hydrochloric acid or 1-2% formalin. In case of adenovirus diseases, the barracks should be cleaned with a 0.5-1% solution of chloramine or bleaching powder. The table dishes should be boiled or immersed in a disinfectant as in the case of influenza.

In case of a suspected spread of viruses by the aerogenic method (the aerosolization of the dispersed viruses, laboratory accidents, etc.), a gas disinfection of the buildings should be carried out by the use of formalin, ethylene oxide or beta-propiolactone. If this is impossible, the above-mentioned wet facilities should be used to spray all the items and the air in the buildings.

The above data show that the disinfection to be carried out in cases of viruses diseases has a number of characteristic features which should be well known to the military doctor. The unsuitability of a number of well known disinfectants (phenol, lysol, alcohol, heavy metal salts) for practical virus disinfections should be borne in mind. The larger the virus the closer it comes to a bacterium from a disinfection point of view. The small viruses are frequently insensitive to certain disinfectants. The disinfection is adversely affected by the presence of ballast substances usually accompanying the viruses as well as by the intra-cellular position of the viruses. The disinfectant doses used in such cases should therefore be considerably larger than those used against bacteria.

There are a number of facilities (beta-propiolactone and ethylene oxide) with universal virucidal action. These should be introduced for disinfecting purposes as soon as possible. The next goal of the antiepidemic institutions is to develop methods designed to control the effectiveness of disinfections against virus diseases that could be used in every day work.

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The Use of Immuno-Fluorescent Paper Discs for
the Rapid Detection of Pathogenic Microbes

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The rapid detection of pathogenic microbes in the food, water, air, soil, on surfaces of various objects and materials used by the patient is very important for the timely implementation of the necessary antiepidemic measures. In this connection, both Soviet and foreign researchers have in recent years been successfully developing one of the most promising detection methods--the method of fluorescent antibodies facilitating a rapid diagnosis of numerous infectious diseases and a specific indication of pathogenic microbes in the external medium.

As is known, the fluorescent sera currently developed by the scientific research institutes are produced and used only in liquid form. The storing and repeated use of the liquid fluorescent conjugates usually involves contamination and leads to their rapid inactivation. The mentioned shortcomings involved in the use of fluorescent antibodies in liquid form prompted us to investigate the possibility of developing new methods of using fluorescent sera that would simplify the storing and utilization of luminescent conjugates and make the method of fluorescent antibodies simpler and more accessible to practical laboratories. Instead of the liquid form of labeled gamma-globulins we used strips of various kinds of paper which had been saturated with fluorescent conjugates. The immuno-fluorescent paper should serve as a kind of specific immunochemical indicator of a pathogenic microflora.

It should be pointed out that in serological practice various kinds of paper have long been used for the purpose of drying and holding immune sera as they are transported in the laboratories. The majority of the authors point to the relatively fast inactivation (in 10-15 days) of the immune sera dried on paper. L. S. Reznikova, Ye. A. Yevleva, etc. (1956) proved, on the basis of an electrophoretic analysis, that the storing of paper-dried immune sera results in a reduction and rapid loss of their immunological activity and reveals a change in the electrophorogram; in particular, the gamma-globulin fraction is markedly reduced in size during storage, completely disappears after 2½ months, and the positive serum changes to negative.

As for the use of fluorescent serum, dried on paper, we have found no reference to this in the literature available to us. The investigation we made in this connection was designed to study the duration of the fluorescent antibodies adsorbed on paper and their possible continued use for the rapid detection of pathogenic microorganisms in smears.

We used various kinds of paper to prepare the immuno-fluorescent papers (usually in the form of discs or strips): waxpaper, newsprint, writing paper, filter paper, etc. Special tests revealed that the best immuno-fluorescent disc can be made of filter paper which easily adsorbs and desorbs fluorescent gamma-globulin in a physiological solution preserving their immunological activity for a long time.

Pasturizer pipets with fine capillaries are used to apply one drop (usually 0.005-0.01 milliliter) of fluorescent immune serum of a certain specificity to each side of the disc made of filter paper and measuring 1 cm in diameter. The fluorescent sera used for impregnating the discs are undiluted, as the paper discs saturated with diluted conjugates lose their immuno-fluorescent capacity faster. The paper discs with the fluorescent gamma-globulins in Petrie dishes are rapidly dried at room temperature or in a thermostat at 37° for 10-15 minutes. The dried immuno-fluorescent discs are then placed in sterile test tubes, tightly closed with rubber corks and kept in a refrigerator at 4°.

The quantity of fluorescent gamma-globulins applied to the paper discs

can be carefully measured thereby standardizing the produced immuno-fluorescent indicators by analogy with the standardization of the discs with antibiotics.

The immuno-fluorescent discs can be used for work by the direct and in direct methods of fluorescent antibodies. Antimicrobial fluorescent discs are used in the direct method of fluorescent antibodies, and anti-globulin discs in the indirect method.

The direct method. The immuno-fluorescent disc is placed on a fixed bacterial smear, and a pasteurizer pipet is used to put a drop of physiological solution on the disc. The preparation is placed in a humid chamber at 37° usually for 10-30 minutes. In that period the fluorescent gamma-globulins adsorbed on the discs are dissolved in the physiological solution and interact with the homotypical microbial cells found in the smear. The preparation is then taken out of the humid chamber and washed with running water or in a physiological solution for 5-10 minutes to remove the immuno-fluorescent disc and the unbound fluorescent antibodies. The preparation is dried and examined under a luminescent microscope.

The indirect method. A drop of unlabeled antimicrobial serum solution 1:10 is applied to a fixed smear. The preparation is then treated in a humid chamber for 10 minutes. The preparation is washed for 10 minutes in running water and dried in order to remove the serum from the smear. An anti-globulin immuno-fluorescent disc with one drop of a physiological solution on it is then placed on the smear. The preparation is again placed in a thermostatically controlled humid chamber at 37° for 10-30 minutes, then taken out of the chamber, washed for 10 minutes, dried and examined under a luminescent microscope.

We used the above-described methods to produce immuno-fluorescent paper discs of various specificity. The direct method, for example, was used to treat the preparation required for the immuno-fluorescent discs to be used in connection with the Flexner tularemia and dysentery. The characteristics of the initial fluorescent gamma-globulin used in the preparation of immuno-fluorescent paper discs are presented in Table 1.

Properties of initial fluorescent gamma-globulins used for the preparation of immuno-fluorescent discs

Type of gamma-globulin	Liquid fluorescent gamma-globulin			
	Protein, %	agglutination titer	specificity	staining capacity
Flexner anti-dysenteric	2.3	1:3200	Stains homologous microbes only	++++
Anti-tularense	1.9	1:1800	Ditto	++ ++

Paper discs saturated with fluorescent anti-equine gamma-globulin were made for the use in the indirect method of fluorescent antibodies. The discs were kept in sterile test tubes at a temperature of 4°. Throughout the entire observation period the immuno-fluorescent discs were periodically used for the rapid treatment of bacteriological preparations by the direct and indirect methods with a view to studying their specific capacity to stain homotypical microbial cells. All the tests involved the employment of the required controls which are used in the work with fluorescent antibodies: the treatment of homo- and heterotypical bacteria by the use of immuno-fluorescent discs of a known specificity; the use of normal sera to stain immuno-fluorescent paper discs.

The results of the investigations involved in the study of the intensity of the specific staining of the bacteria in smears treated by the use of immuno-fluorescent discs by the direct and indirect methods, depending on their storage duration, are presented in Tables 2 and 3.

The staining capacity of the immunofluorescent disks used in the direct method depending on the duration of their storage

Table 2

Microbial culture	Type of immuno-fluorescent disks	Storage duration & fluorescence intensity									
		Days			Months						
		1	7	15	1	3	6	9	12	15	
Flexner dysenteric	Flexner anti-dysenteric	++++	++++	++++	++++	++++	++++	++++	+++	++	***
Bacillus coli	ditto	-	-	-	-	-	-	-	-	-	-
Tularemia vaccine	anti-tularemia	++++	++++	++++	++++	++++	+	+	+	+	+
Bacillus coli	ditto	-	-	-	-	-	-	-	-	-	-

Remark. The fluorescence intensity was estimated by the generally accepted quadripolar system. Initial exposure to staining process 10 minutes.

* exposure to staining process from that time on was increased to 20 min.

** exposure to staining process from that time on was increased to 30 min.

The staining capacity of the immunofluorescent disks used in indirect method depending on the duration of their storage

Table 3

Microbial culture	1st processing phase (10 min)	2nd processing phase (10-30 min)	Storage duration & fluorescence intensity									
			days			months						
			1	7	15	1	3	6	9	12	15	
Anthrax vaccine	Anthrax horse serum (1:10)	Anti-equine immuno-fluorescent disk	++++	++++	++++	++++	++++	++++	+	+	+	++
Bacillus coli	Ditto	Ditto	-	-	-	-	-	-	-	-	-	-

Remark. Same as in Table 2.

As the above tables indicate, the immunofluorescent paper disks (for the direct and indirect methods) kept for a long time in a refrigerator (15 months) retained their immunological capacity for the specific staining of homologous microbial cells. The treatment of the heterologous bacteria in the control animals by the use of immunofluorescent disks did not develop any nonspecific fluorescence in them.

The Luminescence intensity of the microbial cells in the smears treated by the use of immunofluorescent disks remained almost at the same level for a long period of time. But in the course of time, the exposure had to be increased during the processing of the fluorescent disk preparation in order to produce a bright fluorescence of the cells. Thus after the fluorescent disks had been made it took 10 minutes to treat the preparation on them by the direct method in order to get a +++ fluorescence; six months later, a +++ fluorescence of the bacteria required an increase of the exposure to 20 minutes, and 12 months later a bright fluorescence of the bacteria (+++ or +++) required a 30-minute exposure during the staining of the preparation. After being stored for 9-12 months in a refrigerator the immunofluorescent disks revealed a partial loss of their staining capacity because of the deeper adsorption of the fluorescent antibodies on the filter paper and, apparently, the partial denaturation of the fluorescent gamma-globulins.

The immunofluorescent disks were successfully used, instead of liquid fluorescent conjugates, for the rapid detection of pathogenic microorganisms in the smears. Our investigations have proved that the use of immunofluorescent indicator disks is the simplest and most convenient method of applying fluorescent antibodies. The use of immunofluorescent paper disks simplifies the storing, application and transportation of the fluorescent antibodies, facilitates their standardization and justifies the recommendation of their use in field conditions.

Determining the Supply of Vitamin C in the Organism by Testing the Urine Discharged Before Breakfast

Major of the Medical Service
V. S. Rozovski and
G. I. Ratkovskaya

We determined the vitamin-C saturation by the urine of homogeneous groups of servicemen living in the same conditions, doing the same work, engaged in the same training exercises and eating the same diet in the same dining room. Immediately after waking in the morning, the soldiers and sergeants as a rule go to the wash-together where they urinate at the same time. Fifty-sixty minutes after the first urination, the soldiers and sergeants of the unit under examination report to the medical aid center where they are given a graduated 0.5-liter jar for every five people in which the urine is collected (the time of the first and second urination is recorded). That urine is used to determine the content of ascorbic acid. This type of examination reduces the number of analyses, speeds up the determination of ascorbic acid concentration in the urine and obviates the necessity of adding a preservative to the urine. Experience shows that the definition in such cases is more precise as the number of investigated people increases several times over, and the methods of laboratory determination become simpler (it is no longer necessary to pour the urine from a jar into a cylinder and from there into a bulb, a smaller quantity of laboratory dishes are used for titration purposes and fewer reagents are used up).

The contents of ascorbic acid found in the urine of each individual soldier was added up and the average amount of ascorbic acid in mg/hour of the morning urine calculated.

The quantity of ascorbic acid in the urine obtained from five men was found to be approximately the same.

Calculation example. The milligram-hour of vitamin C eliminated with the urine is calculated by the same formula as in the individual determination:

$$X = \frac{(V_1 - C) \cdot B \cdot V_2 \cdot 60}{2 \cdot t}$$

where V_1 is the average titration result of the experimental test; C the average titration result of the controls; D the amount of ascorbic acid in mg corresponding to 1 milliliter of Til'man's reagent; V_2 the amount of urine in milliliters; 2 -- the amount of urine in milliliters used for titration purposes; t the time interval between the first and second urination expressed in minutes; 60 the conversion factor of minutes into hours.

Only the calculation of the V_2 magnitude changes in our case. For example, the urine specimens of five people were collected in a single jar. The amount of the urine was 180 milliliters. Dividing this amount into five, we get:

$$V_2 = \frac{180}{5} = 36 \text{ ml. Hence:}$$

$$X = \frac{(0.27 - 0.05) \cdot 0.08 \cdot 36 \cdot 60}{2 \cdot 50} = 0.38 \text{ mg/hr.}$$

Using this method, we examined 380 persons in 1962 for their vitamin C intake. After the addition of 50 mg ascorbic acid to each man's daily ration, we found that 0.4-0.45 mg/hr of that acid was contained in the morning urine. An examination of another group of servicemen receiving as much ascorbic acid as doing harder work (tank driving at night and firing practice) have revealed a lower content of ascorbic acid in their morning urine -- 0.12-0.13 mg/hr.

Thus by using the proposed method of determining the vitamin C content in the morning urine it is possible to get a clear idea of whether the men of a given group receive enough of that vitamin.

Aviation And Naval Medicine

The Changes in Human Peripheral Blood Produce by
Breathing Oxygen Under Increased Pressure

A. I. Shevchenko

The study of the reaction of peripheral blood to the respiration of oxygen under increased pressure consisted of two series of experiments. The first series included the study of the effect of oxygen respiration under pressure on the ground, and the second at altitudes above 20,000 meters. Forty males aged 19 to 22 participated in the oxygen-breathing experiments on the ground, and 50 in the experiments carried in rarified air. A KP-T apparatus was used in the ground experiments to increase the pressure in the first tests to 250 mm of the water column for a 30-minute period; in the second version of the tests, involving compensating clothing, the pressure was increased to 2,000 mm of the water column for 10-20 minutes.

The second series of experiments was carried out in a pressure chamber at an altitude of 20,000 meters and higher. In this case the increased oxygen pressure in the lungs exceeded 1,500 mm of the water column, and lasted up to 60 minutes. Pressure suits were used in these tests.

The peripheral blood for analysis purposes in both series of tests was drawn from the fingers 30 minutes before the experiment, and 10-20 minutes and 24 hours after it, and in case of considerable changes the blood was also taken 48 and 72 hours later. The blood analysis was used to determine the hemoglobin content, the number of erythrocytes and leucocytes per 1 mm³, the color index, the erythrocyte sedimentation reaction and the leucocyter formula.

The major results of our investigations on the ground (first series) revealed that a 250 mm increase in the pressure also produced a small increase in the number of leucocytes in the test subject (by 900 cells) through the medium of the neutrophil group. No changes were found in the red blood and erythrocyte sedimentation reaction. When the oxygen pressure was increased to 2,000 mm of the water column and the pressure suit was used, the composition of the blood changed in the same direction, the only difference being a larger increase in the number of leucocytes (1,900 cells per 1 mm³ of blood).

The statistical processing of a larger volume of observation materials revealed that the immediate after-effect of oxygen respiration under increased pressure at altitudes up to 20,000 meters and higher is some increase in the number of erythrocytes (200,000) with the hemoglobin content remaining unchanged, an insignificant fluctuation of the color index and a distinct increase in the number of leucocytes (by 2,400 cells per 1 mm³ of the blood); An increase in the number of all cells, particularly of the neutrophil group, with a distinct shift to the left, is noted in the leucocyter formula. Such changes in the blood composition after the effect of oxygen respiration under increased pressure can last from a few to 24 hours. But in a number of cases, a higher number of leucocytes is found also after a longer period of time (2-3 days).

We know from published information that respiration under increased pressure is conducive to congestive events in the lesser circulation and a slower flow of blood in the greater circulation. Noted also was the condensation of blood due to the exudation in the tissue and the reduced volume of circulating plasma (Sobel, Marotta and Marberger, 1959). But these changes in the hemodynamics do not fully explain the results of our investigations. If the congestive events or condensation of the blood played a decisive role in the changes of the peripheral blood, the nature of the white and red blood changes would be largely identical. Our experiments revealed primarily a change in the white blood, especially in the days following the experiment.

According to our information, the changes in the peripheral blood play a definite part in determining the period of time required for the complete restoration of the organism's functions which have been changed under the effect of higher oxygen pressure. The normalization of the blood may serve

as an important criterion for determining the duration of the time between the tests in case they have to be repeated. When estimating the nature of the blood changes, it should be borne in mind that the above-described changes are not strictly specific to respiration under increased pressure. This was shown by our observations of the changing blood morphology in people subjected to the effect of G-force weightlessness and other flight factors.

Thus the mentioned changes in the white blood produced by increased oxygen pressure probably reflect the dynamics of the development of functional stress which occurs under the effect of various unfavorable factors of the external medium on the organism. It is therefore desirable that the repeated experiments involving the use of oxygen under increased pressure be carried out at intervals of at least three days.

A Study of the Thermoregulation of the Flight
Personnel With a View to Facilitating a Medical
And Flight Expertise

Lt. Col. of the Medical Service
A. S. Panfilov
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The important methods of examining the flight personnel with a view to facilitating the medical and flight expertise include various functional test-loads which make increasing demands on certain systems and functions of the organism. The use of such test-loads makes it possible to estimate adaptive-compensating possibilities of the organism in flight conditions. The most specific factors affecting the pilot's organism in flight include: oxygen deficiency, acceleration and reduced barometric pressure. Appropriate function test-loads are used for estimating the effect of these factors in the practice of aviation medicine.

Another factor of practical importance in the flights in modern planes, particularly supersonic fighter planes, is the temperature. The temperature factors are determined primarily by the thermoregulation system in the plane's cabin and under the pilot's pressure suit. The existing air ventilation system in the cabin and under the pilot's pressure suit (the sealed helmet, pressure suit) does not always insure the proper air circulation.

A decrease in the heat emission may result in the disruption of the thermal balance of the pilot's organism and a considerable rise in body temperature which, in turn, may be accompanied by profuse perspiration and changes in the cardiovascular and other vegetative reactions. The neuro-emotional stress experienced by the pilot in flights on modern planes, particularly in the study of the new materiel, is in some measure also responsible for the rising temperature.

A number of authors (V. R. Yaroshevskiy and A. V. Solodovnikov, 1960) found the body temperature of the fighter pilots to be $0.4-1.5^{\circ}$ higher after a flight. According to their observations, the increase in temperature is to some extent also determined by the flying experience and the complexity of the flight. According to V. R. Yaroshevskiy and R. I. Shaidin (1962), the continuous recording of the temperature reaction by a Voldman thermograph revealed that during the preparation for a flight the pilot's body temperature was $36.1-36.2^{\circ}$, in the course of several flights it was $37-37.1^{\circ}$, and after the end of the flying day it returned to the initial level. A rise in the pilot's temperature under actual flying conditions was noted also by other authors (N. P. Sergeyev and D. I. Ivanov, 1960). The importance of the pilot's temperature reactions for aviation medicine may be explained by the fact that by changing the vegetative reactions, the temperature effect may also change the organism's reactivity to other flight factors. Some authors (A. A. Dorodnitsina and Ye. Ya. Shmel'ev et al, 1958) have noted changes in the tolerance of hypoxia under the effect of temperature.

The determination of the thermoregulation stability of the organism and its reactivity to the temperature factor is an important feature of the examination of the flight personnel. The discussion of this problem in the literature available to us is inadequate. Nor are there any valuable methods of studying thermoregulation available. The Tscherbak thermoregulation reflex cannot be conveniently used, and it does not represent a functional test load. In our study of thermoregulation we adopted a test with a thermal load. The results of that investigation were evaluated on the basis of skin temperature, perspiration and cardiovascular reactions.

The following investigation methods were used. After keeping the test subject in a lying position for 10 minutes, his pulse was taken, arterial pressure measured and the skin temperature determined on the extremities, body, head and oral cavity. The arterial pressure was measured with a

sphygmomanometer by the Korotkov method and recorded on paper by an oscillograph. The skin temperature was determined by a "biotherm" electrothermometer, and the perspiration by an electrometric method. After recording the initial figures, the test subject (who wears the usual hospital robe) is given an air bath. The temperature of that bath is 40°. After 30 minutes of the air bath, all the above mentioned measurements are taken again, and repeated 20 minutes later. Fifty healthy persons of the flight personnel, aged 22 to 30, were examined by the mentioned methods (Table 1).

Table 1

Measured areas	Immediately after ther.load				20 minutes after thermal load			
	Skin temperat. in degrees		perspiration, in millivolts		Skin temperat. degrees		perspiration, in millivolts	
	incr- eased	average	incr- eased	average	incr- eased	average	incr- eased	average
Upper extremities	0.4- 4.5	2.2	0-109	50	0-3.8	1.6	0-180	30
Lower extremities	0.2- 2.8	0.8	20-900	130	0-1.4	0.4	0-60	20
Body	0.6- 2.8	1.5	20-500	80	0-1.3	0.6	0-200	20
Head	0.4- 2.0	1.0	40-1000	200	0-0.8	0.4	0-800	110
Oral cavity	0.2- 1.8	0.7	-	-	0-1.4	0.4	-	-

As indicated in Table 1, the thermal load is followed by a varying level of skin temperature and perspiration. The highest fluctuations in skin temperature are noted in the upper extremities -- from 0.4° to 4.5°, and the perspiration on the head and lower extremities. The skin temperature and perspiration did not always return to the initial levels 20 minutes after the thermal load, but the perspiration was normalized faster than the skin temperature.

The reaction of the cardiovascular system under the effect of a thermal load was judged by the pulse frequency, the systolic and diastolic pressure as well as by the changing arterial pressure and oscillating index. Forty-eight people revealed a higher pulse rate; in 44 of them it was 5-10 beats per minute higher, in two 11-15 and in two 16-20 beats per minute. Twenty minutes after the thermal load the pulse rate dropped to the initial level in only 28 of the people, in the others it remained higher than normal for a longer period of time (Table 2).

Table 2

Arterial pressure	Increase in mm of merc. col.	Number of examinees	Reduction in mm of merc. col.	Number of examinees	Number of examinees with unchanged arterial pressure
Diastolic	5-10	4	5-10	8	31
	16-20	2	11-15	5	
Systolic	5-10	3	5-10	32	
	16-20	1	11-15	3	10
			16-20	1	
Average	5-10	3	5-10	7	38
			11-15	2	
Oscillator index	---	3	---	8	39

It appears from Table 2 that the most frequent reaction of the cardiovascular system to a thermal load is a lower diastolic and especially systolic pressure. Twenty minutes after the thermal load, the diastolic pressure returned to the initial level in 8 people, the systolic pressure in 6, the average in 5 and the oscillation index in 2. Thus a 30-minute thermal load produces a certain strain on the compensatory mechanisms which manifest itself in the reactions of the cardiovascular system, and in a high skin temperature and perspiration. The considerable deviations of the temperature, perspiration and vascular reactions from the initial magnitude as well as their stability suggests an unstable thermoregulation in some individuals.

A simultaneous investigation was made of the tolerance of a thermal load on the part of 40 people, aged 25 to 35, who had been examined in the hospital for various functional disturbances symptomized by pulse and arterial pressure lability, higher exudation, pronounced vasomotor reactions and emotional lability. The mentioned deviations were treated as vegetative-vascular and neurocirculatory dystonia.

It is a known fact that in certain individuals the development of vaso-vegetative dystonia is accompanied by a lower tolerance of hypoxia, and acceleration and a tendency to faint -- which is indicative of inadequate adaptive-compensatory possibilities of the organism in regard to certain flight factors. This made it desirable to determine the compensation reaction to temperature effects in this group. An examination of the people in the mentioned group revealed a higher pulse rate in all of them after the thermal load; in 19 of them the increase was by 5-10 beats, in 11 by 11-15, in 9 by 16-20 and in 1 person it was more than by 20 beats per minute. A comparison of the investigation results justifies the assertion that the thermal load was followed by more pronounced changes in the skin temperature and perspiration in the people of the second group. The reaction of their cardiovascular system to the thermal load was stable and considerably more pronounced than in the practically healthy people. Thus among the people of the second group, the minimum pressure returned to the initial level 20 minutes after the thermal load in 6 persons, and the maximum pressure only in 2. Furthermore, 15 persons revealed a further drop in the maximum pressure by 5-10 mm of the mercury column, and 5 a drop in the minimum pressure within the same range.

The more pronounced reaction on the part of the cardiovascular system to a thermal load in persons with different vegetative-vascular disturbances may be evaluated as a definite insufficiency of the adaptive-compensation possibilities of the cardiovascular system. This is manifested in a more pronounced hypotonic reaction, a higher pulse beat frequency and changing oscillation index, as well as a slow reversion of the mentioned indexes to the initial levels. The reduced compensation possibilities of the cardiovascular system in persons with vegetative-vascular disturbances are also indicated by the fact that two of the 20 test subject revealed a poor tolerance of hypoxia, and 7 a vaso-hypotonic reaction to the changing body position on a revolving table. It should be pointed out that in a test involving a thermal load, these people showed a very pronounced reaction of the cardiovascular system and a wide fluctuation of the skin temperature.

The investigation results showed that persons with vasculo-vegetative instability are in the majority of cases characterized by a hyperreactive type of thermoregulation with increased reactions on the part of the cardiovascular system similar to the hypotonic type. Consequently, the effect of such basic flight factors as hypoxia and acceleration on these people will be made against the changed background, which will still further reduce the adaptive-compensation possibilities of the organism. A further study of the patterns of the temperature effect on the pilot's organism in flight is therefore a matter of some urgency.

The resulting data justify the conclusion that the thermal load used as a functional test of thermoregulation can also be applied in the examination of the flight personnel with a view to facilitating a medical expertise.

[REDACTED]

The Importance of an X-ray Diagnosis of
Atherosclerosis of the Abdominal Aorta
And Its Bifurcation in the Flight Personnel

Lt. Col. of the Medical Service
I. V. Orlov

The etiology and pathogenesis of atherosclerosis have not yet been fully clarified. A great deal of attention has therefore been devoted in our country and abroad to the study of this disease which frequently affects young people, and is clinically manifested at the age of 30 (A. L. Myasnikov). X-ray methods of examinations are particularly important for a diagnosis of atherosclerosis.

The symptoms of atherosclerosis of the thoracic aorta encountered in daily practice, particularly its induration, elongation and dilatation, are frequently used in combination with clinical data as symptoms of atherosclerosis of the thoracic aorta. But in view of the fact that the X-ray and anatomical data frequently do not coincide because of the individual structural characteristics of the aorta and the age of the test subjects, many authors attach only relative importance to these symptoms in their diagnosis of atherosclerosis of the thoracic aorta. Calcinosiis of the thoracic sections of the aorta, on the other hand, is a fairly rare occurrence even in cases of a very pronounced atherosclerosis. In such cases the changing amplitude or deformation of the waves of a kymogram may indicate an atherosclerotic process (V. V. Zolnev, A. A. Kosachevskiy, Z. G. Spektorova, etc.).

Of considerable importance for the detection of atherosclerosis is an X-ray examination of the abdominal aorta and its bifurcation, that is the portion of the aorta where the calcinosiis of the atheromatous patches, as a rule, appears earlier and more frequently, and is often widespread. An X-ray indication in the form of calcium deposits in the atheromatous patches is an unmistakable sign of atherosclerosis of the aorta and other large arterial trunks.

The detected calcinosiis sources, as a rule, correspond to the L_3 level, that is the aortic bifurcation area. They are frequently located in the large pelvic arteries, and occasionally also in the femoral arteries. The shadows of calcinosiis are characterized by a large variety of forms and sizes. These data were first published in 1956 by Z. G. Spektorova who pointed to the frequent combinations of pronounced aortic atherosclerosis with various stages of the hypertonic disease. K. G. Volkova reached the same conclusion.

The X-ray method of diagnosing atherosclerosis is based on the detection of the late and secondary manifestations of calcinosiis. The focal calcification of atheromatous patches indicates a third stage in the development of atherosclerosis which is preceded by a first, cholesterol-lipoid, and a second, fibrous, stages of development of atherosclerosis. It is obvious therefore that whenever an X-ray examination detects the third stage, the first two stages preceding it are already exist.

An entirely different case is the so-called Menkeberg sclerosis, the diffuse calcinosiis of the central arterial membrane, which is of a benign nature and is not manifested clinically. It is frequently detected accidentally in an X-ray examination of the pelvis of extremities. Diffuse calcinosiis is occasionally combined with focal atherosclerotic calcinosiis. N. N. Anichkov points out that the true calcification forms are sharply different from one another in their location in the membranes, their prevalence in the arterial system, in the histological picture and the importance to the organism.

We have in recent years examined a group of 142 people of the flight personnel, aged 30 to 55, in hospital conditions. The mentioned people were subjected to a careful clinical examination, including, among other things, biochemical, electrophysiological (EKG, VCG, FCG), roentgenological and

clinico-physiological tests. The functional condition of the cardiovascular system was determined as under ordinary conditions as well as under test loads (hypoxia, orthostatic tests, etc.). Those with disturbed fatty metabolism and vascular tonus, with a hypertonic disease or symptoms of atherosclerosis were subjected to an X-ray examination.

The X-ray investigation included an examination of the chest, X-ray and kymographic examination of the thoracic aorta, and an X-ray picture of the cervical vessels (carotid arteries), femoral arteries, the abdominal aorta and its bifurcation. The pictures of the abdominal aorta and its bifurcation were made at the lumbosacral level of the spine (D₁₂-S₅) in a direct and lateral projections. The examination was preceded by the preparation of the patient (an enema on the previous evening and in the morning of the day of investigation). The RUD-110-115-2 (RUM-5) apparatus was used. The technical conditions varied according to the patient's constitution. The focal distance was 89-95 cm, the voltage 83-91 kv, the current 100 milliamperes, and the exposure 12-2 seconds. The X-ray picture of the abdominal aorta was the most significant. In doubtful cases, collimating pictures were made with the use of a tube and compression (football chamber).

We have not been able to obtain convincing data indicating indisputable atherosclerotic changes (calcinosis in the atheromatous patches) in the examination of the thoracic aorta or the carotid arteries. An examination of the femoral arteries revealed a diffuse calcinosis in only three cases. But the most valuable data in regard to the detection of atherosclerosis were obtained in an X-ray examination of the abdominal aorta and its bifurcation. Calcinosis in the atheromatous patches was found in 27 people (19%); 23 of them were between 40 and 50 years of age, two under 40 and two over 50. The X-ray examinations produced indisputable data indicating atherosclerosis, and resulted in the following diagnosis: atherosclerosis (17 people), hypertonic disease and atherosclerosis (10 people).

Thus the X-ray examination produced more objective data required for diagnosing atherosclerosis. As a rule, the calcinosis of the atheromatous patches in the walls of the abdominal aorta proved to be the earliest X-ray signs of atherosclerosis, and were located at the L₃₋₅ level, that is in the aortic bifurcation area. The shadows of the calcinosis varied a great deal in form and size. In some cases the calcinotic foci were arranged in a chain along the anterior and posterior walls of the aorta, or appeared separately and were not very prominent. Patches measuring up to 1.5-2 cm in length could be seen in cases of massive atherosclerotic calcinosis (Fig. 1). The calcinosis was found to be located in the walls of the abdominal aorta alone (10 cases), in the walls of the abdominal aorta and pelvic arteries (7), in the walls of the abdominal aorta and femoral arteries (1), in the pelvic arteries alone (2), and in the walls of the pelvic and femoral arteries (1).

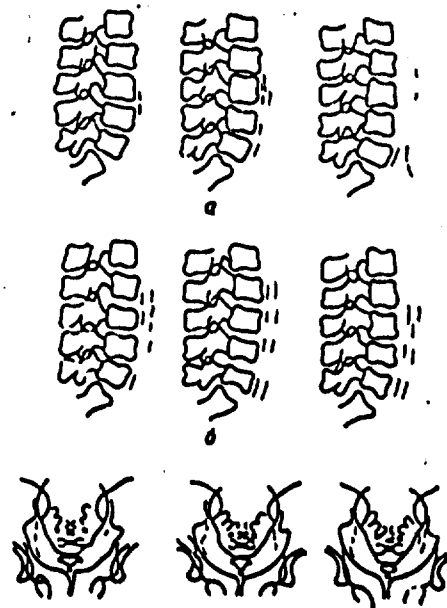


Рис. 1.

— одиночные тени кальциноза в стенках брюшной аорты; б — массивная кальциноз стенок аорты; в — множественные и одиночные очаги кальциноза в тазовых артериях.

Fig. 1. a—Isolated shadows of calcinosis in the walls of the abdominal aorta; b—massive calcinosis of the aortic walls; c—numerous and isolated patches of calcinosis in the pelvic arteries.

The above-cited data reveal that the most frequent occurrence was the calcinosis of the atheromatous patches in the walls of the abdominal aorta (18 cases). Only isolated foci of calcinosis were found in a few atheromatous patches of the aorta in 11 cases, and a widespread focal calcinosis in 7 cases. Diffuse calcinosis, found to be combined with atherosclerotic calcinosis, was as a rule found in the vessels of the small pelvis and the femoral arteries. Ten of the people with X-ray signs of atherosclerosis were kept under active observations for two years; no substantial roentgenological dynamics was found in them. Twenty of the 27 persons with X-ray signs of atherosclerosis revealed a higher cholesterol content in their blood (180-200 mg% and more), and only in five of them were the contents normal.

The correlation between the detected changes and the speed of the pulse wave along the elastic-type arteries was carefully defined. Thus in 16 people with X-ray signs of atherosclerosis the speed of the pulse wave exceeded 8.5 meter/sec. No complaints were as a rule made by the people with calcinosis of the atheromatous patches in the walls of the abdominal aorta and its bifurcation, the incipient development of the third stage of atherosclerosis. Only some of them complained of aches in the heart region occurring after long flights.

Navigator, first class Ch., born 1923, has been flying since 1944. He was found to be fit for flying without limitations until 1959; since that year he was frequently examined at the Scientific Research Aviation Institute in connection with lumbrosacral radiculitis. He was last examined in 1961 when he complained of aches in the lumbar region occurring after long flights, fatigue, partial loss of memory, weakness and shortness of breath when walking fast.

An X-ray examination revealed numerous foci of calcinosis of the atheromatous patches in the walls of the abdominal aorta at the L₄₋₅ level and the small pelvic arteries. In this case, the widespread atherocalcinosis of the abdominal aorta and the small pelvic arteries was detected only by the X-ray method (Fig. 2 and 3).

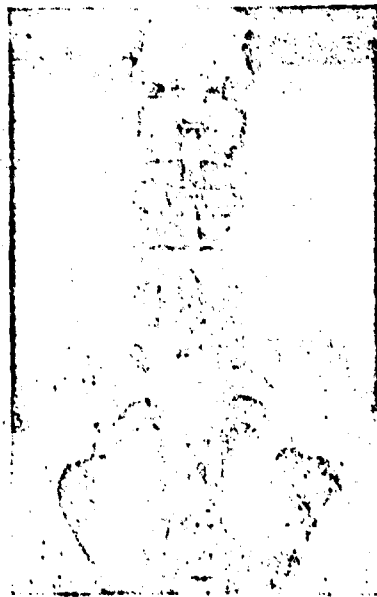


FIG. 2.

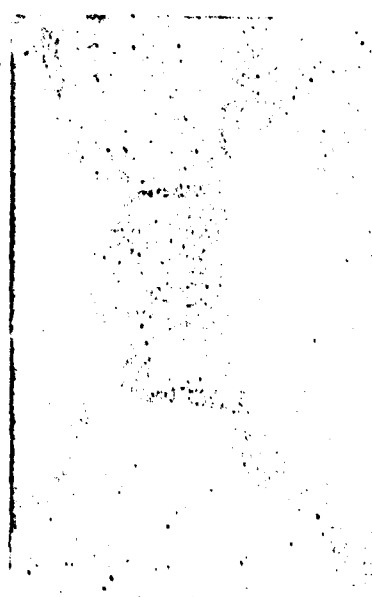


FIG. 3.

The above-described case emphasizes the importance of X-rays in diagnosing atherosclerosis among the flight personnel. X-ray examinations undoubtedly widen the diagnostic possibilities and affect the final expert conclusions. The flight crews whose atherosclerosis had been established by X-ray methods were, as a rule, put on limited duties. All the cases in which calcinosis was detected by X-ray methods were eventually diagnosed as atherosclerosis.

An X-ray examination of the abdominal aorta connected with the diagnosis of atherosclerosis frequently detects a number of other spinal diseases (osteochondrosis, deforming spondylosis, old fractures of the vertebrae, ribs and other traumatic injuries, as well as hemangioma of the vertebral bodies, chronic spondylarthritides ankylopoietica, or Bekhterev's disease, stones in the urinary tracts and serious developmental anomalies). In most cases, the mentioned "discoveries" do not involve complaints of pains in the spine and are not unusual from a clinical point of view. These changes may not be discovered by a surgical examination even though they are very important for an expert decision.

An X-ray examination of the flight personnel suspected of atherosclerosis can be used in the daily medical practice associated with the flight personnel, and for special examinations and certification of the flight personnel.

Exchanging Experience

The Importance of the Military-Science Society
of the Academy Students in the Training of
Military DoctorsLt. Col. of the Medical Service
A. T. Rudenko

The Society of Military Science consisting of students of the Military Medical Academy imeni S. M. Kirova, is an old organization with its own history; it is strictly voluntary and involves a wide participation in military science on the part of all students of the Academy regardless of age and grade. The participation of most of the Academy's students in the work of the Society of Military Science is regarded as one of the important methods of training and educating qualified military medical cadres.

The Academy has all the necessary conditions for the student to test his capacity in the field of scientific research. Special men are therefore appointed in charge of the scientific circles from among the experience teachers and scientists of the Academy, special days and hours are designated for work by the students in the various departments and laboratories, and necessary funds are appropriated for experimental purposes. The scientific research work by the students is a matter of constant concern to the teaching personnel. This type of research has been expanding from year to year and become one of the most important aspects of the Academy's activity as a school of learning. Taking an active part in the work of the student society, in addition to the future doctors, are all those taking advanced courses, that is army doctors with some experience in the treatment of troops. It is their work that is of particular interest because it is purposeful and designed to meet the demands of the daily medical services among the troops and raise the level of scientific methods.

The type and scale of the research work may be judged from the following data. One hundred and eighty to 200 of the best scientific studies are usually submitted to the annual scientific conferences of the students. Experience shows that these studies frequently transcend the realm of methodology. Many of them represent important independent research projects.

The nature of their work varies a great deal because of the many fields in which the students are trained. But they are all united on a very high level of scientific methods, and by a desire to be as close as possible to the interests of the military medical service. Among the best research projects are those completed by the officers of the medical service L. V. Pastushenkov "Pharmacological facilities designed to increase the organism's resistance to overloads and hypoxia", A. N. Litzov "On the performance capacity of a surgeon in determining the various notches on a target indicator moving on a screen", F. A. Tsitovich "Determining the functional condition of the myocardium and the coronary blood circulation by the method of measured hypoxemia", etc., which were awarded the first prize by the Academy's Command in 1963. Worth mentioning also are the other research projects carried out by the students V. V. Sedov "Some problems concerning the organization of medical assistance and the treatment of slightly wounded in present-day conditions", A. V. Sakhno "A study of the properties of resorpting magnesium steel used for intra-medullary nailing", by the officers of the medical service A. F. Savchenko "The homo-transplantation of a vitreous body in the surgical treatment of large penetrating scleral wounds of the eyeball", N. V. Golovashenko "Operating on an open injury of the spine and spinal cord", etc.

These examples are indicative of the wide range of the students' interests. The experience of recent years has convinced us that scientific studies of military-medical themes are becoming increasingly popular among the students. Credit for this should go to the Academy's teaching personnel who usually recommend or determine the list of themes for the scientific research projects.

There is adequate ground for the statement, therefore, that the research work carried out by the students at the Academy is one of the important elements of the system of training and advance studies of military medical cadres. But this is only one of the positive aspects of the activity of the student Society of military science. Another feature, which is just as important, is the training of the army research physician. The solution of contemporary problems of military medicine cannot always be provided for in the existing basic statutes, directives, instructions, etc. A number of particular problems require a solution by way of research, which is within the competence of the army doctor and practicing physician who is familiar with the methods of scientific research.

It is these basic methods that are acquired in the Society of military science, not to mention the acquisition of concrete research methods. The ability to define the purpose and extent of the investigation, to select (find), consult and generalize the required literature, to experiment, if necessary, conduct the research work on the basis of the commonly adopted methods (hygienic, physiological, epidemiological, etc.), analyze the resulting data and reach an appropriate conclusion -- these are the basic methods in which the student working in the Society of military science is trained.

All these activities are, of course, not provided for in any curriculum, and a doctor reporting for duty in a unit, on a ship or in a hospital, regardless of his advance training, is still unable to do independent research work. Furthermore, any doctor who has had no contact with scientific research work and is not "oriented" to any definite objective, will not always find such work necessary even when the necessity for it is quite obvious. It takes habit and ability, and these are the qualities which are inculcated at the student Society of Military Science. That is why the student Society of Military Science may be called a true school for the training of research doctors and in this sense it is an organization of enormous importance.

Numerous examples can be cited to prove the point. Here are some of them. N. A. Kurgan, Captain of the medical service, was an active member of the Student Society of Military Science, department of otolaryngology, while attending the Academy (he graduated in 1961). During that period he completed a number of scientific studies and was awarded a prize for one of them. Now in the army unit, he continues to pursue his studies in the field of otolaryngology. He submitted several reports to scientific conferences in 1962-1963. Only three years after his graduation from the Academy, this young doctor has already completed 10 scientific studies and published more than 15 popular science articles in the newspapers.

A. K. Popkov, Senior lieutenant of the medical service, became interested in the organization of medical service in the fleet while attending the Academy. He was an active member of the students scientific circle in the Department of Naval Medical Services. A. K. Popkov is still very much interested in the organization of medical services, as are many other former students now performing their honorable duties as doctors in units, therapeutic and prophylactic institutions of the army and navy and successfully combining these duties with challenging scientific research.

We strongly recommend that all the army doctors intending to take up advanced courses at the Academy should join the student Society of Military Science from the very first day; this is a widespread and accessible form of student participation in active scientific-research work.

The Use of Sterilizing and Distilling
Devices in Field Conditions *

Lt. Col. of the Medical Service
G. V. Shakhovenko
Capt. of the Medical Service
V. L. Bondarenko

*(The SDP sterilizing and distilling device has now been replaced with an SDP-2 model. The latter is capable of producing 25-26 liters of distilled water per hour; the current water reserve is kept in two 100-liter rubber containers and one 100-liter metal tanks built into the body; 4 metal baskets are used for the sterilization of injection solutions in the autoclaves inside the steam-heated boiler. For a more detailed description of the SDP-2 model see S. D. Bashkirov's article in the Military Medical Journal No. 7, 1963)

The field medical institutions have been using a sterilizing and distilling device (SDP) for producing large quantities of distilled and boiled water and sterilizing injection solutions, dressing materials and surgical linen.

We have been using the SDP device in field exercises, in summer and winter training courses, in daytime and at night and under temperatures ranging from +20° to -15°. That device was kept in operation for 2-3 days on end.

This SDP revealed its satisfactory performance in the production of distilled water, and the sterilization of dressing materials and operating-room linen as well as injection solutions. This device proved capable of producing the required quantity of distilled and boiling water for the separate medical battalions and medical service departments. This device is relatively simple in design and durable in operation. But it also has a number of shortcomings which, as we have established, could be largely eliminated by the service personnel itself in the course of operation. Thus during night operations it is not always convenient to illuminate the control and measuring devices (manometer, water-measuring glass, etc.); nor is it convenient to use the "best" type lantern for such purposes, as its glass usually cracks when in contact with water drops, and the lantern is frequently extinguished by a strong wind. We therefore made use of the storage battery which is located in the right instrument box under the floor board of the vehicle to illuminate the control and measuring instruments. Two electric bulbs with a reflector were connected by wires to the storage battery. We have thus provided sufficient illumination for the required spots on the device without revealing its location.

If injection solutions are urgently needed while the two autoclaves are filled with dressing materials and surgical linen, the mentioned solutions can be sterilized in a boiler heated with live steam. To utilize the boiler as a sterilizer, we made a round support measuring 330 mm in diameter and 250 mm in height, put 8-10 250-500 milliliter vials on it with an isotonic or glucose solution and sterilized them for 30 minutes. The support is held up by two suspended hooks; it has an opening in the bottom for the passage of steam. When solution-containing vials measuring over 250 millimeters in height are sterilized, the depth of the support in the boiler can be regulated by means of the opening in the support itself or the hooks. A sterilization container (beaker) can be used as a support by merely connecting the wire hooks to it and suspending in the boiler.

The sterilization temperature in the steam-heated boiler is controlled by a thermometer inserted in the opening for the steam outlet and fastened with a rubber gasket. When the SDP is used in the open field without any canvas or other covering, the opening of the steam-heated boiler (at the time it is loaded or water is added) may let in dust and rain. We have therefore

fastened a peak-shaped sheet of metal above the upper front portion of the SDP to prevent the boiler from such contamination.

The horizontal position of the autoclave in the SDP complicates the distribution of the vials and jars with the solutions to be sterilized on the cylindrical surface of the sterilization chambers. We eliminated this inconvenience by introducing wire supports measuring 550 x 350 x 200 mm which hold the solution container in place during the sterilization process. These supports could be arranged in two layers when the solution-containing jars are small.

Frequent tests have revealed that the production of the desired hourly quantities of steam and distilled water is possible only when the device is carefully started and properly operated. We usually tried to locate the SDP under natural cover or in a half-caponier between the operation and dressing unit and the pharmacy. When placed in a shelter, the device was arranged in such a way that the opening of the firing chamber was on the windward side; this provided a good inflow of air into the firing chamber through the grating. The device was usually tightly covered with a canvas.

The type of distilled water designed to meet all the pharmacopoeian requirements is largely determined by the original consistency. The presence in the water of large quantities of organic impurities, sulphates and chlorides has an adverse effect on the quality of the distilled water. In view of all that we tried to get the water from high quality water sources. But as the original water contained large quantities of organic admixtures, we occasionally had to oxidize them with potassium permanganate.

Good results were achieved also by burning a small quantity of dry firewood by the use of an adequate quantity of liquid fuel, such as tractor kerosene; the use of diesel fuel alone was somewhat less effective in the production of steam. The intensive emission of steam from the distiller funnel should not cause any concern; on the contrary, experience shows that such cases are indicative of an intense formation and release of the distillate.

A 50-liter tank designed to receive the water from the steam boiler with the SDP working at full capacity, is too small to meet the requirements. We find it necessary to use also a rubber contain, RE-6000, for the water in addition to the tank. In wintertime the water in the rubber container is kept from freezing by connecting one end of the extended rubber hose to the steam outlet pipe of the device, and the other end is inserted into the rubber container with water. The steam thus flows along the hose into the water, heats it and keeps it from freezing.

Our observations have shown that a needle-type nozzle is not very durable: it frequently breaks off or just stops working for other reasons. The available spare nozzle rapidly wears out and it is difficult to produce another one on the spot. Two or three spare needle-type nozzles should be available if the installation is to operate without interruption. The low position of the fuel tanks does not produce the required pressure, it frequently clogs the fuel line and damages the nozzle. It would probably be advisable for the military medical warehouses to keep a certain quantity of spare sprayers with needle-type nozzles for atomizing the liquid fuel, as well as other spare parts for the SDP and DDA (mobile disinfection and shower installation) to replace the damaged parts.

In cold weather, we insulated the pipes, valves and pump of the device to keep them from freezing. Asbestos fabric can best be used for such purposes, and if that is not available felt or rags will do. To get more boiling water than the device could produce, we used a 200-liter zinc-plated barrel instead of the steam heated boiler. A valve was first welded to the barrel of the same size and diameter as the boiler valve, and a steam hose attached to the valve. This arrangement enabled us to produce up to 400 liters of boiling water an hour.

Our frequent use of the SDP device in field conditions shows that the

following can be produced within one hour, depending on the fuel and the efficient operation of the device: 10 to 14 liters of distilled water; 100 to 200 liters of boiled water by the use of "direct heat" from the boiler, up to 120 liters (assuming a 40-liter working capacity) and up to 400 liters of boiled water by the use of a 200-liter zinc-plated barrel.

Only the use of a sterilizing and distilling device can provide the considerable quantities of distilled water, sterilized dressing material and operating room linen required by the separate medical battalions (departments of medical aid) for urgent medical assistance to large numbers of wounded and sick men.

The Hematological Indexes of Healthy Young Males

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The normal fluctuation of hematological indexes is not being discussed in the press with increasing frequency. The information available in literature, particularly on leucocyte "norms", is contradictory. The leucocyte norms cited by some authors (D. N. Yanovskiy, A. L. Kaganov and A. G. Rakhmankulov, etc.) are not different from the classical ones (6,000-8,000 per 1 mm³), while others tend to decrease them. This is the normal content of leucocytes as considered by some authors: A. P. Yegorov, 5,000-8,000; Ye. D. Goldberg et al., 4,000-9,000; Vagelder, 3,500-800; and Dakier, 4,000-10,000 per 1 mm³, etc. The reason for decreasing the leucocyte content in the blood of healthy people is laid to the radioactivity of the air as well as the increasing intensity of solar radiation. Nor is there any unanimity in the concept of the "norms" of the percentage-wide content of neutrophils and monocytes. Many authors point to a tendency to increase the maximum content of lymphocytes and monocytes.

Table 1

Indexes	numb. of observ.	M	$\pm\sigma$	$\pm m$	M $\pm\sigma$	P
Hemoglobin	1802	88.4	6.1	0.14	82-92	<0.01
Erythrocytes		4742000	300000	7264	4434000	
Thrombocytes	1720	231800	34800	840.5	197000 266600	
Leucocytes	1802	5950	1350	31.8	4600-7300	
Stabnuclear neutrophils		relat. absol.	2.38 155	1.7 115	0.04 2.7	0.5-4 40-270
segmento- nuclear neutrophils		relat. absol.	54.5 3285	8.25 930	0.19 21.9	45.25-62.75 2355-4215
eosinophiles		relat. absol.	2.3 152	1.8 114	0.042 2.68	0.5-4.0 38-266
lymphocytes		relat. absol.	35.84 2008	6.96 548	0.16 12.9	27-41 1160-2556
Monocytes		relat. absol.	7.23 415	2.7 185	0.06 4.3	4.5-10.0 230-600
Basophils		7.9%				
Erythrocyte sedimentation reaction			5.7 3.1	0.07	2.6-8.8	

The contradictory peripheral blood indexes are partly due to the age and sex differences of the contingents under investigation. In this connection we examined the peripheral blood of 1,802 healthy males, from 19 to 25, to determine the hematological norms. The blood for test purposes was drawn in the morning before breakfast. The following elements were determined: hemoglobin, erythrocytes, leucocytes, thrombocytes, erythrocyte sedimentation reaction, and the percentage and absolute content of white blood elements. The thrombocytes were counted up in a chamber by the Isachenko method. The results of these examinations were processed by the method of variation statistics (Table 1).

The average leucocyte content in the test subjects (5,900) was found to be lower than according to the data produced by the other authors (6,200 per 1 mm^3 according to Ye. D. Goldberg et al, and 6,500 according to A. P. Yegorov).

We studied the variational distribution of the leucocyte content to get a more precise definition of its norm (Table 2).

Table 2.

Number of Leucocytes in 1 mm^3	Number of Observations	
	Absolute	in %
3050 - 3500	6	0.3
3550 - 4000	79	4.3
4050 - 4500	114	6.3
4550 - 5000	280	15.6
5050 - 5500	264	14.7
5550 - 6000	241	13.4
6050 - 6500	219	12.2
6550 - 7000	204	11.4
7050 - 7500	121	6.7
7550 - 8000	138	7.7
8050 - 8500	41	2.2
8550 - 9000	52	2.9
9050 - 9500	30	1.6
9550 - 10000	13	0.7

It appears from Table 2 that in 10.9% of the observations the quantity of leucocytes amounted to 4,500 and less per 1 mm^3 , and 15.1% above 7500. That gives us the right to expand the narrow norms of leucocytes ($M \pm \sigma$) cited in Table 1. Consequently, the normal leucocyte content in young males is believed to be 4000-8000 per 1 mm^3 .

We were able to derive the "norms" of the other blood indexes by comparing $M \pm \sigma$ and the variational data (Table III).

Table 3.

Indexes		normal fluctuation
Hemoglobin		80-100 units
Erythrocytes		4300000-5300000 in 1 mm ³
Leucocytes		4000-8000 in 1 mm ³
Thrombocytes		170000-310000 in 1 mm ³
Stabnuclear neutrophils	absol.	50-400 in 1 mm ³
	relat.	0.5-6%
Segmento-nuclear neutrophils	absol.	2000-4800 in 1 mm ³
	relat.	40-68%
Leucocytes	absol.	1100-2900 in 1 mm ³
	relat.	22-48%
Monocytes	absol.	150-650 in 1 mm ³
	relat.	3-10%
Eosinophiles	absol.	25-400 in 1 mm ³
	relat.	0.5-5%
Erythrocyte sedimentation reaction		2-12 mm per hour

Eosinophils were found in the blood smears of only 7.9% of the test subjects. A count of the leucocyte formula of 4.5% of the test subjects failed to detect any eosinophils, but a further inspection did reveal a few single specimens.

The study of the normal hematological indexes of young males should be continued. The established norms are acceptable for the middle strata. Similar investigations should be carried out in different climatic conditions. Furthermore, repeated investigations every two-three years would be expedient.

The Treatment of Patients Suffering from the
Presence of Foreign Bodies in the Gastro-
intestinal Tract

Lt. Col. of the Medical Service
A. Ya. Rakitin

Swallowed foreign matter is frequently eliminated from the intestine without causing any marked damage. These bodies can be moved by eating intestine-coating food which is rich in cellular tissue. The retention of the foreign matter for a long time and the resulting complications may require surgical treatment. And the urgency of such surgery is determined by the nature of the complications. A. N. Filatov believes that the retention of a foreign body in the stomach for over a week is considered a long time, and A. S. Mochul'skiy thinks that a needle should be removed from the stomach by surgery after 3-5 days in the stomach. The differences of opinion on this subject prompt us to describe our observations and comments on the surgical removal of foreign bodies from the gastrointestinal tract.

Twenty-two persons who swallowed foreign bodies have been under treatment in our hospital in the past ten years: a sewing needle was swallowed by four, paper clips by four, metal coin by four, a stomach catheter by two, a duodenal catheter by one, a roll of wire by one and a concentration of cherry pits by one.

The movement of the needle in side was observed by X-ray in the needle people who swallowed it. The roentgenoscopic examination occasionally produced the wrong impression that the needle was moving from the stomach into the intestine. In such cases the introduction of a barium suspension made it possible to establish the true location of the needle. In five of the people the needle left the stomach and moved to the large intestine between the first and third day, and out of the intestine from one to six days later. In the other four cases the needle did not leave the stomach and had to be removed by gastrotomy. In three cases an operation became necessary because the needle had remained in the stomach for a long period of time causing pains in the epigastric region, and in one case the symptoms of peritonitis called for surgical intervention. In all the operated patients the needle was found in the outlet compartment of the stomach; in one of them the front wall of the duodenal bulb was perforated, in another the point of the needle penetrated through the stomach wall near the large curvature, in a third the needle was stuck in the mucous membrane of the stomach and in a fourth it was loose.

Patient B. was brought in on September 30, 1963 complaining of pains in the epigastric region when he ate or took a deep breath. He had become ill 1½-2 weeks before after accidentally swallowing a sewing needle. Stomach pains occurred after breakfast on September 23. An examination found the stomach to be soft and painful to the touch in the epigastric region. Muscular tension was felt in the epigastric region on October 1. An X-ray examination showed two sewing needles in the stomach. The leucocytosis was 19,200. Erythrocyte sedimentation reaction 200 mm per hour. A toxic granularity of the neutrophils.

A gastrotomy was performed on October 1. Two sewing needles were removed the outlet compartment of the stomach. A small perforation with a fibrinous coating around it was found on the front surface of the duodenal bulb. Antibiotics were introduced into the abdominal cavity. The postoperative course was fairly smooth. The patient was released on October 16.

In this case the patient did not know about the second needle he had swallowed. Assuming that the needles were swallowed simultaneously, they must have been in the stomach about 1½-2 weeks. The duodenal bulb had probably been punctured three days before the operation. A limited peritonitis was noted during the operation.

Thirteen persons who had swallowed blunt foreign objects were under our observation. Two of them had swallowed stomach catheters and one a duodenal

probe. In all three cases the probes had been introduced for investigation purposes and bitten off by the patients during the vomiting. The olive-shaped tip of the duodenal probe introduced into the duodenum left the intestine by itself on the third day. The stomach catheters in both cases remained in the stomach and had to be removed by surgery -- after three days in one case and one day in the other. The small blunt foreign objects (paper clips, metal coins and tiny coil of wire) left the intestines by themselves in two-three days. The large concentration of cherry pits found in the sigmoid of a women patient an intestinal obstruction.

A woman patient K, aged 22, came to us on January 21, 1960 complaining spasmodic pains in the left half of the stomach, nausea, weakness, dizziness, and frequent watery stool. She had been treated at home since January 8 when she suddenly felt pain in the left half of the stomach. On January 19 she was placed in an infectious-disease hospital where she was suspected of suffering from dysentery, and on the 21st she was moved to the surgical department.

The patient's condition was serious, the skin pale and the facial features sharply drawn. The pulse showed 104 beats per minute, and arterial pressure was 100/50 mm of the mercury column. She had two old postoperative scars on the stomach. In 1953 she had been operated on the sigmoids in connection with Hirschsprung's disease. The left half of the stomach was inflated, tense and morbid; a tumor-like formation extending from the iliac to the hypochondriac region could be felt in the same area. The palpation of the stomach on the left side revealed some crepitation. The right half of the abdomen was slightly recessed, soft and not very painful. The temperature was 38°. Blood analysis: Hb. 10.5 g% (63 units), 9,400 leucocytes and erythrocyte sedimentation reaction 60 mm per hour.

An urgent laparotomy was carried out on the assumption of an intestinal obstruction and gas phlegmon. An obdurate intestinal obstruction produced by a concentration of cherry pits in the sigmoid was found during the operation. Two hundred and forty-five pits were removed through an incision made in the intestine. The patient recovered and was released on February 2.

The intestinal obstruction in this case was partially associated with colitis. The friction of the cherry pits had been interpreted as gas crepitation in the tissues which made the doctors think of a gas phlegmon.

Thus, swallowed small foreign objects leave the intestine by themselves between one and six days. If sharp foreign bodies, even small ones, do not appear to move, the indications are that they are stuck in the walls of the gastrointestinal tract. The failure of swallowed large and small foreign objects to move in the course of 24 hours calls for surgical intervention.

Skin Doses Received by Patients in the Course
of Various X-ray Examinations

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B. A. Bernshteyn and
Engineer-Lt. Colonel P. A.
Rabinovich

The safety factor involved in X-ray examinations has recently attracted increasing attention. Despite the enormous importance of roentgenological examinations in the diagnosis of various diseases, it should always be borne in mind that X-rays are harmful to the human organism. This problem has taken on particular significance lately in connection with the increasing volume of examinations and the wide use of radioactive isotopes.

According to Soviet and foreign sources, even small doses of ionizing radiation may produce long-range radiation injuries resulting in the disturbance of the nervous system, and increasing frequency of cancer, and leukemia, a low immunity and unfavorable genetic consequences.

The sex organs are highly sensitive to the effect of ionizing radiation. Radiation is therefore particularly dangerous to children and young people of child-bearing age. Investigations reveal that the gonads are irradiated in every type of X-ray examination because of the X-ray diffusion. According to A. V. Lebedinskiy, the radiation effect on the gonads is manifested even in the first generation in the form of abnormal development and various diseases.

In view of the great importance of the roentgenological methods of investigation to the diagnosis of various diseases as well as the radiation harm to human organism, the use of X-ray requires a sensible approach, that is no patient should be subjected to an X-ray examination without sufficient medical reason. Repeated X-ray examinations, particularly those involving large radiation doses (the gastrointestinal tract, roentgenography of the lumbar region of the spine, tomography, etc.) should be applied only to individual cases, if required, at adequate time intervals. It is quite clear that the prevention of undesirable excessive radiation of the patients calls for a familiarity with the concrete skin doses received by the patient in different X-ray examinations. Such a knowledge is required not only of roentgenologists and laboratory X-ray technicians but also for doctors in every field with the purpose of avoiding overdoses in various X-ray examination.

The radiation doses received by the patients depend on a number of factors: the time of irradiation, the generation intensity, the power of the current, the distance between the radiation source and the skin, the filter, the type of X-ray tube and the duration of the use, the magnitude of the radiation field, etc. That is why the major purpose of our project was to determine the skin doses receivable by the patients in various X-ray examinations, taking into account all the mentioned factors. We measured the strength of the doses on the skin as well as the skin doses (that is on the side of the skin nearest to the X-ray tube) in X-ray examinations of people (160) and phantoms (350).

We used phantoms in the form of cardboard boxes measuring 30 x 30 x 20 cm and filled with rice and millet seed as diffuse bodies equivalent to a human being. The basic instrument used for the measurements on people and phantoms was a PM-1M roentgonometer with a caprolactone kit; the other dosimetric apparatus (KID-1, DK-0.2 and DP-23) was used for auxiliary purposes. Account was also taken of the margin of error of these instruments: it was 10% above 80 kw, and 20% up to 80 kw.

During the X-ray examination the patients wore a gauze belt from which the dosimeters were suspended. To obtain more accurate data from the PM-1M instrument, the phantoms were irradiated considerably longer than the patients (up to 10 minutes). The dose was then calculated in roentgens per minute. This method was used also to determine the skin doses when taking X-ray pictures. The ionization chambers were placed in a straight pencil of rays for

the production of the pictures. The magnitude of the doses was also checked on the phantoms.

The value of the doses produced by the use of an ARD-2 apparatus with a 2/8 BDM-110 X-ray tube are listed in Table 1.

Technical Aspect of the Examination

Table 1.

Object of examination	KW	MA	Semi-relaxation layer Δ (mm AL)	Focal distance of skin, cm	Additional aluminum filter, mm	Magnitude of skin dose r/min
Thorax	52	2	0.56	60	1	1.5
	57	2	0.58	60	1	2
	57	3	0.7	60	1	2.5
	63	2	0.61	60	1	2.5
Gastrointestinal tract	57	2	0.58	41	1	3.9
	63	2	0.61	41	1	5
	69	2	0.63	41	1	6
	75	5	0.68	41	1	7
	75		0.93	41	1	10

We made a time study of the irradiation of patients during various X-ray examinations, and calculated the average and maximum time the subject was subjected to the effect of X-rays. The mentioned data are listed in Table 2.

Table 2.

Object of Examination	Number of Patients	Duration of one examination	
		Average	Maximum
Thorax	45	1	5
Stomach	40	4	10
Intestine (24 hours after the introduction of barium)	25	1	5
Intestine (by a contrastive enema method)	20	5	12

According to our experimental data on the magnitude of the doses and the duration of the examination (Tables 1 and 2) the average skin dose receivable in a single examination amounts to 1.5-2.5 roentgens in an X-ray examination of the lungs (up to 12.5 roentgens in complicated cases), and 17.6-40 roentgens in an examination of the gastrointestinal tract (up to 120 roentgens in certain complicated cases).

The above cited doses agree with the figures obtained by other authors. In view of the fact that the exact importance of the doses can be found only by measuring the performance and technical specification of every X-ray machine, the magnitude of the doses radiated by such machines should be checked at least once-twice a year.

The above data on the skin doses show that an X-ray examination of the gastrointestinal tract produces a heavy radiation load on the patient. To prevent excessive radiation, the skin doses should be recorded in every X-ray examination. The reason for such requirement is that the consequences of the radiation are not manifested immediately but after a long period of time, even after many years. A record of the skin doses also makes it possible to judge the effect of radiation in diagnosing various diseases which may eventually

1-1000
occur. When a record of the skin doses is kept, the physician in charge can be guided by the dosimetric control figures in his prescription of additional X-ray examinations.

We believe it would be expedient to record the skin doses received by the patients during the examinations in a medical book (on a special card) with an indication of the type of examination and the magnitude of the skin dose. The best solution of the problem involving the measurement of skin doses receivable by the patients would be to equip every X-ray machine with an integral dosimeter. But the solution of this problem will require a great deal of time and money. We should therefore introduce a stop watch into every X-ray machine that would be activated when the voltage is turned on, and disconnected when it goes off. This would make it possible to determine the total duration of the patient's exposure to the X-rays.

The dose and type of examination should be recorded in the case history (outpatient chart), and when the patient is released the record should be entered in his medical book. Special tables showing the skin doses receivable in the roentgenoscopy and roentgenography, in every type of examination, should be compiled for every X-ray machine. These tables could be compiled by roentgenologists working together with the dosimetrists, hygienist--radiologists of the medical institutions as well as other specialists of the radiological laboratories of the fleets and military districts. These tables and the figures showing the total exposure time of the patient to the X-rays would make it easy to calculate the total skin received by the patients in a given examination.

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Some Possibilities of Reducing the Radiation
Produced by an X-ray Diagnosis

Capt. of the Medical Service
F. F. Telichko

The harmful effect of small radiation doses on the human being may also have some effect on his posterity. According to conventional conceptions, the genetic effects of radiation have no threshold or are so insignificant as to be almost nonexistent (G. N. Gusev, 1961). According to R. Yezer (1961), however, the average dose receivable by the gonads over a period of 30 years from natural sources amounts to 3 rads, from artificial radiation 0.18 rads and in X-ray examination 0.7-2.5 rads. Thus the relative amount of radiation on the gonads produced by X-ray examinations is quite significant and apparently has a tendency to increase. Thus the radiation produced by an X-ray examination could be reduced not so much by technical protective measures as by very strict indications to an X-ray examination.

We made a study of the pathological changes produced by X-ray examinations and the frequency of repeated examinations per patient in order to find out whether the X-ray method of examination is being used rationally.

We studied the medical documentation of 14,497 primary X-ray examinations of people under 40 years of age in hospital conditions. The materials under study were the examinations whereby the nervous system, the chest, abdominal cavity and gonads were primarily exposed to X-rays: 10,530 examinations of the chest, 997 of the esophagus, stomach and small intestine, 580 of the large intestine, and 2,390 examinations of the bones and joints.

It was established that an X-ray of the chest accounts for 73% of all the examinations. The total number of lung X-rays for prophylactic purposes was 9,673 (92%), and in cases of suspected pathology 857 (8%). The first group revealed the presence of 22 active cases and 15 with residual symptoms of previous pulmonary diseases. The second group was found to contain 246 active cases and 43 with residual symptoms of previous diseases. At the same time, up to 30% of the pulmonary patients with active processes (tuberculosis of the lungs, atypical pneumonia, pleuritis) were diagnosed for the first time by X-ray methods. Some of them (13%) considered themselves practically healthy.

All the patients were divided into three groups for the purpose of evaluating grounds for an X-ray examination. The first group included patients with pulmonary diseases in most of which the X-ray was the major method of diagnosing the disease (268 out of 10,630, or an average of 2.5%). In the case of the second group of people, although an X-ray was not indispensable, such an examination had to be made because a pulmonary disease apparently could not be ruled out with certainty by any other method (up to 20%); the included patients with a high temperature, and accelerated erythrocyte sedimentation reaction who had recovered from pulmonary diseases in the past but were in contact with tubercular patients, and weak patients brought in for urgent X-ray examinations of the chest, abdominal cavity, etc. The most numerous was the third group in which 77.5% of the cases revealed no clinical symptoms of any disease (no complaints about the lungs, negative percussion and auscultation data, normal temperature and blood picture, and negative results of a recent fluorography of the lungs), and did not have to be sent for X-rays.

Of the 665 persons (out of 997) sent for an examination of the gastrointestinal tract, eight were found to have duodenal ulcers, five stomach ulcers, 16 gastroduodenitis, and two hyperplastic gastritis. No organic or functional changes were found in the other (95%) persons.

Forty-seven (8%) of the 580 patients whose large intestine was X-rayed, revealed pathological changes 24 hours after the exposure. In a study of the examinations of 480 people (320 hospital and 160 outpatients) the even performance of every section of the large intestine 24 hours after the intake of barium was observed in only 24.5% of the cases; in 75.5% the nature of the

performance made it impossible to rule out the process because of the uneven concentration of barium (in the cecum, colon and rectum). Thus an X-ray examination of the large intestine 24 hours after the intake of barium, without definitive clinical data, would apparently be irrational as small diagnostic possibilities may involve a great deal of irradiation.

Two thousand three hundred and ninety persons had their bones and joints X-rayed, and no deviations from the norm were found in 88% of the coxofemoral cases, 90% of the lumbosacral and 91% of the cranium cases, etc. Thus the average percentage of the examined persons revealing no deviations from the norm includes 96 in the chest X-rays, 77 esophagus, stomach and small intestines, 92 large intestine and 76 of bone and joint X-rays. The average number of pathological changes found in the 14,497 examined persons was 10%, 7.2% of which had some clinical significance.

It is clear from the above that the number of X-ray examinations could be reduced.

We are alerted by the figures on the frequency of examinations of the same person with a view to diagnosing the disease and observing the dynamics of the process. Thus 155 of the 620 patients suffering from various gastrointestinal diseases underwent repeated examinations: two X-rays were made of the chest and gastrointestinal tract of 119 patients, three of 29 and four of seven patients. Every patient suffering from an inflammation of the pleura and lungs (222 persons) was subjected to an average of three roentgenoscopic and eight roentgenographic examinations of the chest in the course of one-two months; eight of the patients had their gastrointestinal tract examined. The following numbers of X-ray pictures were taken of the 300 patients under treatment for traumatic changes in the bone and joints: 179 persons, five to ten pictures; 65, 10 to 15; 35, 15 to 20; and 14 persons 20 to 25 pictures; over 25 X-ray pictures were taken of four patients in the course of two to eight months. In addition, 171 persons were subjected to one roentgenoscopic examination of lungs, 29 to two, and 13 had their gastrointestinal tract examined.

Thus some of the patients were subjected to repeated X-ray examinations, the total radiation dose reaching a considerable magnitude. To avoid excessive exposure of the patients, they should be X-rayed only, as pointed out above, when absolutely necessary, after a clinical examination; and such an X-ray examination should be conclusive if possible. Only a consultant specialist and the chief of the therapeutic department should have the authority to prescribe an X-ray examination involving a considerable exposure of the patient (examination of the gastrointestinal tract, duodenal tracts and a series of examinations). Such examinations should take into account all the previous exposures, the total radiation dose and the age of the patient. A careful account of the examinations and a continuous record of the radiation doses kept in the medical book will prevent repeated examinations.

In view of the considerable frequency of X-ray examinations of the gastrointestinal tract, it would be desirable to make more frequent use of the simultaneous method of contrasting the stomach, duodenum and gall bladder for purposes of differential diagnosis. In such cases the duration of the examination and the radiation dose are usually small than in a separate examination of these organs (such a method has its obvious advantages from a diagnostic and functional point of view).

The most important protective measures to be used in X-ray examinations is to use "thick" filters (see note) with the increasing voltage and confine the exposed area to the section under investigation. It is a known fact that the use of filters in case of high voltages makes it possible to reduce the surface dose (5 to 20 times) which also means a reduction in the radiation effect on the patient and the personnel. It has been established that "thick" filters reduce the radiation more than an increase in the voltage and corresponding decrease of the exposure (magnitude of the current), an increase in the usual focal distances of the skin, etc.

(Note. The aluminum filters of all the X-ray machines are 3 mm thick).

A Novocaine Block of the Sinuso-Carotid
Reflexogenic Zone

V. M. Lyskovtseva

A novocaine block of the sinuso-carotid zones was proposed by I. N. Ishchenko in 1940 for the treatment of craniocerebral trauma. We used novocaine to block the sinuso-carotid zone of 75 patients suffering from craniocerebral injuries. Forty-six of them suffered from brain concussion, 16 brain injury and 13 from brain injury combined with cranial fractures. The novocaine block, unilateral and bilateral, was applied once to 37 patients, and two to five times to the others.

This is how the novocaine block is applied to the sinuso-carotid zones: patient lies on his back, his head turned sideways. A finger of the left hand is used to find the bifurcation area of the common carotid artery near the front end of the sternocleidomastoid muscle on the upper end level of the thyroid cartilage. The needle is inserted toward the top and inside in the direction of the carotid bifurcation. The puncture of the fascia (against tangible resistance) is followed by the introduction of 15-20 milliliters of 0.5-1% novocaine solution. Care should be taken to see that the needle does not damage the vessel; the needle "pulsates" when properly inserted. The manipulation should be careful, with a novocaine jet preceding the movement of the needle.

Sixty-five patients felt a definite improvement in their condition after the novocaine injection, 7 did not feel any improvement, and 3 revealed a deteriorating condition. The arterial pressure, as a rule, rose within the range of 10 to 100 mm of the mercury column, the pulse frequency increased by 10-30 beats per minute, respiration grew deeper and slower. The increase in arterial pressure was observed for 30-60 minutes whereupon it returned to the initial figures. The earlier the novocaine was applied after the injury the better the therapeutic results. The introduction of novocaine into the sinuso-carotid zones brought about a higher arterial pressure and pronounced arterial hypotonia produced by a state of shock or collapse.

We applied the novocaine block to 32 patients; five of them were in a state of deep traumatic shock, seven developed a postoperative shock and 10 revealed a heavy intoxication of the organism because of an intestinal obstruction and peritonitis. In all cases the novocaine block of the sinuso-carotid zones was applied one at a time: eight times from one side and 12 times from both sides. The novocaine block was not followed by any changes in two of the patients. In the others, the arterial pressure went up by 20-100 mm of the mercury column, and their general condition deteriorated. The pulse, where it could be felt, was faster; only the thready pulses revealed an improvement. The paleness of the face alternated with hyperemia, the extremities grew warm and the adynamia disappeared.

There is also justification for the application of the novocaine block to the sinuso-carotid zone in cases of trigeminal neuralgia as the sinuso-carotid zone is connected to the trigeminal nerve both physiologically and anatomically (N. B. Chibukmakher and A. I. Galmanovich). The introduction of novocaine into the sinuso-carotid zones of the patients suffering from trigeminal neuralgia eliminated the pain in all cases. No improvement was found in the so-called chronic neuralgia of an unclear origin.

The introduction of novocaine into the sinuso-carotid zones in cases of an affected optical nerve (atrophy or inflammation) connected with a disrupted blood circulation in the retina, served to alleviate the course of the disease as the blood circulation in the retina is closely connected with the reflexes of the sinuso-carotid zone. Our observations in this field, though very limited, are sufficient to recommend the wide use of the novocaine block of the sinuso-carotid zones in ophthalmology.

It is not easy to understand the action mechanism of the novocaine block. Viewed in the light of A. V. and A. A. Vishnevskiy's concept of nervosism, the action of the novocaine block in general may be interpreted as follows: neurodystrophic processes lie in the pathogenesis of most of the diseases; when the disease does not last long and the pathological connections are not very strong, the mentioned processes can be affected in such a way as to change the course of the disease. By blocking the sinuso-carotid zone we exert an influence on one of the major regulatory links of the vegetative nervous system; the immediate effect is a change in the blood circulation of the brain and retina, a temporary elimination of sinus depressors from the vasomotor centers and a change in the secretory function of the adrenal cortex. The effect of the novocaine block of the sinuso-carotid reflexogenic zone on the functional system of the hypophysis-adrenocortical system is indubitable. The sinuso-carotid zone regulates the function of the adrenal cortex reflexively in normal and pathological states.

The counterindications to a novocaine block of the sinuso-carotid zones include arterial hypertension accompanied by arteriosclerotic changes in the brain vessels, the tonus lability of the vegetative nervous system and the acute period of the so-called traumatic meningitis which is in most cases based on intracranial hypertension.

ABSTRACTS

Docent A. A. Ostapenko, Col. of the Medical Service and candidate of medical sciences, and V. G. Mashkev, Maj. of the Medical Service: On the Medical Education in the Hospital.

Annual and quarterly plans of medical education are drawn up in every department of the hospital. Lectures are read in the hospital by doctors twice a month on natural-science, general medicine and atheistic subjects. In the various department the discussions are usually held by the nurses once a week under the program of minimum medical education. Before they are released, the patients are tested to see how well they have assimilated the mentioned program. The development of personal and public hygiene habits is facilitated by the cleanliness of the wards, therapy rooms, other places used by many people and the personal example set by the medical service personnel. Much use is made of the well-arranged visual propaganda facilities, such as continually changing slides, stands with colored placards and articles from the magazine *Zdorov'ye* (Health). The visual propaganda facilities made the medical education more effective, and enhance the patients' interest in problems of medical culture.

The minimum medical education acquired by the patients in the hospital helps them in the implementation of the statutory requirements which are designed to facilitate a healthy life, improve their physical condition and prevent diseases.

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I. M. Schmidt, Lt. Col. of the Medical Service, and Ye. A. Stal'kov, Lt. Col. of the Medical Service: Teaching the Military Medical Students How to Care for the Sick and Administer Certain Treatments.

Our experience in the training of medical instructors revealed that the medical students are easily mastering the theoretical end of the program, but their care of the patients and the performance of certain medical procedures are inadequate. The reason for the slow development of practical habits by the students apparently lies in the imperfection of the teaching system whereby the instructors use phantoms instead of actual patients, in unsuitable quarters (usual class rooms) without observing the aseptic and antiseptic regulations, and without going through the actual motions of preparing the patient, the instruments and sick room appliances.

These shortcomings prompted the introduction of the following methods of teaching. A special course in caring for the sick and other medical procedures was opened in the school in addition to the regular courses in the treatment of the major diseases. A light 70 m² room was used for that class. The walls and all the furniture of that class room were painted with light oil paint, and the floor covered with linoleum. The room was divided into two parts by a low barrier across it. The chairs for the students were arranged in amphitheater pattern on two projections in the smaller part of the rooms. The rest of the room contained all the equipment of a regimental medical aid center. Permanently attached to this class room was an experience nurse who prepared everything required for the training sessions, and was an active assistant to the instructor during those sessions. The students had to wear white robes and caps in the class room, and sterilized gauze masks near the sterilized instrument table; that encouraged the development of certain medical habits from the very first day.

The following practical operations and medical procedures were carried out in that class room: subcutaneous and intramuscular injections; cupping, mustard plaster applications and enemas; the practical utilization of the physiotherapy apparatuses; gastric lavage; the use of sick room appliances; carrying and moving the patient from a stretcher to a table or bed, changing the linen and the preventive treatment of decubitus ulcers; observing the patient's respiration, taking his pulse and temperature; the use of oxygen inhalers, inflating oxygen pillows and supplying oxygen; the distribution and administration of medicines and oxygen; working at the sterilization table, and the sterilization of instruments and syringes. The visual aids consisted of brief instructions

and photographs posted on all the machinery and apparatuses explaining and illustrating their use under various conditions. Such instructions and photographs were also used for the compilation of six albums of study aids demonstrating the care of the sick patients and appropriated medical procedures. These albums are used by the students in their independent training hours.

The work in the class room boils down to the following. After a brief explanation and demonstration of a certain procedure by the teachers, the students take turns practicing it on one another. The training is supervised by the teacher, registered nurse and squad commanders, or medical instructors. The training in the use of sick room facilities, moving and handling the patients, sterilizing the instruments and syringes and gastric lavage is based on the teacher's demonstration and the students emulation of the entire cycle of preparing the patient and using the required apparatuses; all this facilitates the assimilation of the required knowledge by the students. Additional practical training sessions, involving the same procedures, are arranged for the students who missed their first classes.

Having mastered the methods of medical procedure and practiced them on one another, the students return to their respective duties better prepared, which enables the hospital doctors to assign them to more responsible duties connected with the care of the sick in the different wards.

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V. A. Maksimov, Candidate of Medical Sciences: Some Indicators of the Hemodynamics of Patients Suffering from Infectious Myocarditis.

An N. N. Savitskiy mechanical cardiograph was used in the study of the hemodynamic indexes of 60 patients, mostly young ones, suffering from infectious myocarditis. The average dynamic pressure was found to have been reduced in 21 patients, and the minimal pressure in 12. No substantial changes were found in the viscoelastic properties of the vessels in most of the patients (only 12 of them revealed a moderate increase in the propagation of the pulse wave and the modulus of elasticity of the myogenic vessels, and six a moderate increase in the propagation speed of the pulse wave and elasticity modulus of the elastic type vessels). The majority of the patients suffering from coronary atherosclerosis (the control group), on the other hand, revealed a considerable increase in the propagation speed of the pulse wave and elasticity modulus, particularly in the elastic-type vessels. These manifestations can be utilized for a differential diagnosis of infectious myocarditis (which is frequently accompanied by angiosis-like pains) and atherosclerosis of the coronary vessels.

In 45 patients the minute volume exceeded the normal magnitude by 20-110%, in 10 of them it was normal, and in 5 it was 20-40% below the normal magnitude. The specific peripheral resistance 20-70% below normal in most of the cases (49 patients), within the normal range in eight, and 20-40% above the normal range in three cases.

A combination of a low minute volume with a high peripheral resistance was found in persons with pronounced symptoms of cardiac insufficiency as well as in patients with persistent painful syndromes. A dynamic investigation established that the hemodynamic indexes of about one-third of the patients was back to normal at the time they were released from the clinic. The others were released with some changes in the hemodynamics, although they had no clinical symptoms of disturbed blood circulation. This situation calls for a more thorough control of the hemodynamics in this group of patients, both in hospital and dispensary conditions. The hemodynamic disturbances observed in the infectious myocarditis patients were initiated not only by an injured myocardium but also by a faulty blood circulation in the broad sense of that word, which is manifested first of all in the disturbance of proper mutual relations between the volume of circulation and the condition of the pre-capillary channel (that is the magnitude of the peripheral resistance).

Ye. D. Yezovit, Lieutenant Colonel of the Medical Service: A Case of Dissecting Aortic Aneurysm of a Patient Suffering from Hypertension.

Patient T., aged 44, has been treated for hypertension off and on since 1955. His arterial pressure was up to 220/140 mm. On September 29, 1961, while at work he suddenly felt weak, and pain in the retrosternal area, at the bottom of the abdomen and in the loins. It was a throbbing pain. His EKG in the hospital showed a sinistral type, myogenic and coronary changes of the ischemia type. On September 27 the abdominal pains became intense, "burning" pains were felt in the testes and an inclination to move the bowels. Endeavoring to move his bowels, the patient grew pale, his lips and tip of the nose became cyanotic, the pulse thready, arterial pressure dropped to 0, the cardiac tones were mute and his consciousness became depressed. His abdomen, particularly in the suprapubic area, was painful to the touch. His condition was improved after the introduction of analgesics and cardiac medicines. The consulting physicians believed it was a dissecting aortic aneurysm. Eventually the patient developed a subfebrile temperature, hypochromic anemia and leucopenia and abdominal pains throughout the entire observation period. The EKG failed to reveal any new data. The patient felt a subjective improvement, and began to walk. On November 11 his abdominal pains became more intense. The patient was given narcotic injections. On November 12, he suddenly died after dinner.

Clinical diagnosis: hypertension III stage, atherosclerosis with predominant injuries of the aorta, coronary and cerebral arteries. Coronary insufficiency. Hemorrhage in the pancreas zone, pancreatitis and anemia.

An autopsy and histological examination revealed the presence of a dissecting aortic aneurysm. The aortic wall from the arch to the bifurcation and the larger part of the two external iliac arteries was detached in the area of the central vascular membrane. The aorta looked like a double tube. A deep-seated defect measuring 1.5 x 2 cm was found in the area of the aortic arch on the level of Botallo's duct in the detached portion of the wall; a second defect measuring 0.5 x 0.1 cm was found 5 cm away from the aortic bifurcation in the exfoliated internal portion of the right common iliac artery. Both of these openings connect the lumen of the aorta and iliac artery with the aneurysm cavity. In the accretion area of the aorta and the left lung is a slit-like opening in the vascular wall measuring 0.4 x 0.5 cm which is connected with the left pleural cavity. The latter contained 1,250 cm³ of liquid blood and 1,600 grams of blood clots. A planar hemorrhage covering an area of 19 x 3 cm was found at the root of the mesointestine and in the subparietal peritoneum on the left. Small yellowish patches were found in the coronary and cerebral arteries.

The observations have thus confirmed the cyclic nature of the dissecting aneurysm. The throbbing pains, according to all information, corresponded to the expansion of the exfoliation zone in the aortic wall. Confirmed also were the characteristic symptoms of dissecting aneurysm: pains along the aorta (behind the sternum, in the epigastrium and in the lower part of the abdomen), and acute vascular insufficiency followed by the development of anemia as a result of the internal hemorrhage. An insufficient familiarity with the clinical aspects of the disease prevented a correct diagnosis, even though the assumption made at the beginning turned out to be correct.

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E. A. Kaytazov, Colonel of the Medical Service, and K. M. Nefedova: The Importance of bronchography for the Detection of prebronchoectatic Conditions and Bronchoectasia With Faint Clinical Symptoms.

A clinical differential diagnosis between the individual stages of bronchoectasia is impossible. This problem is made easier by bronchography. But it is still being used primarily as an additional method of examination designed to confirm the clinical diagnosis of a bronchoectatic disease. Without the use of bronchography the so-called pre-bronchoectatic states and

bronchoectasia with faint symptoms remain undetected.

The use of bronchography was increased in the hospital beginning with the end of 1959 because of the characteristic course of the chronic nonspecific pulmonary diseases. Indications to bronchography were based on infectious and other respiratory diseases suffered in the past, particularly in childhood, and the discovery of even meager clinical data and changes in the lungs in an X-ray examination. Seventy-five patients were thus selected and examined. Seventy of these patients, examined bronchographically, revealed various stages in the development of prebronchoectatic conditions and bronchoectasia. In most cases the changes in the patients were found in the III, VII, VIII, IX and X segments. The bronchogram was, as a rule, taken of two-three lobes simultaneously. A bilateral bronchography is particularly useful for comparing the condition of the bronchi subjected to small changes.

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Yu. Yu. Berlin, Major of the Medical Service: A Case of a Diencephalic Syndrome.

Under observation was a patient whose closed cerebral injury was followed by the development of a unique diencephalic syndrome.

At the age of eight, the patient struck his occiput against the ice and lost consciousness for several minutes. Since that time, any insignificant physical exertion was followed by headaches. Tachycardiac seizures accompanied by chills developed several months later, troubling the patient two-three times a year. At the age of 16, these seizures appeared once-twice a week: they were more intense and led to copious urination. Objective findings: internal organs are normal; in the nervous system: anisocoria and the pupil is wider on the light side; an unstable horizontal nystagmus, resuscitated knee reflexes, higher on the left, the achilles tendon reflexes are uniformly lively, the abdominal reflexes are even, no pathological reflexes, a left knee clonus.

The following seizures occurred three times in the hospital against the background of general weakness: seizure-like pains in the cardiac region, tachycardia up to 120 beats per minute, chills, cold extremities; the seizure ended with frequent urination. Arterial pressure went up to 140/80 -- 150/90 mm. The duration of the seizure 20-30 minutes. A general blood and urinalysis revealed no pathological changes. Spinal fluid analysis: colorless, fully transparent, cytosis 1, protein 0.165%, Pandy's reaction mildly positive. Fluid pressure 180 mm of the water column. An EKG showed a normal position of the heart axis; the functional capacity of the myocardium was somewhat lower. Fundus oculi: retina vessels (veins) somewhat dilated. Papilla contours distinct. Ultraviolet erythema reveals a very weak skin sensitivity to ultraviolet rays.

Thus after recovering from a craniocerebral trauma, the patient developed diencephalic crises with predominant disturbances of the cardiovascular system.

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P. I. Greenshpun, Lieutenant Colonel of the Medical Service: The Dissociation of Meningeal Symptoms in Membranous Pathology.

Under observation were patients with acute and chronic meningitis and a dissociation of objective meningeal symptoms. The classic objective symptoms, such as rigidity of the occipital muscles, and Kernig and Brodzinski's symptoms were absent in all the patients; but pronounced changes in the spinal fluid of the type of the albumino-cytologic dissociation were found in both the acute and chronic injuries to the meninx. A cytosis of 543/3 and albumin 0.264% were established in the fluid of one of the five patients 35 days after the temporary increase in temperature between 37.3-39.5° (for two days) which was not accompanied by other meningeal symptoms. The control puncture 20 days showed a cytosis of 14/3, albumin 0.264 (within the norm). An albumino-cytologic dissociation was frequently diagnosed in the second patient who

complained of slight headaches but had no meningeal symptoms: cytosis 202; 173, 110, 153, 80; 69; 64 cells in 1 mm³, the albumin, respectively: 0.398; 0.264; 0.33; 0.33; 0.33, 0.4; 0.5%. The third patient began to complain of headaches one year after the closed craniocerebral trauma. Five years later, the lumbar puncture revealed a cytosis of 108 cells in 1 mm³, and an albumin of 0.165%; there were no other meningeal symptoms.

A lumbar puncture five years later of the fourth patient who had complained of slight headaches, pains in the loin and the legs since 1958, revealed the following albumino-cytologic dissociation: cytosis 35/3, albumin 0.264%; cytosis 74/3; albumin 0.264%. The fifth patient who complained of pain in the joints and muscles and a slight headache (for 2½ years) was found to have cytosis 103/3; albumin 0.132%; a control puncture made 70 days later showed cytosis 4/3, and albumin 0.132%.

The dissociation of the objective meningeal symptoms in membranous pathology complicates the diagnosis, first of all in the dispensary where the patient's complaints in the absence of objective symptoms determined by neurological examination cannot be used as a basis for diagnosing an inflammation of the membranous process. The stability of objective symptoms in the absence of objective neurological symptoms require an examination of the spinal fluid which frequently makes it possible to ascertain the nature of the disease.

Anamnestic data as well as that produced by the examination justify the belief that the etiological factor in the first observations was an acute infection (possibly influenza); the reason for the second serous chronic meningitis in the second observation was a chronic serous otitis media; the etiological factor in the fourth and fifth observations was a neuroinfection which developed like meningo-radiculoneuritis (fourth observation) and serous meningitis (fifth observation). The cause of the serous meningitis was the closed cranial cerebral trauma.

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I. A. Miryanov, Candidate of Medical Science: Expert Military-Medical Opinion on Diskitis.

The data on expert military-medical opinion of 171 patients suffering from diskitis are presented in this article. The injuries: the cervical section of the spine six patients, the thoracic section 103 patients and the lumbar section 62 patients.

Thirty-four patients had previously been treated for injuries or pains in the lumbar region in a hospital, 100 in a dispensary and 37 patients were not treated at all. Location of intervertebral disk hernias: anterior hernias 16.5%, lateral and posterolateral 76.0% and posterior hernias 7.0%. The X-ray pictures of 171 patients showed 311 intervertebral cartilaginous hernias, 97 of which prolapsed along the upper contour of the vertebrae, and 214 along the lower. Seventy-four patients had one intervertebral hernia, 68 two, 17 three 10 four and two patients had 5 and more hernias.

One hundred and thirty-nine of the 167 servicemen suffering from diskitis were examined by military medical commission with a view to determining their fitness for military service. Thirteen patients were found to be partially fit for military service, 78 unfit for service in peacetime, and 48 patients were found to be completely unfit for the service and subject to discharge. Thus 73.7% of the total number of patients were found to be unfit for military service because of the intervertebral disk pathology.

D. N. Tikhomirov, Honored Physician of the Ukrainian SSR: The Use of Intermedullary Nailing in the Treatment of Tubular Bone Fractures.

A study was made of the intermedullary nailing treatment applied to 107 persons after they had been given sick leave. Thirty-seven of them had fractured hips, 36 broken shin bones, eight had fractured shoulders and 26 fractured forearms; 10 of the patients had open fractures. After their sick leave, 59 patients were found to be fit for combat service, 14 for limited service, and 34 were unfit for service in peacetime or subject to discharge. Twenty-two of the patients were found to be fit for limited service or unfit for it altogether because of the reduced movements, and 11 patients because of the slow healing of their fractures. In the case of nine patients, the conclusion of their unfitness for service was premature. In a number of cases the limited service verdict was due to a late osteosynthesis, inadequate and late use of functional therapy.

In most cases the osteosynthesis was applied in the first 15 days after the injury. Rods (nails) proposed by various authors were used in the osteosynthesis of 69 patients; Klimov, Vorontsev and Novikov plates for 29, and needles and wires for 14 patients. Rod deformations were noted in two patients, and a breakage of the metal part in one. The rods were replaced in the repeated operations; an autotransplant was applied to two of them. Four persons were operated a second time. The metal parts were removed at different times. A proper operation carried out on time, an adequate immobilization and a full course of physical therapy served to improve the conditions after the osteosynthesis.

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S. V. Filippov, Captain of the Medical Service: The Use of Endotracheal Anesthesia in a Garrison Hospital.

Endotracheal anesthesia was applied over a period of three years in 40 different operations (laparotomy, Splenectomy, resection of the stomach and rectum, and osteosynthesis of the hip, shin bones, humerus, etc.). Twenty-four operations were based on urgent indications, and 16 were routine. The operation was preceded by the following intramuscular injection: a lytic mixture consisting of 1-2 milliliters of 2.5% aminazine solution, 2 milliliters of 2% prothazin or 2 milliliters of 1% dimedrol solution and 2 milliliters of 2% promedole (or pentopon) solution; a hypodermic injection of the 0.5-1 milliliter of 0.1 solution of atropine sulfate was made 30 minutes before the operation.

The patient was taken to the operating room as soon as he became drowsy. The induction process consisted of the slow intravenous injections of 30-50 milliliters of 1% thiopental sodium (evipan) solution with 60-100 mg lythsenon or or muscle relaxant. After the intubation he was anesthetized by a 3:1 (2:1) ratio of ether-oxygen and a droplet intravenous injection of 0.5% novocaine solution (200-250 ml), and a 5% solution of glucose, isotonic solution of sodium chloride, etc. into the blood. Also, in the course of the operation while the patient was under the ether-oxygen anesthesia, he received injections of 1.5-2 ml 2% diplacin solution (a curare stimulant) every 20-30 minutes without interfering with the patient's independent breathing. Muscle relaxants of a repolarizing type were injected every 5-6 minutes; the respiration was controlled throughout the operation.

No complications were observed in the routine operations on the abdominal cavities under endotracheal narcosis. Nor were there any complications noted in the traumatological operations involving an adequate relaxation of the extremity muscles which made the surgery much easier and shorter. In the case of extra surgery, the premedication consisted of the introduction of a lytic mixture 40-50 minutes before the operation. The induction and the entire anesthetic process was the same as in the routine operations. Nitrous oxide with oxygen were used as an anesthetic. There was no fatal outcome connected with the endotracheal narcosis.

V. S. Ogiyenko, Lieutenant Colonel of the Medical Service, and I. K. Arbuznikov:
The Use of Intra-osseous Novocaine Anesthesia in Operations on the Extremities.

The use of intra-osseous novocaine anesthesia in operations on the extremities was studied and analyzed in the case of 980 patients from 8 to 65 years of age. The total number of operations involving the use of intra-osseous anesthesia was 1,025 (from 1953 through 1962). The anesthesia was applied by the method described by I. L. Krupko, A. V. Vorontsov and S. S. Tkschenko with the only difference being that the application of the tourniquet was preceded by the intra-osseous introduction of 5-10 millimeters of 0.5% of novocaine solution. This made the anesthesia less painful.

Practical experience shows that a 0.5% novocaine solution is preferable to a 0.25% for intra-osseous anesthesia, as this makes the anesthetic process shorter and requires a smaller quantity of novocaine solution. In the case of adult patients, a 0.5% novocaine solution should be introduced in the following operations and quantities: hip and knee joints, 120-150 milliliters; shin and shoulder 100-120 milliliters; foot and forearm 30-100 milliliters; and wrist 60-80 milliliters. The hyperesthesia is restored simultaneously in the entire extremity 5-10 minutes after the removal of the tourniquet. In the case of 55 patients, one milliliter of 0.1% adrenalin solution was added to the intra-osseous injection of the novocaine solution with a view to prolonging the period of anesthesia. But this actually extended the period of anesthesia (for not more than 20 minutes) following the removal of the tourniquet only eight patients.

Intra-osseous anesthesia potentiated by the V. I. Parmenov method was applied to 205 patients. The patient's general condition, pulse, arterial pressure and respiration frequency were closely watched during the operation. In 74% of them the pulse frequency remained unchanged, in 25% it increased by 10-15 beats per minute and in 2% it was reduced by 8-10 beats per minute. The arterial pressure was unchanged in 78% of the patients, increased in 20% and dropped in 2% (within 10-20 mm). Eight percent of the patients under the potentiated intra-osseous anesthesia were asleep, 47 were drowsy, and 45% were fully conscious.

The use of intra-osseous anesthesia potentiated by the V. I. Parmenov method revealed that in this case the pain-killing quality is much better, and the patients withstand the operation better. The positive aspects of the intra-osseous anesthesia include a rapid onset of a state of painlessness, simple anesthetic techniques, and the anatomo-topographic tissue relations are not disturbed; all this produces a better condition for surgery than infiltration anesthesia, and reduces the required amount of novocaine several times.

Counterindications to intra-osseous anesthesia are: high sensitivity to novocaine, anaerobic infection and an acute vascular inflammation of the extremities.

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G. N. Klintsevich, Senior Lieutenant of the Medical Service: A Case of Pulmonary Barotrauma.

The case of pulmonary barotrauma under observation took place in a recompression chamber in the course of therapeutic recompression. An attempt was made to raise the pressure in the chamber to above 100 meters of the water column but the failure of the safety valve was followed by a rapid drop in the pressure. Diver K., administering artificial "mouth to mouth" respiration to another diver, suddenly felt a sharp pain in the left half of the chest which was later followed by a temporary loss of consciousness. He began to cough continuously bringing up phlegm with blood. The recompression lasted 40 hours according to the fifth therapeutic regiment.

In the chamber K. received intramuscular antibiotic injections, a 10% solution of calcium chloride and cold applications were used on his chest. His

condition then somewhat improved. He felt only aches in the left part of the chest, a headache and general weakness. These manifestations continued to annoy K. even after he left the chamber. His pulse at that time showed 100 beats per minute, his temperature was 37.4° and arterial pressure 130/85 mm of the mercury column. A percussion of the lungs revealed a shortened pulmonary sound in the left and lower lateral sections of the thorax, where dry and microvesicular moist rales could be heard. The left half of the thorax was somewhat behind in the respiration process.

The treatment was continued in the unit hospital. The patient received a total of 10 million units of penicillin, 6 million units of streptomycin and 12 million units of tetracyclin. He was examined in the hospital two weeks later. By that time he showed a subfebrile temperature in the evening, a headache, a dry cough and general weakness. An increased arterial pressure to 160/110 mm was first discovered in an objective examination at the hospital. An auscultation of the lungs revealed a dry rale, and an X-ray examination found residual symptoms of pulmonary barotrauma. The arterial pressure and temperature returned to normal after a three-week outpatient treatment with hypotensive medicine and general tonics. By that time the respiration in his lungs was residular, and no rales were heard. Forty days later he resumed his work.

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A. I. Poluda, Captain of the Medical Service: Allergy to a Wide Range of Medicines with an Adverse Effect on the Ocular Appendix.

Under observation was a case of allergy to a wide range of medicines whereby the ocular appendixes were primarily affected.

Patient I., aged 22, entered the hospital complaining of a sharp edema of the right eyelid, a clogged right nostril, a rash on the face, neck and body accompanied by a pruritus. It all began half an hour after he had taken half an aspirin to stop a toothache. A close questioning revealed that the use of alcohol in the past had produced a similar state. His face, neck and body were covered with a large papular rash. The upper and lower lids of the right eye were edematous, and the orbital fissure closed. His visual acuity with open eyelids was 1.0. A moderately pronounced chemosis of the eyeball conjunctiva. The refracting media were transparent. The pupils were round and of equal size, and the reaction to light and adaptation to a convergence were rapid and even. The image and color of the iris were unchanged. A slight enlargement of the central retina vein on the ocular fundus was noted. The left eye was healthy, and the right side of the nasal mucous membrane was edematous. No visible changes were observable in the other organs and systems.

In view of this "medicinal allergy", the patient was confined to bed and given 0.05 dimedrol three times a day and ascorbic acid in the usual doses. By the third day of this treatment all the symptoms had disappeared. Eventually this patient got into a similar state after taking a pyramidon tablet, and a third time after the use of alcohol. The high point of the allergic development was characterized by the following indexes: l. 14,000, segm. 60%, lsb. 12%, EOs. 3%, bas. 5%, lymph. 17%, mon. 7.5%; erythrocyte sedimentation reaction 15 mm per hour.

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M. F. Pakshin, Lieutenant Colonel of the Medical Service, and V. I. Pestenko, Captain of the Medical Service: Some Epidemiological and Clinical Characteristics of Influenza.

For a number of years preceding the pandemic disease of 1957 and the epidemic outbreaks of 1959 and 1962, influenza among groups of people in Sevastopol' was primarily of a sporadic nature. But the foci of influenza and other respiratory diseases developed among certain groups of people resulted in a higher incidence of the disease in the autumn-winter and spring seasons as compared to summer. But despite all that influenza did not become widespread.

Three waves of influenza were recorded during the pandemic influenza of 1957: spring, summer and autumn waves. The autumn incidence of the disease was the highest, exceeding the spring level 3.5 times and the summer level 3 times. The 1957 incidence of influenza exceeded the 1954 level 9.5 times, 1955 7.0 and the 1956 level 12.5 times. The influenza virus isolated in most cases (551) was the A₂ type.

The 1959 influenza epidemic lasted for a shorter time, was more intense and produced a larger number of diseases than the 1957 pandemic incidence within a shorter period of time. Thus if the incidence of influenza amounted to 61% in 1957, it was 33.8% in 1959. The number of diseases in the contaminated areas fluctuated from 2-5 to 10-150 affecting from 1-2 to 20-35% of the people. Eighty-one strains of the influenza virus -- 35 A₂ and 46 B strains -- were isolated from 896 specimens of nasopharyngeal mucus. The A₂ type virus was prevalent in the first part of the epidemic, and the type B virus toward the end.

The influenza epidemic of the winter and early spring of 1962 was considerably less intense than those of 1957-1959. The incidence of influenza amounted to only 29.8%. At the same time, the incidence of the influenza among the unorganized population in 1962 exceeded the 1959 level. That outbreak was caused by type A₂ influenza virus.

The clinical course of most of the cases was a mild one. The most characteristic changes were observed in the white blood: leucopenia in 44% of the patients; moderate leucocytosis in 8.5%; and a shift of the leucocytar formula to the left in 75%. If in 1957 and 1962 the influenza patients revealed a moderate shift of the leucocytar formula to the left, 28% of the patients in 1959 showed a sharp shift of the leucocytar formula to the left in the presence of neutropenia, AN- and eosinopenia, lympho- and monocytosis. The complications included: bronchopneumonia in 4% of the patients, pansinusitis in 1.5%, focal nephritis in 0.4%, and acute bronchitis in more than 18% of the patients. Pneumonia was frequently characterized by indistinct clinical symptoms, and detected only by an X-ray examination ("mute" pneumonia). There were no fatalities in 1957, 1959 or 1962.

An examination of 542 sera taken from healthy people between the epidemics (in 1958 and 1960) has established that the influenza virus A₂ is the least immunogenic, and is followed by types A and A₁; the largest quantity of antibodies in the organism is formed against the influenza virus type B. It is quite probable that this accounts for the fairly large percentage of repeated cases of the disease (from 15 to 25) observed in 1957 and 1959 which were caused by the same virus A₂. It has also been established that the number of antibodies to the HA-2(D) parainfluenza virus is increasing from year to year, which had not been observed before.

The wide use of acricrine (quinacrine) in the pandemic disease of 1957 did not produce any epidemiological effect. A dry multipurpose (Russian term: politipazhnaya) antiinfluenza serum possessing definite therapeutic and prophylactic properties was used in 1959 for the therapy and preventive treatment of influenza; but this serum requires further improvement and study. The use of A₂ and B vaccines showed that in all the immunized groups of people the coefficient of effectiveness was 0.5-1. The usual restrictive, disinfection and sanitary measures were carried out in the influenza foci. Gauze masks were used on a large scale. All the patients were treated with antibiotics and sulfanilamides including symptomatic medicines from the very first day they applied for medical assistance.

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V. B. Synkovskiy, Senior Lieutenant of the Medical Service: The Prophylaxis and clinical Aspect of Influenza During an Epidemic.

The following prophylactic measures were developed and introduced in cut unit for the purpose of preventive treatment of influenza in the 1962 epidemic.

The immediate isolation of the patients, the addition of more hospital beds, a close watch of all the men on leave, the introduction of discussions and lectures on the epidemiology of influenza, the introduction of "wet cleaning" involving the use of disinfectants, and the establishment of medical posts manned by medical instructors and feldshers in the barracks.

The influenza was comparatively mild, the complications amounting to a small percentage. But there were also cases with an aggravated clinical aspect; some patients developed complications in the form of pneumonia, bronchitis, sinusitis and otitis. Early in the outbreak there were cases with a pronounced clinical aspect: an acute onset of the disease, high temperature, chills and headaches. An obliterated clinical picture was predominant at the end of the epidemic, but with a large percentage of complications.

A study was made of 145 case histories of influenza patients under treatment in the hospital. Characteristic influenza symptoms (an acute onset, chills, a scratchy pain in the pharynx and painful eyeballs) were observed in almost all of the patients. In cases with a sharply pronounced clinical aspect the febrile period came to an end between the third and fourth day of the disease, and the temperature drop followed a critical course (48%). In 34% of the cases the temperature drop was gradual, and the febrile period lasted about 4-5 days. In 13% of the cases there was an inverse correlation between the morning and evening temperature (the difference amounting to 1-2 degrees). The catarrhal symptoms of the respiratory tracts in most of the patients were moderately pronounced. Headache as a clinical symptom was observed in all the patients. The headaches were localized primarily in the frontal and frontotemporal regions. Except the mildly pronounced adynamia, there was no nausea, vomiting or delirium. No serious disturbances were found in the cardiovascular system. In the digestive tract system: a coated tongue, dry mucous membranes of the oral cavity, and pains in the right iliac region occasionally growing in intensity and resembling an attack of appendicitis; in some cases it was even difficult to distinguish between the two.

An examination of the blood of 15% of the patients revealed a moderate leucocytosis (8,500-9,200), and leucopenia was found in 41% of the patients. A relative neutropenia (59.5%) and moderate lymphocytosis and monocytosis (34.4 and 40%) were noted in the leucocyte formula. The erythrocyte sedimentation reaction in most of the patients (79%) was normal. The A₁ strain of the influenza virus was isolated from the nasopharyngeal wash water.

The influenza patients were treated with sulfanilamide drugs (mostly norsulfazol /sulfathiazole/, and to a lesser extent sulfadiazine), antipyretics (aspirin, phenacetin and pyramidon), desensitizing preparations (calcium chloride and dimedrol), vitamins, etc. Those with sharply pronounced general symptoms (chills, severe headaches and adynamia) were given antibiotics: 100,000 units of biomyoin four times a day and intramuscular injections of 150,000 units penicillin every four hours. The patients with a disrupted pulse rhythm were given cordiamine (nikethamine) and adoniside in drops. But the effect produced by the treatment of uncomplicated influenza was insignificant. The average hospitalization period was six to eight days.

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Yu. M. Shefer, Major of the Medical Service: About an Influenza Outbreak.

There was an influenza outbreak in our unit in 1962. Before then, an A. A. Smorodintsev type of dry antiinfluenza serum had been introduced into the nose with a pulverizer in the entire personnel. During the outbreak the A₂ influenza virus was isolated from the patients.

All the patients were hospitalized at the medical aid station and also in the isolation ward. The patients hospitalized in the medical aid station had a temperature above 40° and were in serious condition, while the patients with a milder clinical course of the disease were placed in the isolation ward. Furthermore, an entire section of the isolation ward had been

provided for persons in contact with the patients. To begin with, all the patients were questioned and their temperature taken. The floors in the barracks were disinfected daily with a 2% solution of purified calcium hypochloride, and the beds were wiped with a chloramine solution.

The isolation ward was cleaned with a 2% purified solution of calcium hypochloride and 1% chloramine solution. At the same time all the quarters were irradiated with quartz. An antiinfluenza serum was introduced once daily to the entire personnel throughout the outbreak of the disease. The first group of the hospitalized patients were treated with antiinfluenza serum (twice a day during the entire course of treatment), the second group with pyretics (norsulfazol and asperin), and the third group with cutisone. The serum was found to reduce the temperature of the patients faster than the pyretics. The duration of their febrile period was also shorter. The group of patients treated with cutisone was too small to justify any conclusions. Complications from pneumonia were noted in 4.3% of the patients.

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A. I. Vasilyev: The Etiology of Food Poisoning.

Cases of food poisoning caused by the consumption of milk jelly were observed. Such cases occurred among an organized group of people. The general symptoms of the disease included slight pains and rumbling in the stomach, nausea, a watery stool without blood, general weakness and dysphoria. The temperature was mostly normal. The clinical symptoms of the disease were observable six-eight hours after a meal.

An examination of the leftover food, especially the milk jelly, revealed that the latter consisted of a watery mass with jellied lumps with a pH equal to 7.1. A paracolobactrum was isolated from the milk jelly by bacteriological methods. The quantity of intestinal microflora in the milk jelly was so great that fields solidly covered with gram negative bacilli could be seen in the ordinary milk jelly smears under a microscope; the growth of these bacilli in culture media could be detected even when the milk jelly was diluted 1,000 times. A similar paracolobactrum was isolated from the fecal matter of 87 patients affected by food poisoning. Typhus-paratyphoid, dysenteric, strepto-staphylococcal and other pathogenic bacteria could not be found in the food workers, the patients, in the dishwater and galley facilities or the food products.

The epidemiological and laboratory data revealed that the food poisoning was caused by the milk jelly contaminated with paracolobactrum. The milk jelly had been prepared 10 hours before serving, and kept in the kitchen. The reason for the contamination of the milk jelly was that the workers of this organization, assigned to potato peeling and fire stoking duties in the kitchen, used the same pitcher for taking the milk jelly from the kettle and drinking it. The paracolobactrum could have gotten into the kettle directly from the hands of the workers in the kitchen as well as through the pitcher they used for ladling the milk jelly from the kettle and drinking it.

V. A. Ievlev, Lt. Col. of the Medical Service, and Yu. Ya. Dobin, Lt. Col. of the Medical Service: Electronarcosis and Reflexo-Segmental Physiotherapy in the Complex Treatment of Dermatoses.

The complex treatment of 438 patients suffering from various forms of dermatosis included the following: electronarcosis, nasal electrophoresis consisting of 2% solution of calcium chloride, 0.5% dimedrol solution and 1% vitamin B₁ solution; general galvanization by the Vermel' method, and Shcherbak's "collar and shorts" methods. Two hundred and twenty eight patients had eczema, 126 psoriasis, 60 neurodermatitis and 24 patients had urticaria. The age of the patients ranged from 20 to 50 years. The treatment of 96 patients suffering from acute forms of eczema with aggravated psoriasis and neurodermatitis consisted of electronarcosis and intranasal electrophoresis which produced a positive therapeutic effect in all cases. The treatment used in cases of diminishing acute stage of eczema, unchanged psoriasis and chronic neurodermatitis consisted of Shcherbak's reflexo-segmental method in the form of a "collar" or "shorts", depending on the location of the process. The physiotherapeutic stimulants employed included galvanic and diathermic currents, d'Arsonvalization, UHF electromagnetic and capacitor fields as well as ultraviolet rays in suberythema and erythema doses (3-4 biological doses).

A total of 342 patients were treated by the reflexo-segmental method; 220 of them had eczema, 68 psoriasis, 40 neurodermatitis and 14 patients suffered from urticaria. There was not a single case of aggravation and complication of the disease. But the application of physiotherapeutic stimulants directly to the affected area, especially in cases of eczema, aggravated the process in the form of vesiculation and wetness (Russian term: moknutiye).

This treatment resulted in the recovery of 130 patients and the improvement of 188, and only in 24 of the patients was the treatment unsuccessful. Eight of the eczema patients came back for a repeated treatment two years later: five with psoriasis and three with neurodermatitis.

G. A. Shmaliy, Capt. of the Medical Service, and Yu. P. Pinogeyev, Capt. of the Medical Service: The Lasting Effectiveness of Sterilized Surgical Materials in Various Packages in a Submarine.

An investigation was carried out for the purpose of establishing the lasting effectiveness of sterilized materials used for surgical operations in the course of different submarine trips.

Observations have made it possible to establish that the type of packaging and the methods of sealing the beakers containing the surgical materials have a great deal to do with the lasting effectiveness their sterilization. Thus when the material was packed in an oil-cloth bag and kept in a beaker which was wrapped in gauze saturated with melted paraffin, the sterility was preserved for 162 days. In the other series of tests involving the same storage period but not including oil-cloth bags, only one of the 15 beakers was found to be free of microflora. The sterility of the surgical material can last 40-66 days if it is kept in ordinary beakers and their opening sealed with paraffin-saturate gauze. The loss of sterility of the surgical materials kept in beakers in the submarines was almost always followed by the appearance of fungi.

The results of the bacteriological investigations were confirmed by the observations of the patients whose surgical operations involved the use of the materials kept in the experimental beakers. The sterilized materials used in the operations had been kept in the submarine 50 to 56 days. They had been kept in a beaker wrapped around the top with gauze saturated with melted paraffin. The wounds healed after the initial application of tension.

On the Pages of the Foreign Medical Press

The High-Altitude Equipment and the Medical Service on the Lockheed U-2 Planes

Maj. of the Medical Service
I. M. Chernyakov
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In an article published in the magazine Aviation & Space Medicine, No. 4, for 1962, R. Bruno and H. Hertz report on the three years' experience in medical service connected with the high-altitude flights on U-2 planes, and cite certain data on the operational qualities of the high-altitude equipment used by the pilot of such a plane. The above article is of some interest to airforce doctors and flight crews.

The flights on the U-2 planes were made from the Laughlin base in Texas. The purpose of those flights, according to the authors, was to study the "weather" in the upper layers of the atmosphere (at altitudes above 16,000 meters) (see note). Since the high-altitude flights were also carried out in non-pressurized cabins, the pilots always had to use protective high-altitude equipment. The latter included an MS-3A pressure suit, MA-2 pressure helmet, flight gloves, flight boots and a flying suit, and a urinal. The pilot also had a haversack containing an oxygen pressure regulator, an emergency oxygen apparatus, a life raft for one person, and all the necessary items required for survival in an unpopulated area. The pilot's seat also contained a parachute and spare food rations.

(Note. The purpose of these flights can be better understood in the light of Powers' spying flight of May 1, 1960).

Much attention was devoted to the medical service on these flights. A special unit, a physiological protection group, was organized for that purpose, and its functions included the pre-flight and post-flight examination of the pilot, the enforcements of the regulations governing the use of the high-altitude equipment, analysis and generalization of the flight personnel's comments on the performance of the mentioned equipment, a study of the failures to complete the flight, etc. This group consisted of aviation doctors and physiologists, officers in charge of physical and special (high-altitude) training, high-altitude equipment mechanics, etc.

The duties of the U-2 pilot and the physiological protection group boil down to the following. On the day preceding the flight the pilot makes a detailed study of his mission. Some preflight preparations in an air-conditioned building were also made on the day of the flight. The menu on that day consisted of bread, meat, eggs, juice and coffee. The pilot is examined by the doctor 1½-2 hours before takeoff. A record was kept of his temperature and weight, pulse and blood pressure.

There is not information in the article about the changes in the mentioned indexes produced by the mission which frequently lasted 8 hours. It is only indicated that the pilot usually lost 1.2-2.7 kg of weight during the flight. Assisted by the members of the physiological protection group, the pilot began to put on his high-altitude equipment 45 minutes before takeoff, which took him 10-15 minutes. The pilot also put on cotton underwear with the seams facing outside to prevent any possible damage to the skin under the VKK pressure suit. As soon as the pressure helmet was connected, the pilot was supplied with pure oxygen. From that moment on he was subjected to a nitrogen desaturation. The authors point out that in the first flights the preliminary oxygen respiration lasted 2 hours, and that period was later reduced to 35-40 minutes without any marked increases in the number of cases involving decompression pains.

An oxygen apparatus, mounted on a stand, was operated before the pilot entered the plane. After that he was taken to the plane in an air-conditioned vehicle. Inside the plane (even during the performance of his body functions), the pilot did not interrupt the desaturation process; he was breathing oxygen

from a portable tank with a flexible tube. The pilot entered the plane and put his parachute on with the assistance of other people. After the flight he was met at the plane and taken to the pilots' room where he undressed. All his comments on the performance of the high-altitude equipment were in the meantime taken down. The authors suggest a stein of beer or a shot of whiskey and a massage of the tired muscles to "eliminate" the excited state characterizing a pilot after the accomplishment of his mission.

Analyzed in the article are the causes of the failures to complete the flights. A total of 6,048 flights were made between May 1957 and May 1960, 3,740 of them at altitudes above 15,000 meters. Two thousand three hundred ninety three high-altitude flights lasted over 4.5 hours. In 271 cases the pilots flew in nonpressurized cabins, and in 197 of them above 15,000-meter altitude. The failure of the high-altitude equipment was noted in 870 flights (14.4%), and in 64 cases (1.1%) such failures accounted for the premature end of the flight. The most frequent causes were: the excessive use of oxygen, the steamed up glass of the pressure helmet produced by the failure of the heating system, a damaged expiration valve, an air leak in the neck valve, damaged radio communication connections in the pressure helmet, and excessive pressure on the face by the helmet frame. Malfunctioning VKK pressure suits and gloves were relatively rare occurrences. In 49 cases (0.8%) the flights were called off or discontinued for medical reasons -- an aggravated catarrh of the upper respiratory tracts and gastroenteritis. Mention should be made of the fact that the decompression-connected pains in the joints, first and second degree, and meteorism (17 cases) were not very pronounced and never accounted for the premature end of a flight.

Analyzing all the above-mentioned information, the authors of the article reached the conclusion that the U-2 pilot is a more reliable element in the man-machine system than his equipment and the plane from the point of view of a possible reason for discontinuing the flights.

From the History of Russian Military Medicine

V. A. Kangelari: A Communist, Commander and Doctor

Docent I. T. Leonov

(The information used in this article has been supplied by V. A. Kangelari's widow, Lydia Yevseyevna Kangelari) would have been/

The 80th birthday marked this year by V. A. Kangelari, an active participant in the October Revolution and the Civil War and the holder of two orders of the Red Banner whose name is associated with the history of the development of the medical service in the soviet armed forces.

V. A. Kangelari was born in 1884 into a family of a railroad worker. He was left fatherless at an early age, his father having died after a beating at the police station for his participation in a strike, and earned his living while attending the secondary school at Belgorod by tutoring rich students. During the first Russian revolution Kangelari, then a medical student at the Kharkov University, joined the Social-Democratic party, participated in demonstrations, was repeatedly arrested and deported, and was sentenced to one year imprisonment in the fortress in 1908.

He managed to get his doctor's diploma only in 1910. Still under police surveillance, V. A. Kangelari applied for work in one of the rural hospitals but was rejected as "politically unreliable." After working two years in a miners' hospital in the Donbass region, Valentin Aleksandrovich moved to Siberia and worked as a physician at the Kuznetsk coal mines.

In the first world war V. A. Kangelari was an army doctor. In May 1917 he joined the Bolshevik party. Discharged from the old army in 1918, V. A. Kangelari joined the Red Guards and became a military instructor. In the spring of 1918 he was elected presidium member of the executive committee of the Omsk council of workers' and soldiers' deputies. The outbreak of the civil war in Siberia in June 1918 found V. A. Kangelari in command of a detachment of Omsk communists defending the city against the White Guards.

V. A. Kangelari participated in many battles on the Eastern front in the summer and autumn of 1918. The fighting was particularly heavy in the Nizhniy Tagil area. This is what Marshal of the Soviet Union F. I. Golikov recalls in his book "Red Eagles": "Every battle created new heroes among us. Everyone in our regiment is now proud of the deputy commander of the Kamyshlovskiy regiment, comrade Kangelari, who continued to lead his comrades into attack despite his severe wound." V. A. Kangelari was one of the first men in the soviet army to be awarded the Order of the Red Banner for personal bravery, distinction in battle and able leadership of the troops fighting in the Ural region.

After his treatment at the hospital V. A. Kangelari joined the first class of students of the Military Academy (Now the Frunze Military Academy). But his studies were interrupted as the students frequently went to the fighting fronts. In 1919-1920 V. A. Kangelari was chief of the reconnaissance division of the Western front, acting chief of staff of the Third army and executive secretary to the Council of the First labor army, assistant chief of the operations division of the Sixteenth army staff on the Western front, chief of staff of the Tenth rifle division and later commander of that division. V. A. Kangelari was awarded the second Order of the Red Banner for his bravery, energy and resolution in the operation against Bulak-Balakhovich's army in November 1920. In January 1921 V. A. Kangelari joined the Military Academy for the third time, but in March of the same year he was back at the front participating in the storming of the Kronstadt fortress as assistant commander of the northern army group. The Revolutionary Military Council gave him a personalized gold watch in appreciation of his fighting services in that operation.

In the period of peaceful construction Valentin Aleksandrovich held a number of different commanding and staff jobs: chief of staff of the special purpose units of the USSR, assistant chief of the reconnaissance administration of the Red Army Staff, advisor to the Mongolian People's Army, deputy chief of staff of the Caucasian Red-Banner Army, and chief of the department of advanced Red Army officer training of the Frunze Military Academy. By order of the Revolutionary Military Council of the USSR No.233, dated March 10, 1930, V. A. Kangelari was appointed chief and military commissar of the Military Medical Academy which he managed until 1934.

During these years the Academy developed into a genuine military school. It was at that time that the faculty of military and military-medical sciences, headed by B. K. Leonardov, came into being. V. A. Kangelari did a great deal to expand the operation of the department of military field surgery which had been founded in 1931 by Prof. V. A. Oppol. A department of military chemistry which included the teaching and scientific treatment of problems of the pathology and therapy of poison-gas injuries, and protection against chemical attack. Field training was expanded and improved, the students doing their practical work among the soldiers. Scientific research work was thoroughly reorganized. The scientific activities of the professors and instructor were now guided by a plan, and their ties with the army and navy grew closer. While in 1929-1930 only 6% of the scientific studies had to do with military medicine, such studies in the following two years accounted for 50-60% of the planned total.

Unpretentious and accessible, sensitive and responsive, Valentin Aleksandrovich was also a strict and demanding boss capable of maintaining comradely relations with his subordinates. He enjoyed a great deal of prestige among the students and professors of the Academy. It was a deep ideological conviction, implicit loyalty to the Party and the people, courage and adherence to Party principles that primarily determined the image of this uncommon man.

While still in the prime of his life and working as first deputy of the People's Commissar of Public Health, V. A. Kangelari fell victim to the crude arbitrary rule of the personality cult. He lost his life in 1937. Our Party has brought back to history many glorious names of the fighters for the great cause, including the name of Valentin Aleksandrovich Kangelari, the loyal son of the Communist Party and the soviet people.

NEWS ITEMS

Nikolay Ivanovich Zavalishin

(On the occasion of his 70th birthday)

Prof. Nikolay Ivanovich Zavalishin, capable organizer, scientist, teacher and Lt.Gen. of the medical service (Ret.), recently marked his 70th birthday.

Nikolay Ivanovich's broad knowledge in many fields, his culture and organizing skill combined with modesty and a sympathetic attitude have earned him universal respect and recognition.

In his 47 years of medical practice and scientific and social activity, Nikolay Ivanovich has done a great deal to develop soviet military medicine. N. I. Zavalishin was born on November 14, 1894, into a railroad worker's family in the city of Novgorod. He had to work hard, because of financial difficulties, to complete his secondary education in 1912, and the medical faculty of the Moscow University in 1917.

In 1918 N. I. Zavalishin volunteered for service in the Red Army, and his whole life has since been closely connected with the soviet army. Nikolay Ivanovich participated in the Civil, Soviet-Finnish and Great Patriotic wars. He joined the ranks of the Communist Party in 1942.

Nikolay Ivanovich's entire medical life has been closely associated with science and teaching. From 1928 through 1933 he trained military doctors at the Tashkent Medical Institute; the next six years he taught in the military and military-medical departments of the Military Medical Academy imeni Kirova, and after that was appointed head of the department of military and military-medical sciences of the Kuibyshev Military Medical Academy. He later served as chief of the medical administration of the front, deputy chief and then chief of the Main Medical Administration (1944-1952) and chief of the Military Medical Academy imeni Kirova. (1952-1953). Nikolay Ivanovich has never left his research work. He is credited with over 85 scientific and literary studies, including three monographs. Characteristic of Nikolay Ivanovich is his ability to systematize the experience acquired by the military doctors in the war and combine it with specific recommendations which made it possible to improve the medical evacuation and services for the wounded soldiers.

Particular emphasis should be laid on Nikolay Ivanovich's work as an editor. He was a member of the editorial board of the Military Medical Journal for a number of years, later senior editor of that publication, member of the editorial board of the magazine The Rear Service And Supply of the Soviet Armed Forces, editor of the collected works under the title "Military Medicine in the Great Patriotic War" and a number of other books, member of the main editorial board of the publication "The Experience of Soviet Medicine in the Great Patriotic War of 1941-1945, deputy chief editor and editor of the department of medical service of the encyclopedic dictionary of military medicine, and, finally, chief editor of the encyclopedic reference manual for military feldshers. In 1962 N. I. Zavalishin left the Soviet Army and became deputy chief editor of the Large Medical Encyclopedia.

N. I. Zavalishin has always combined his service duties with active social and Party work. Highly appreciated of his irreproachable and fruitful service, the government awarded Nikolay Ivanovich the Order of Lenin, three Orders of the Red Banner, the Order of the Patriotic War, first and second class, two Red Star Order and medals. On this day of his glorious birthday, we wish Nikolay Ivanovich a long and happy life and further creative successes in the noble pursuit of public health.

Andrey Yermolayevich Sokolov

(On the occasion of his 60th birthday)

A. Ye. Sokolov, Colonel of the Medical Service (Ret.) and candidate of medical sciences, will mark his sixtieth birthday in October of this year. He served over 27 years in the Soviet Army.

Drafted into the army in 1931, communist A. Ye. Sokolov continued his service after his enlistment term, devoting all his energies to the service in the Armed Forces of the USSR. Army doctor A. Ye. Sokolov began his military medical career as a resident doctor of a military hospital and a junior physician of a medical aid detachment of a rifle division in the Far East. In 1933 he took a year's course in advanced surgery at the military medical academy, and followed it up by a study of tuberculosis of the bones in a military sanatorium. In May 1936 he began to work in medical service system of the airforce.

During the Great Patriotic War A. Ye. Sokolov held the following leading posts in the military medical service: deputy chief and chief of the army medical department, and deputy chief of the medical administration of an army group and the front. After the war A. Ye. Sokolov was for a number of years instrumental in putting the German public health service on a democratic footing while holding the job of deputy chief and then chief of the medical service of soviet military administration in Germany. In 1949 he became head of a scientific-research institute, and later held a number of important jobs in the main military medical administration, completing his service in the soviet army as deputy chief of that administration.

At the end of 1958 A. Ye. Sokolov retired for reasons of health. All his creative activity had been subordinated to the improvement of the medical service and the enhancement of the armed forces' fighting capacity. Highly appreciative of his service, the soviet government awarded A. Ye. Sokolov the orders of Lenin, Red Banner and Patriotic War, first and second class, three orders of the Red Star and medals.

On the occasion of his birthday we wish him good health and a long and happy life.

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In the Society of Military Science
of the USSR Defense Ministry's Museum
of Military Medicine

Maj. Gen. of the Medical Service (Ret.)
V. S. Ozhigar

An accountability and election meeting was recently held by the society of medical science of the Museum of Military Medicine of the USSR Defense Ministry to review the society's performance. Twenty seven reports had been submitted to the 20 conferences held by the society in two years. The society's conferences were addressed by the museum officials and professors and instructors of the Military Medical Academy imeni S.M. Kirova. Those reports dealt with the most important problems of modern military medicine.

Lt.Gen. D. D. Kuvshinskiy, chief of the central military medical administration of the USSR Defense Ministry, reported on the problems facing the medical service of the USSR armed forces. He commended the society on its performance, and specified the problems facing it in the field of scientific and practical activity.

The society invests a considerable amount of effort in the preparation and for the conferences dedicated to Victory Day, the Anniversary of the Leningrad Blockade Lifting and other historic war events. The conference held jointly with the Leningrad branch of the All-Union Society of Medical Historians on the occasion of the 20th anniversary of the liberation of Leningrad was particularly crowded. The conference was attended by many of the former military doctors participating in the defense of Leningrad. Cogent reports were made by the members of the society of military science and former officials of the military medical service of the Leningrad front and the Red-Banner Baltic Fleet A. M. Chernyak, A. V. Smol'nikov, Ya. A. Boreysha, etc. These reports were later read to the students Military Medical Academy imeni S. M. Kirova.

The members of the society have carried out 26 research studies of practical importance to the military medical service. P. I. Sokolov, Colonel of the Medical Service (Ret.), wrote two scenarios for training films; the museum of military medicine has made a movie of one of them. N. D. Golitsyn, Major of the medical service reserve, is compiling an atlas under the title "Combined cranium and eye battle injury." The members of the society engage in scientific research of a military-historical nature in the interests of the military medical service.

Work among the population is one of the important occupations of the society of military science. The members of the society have sponsored 136 reports and discussions among the population of military medical subjects in the period under review. This work among the population is carried out by a lecture bureau which draws up the lists of lecture and report themes, selects the speakers among the society's members and maintains communication with the local Party organizations. The following have become popular as good propagandists: R. A. Kholodovskiy, Col. of the Medical Service reserve, A. V. Smol'nikov, Maj. Gen. of the Medical Service (Ret.), Ya. K. Vedzhanovich, Lt. Col. of the Medical Service, etc. R. A. Kholodovskiy submitted 36 reports on various subjects and sponsored 28 excursions in the museum.

The members of the society of military science are very active in the collection of historical relics for the museum. Maj. of the Medical Service reserve Perkovskaya, for example, submitted to the museum 20 exhibits and more than 100 photographs depicting the activity of the military medical service of the Red-Banner Baltic fleet during the Great Patriotic War. Other members of the society also take an active part in the collection of materials for the museum.

Reviewing its performance for the past two years, the society outlined a number of new measures. The most important of them is the concentration of efforts on the expansion of scientific research. The society is quite capable of it, especially if one bears in mind that its members include 7 professors, 4 doctors of medical science and 44 candidates. The resolution of the Central Committee CPSU to enhance the role of museums in the communist education of the population calls upon the society of military science to improve its performance in every possible way thereby contributing to the implementation of the 22nd Congress decisions on the education of the people of a communist society.

CONSULTATIONS

A Loose-Weave Viscose Cotton Gauze

Col. of the Medical Service
N. A. Schluger,
Candidate of Biological Sciences
Z. V. Mikirtichova and
Engineer-Lt. Col. A. I. Menzheritskiy

The military medical service is currently being supplied with a loose-weave viscose cotton gauze instead of the ordinary cotton gauze. The quality of the new gauze is hardly different from that of the previous type (Govt. Stand. 9412-60), but it is considerably more economical. The loose weave and the substitution of a viscose staple for the cotton fiber make the cost of the gauze lower.

It was proved by experiments that the best way of producing the required loose weave of the gauze is to remove 15 threads per 10 cm of the warp and 8 threads per 10 cm of the woof. In this case the ratio between the number of threads in the warp and the woof is the same as the ratio between the respective number of fibers in the standard gauze (1.3). Experiments revealed that a change in this ratio is undesirable, as the threads have a tendency to move and the entire gauze becomes weaker. The introduction of a viscose staple into the weave has preserved the absorbing capacity of the loose-woven gauze. Thus the capillarity of this gauze has been found to be higher than that of the experimental samples of the loosely-woven gauze made from 100% cotton fiber and the imported loosely-woven cotton gauze.

The loose-weave viscose cotton gauze contains 75% cotton and 30% viscose staple. Our investigations revealed that the introduction of 30% viscose staple does not reduce the strength of the gauze (breaking and tearing strength) when it is dry, and especially when moist. The physical index of the loose-weave viscose cotton gauze is practically the same as that of cotton gauze. The capillarity of the loosely-woven viscose cotton gauze meets the government standard requirements in the warp, and exceeds them by 25-55% in the woof. The moisture-retaining capacity of the compresses (applications) is the same as in the case of the ordinary gauze. The breaking strength of this gauze is somewhat lower than that of the standard gauze but it is quite suitable for bandaging purposes. It has more friction than the cotton gauze which facilitates greater adhesion between the windings of a bandage.

The loose-weave viscose cotton gauze has good physico-chemical properties, including a low oxidizability of the wet stretch and low ash content. It was subjected to clinical tests, used in general surgery, in the surgical treatment of penetrating chest and abdominal wounds, extremity wounds, amputation and the treatment of burns.

Experiments show that the loose-weave viscose cotton gauze absorbs the blood and vulnerary secretion quite well, and retains the medicinal substances; it does not lose any strength when wet, it shrinks about as much as ordinary cotton gauze, produces a strong adhesion between the bandage windings, it can hold and retain a plaster case, and is suitable for repeated use. The physical properties of the loose-weave viscose cotton gauze are practically unaffected by sterilization in an autoclave.

Benefits Granted To Medical Workers
Residing And Working In Rural Areas

Attorney M. D. Voytsikova

The Communist Party and the soviet government are always concerned about the welfare of our people. The councils of ministers of the union republics have decided to provide rentfree living space, including heating and light, for medical workers in rural areas with a view to creating the most favorable working conditions for them. The categories of the qualified doctors entitled to these benefits, the extent of such benefits, the areas in which they are made available, as well as the norms of living space, heating and light are governed by the legislation in the union republics.

The benefits are extended also to the medical workers employed by the soviet army and navy in military medical institutions (base and other hospitals, medical aid stations, etc.) located in rural areas and holding the jobs listed in the decisions of the union republics. If these decisions list not only the medical posts but also the institutions (BSSR, UkrSSR, etc.), the medical workers employed by the soviet army and navy are entitled to the benefits if the nature and extent of their duties correspond to those of the medical workers of these institutions.

By a decision of the Council of People's Commissars of the USSR of April 23, 1938 (See Sortirovochnyy Punkt SSSR, 1938, No.21, p.132), rentfree apartments, including heating and light, are made available to rural doctors all over the country. Furthermore, in most of the union republics (except Belorussia, Lithuania and Georgia) the rural doctors in every specialized field, who are not rural district physicians, are entitled to rentfree apartments, including heating and light; and these benefits are extended also to the intermediate medical and pharmaceutical workers.

Under the laws of the union republics the benefits are granted not only to the medical workers living in their rentfree apartments but also to those living in their own homes; the medical worker is also entitled to compensation for the rent he is paying for an apartment of his own choice in the event he refuses the living space offered to him; special regulations indicate the type of living space to be offered, and whether the doctor is to be compensated for the rent he pays for another apartment instead of the one offered to him rent-free including heating and light.

In the vast majority of the union republics the doctors are offered rent-free apartments including heating and light in physical terms only. If the appropriate institutions, enterprises and organizations do not have any vacant living space to offer, the latter is made available in rented buildings. The payment of financial compensation instead of the mentioned benefits is permitted only by the government of the Ukrainian SSR. In such cases the compensation for the heating and light is based on the actual cost, and the rental for the apartment is repayable on the basis of 13.65 square meters per person.

The laws of the RSFSR, the Kirghizian, Ukrainian, Uzbek and Azerbaidzhan union republics also provide for the possibility of doctor refusing to occupy the living space offered to him. In such cases, the rent he pays for an apartment of his own choice is not repayable by the government, but he is still entitled to free heating and light.

In most of the republics (except Turkmenia, Tadzhikistan, Lithuania and Moldavia), all the doctors are entitled to free heating and light, whether they live in the rentfree space given to them by the appropriate institutions, organizations or enterprises, or in their own homes. However, they are not entitled to receive compensation instead of the rentfree living space. Nor is such compensation payable to the medical workers in the Ukraine, Belorussia, Azerbaidzhan and Lithuania living in their own houses or in those of their close relatives.

In the RSFSR, Kirghizia, Uzbekistan, Moldavia, Estonia and Latvia the

living space made available to a doctor must meet the sanitary and hygienic requirements of the particular locality, and must be located in the community of his employment or not more than 3 kilometers away from it.

The decisions of each union republic government list all the categories of the qualified medical and pharmaceutical workers entitled to free apartments including heating and light, and point out whether such benefits may be extended to their families and under what conditions. In the RSFSR and the Kirghizian SSR, for example, these benefits are extended to all M.D.'s, dentists, and qualified intermediate medical personnel (feldshers, midwives, nurses, pharmacists and dental, X-ray and laboratory technicians with special higher or secondary school education, and disinfecting instructors with special medical training in disinfection and experience). The benefits are offered regardless of the institution, enterprise or organization (state, cooperative, public, subsidized, self-supporting, military, etc.) in which the medical workers are employed as long as such institutions, enterprises or organizations are located in rural areas and workers settlements, and the mentioned workers are permanently employed in one or several of the institutions, enterprises or organizations at least 75% of their normal working time.

The following are entitled to the mentioned benefits under the law of the Belorussian SSR: dentists, intermediate medical and pharmaceutical workers employed in rural dispensaries, district hospitals, kolkhoz lying-in hospitals, feldsher-midwife, and rural drug stores and drug-distributing centers located outside the district centers. The benefits extended to the medical workers in the Ukraine are also determined by the type of institution employing them and their location. Rentfree apartments including heating and light in the areas under the rural and settlement Councils of Workers' Deputies are offered to: the senior and intermediate medical personnel working in prophylactic and anti-epidemic institutions (except those employed at the blood-transfusion stations and health resorts), drug stores, drug-distributing centers, children's sanatoria, children's homes and other boarding-type children's institutions; medical workers employed in homes for adult invalids and children as physicians, dentists, pharmacists with a secondary pharmaceutical education, feldshers, midwives, nurses, disinfection specialists, laboratory technicians and sanitation feldshers, head nurses, educator-nurses, dietitians, vaccinators, masseuses, preparators, synchronizers, disinfectors, dental technicians, orthopedic and plaster cast technicians if they have a secondary medical education and are employed not less than 100% of their working time. Administrative nurses and registration desk nurses are not entitled to the benefits even though their salaries are equivalent to those of the intermediate medical personnel.

Similar conditions, that is employment 100% of the working time as doctors in all fields, dentists and intermediate medical personnel with a secondary special education (feldshers, nurses, pharmacists, dental technicians, X-ray and laboratory technicians and disinfection specialists) determine their right to the benefits under consideration under the laws of the Uzbek union republic.

Extending the mentioned privileges to doctors, druggists, intermediate medical personnel and pharmacists, the Council of Ministers of the Tadzhik SSR has instructed the local government authorities to assign plots of land to the medical workers in the rural areas -- not more than 0.1 hectare per family, and about half that size in the areas of irrigation farming.

The following medical workers are entitled to benefits in the Azerbaidzhan SSR: doctors in all fields, dentists, qualified intermediate medical personnel feldshers, midwives, nurses, pharmacists and other workers with a higher or secondary pharmaceutical education, dental technicians, X-ray and laboratory technicians with a special higher and secondary education, and other intermediate medical workers with a secondary medical or biological education), as well as chemists, biologists and instructors in physical therapy (employed in their respective fields in medical institutions) working in institutions, enterprises and organizations located in rural areas, workers settlements or urban-type settlements -- if their duties are part of the major functions of the mentioned institutions, enterprises and organizations.

The Turkmenian, Armenian, Kazakh and Moldavian union republics offer these benefits to physicians and intermediate medical personnel residing and working in rural areas. The areas where rentfree apartments including heating and light are available are specified in the legislation of each of these union republics. In Turkmenia such areas consist of rural settlements, in Armenia and Kazakhstan rural areas and workers settlements, and in Moldavia rural areas, workers settlements and urban-type settlements. In the Kazakh and Moldavian union republics the right of the intermediate medical personnel to a rentfree apartment including heating and light is contingent upon a secondary medical education. A secondary medical education is required also of the intermediate medical personnel working in the medical institutions in the rural areas of the Georgian union republic (except the main rayon towns). If the job classification of these medical workers provide for the same salary rates payable to persons without a secondary special education, they are not entitled to free utility services even if they have a secondary medical education.

In the Latvian union republic, benefits are offered to doctors and intermediate medical and pharmaceutical personnel with a completed special education working and residing in the rural areas. In the Lithuanian republic such benefits are extended only to qualified intermediate medical personnel and pharmaceutical workers.

Doctors, dentists, feldshers and pharmacists employed in the rural areas and workers settlements are entitled to rentfree apartments and free utilities in the Estonian SSR. The qualifying medical workers of certain urban settlements in Estonia, formerly called workers settlements, retain their right to free utility services they had used before the mentioned settlements were renamed.

Such is the category of jobs held by the medical personnel who may be entitled to rentfree apartments including heating and light.

The families of the medical workers who are entitled to benefits in the rural areas receive similar benefits in all the republics, except Armenia, Belorussia, Kazakhstan and Tadzhikistan. If the laws of a union republic provide for benefits in the rural areas for the family of a qualifying medical worker who happens to be the wife of an army officer living in her husband's quarters, the military medical institutions of the USSR Defense Ministry will extend such benefits to the family of such worker, except the army officer himself, according to the regulations applicable to the particular area.

In the Ukraine, if one of the spouses is entitled to privileges while the other gets separate salary without such benefits, the members of their family are entitled to 50% of the mentioned benefits; the members of the family earning a salary do not get any of the benefits. In Azerbaidzhan, such benefits are also extended to one of the spouses if the husband and wife are both medical workers employed in the same area, but the members of their family earning an independent salary do not get any benefits. The benefits provided by the legislation of the union republic for medical workers in the rural areas do not apply to military medical workers.

THE BOOKSHELF

I. S. Zhorov. General Anesthesia. A manual for anesthetists and surgeons. Moscow, Meditsina Publishing House, 1964, 686 pages, price 3 rubles 30 kopeks.

This book is a manual of general anesthesia which combines the experience and achievements in soviet and foreign anesthesiology in recent years. This edition is considerably different from the preceding one. Most of the chapters have been changed and expanded, and the following new chapters added: anesthesia in cases of profuse bleeding, collapse, shock and diabetes of children and middle-aged people, etc.

A. N. Karasev, A. G. Makarov, G. A. Mikhel'son and A. A. Subbotina. A manual on indoor disinfection. Edited by Dr. of Medical Sciences G. A. Mikhel'son. Moscow, "Meditsina," 1964, 208 pages, price 1 ruble 01 kopek.

The basic methods of indoor disinfection and disinfestation are outlined in this book. It contains a detailed description of the different systems of chambers and apparatuses used for such purposes. The instructions and tables required in the use of the disinfection chambers are found in the appendix.

A collection of scientific studies made at the Kiyev military hospital No.5. Kiyev, state publishing house of medical literature, 1964, 315 pages, price 1 ruble 49 kopeks.

This collection deals with the urgent problems of military field surgery and traumatology. A number of the studies deal with respiratory, cardiovascular and blood diseases, and the methods of diagnosing and treating them. These studies will be found interesting by a wide circle of physicians.

S. M. Gorodinskiy, Z. Ye. Panfilova, D. S. Gol'dshteyn and L. M. Mosova. The decontamination of the individual protective facilities and protective covers. Moscow, Atomizdat, 1964, 118 pages, price 29 kopeks.

This book deals with decontamination, that is the removal of radioactive contaminants from buildings, equipment and individual protective facilities. It contains information furnished by soviet and foreign scientists on various aspects of decontamination and the results of the investigations carried out by the authors.

Radioactive contamination of the seas and oceans. Moscow, "Nauka" publishing house, 1964, 224 pages, price 1 ruble.

This book is a collection of scientific studies of the radioactive contamination of the seas and oceans, made by various scientific institutions. It contains the following sections: the natural radioactivity of the seas and oceans; the fallout on the seas; radio hydrochemistry; biology; the physical methods of investigating radioactivity and methodical problems.

L. N. Karlik. How to find and use the required medical literature. Moscow, "Meditsina," 1964, 86 pages, price 24 kop.

This book discussed the following three basic problems: how to find the required medical literature and read it; how to write about a studied subject, and how to present it orally. It is a very useful study aid that may help a doctor study and make the most rational use of special literature and improve his knowledge.

M. Fogel' and Z. Nage. An X-ray atlas of traumatology. Budapest, 1964, 439 pages, price 4 rubles 90 kop.

This atlas was compiled by the authors on the basis of many years of experience acquired in a university clinic of traumatology. The atlas contains a discussion of damages to the cranium, spine, extremities, pelvis, chest and abdomen. Each section is preceded by a brief outline of information on X-ray diagnoses in the given field. The atlas contains 536 X-ray pictures most of which are accompanied by diagrams.

Restorative processes after exposure to radiation. Moscow, Atomizdat, 1964, 244 pages, price 87 kop.

This book consists of a collection of articles edited by N. A. Krayevskiy and A. V. Lebedinskiy, members of the USSR Academy of Medical Sciences. The restoration process following the exposure to radiation is discussed in most of the articles. A considerable number of them deal with the consequences of radioactive injuries and the restorative processes of the hemopoietic organs.

The Biochemistry of small doses of ionizing radiation. Edited by Prof. L. S. Cherkasova. Minsk, "Nauka i Tekhnika" publishing house, 1964, 167 pages, price 57 kop.

This book, recommended to the readers, discusses the effect of small doses of ionizing radiation on the metabolism of a living organism. The book generalizes the results of the experimental investigations carried out by the authors as well as the information found in literature; it consists of the following three sections: the effect of small doses of ionizing radiation on the physiological functions, the metabolism of the central nervous system and other tissues, and the proteinic metabolism and carbohydrate-energy exchange.